Corporate Asset Management Plan 2024

MISSISSAUGA 1974 - 2024

Table of Contents

Acknowledgements

The development of this document was a significant corporate-wide initiative involving staff across the organization. The Corporate Asset Management Office (CAMO) would like to acknowledge the efforts of the Steering Committee, Working Group and all staff in the various Service Areas who participated in asset management workshops, providing their time, expertise, and support in developing the 2024 Corporate Asset Management Plan.

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Executive Summary

Executive Summary

As stipulated by Ontario Regulation 588/17 of the Infrastructure for Jobs and Prosperity Act 2015, the City of Mississauga has prepared its 2024 Corporate Asset Management (CAM) Plan to encompass all[1] of the City's infrastructure assets. Although some assets used by City of Mississauga residents and businesses are owned by other municipalities or corporations, they have not been included in the City's plans.

There are 10 detailed asset management plans developed within the CAM Plan. They are as follows:


Roads


Stormwater


Corporate Fleet

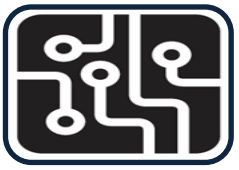

Transit (MiWay)

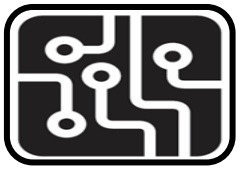

Parks, Forestry & Environment


Facilities & Property Management


Fire & Emergency Services


Recreation & Culture


Information Technology


General Government (Print & Mail Services)

As with every asset management plan, it portrays a snapshot in time based on the best and most reliable data City staff have available. The 2024 Corporate Asset Management Plan is based on 2021 year-end inventory asset data, unless otherwise stated, and relies on the 2022-2031 Capital Plan and 2022-2025 Operating Plan for the financial analyses.

Mississauga's Current State

As assets age over time, it is important that this infrastructure is maintained to minimize disruption in providing services. This includes proactive lifecycle activities such as regular inspections, condition assessment, repairs to extend the life of the asset, cost effectiveness in maintaining the asset in a State of Good Repair (SOGR) and planning for the eventual replacement when an asset is no longer working or providing the level of service expected.

For this iteration, the City's asset portfolio has a current replacement value of $17.6 billion as shown in **Figure 1**. The methodology used to calculate replacement value is identified in each detailed asset management plan, with the majority using the latest tender or market prices as opposed to inflating historical or purchase costs.

[1] With the exception of assets that have insufficient/incomplete data, require further investigation into their ownership, or have been identified by each Service Area for exclusion.

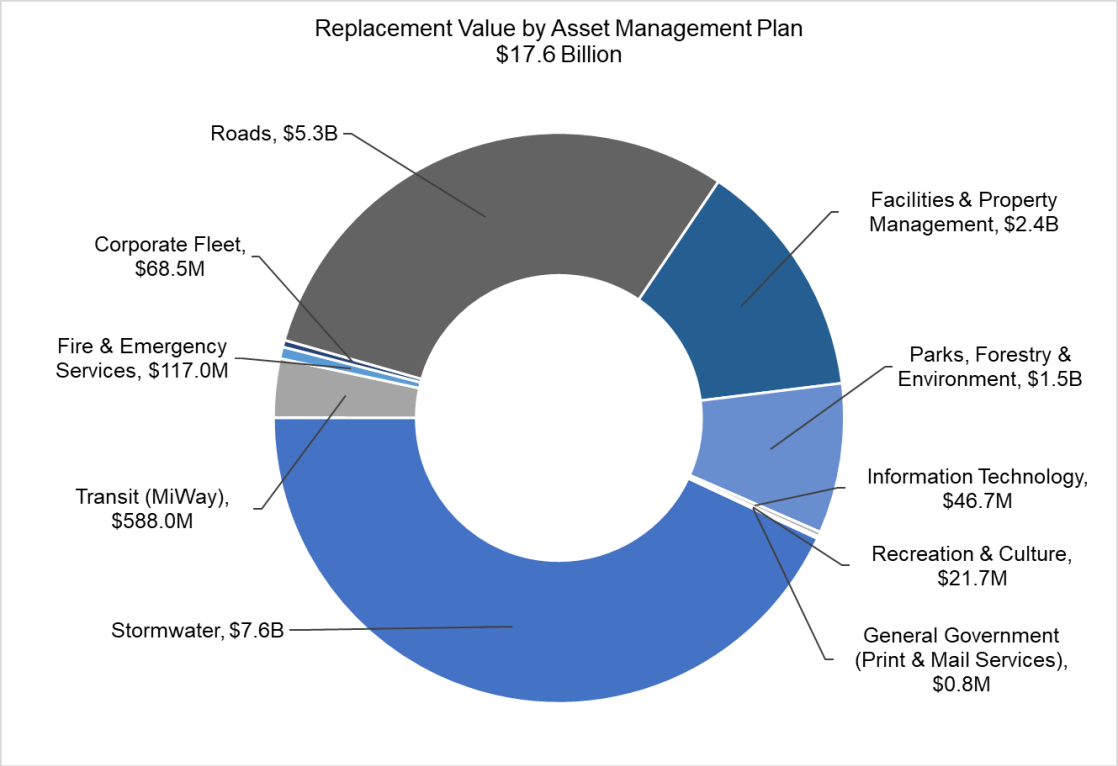
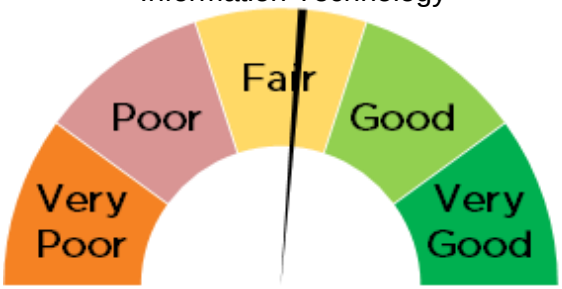


Figure 1: Replacement Value by Asset Management Plan

In addition, the City has adopted a five-point condition rating scale to assess the state of its infrastructure, with each asset owner customizing the condition ranges to align with the asset type and available information. The average condition of all assets within each asset management plan ranges from Fair to Good as illustrated in **Table 1**. For the majority of assets, age was utilized as a proxy for physical condition. However, as age is not always the best determinant of performance or condition, performing regular condition assessments has been identified as a key continuous improvement item for most, if not all, assets.

Table 1: Summary of Average Condition for each Asset Management Plan

Roads 	Stormwater 
Corporate Fleet 	Parks, Forestry & Environment 
Recreation & Culture 	Transit (MiWay) 
Facilities & Property Management 	Fire & Emergency Services 
Information Technology 	General Government (Print & Mail Services) 

Mississauga's Funding Challenges

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan, as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

As such, the City included a two per cent infrastructure levy in the 2022 budget to provide funding to maintain and replace its critical infrastructure; the levy was increased to three per cent in the 2023 budget. The City relies on the stormwater charge to provide funding to maintain and replace its stormwater infrastructure. The City also receives some infrastructure funding from the federal and provincial governments.

An organized and consistent approach to AM across the City will ensure the City continues to focus its limited resources where they are most needed. However, current funding levels are not sufficient to meet current service level needs for State of Good Repair (SOGR), and as such, the City has an average annual infrastructure gap of $108.2 million for the next 10 years (2022-2031 forecast).

Advancing Mississauga's Asset Management Program

One of the goals of the asset management plan is to identify and document the City's current asset management practices in addition to recognizing areas for improvement. In doing so, it was identified that asset management activities were being performed and reported by each service area but there lacked a standardized approach to asset management as an organization.

A Corporate Asset Management Office (CAMO) was established within the Finance Division to implement provincial legislative requirements across the organization and develop a standardized approach in the application of asset management principles across all service areas. The benefits to this approach include standardizing asset condition reporting metrics, developing a single source of information for all City assets, consolidating asset information at the organizational level, and providing guidance to leadership and Council for making funding investments.

The City's current asset management practices were assessed using a variety of tools including a readiness scale provided by the Federation of Canadian Municipalities (FCM) shown in **Figure 2**, a maturity assessment questionnaire (adapted from ISO 55000), and workshops with City staff responsible for the various service areas.

Figure 2: FCM Readiness Scale

Overall, the City is at a Maturity Level 3 (Competent) based on the maturity assessments and readiness scale. Continuous improvement (CI) actions have been identified within each of the detailed asset management plans in order to improve the asset management program and the data and processes that feed into it.

Continuous improvements in asset management practices will advance the City's ability to provide more detailed information on all City assets at the organizational level. It will provide enhanced clarity on operational and funding priorities, identify any potential cost savings, and ensure right-time investment opportunities. The current collaborative, interdepartmental AM governance structure ensures the consistent implementation of AM practices across the organization and allows the City to be well positioned for future AM initiatives.

Introduction

Our Community

The City of Mississauga is a young, vibrant, and diverse community that 717,961[2] people call home. It is the seventh-largest city in Canada, located just a 30-minute drive from downtown Toronto and a 90-minute drive from the U.S. border.

As the City continues to grow, advance on its priorities, and invest in critical infrastructure, Mississauga becomes a place where companies large and small want to locate. This provides local jobs and stimulates economic investment.

Mississauga's population and employment growth forecasts are expected to remain strong over the next 25 years. Mississauga has sufficient land to accommodate projected growth to 2041 and beyond.

Provincial Reporting Requirements

The City's assets play an integral role in service delivery across the entire organization. A formal asset management governance structure has been established to deliver a CAM Plan that addresses provincial requirements contained in O. Reg. 588/17 over a phased time frame. The following AM governance structure is approved and supported by senior leadership. The City has established a Corporate Asset Management (CAM) Office. The CAM Office is responsible for the City's Strategic AM Policy, providing AM guidance and ensuring a coordinated and consistent approach for AM Plans across the organization.

In 2012, the Province published Building Together: Guide for Municipal Asset Management Plans. The City at that time prepared asset management plans for buildings, stormwater management, linear transportation, and transit.

In May 2017, the Province released a draft Municipal AM Regulation to implement best practices throughout the municipal sector. The City of Mississauga participated in provincial consultations; a report proposing changes to the legislation was adopted by Council on July 5, 2017, and comments were submitted to the Province. Regulations were amended based on feedback by stakeholders, and the Province enacted O. Reg. 588/17 – Asset Management Planning for Municipal Infrastructure under the Infrastructure for Jobs and Prosperity Act (IJPA), 2015.

The Regulation provides standard requirements for municipal asset management planning and supports asset resiliency and sustainability. The regulation came into effect on January 1, 2017. The Regulation requires each Ontario municipality to prepare a Strategic AM Policy and publish AM plans approved by their Councils in accordance with a set of scheduled timelines as shown in **Table 2** below.

[2] Based on Census 2021 information.

Table 2: O. Reg. 588/17 Asset Management Timelines

Date	AM Requirements	Status
July 1, 2019	• Strategic AM Policy that articulates guiding principles, commitments, roles, and responsibilities. Five-year review cycle	Completed June 2019
July 1, 2022	• Prepare CAM Plan for core infrastructure assets (i.e. roads, bridges & culverts and stormwater), and include asset inventories, age, condition, current customer and technical Levels of Service (LOS), lifecycle costs and strategies, asset demands from growth and continuous improvement actions	Completed September 2021
July 1, 2024	• Prepare CAM Plan to include all City infrastructure assets, and include asset inventories, age, condition, current customer and technical Levels of Service (LOS), lifecycle costs and strategies, asset demands from growth and continuous improvement actions	Council in June 2024
July 1, 2025	• Council-approved CAM Plan for all City assets indicating the proposed service levels for the following ten years, including the financial strategy to maintain assets at the approved level of service • Strategic AM Policy five-year review	In progress
July 1, 2026	• Annual City CAM Plan progress update to Council on or before July 1 of each year • Annual refresh of CAM Plan	Not started

City's Corporate Asset Management (CAM) Plan

The CAM Office developed a workplan of activities to be undertaken to prepare the 2024 CAM Plan. The first step in evaluating the City's AM practices involved understanding the current activities being performed by City staff in each of the Service Areas. Several workshops were held to record where asset information resides, and how it is documented (i.e., whether in a formal AM software system, Excel spreadsheet, or other medium). The following illustration provides a high-level view of the steps taken to develop and complete the 2024 CAM Plan.

The City's 2024 CAM Plan serves as a strategic, tactical, and financial document ensuring the activities, resources and timelines required for municipal infrastructure are met, while balancing costs, opportunities, and risks against the desired performance of assets.

The purpose of this CAM Plan is to:

- Comply with the legislative requirements of O. Reg. 588/17
- Support funding applications to the federal and provincial levels of government
- Inform future business cases for infrastructure investments to support municipal services now and for future growth
- Understand the current state of asset management systems (i.e., documents, processes and procedures, resources, framework, tools, technologies, data, and the assets) and inform future workplans for continuous improvement in asset management
- Establish levels of service (LOS) metrics with a clear line of sight to strategic goals and objectives
- Support asset lifecycle management strategies and sustainability while addressing service needs
- Quantify the infrastructure gap and develop approaches to address the gap
- Implement AM practices to manage the infrastructure gap, accommodate future growth and sustain desired service levels

Strategic Planning Alignment

The City is regularly engaged in a range of planning processes designed to meet strategic objectives, comply with regulations, and communicate the approach to planning for successful outcomes on multiple initiatives.

The following is a description of other City plans and documents that need to align with the CAM plan:

- The City's Strategic Plan, Our Future Mississauga, directs the shape of the City in all areas including land-use planning, infrastructure, service delivery and asset management. It identifies the Vision for the Future supported by five Strategic Pillars for Change: move, belong, connect, prosper, and green

The Five Pillars in the City's Strategic Plan

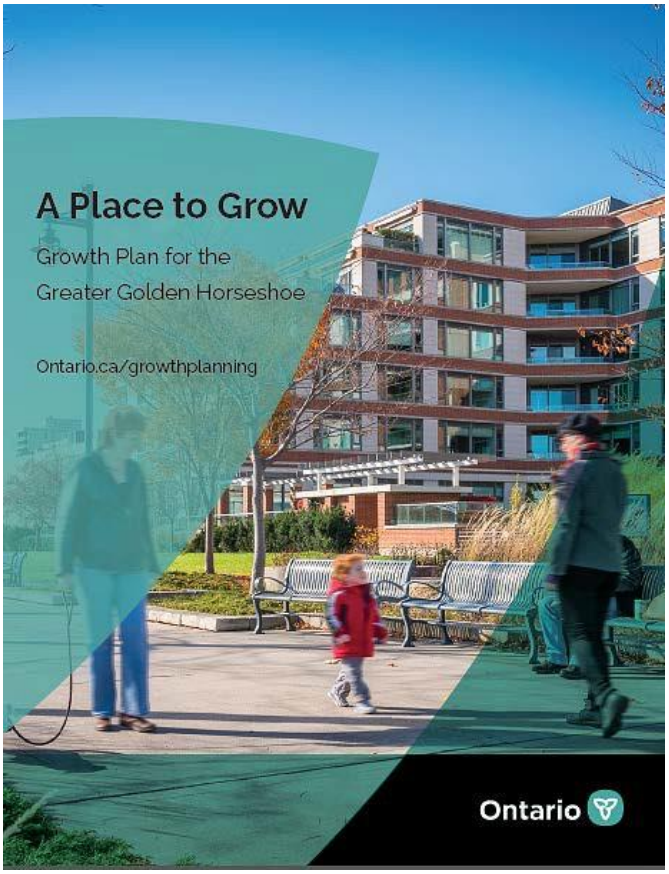
- The Official Plan – The CAM Plan incorporates infrastructure related to land-use policies for long-term growth and development
- Budget and Business Plan – The CAM Plan identifies the infrastructure needs, service levels, policies, processes, and budgets
- Master Plans – The CAM Plan uses goals and projections from master plans to align better decision-making
- Regulations – The AM plans must follow government regulations
- By-Laws, standards, and policies – The CAM Plan will influence policies and by-laws related to asset management practices and industry standards

Alignment with the Golden Horseshoe Growth Plan

The Province enacted the Places to Grow Act, 2005 and subsequently adopted a framework to build strong and prosperous communities by managing growth within the Greater Golden Horseshoe Area (GGHA). O. Reg. 588/17 is aligned with the GGHA to ensure infrastructure required as a result of growth is planned and managed to optimize infrastructure during the land-use planning process for population and employment growth.

The Region of Peel's population is forecasted to be almost 1.8 million in 2031 and reach almost two million residents by 2041[3]. The Region of Peel projects the City of Mississauga's population to reach 842,000 by 2031 and 920,000 by 2041. The number of people employed in the City is projected to reach approximately 535,000 by 2031 and 565,000 by 2041[4].

To plan for new infrastructure, the City updates its growth requirements plan every five years in preparation of the City Development Charge Background Study and By-law. Development charge revenues collected during the building permit process fund the construction of growth-related capital infrastructure required to maintain service levels for new residents and business employment in the City.



[3] A Place to Grow – Growth Plan for the Greater Golden Horseshoe, May 2019, Schedule 3, Employment in the Region of Peel
[4] Growth Forecasts Draft Endorsed for Consultation 2016-2041

State of the Infrastructure

The City of Mississauga was incorporated in 1974 with the amalgamation of the Town of Mississauga, and villages of Port Credit and Streetsville together with portions of the townships of Toronto Gore and Trafalgar. The amalgamation consolidated existing infrastructure assets of various types to serve as the foundation for the newly established City. Since then, Mississauga has changed rapidly from a city where there was continuous development of large tracts of greenfield, to a city that is experiencing intensification through high-density development.

As a result, the City's infrastructure grew significantly over a relatively short period of time to accommodate Mississauga's rapid growth into Canada's seventh-largest City. The City's infrastructure is, on average, in a Fair to Good condition. Some assets are relatively young in their lifecycle whereas other assets are reaching the end of their lives and need replacement, refurbishment, or disposal. A solid asset management plan addresses the various needs of all critical infrastructure.

Assets Included in the Plan

This CAM Plan includes all infrastructure assets that are owned and managed by the City based on 2021 year-end information. However, some assets have been excluded from this iteration due to low data confidence and/or ownership issues. A unique list of excluded assets is identified in each detailed asset management plan. The City has captured and categorized its asset data based on the following hierarchy:

- Asset Management Plan - the highest level of asset category, typically representative of a service group
- Asset Class - aggregate of municipal infrastructure assets that provide the same type of service
- Asset Type - grouping assets with common characteristics that distinguish those assets as a group
- Asset Sub-Type – a granular breakdown of asset types based on unique attribute information

Elements of the 2024 CAM Plan

The City's CAM Plan includes the following components:

- **State of Infrastructure** – Summary of City assets with a breakdown of asset quantities, replacement values, asset condition and asset age based on established asset classification
- **Levels of Service (LOS)** – Framework of customer and technical LOS metrics for City services as mandated by O.Reg. 588/17 and/or determined by staff
- **Demand Drivers** – Identification of demand drivers impacting service delivery and sustainability; Alignment with municipal strategic plans and growth plans
- **Lifecycle Management Strategy** – List of current lifecycle activities, costs, and risks associated with maintaining current service levels
- **Financing Strategy** – Identification of various funding sources and current infrastructure gap based on available funding and funding needs for 10-year forecast (2022-2031)
- **Continuous Improvement** - Identification of actions for continuous improvement to City AM practices

Data Sources for Asset Management Plans

The information within this CAM Plan comes from a combination of different City system sources including:

- Infor (Hansen) Computerized Maintenance Management System (CMMS) – used extensively for the operational management of linear and fixed assets
- CityWide Asset Manager Module (Public Sector Digest) – utilized for financial reporting on Tangible Capital Assets (TCA)
- SAP software – runs the business data platform to store and retrieve financial data as requested. This data helps with business planning and decision-making
- Questica – a financial tool used to track capital and operating budgets and staffing labor and benefit costs
- Environmental Systems Research Institute (ESRI) software – the City leverages geographic information systems to collect, organize and integrate data to improve asset management practices
- RoadMatrix Pavement Management System (RPMS) – stores the road location as well as geometric and pavement condition data. It is an analytical tool used to identify road pavement strategies and forecasts for preventative maintenance, renewal, and reconstruction timing
- Bridge Total Management System (TMS) – stores bridge and culvert location, geometric, component information and condition information collected through a biennial inspection program in accordance with the Ontario Structural Inspection Manual (OSIM). It is an analytical tool used to provide management strategies and forecasts. It is also used for inspection, renewal and replacement of structures or their individual components
- Trapeze EAM & Hastus – software tools that specialize in intelligent transportation systems and manage transit assets, including bus timetabling, resource optimization, and work order management
- FASTER – Fleet Management Information System that allows staff to track vehicles and equipment, issue and manage work orders, manage parts inventory and purchasing, and track fuel consumption and other associated costs
- Vanderweil Facility Advisors (VFA) – houses an inventory of all City buildings, and is used to support budget modeling, requirements forecasting and capital planning for the Facilities & Property management (FPM) portfolio
- Excel and Sharepoint – for assets that do not belong in any dedicated asset management software

CAM Plan Assumption and Limitations

A detailed list of assumptions and limitations are identified in each asset management plan. In addition, every asset class receives a data quality index[5] (DQI) to indicate the level of data confidence and reliability being used in this plan iteration.

[5] The data quality index is explained in more detail in the Navigating the Plan section below.

Levels of Service

Mississauga delivers over 200 services including public transit, libraries, recreation programs, snow clearing, parks, street tree maintenance, fire and emergency services, and much more. One of the fundamental priorities for City business planning is to “deliver the right services” to residents, businesses, and visitors. This involves optimizing the utilization of assets to achieve service levels that reflect a balance between stakeholder expectations and fiscal responsibility.

In compliance with O.Reg. 588/17 for the July 1st, 2024, requirements, the City has defined its current levels of service, determined in accordance with qualitative and technical metrics that have been set out by the regulation and/or established by staff.

These levels of service metrics have been determined by staff and Corporate Asset Management (CAM) based on available data, best industry practice and in alignment with applicable strategic goals and objectives. A full list of these metrics can be found in the Levels of Service section of each detailed asset management plan.

By July 1st, 2025, the City will be required to build on those established levels of service metrics and propose target service levels.

- Staff will determine those feasible target levels of service, through a series of workshops, based on existing or forthcoming legislative requirements (e.g. Minimum Maintenance Standards,), strategic goals or targets identified in other plans (e.g. provisions in Future Directions master plans, Climate Change Action Plan), resource limitations, and various other demand drivers
- Council’s responsibility is to approve the target levels of service and any subsequent financial implications through the annual budgeting process
- To inform and aid in the target levels of service discussions, CAMO will be conducting a Public Engagement Survey in 2024 to receive asset management-related feedback from residents and other key stakeholders

Demand Drivers

There are many internal and external drivers that affect the City's ability to achieve and sustain its desired levels of service. Some examples of demand drivers include:

- Population growth and demographic changes
- Regulatory pressures and changes
- Aging infrastructure
- Technological advancements
- Funding and resource limitations
- Climate change

It is important to understand how these drivers are projected to change in the future, how they may impact the use of assets and service delivery, and to have a demand management plan to adapt to or mitigate the consequences associated with these drivers.

Integrating Climate Change into Asset Management

Climate change is one of the most consequential demand drivers on a global scale, and the City of Mississauga is committed to working with the community across all levels to address the risks climate change presents. Within the context of asset management, climate change is a threat to sustainable service delivery as it amplifies the risk of asset failure, reduces asset service life, and can increase the cost of managing risk and delivering levels of service.

Proactive risk and asset management will improve the overall resilience of asset systems. This Plan integrates climate change within the context of other asset risks, costs, and service objectives with the intention of developing an integrated and cost-effective set of actions to maintain and enhance levels of service as a result of changing climate conditions.

The Missisauga Climate Change Action Plan was developed in 2019 to outline the City's commitment to climate change mitigation and adaptation and identified concrete actions and steps to take to improve the City's resiliency and sustainability.

In 2023, a climate change vulnerability and risk assessment (CCRVA) was undertaken to better understand the hazards and risks associated with climate change as it relates to specific assets, and to identify opportunities and actions to increase resilience and capacity to withstand and respond to current and future climate events. As staff continue to quantify the effects of climate change and determine the costs associated with managing those climate change hazards/risks, they will integrate the outcomes into their asset management programs and levels of service framework.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes. A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Needs vs. Budget

As per O. Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class. Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations
- The costs of any non-asset solutions, acquisition/expansions/rebuilds, and operations & maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of the 2022-2025 Operating Budget and assumes year 4 as annual budget for years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation

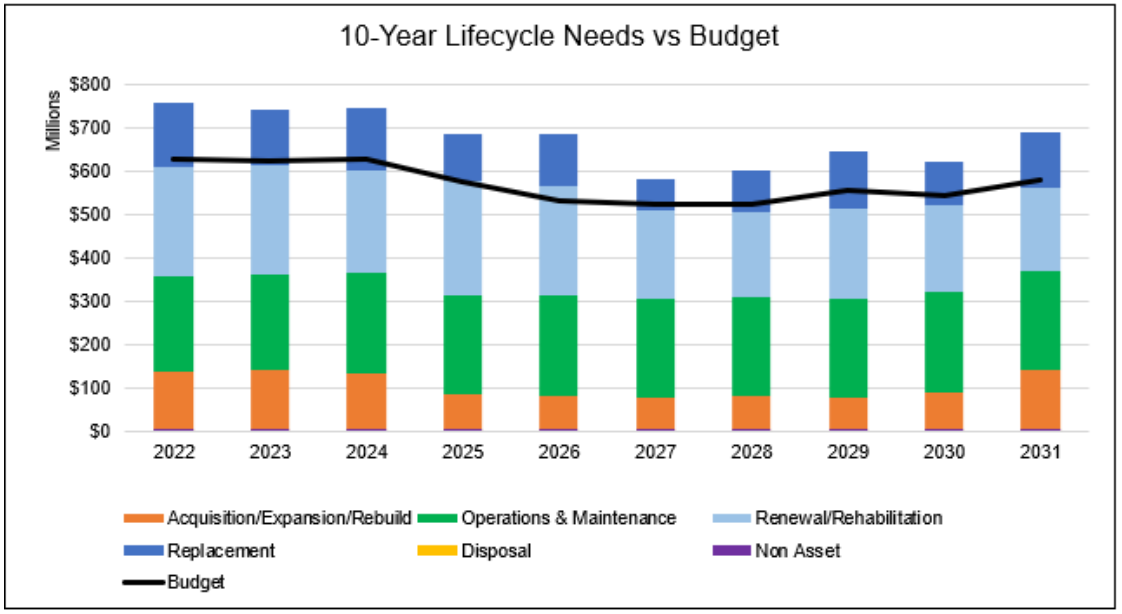
Lifecycle activities only include asset-related operating and capital expenditures. Examples of what has been excluded include land acquisitions and related studies and overhead costs. A more specific list of excluded projects is identified in each individual AM Plan

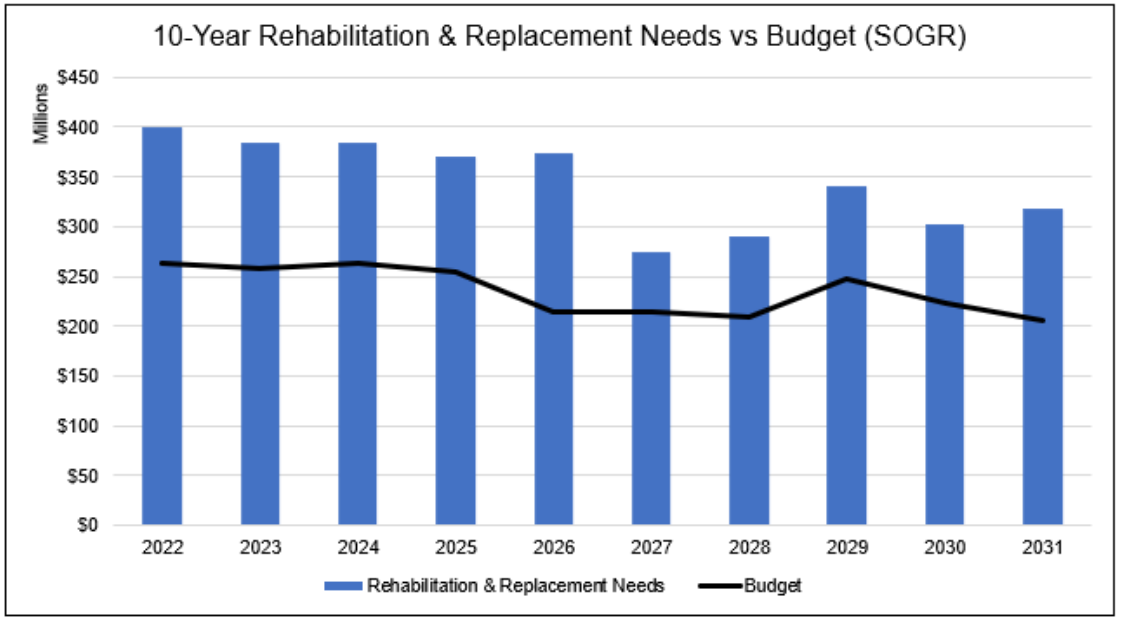
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation, and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

To illustrate the 10-year forecast, two graphs have been created in this section:

- Total Lifecycle Needs vs. Budget Graph
- Rehabilitation & Replacement Needs vs. Budget (State of Good Repair[6]) Graph

[6] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.


10-Year Lifecycle Needs vs Budget
Millions
$800
$700
$600
$500
$400
$300
$200
$100
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Acquisition/Expansion/Rebuild
Operations & Maintenance
Renewal/Rehabilitation
Replacement
Disposal
Non Asset
Budget


10-Year Rehabilitation & Replacement Needs vs Budget (SOGR)
Millions
$450
$400
$350
$300
$250
$200
$150
$100
$50
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Rehabilitation & Replacement Needs
Budget

Over the next 10 years, the City's average annual budget included in the 2024 Asset Management Plans is $5.71 billion as shown in **Figure 3.**

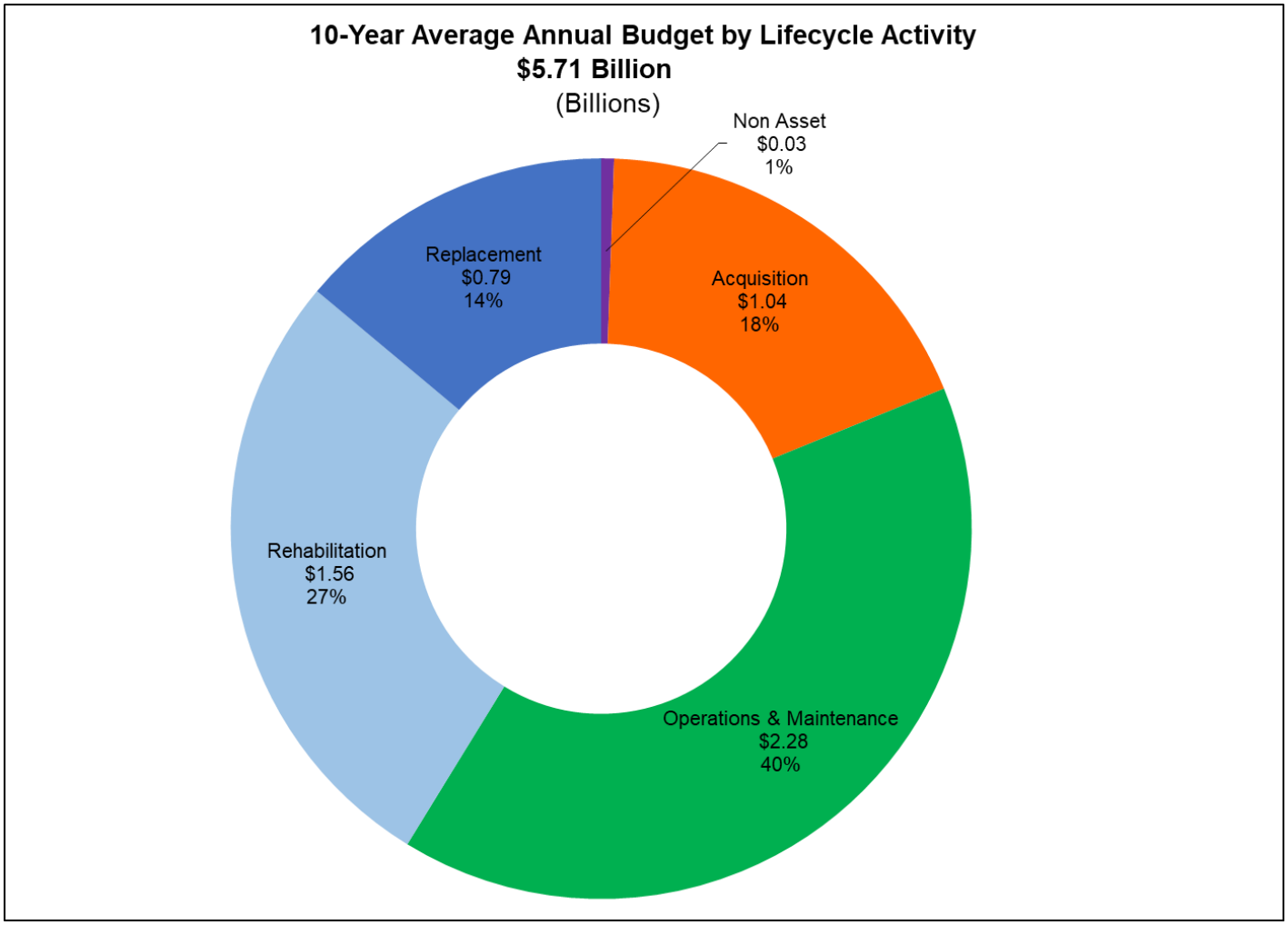


Figure 3: Average Annual Budget breakdown by Lifecycle Activity

Table 3 shows 10-year annual average budget breakdown by Asset Management Plan. 84 per cent of the capital and operating budget is spent on State of Good Repair (SOGR) and 16 per cent on Growth projects.

Table 3: Budget Breakdown by Asset Management Plan

Asset Management Plan	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Roads	51.1	67.2	118.3	28.8	147.1
Facilities & Property Management	54.8	71.5	126.3	17.7	144.0
Transit (MiWay)	55.0	58.0	113.1	8.5	121.6
Parks, Forestry & Environment	31.2	22.8	54.0	16.2	70.1
Stormwater	7.8	14.7	22.5	16.9	39.4
Fire & Emergency Services	9.1	6.8	15.9	1.6	17.5
Information Technology	6.7	7.1	13.8	1.4	15.2
Corporate Fleet	6.9	4.0	10.9	0.5	11.4
Recreation & Culture	1.8	2.0	3.8	0.1	3.9
General Government (Print & Mail Services)	0.8	0.1	0.9	-	0.9
Total Budget	**225.2**	**254.1**	**479.3**	**91.8**	**571.1**
% of Total Budget	**39.0%**	**44.0%**	**84.0%**	**16.0%**	**100.0%**

Financing Strategy

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on the 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt.

As illustrated in **Figure 4**, the estimated available funding for the next 10-year period (2022-2031) is $5.71 Billion. The primary sources of funding are operating revenue sources at 40 per cent and tax reserve funds at 28 per cent which are primarily used to support capital infrastructure renewal needs.

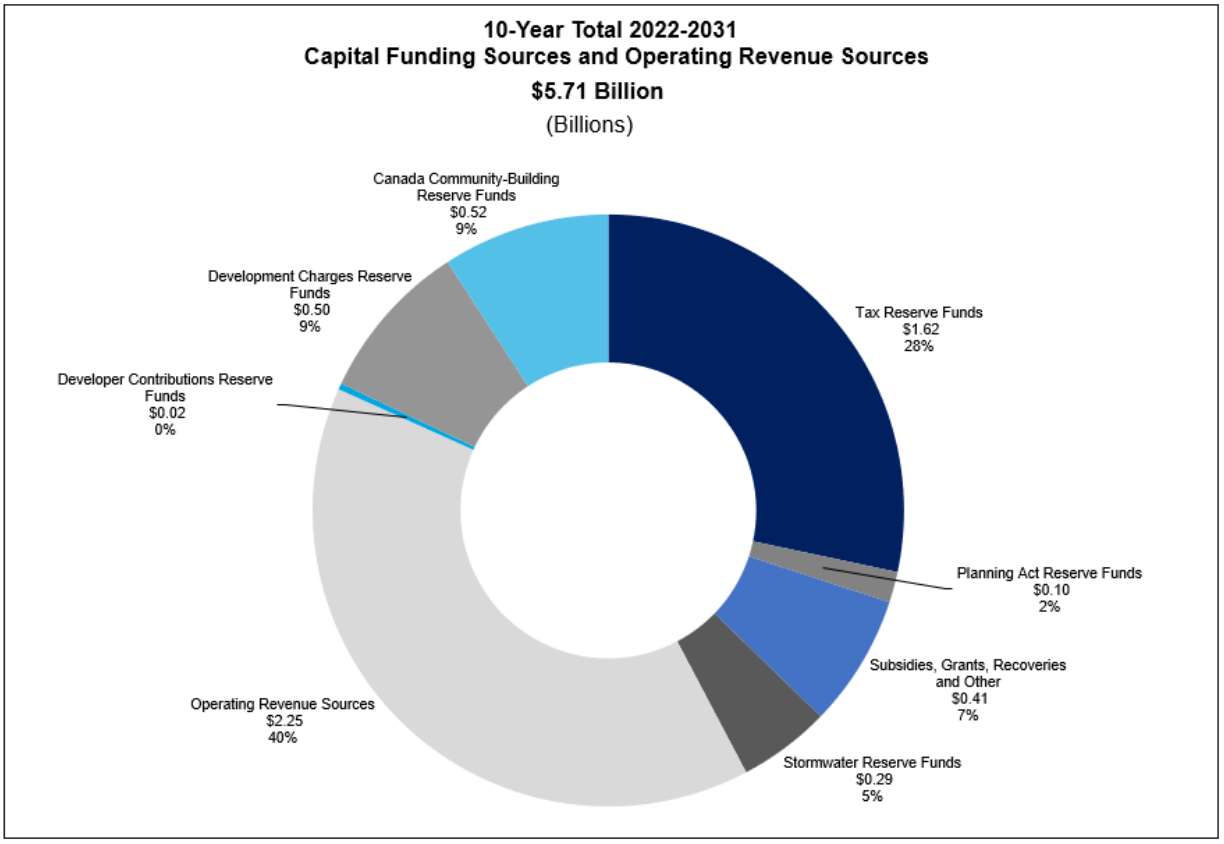


Figure 4: Capital Funding Sources & Operating Revenue Sources

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)
Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget (e.g., utilities, building and sidewalk maintenance, etc.). The City uses a combination of property tax, user fees, investments, stormwater charge revenue, charges/levies, and other revenue to fund the operating budget.

Capital Budget Financing
The Capital Budget provides for significant expenditures to acquire, construct, or improve land, buildings, roads, engineering structures, stormwater, machinery and equipment, including IT network infrastructure used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets (e.g., licensing fees) are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Capital Prioritization
The City employs a capital prioritization model to assist in the decision-making process for allocating limited capital funds. The prioritization ensures that a balance of lifecycle projects, enhancements and high priority new services are included in the capital program.
Capital projects are classified as either:

- State of Good Repair (SOGR) - These projects ensure existing infrastructure is maintained in good condition or replaced when necessary
- Improve/Growth - These projects apply to service enhancements that increase current service levels or provide new capital initiatives

Recoveries
The City of Mississauga receives federal and provincial government grant funding. Generally, only formally approved grant funding is included in the budget.

Reserves
Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget. The Stormwater program has a separate reserve which is fully funded from the Stormwater Charge.

Reserve Funds
Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

Some funding sources are available for specific services. For example:

- The Canada Community-Building Fund Reserve Fund (formerly known as Federal Gas Tax) may be used to fund transit, facilities, roads, bridges, and parks projects)
- The CIL Parkland Reserve Fund primarily funds parkland acquisitions, and to a limited extent may be used to fund other public recreational projects
- Development Charges to fund growth-related infrastructure projects

Tax-based reserve funds are used to finance capital infrastructure needs. The tax-funded Capital Reserve Fund provides the majority of funding for capital projects excluding Stormwater projects. The Capital Reserve Fund is funded, in turn, through contributions from the operating budget. These contributions grow annually through the Capital Infrastructure and Debt Repayment Levy. The Stormwater Program has separate reserve funds to assist with long-term financial stability and financial planning. These funds are set aside to help offset future capital needs and are fully funded from the stormwater rate charge.

More details on all reserves and reserve funds can be found in the annual Business Plan and Budget document.

Capital Infrastructure and Debt Repayment Levy
Repairing and rehabilitating aging infrastructure requires an increased focus on the funding of the City's asset renewal needs. To this end, enhanced infrastructure funding strategies and mechanisms have been developed to assist the City in addressing its infrastructure funding challenges.

Most notably, the Capital Infrastructure and Debt Repayment Levy of two per cent on the prior year's tax levy provides funding necessary to maintain our current assets. The levy is allocated between funding capital infrastructure directly and funding debt principal and interest costs. This levy has increased to three per cent in 2023 and is planned to continue until 2027, and then fall to two per cent thereafter. The Capital Infrastructure and Debt Repayment Levy does not apply to the Stormwater program.

Debt Management
Long-term debt is a critical component in funding new construction and replacing and upgrading capital assets for the City of Mississauga. Taking on long-term debt allows the City to spread out the cost of capital projects over the useful lives of the assets. The amount of debt the City issues each year is determined by how much funding will be yielded by a portion of the Capital Infrastructure and Debt Repayment Levy.

The *Municipal Act, 2001* limits the amount of debt that any city can hold. Debt repayment costs must remain within 25 per cent of own-source revenue (that is, revenue that is earned by the City directly, such as the tax levy, and not revenue like provincial or federal grant funding). The City of Mississauga's debt policy is more conservative than the provincial limits. The City's debt policy requires that annual debt repayment be limited to 15 per cent of own-source revenue as shown in **Figure 5**.

The City's debt management program ensures that it remains well within its prescribed debt policy. Careful and conservative spending in the short run ensures that funds are available for longer-term capital initiatives while keeping tax rates manageable.

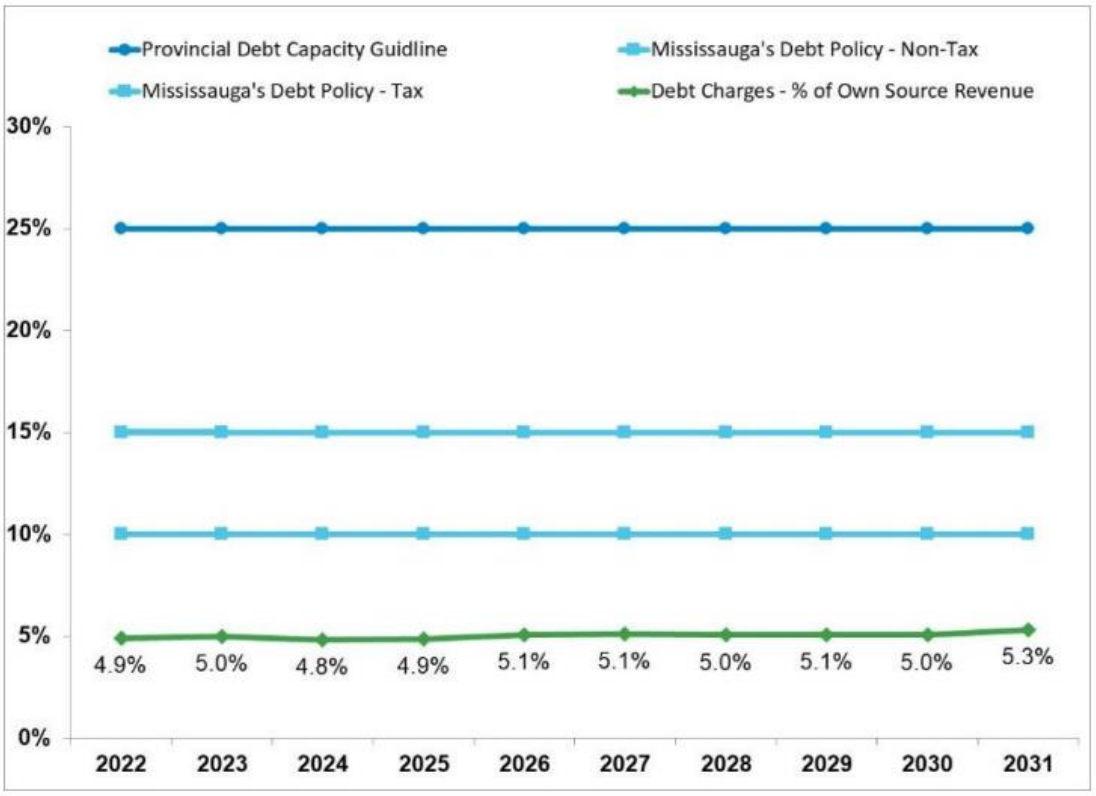


Figure 5: Annual Debt Repayment Limit (2022-2031)

Long-Range Outlook

The Long-Range Financial Plan (LRFP) is an essential tool for long-term planning for the City. The LRFP model provides an indication of the City's future operating, capital, debt, and reserve and reserve fund (R&RF) requirements — given current conditions. The City uses its long-range financial model to ensure that assumptions made in the current year's Business Plan & Budget are sustainable for the future. The strength of the model lies in its ability to identify implications of future strategies and initiatives as they are proposed, to confirm the financial impacts of these strategies, and to determine affordability and impacts on the City's financial position. The LRFP is an important tool to assess affordability into the future and address funding requirements for city-building initiatives.

Each year, the model is updated to reflect the current Business Plan & Budget with informed projections for operating expenditures beyond the four-year period. City staff use this model to ensure projected funding levels for R&RFs are sufficient to finance the capital program as presented.

Infrastructure Gap

The 2022-2025 Business Plan and 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy in the 2022 budget to provide funding to maintain and replace its critical infrastructure; the levy was increased to three per cent in the 2023 budget.

The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g., the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available. An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to levels of customer satisfaction
- Increased liability and claims
- Impacts to operations

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (funding needed) and the annual average budget (funding available) for the next 10 years as is shown in **Figure 6**. Continued implementation of asset management best practices, as well as assistance from senior levels of government through continued infrastructure funding programs, will provide opportunities to address some elements of the funding gap. The overall 10-year average annual infrastructure gap for City of Mississauga is $108.2 million.

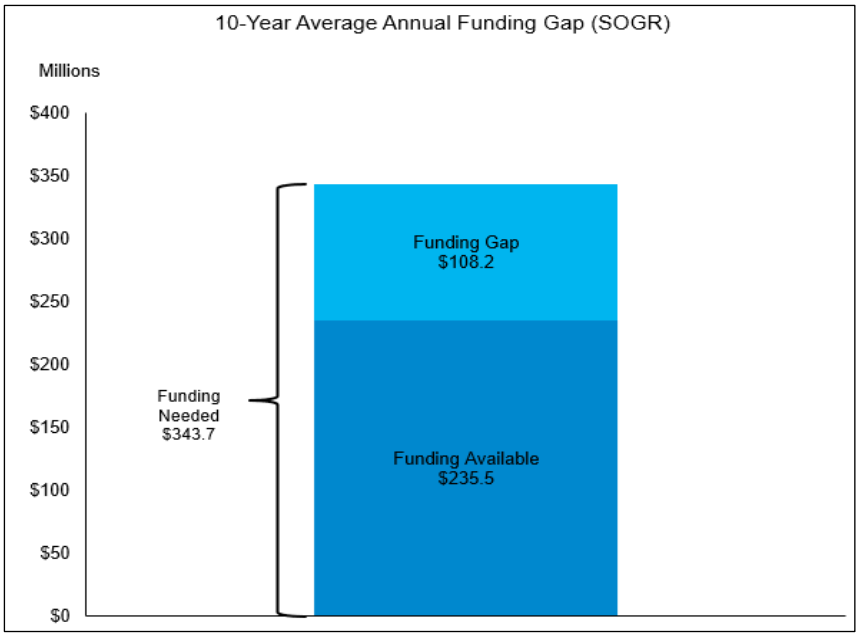


Figure 6: 10-Year average annual funding gap (SOGR) for the City

Table 4 shows the breakdown of the 10-year annual average infrastructure gap for each detailed asset management plan with the Roads and Facilities & Property Management accounting for the majority of the infrastructure gap at 66 per cent and 15 per cent, respectively.

Table 4: 10-year Average Annual Funding gap (SOGR)

Detailed Asset Management Plan	Funding Available ($Millions)	Funding Needed ($Millions)	Funding Gap ($Millions)
Roads	65.5	136.7	71.2
Facilities & Property Management	60.5	76.8	16.3
Transit (MiWay)	55.5	59.9	4.4
Parks, Forestry & Environment	21.6	35.3	13.7
Stormwater	14.5	14.5	-
Fire & Emergency Services	6.0	6.4	0.4
Information Technology	6.0	6.0	-
Corporate Fleet	4.0	6.2	2.2
Recreation & Culture	1.8	1.8	-
General Government (Print & Mail Services)	0.1	0.1	-
Total	**235.5**	**343.7**	**108.2**

Approaches to Closing the Gap

Common asset management practices can be utilized to reduce or close the infrastructure gap. By implementing sound asset management practices, the City can reduce the size of its infrastructure backlog. The following AM strategies/approaches will be explored to achieve a reduction in the City's infrastructure gap:

- Improve Data Quality – Ensure asset inventories are comprehensive, contain accurate condition assessments and performance data is available on a more granular level
- Implement a Standardized Risk Framework – Develop a standardized risk assessment methodology for asset classes across the organization formalized through a Council-approved Corporate Risk Policy. This would establish levels of tolerances for each asset class to prioritize asset investment needs and appropriate levels of service, potentially reducing funding needs
- Set Realistic Target Levels of Service – Track current service delivery performance and establish achievable and affordable targets that optimize funding and bridge the infrastructure gap as part of the 2025 requirements of the O.Reg.588/17

Conclusion & Continuous Improvement

The City of Mississauga's infrastructure supports a wide range of services to residents, businesses, and visitors. This infrastructure serves as the critical foundation in achieving the City's Vision: A Place Where People Choose To Be.

As of 2021 year-end, the City's combined assets have a replacement value of $17.6 billion, in overall Fair to Good condition. The City recognizes the importance of maintaining its infrastructure to deliver services. The City leverages federal and provincial funding programs to control the size of the infrastructure gap and minimize the impact to taxpayers. An asset management plan provides information on the current levels of service, complete asset inventories, assets condition, age and the costs involved to operate, maintain, renew, replace, expand, or dispose assets. The ultimate goal is to have a long-term, financially sustainable plan that optimizes service delivery and available funding.

Adopting new asset management practices will require financial investments in systems and staff to achieve improved reporting and analysis at the asset level. As a result of having better information at the asset level, senior staff and ultimately, Council, can make more informed decisions for establishing target service levels and focused asset-investment decisions.

Continuous Improvement

Continuous improvements in asset management practices will advance the City's ability to provide more detailed information on all City's assets at the organizational level. This will provide enhanced clarity on funding priorities, discover any potential cost savings, and identify the right time for investment opportunities.

Implementing a Corporate Asset Management program across the organization has advanced the following AM activities:

- Established the City's first Strategic AM Policy
- Established an AM governance structure and core working team
- Established an AM reporting framework
- Expanded overall awareness and knowledge about AM
- Engaged a vendor using mobile laser imaging, detection and ranging (LiDAR) to scan, map and collect all the right-of-way assets in the City
- Developed LOS metrics for all asset classes

Continuous improvement is an essential part of any asset management plan. Several recommendations are presented in this plan to support the development of standardized asset management practices in the City of Mississauga. A sample of continuous improvement actions are listed in **Table 5** below. In addition, specific continuous improvement activities/initiatives are listed in the Continuous Improvement sections of each detailed asset management plan.

Table 5: List of Continuous Improvement Actions and Status

Category	Recommendation	Status	Strategy
People	Promote adoption of AM policy to support staff working in the AM environment	Ongoing Activity	Conduct strategy sessions with service area teams to address strengths, weakness, opportunities, and barriers in fully adopting all components in the AM Policy
	Implement Department Capacity Planning	Completed	Use information identified within service specific asset management plans to build a business case for resources necessary to deliver annual asset management work plans
	Foster AM training to the Working Group (AMWG), Steering Committee (AMSC), LT and Members of Council	Ongoing Activity	Monitor foundational AM courses and AM planning certifications available and distribute information to relevant groups
Business Processes	Continue to update AM Plans for the Service Areas	Ongoing Activity	Deliver a comprehensive AM Plan focusing on the highest priority assets in each service area to comply with O. Reg. 588/17 requirements
	Evaluate current capabilities and develop a work plan toward AM maturity	Ongoing Activity	Conduct periodic audits on AM system (e.g., business process, resources, tools)
	Implement an Enterprise Risk Management Framework	Initiated	Prioritize critical and vulnerable infrastructure
	Align AM process templates with financial templates	In Progress	Work with Corporate Finance to standardize templates to capture relevant asset lifecycle cost information
	Include operational costs when calculating the infrastructure gap	In Progress	Determine operational data to consolidate asset information that can be used for infrastructure gap calculation
Assets	Perform ongoing Service Level Agreements (SLA) review	Ongoing Activity	Use the SLA to document roles, responsibilities, and expectations between service areas. Liaise with external stakeholders (e.g., Metrolinx) to determine assets ownership, maintenance, and renewal responsibilities
	Conduct regular Data Governance Review	In Progress	Perform annual reviews to update and document who is responsible for what aspect of the asset lifecycle
	Continue updating Asset Hierarchy and Register	Ongoing Activity	Improve asset database for enabling most asset management functions

Conclusion & Continuous Improvement

Category	Recommendation	Status	Strategy
Tools/Technology	Procure an Asset Investment Planning (AIP) Tool	In Progress	CAM Office is in the process of procuring and implementing an Asset Investment Planning (AIP) solution to support long-term sustainable decision-making and service level delivery. The AIP tool will allow staff to run different scenarios with variable funding envelopes, service level targets and risk tolerances to determine the most effective strategies to implement. The acquisition and implementation of the AIP solution is anticipated to be completed by 2026.
	Develop Enterprise Asset Management Reports and Dashboard for Assets	In Progress	Develop a set of standardized dashboards and reports that will reduce the manual tasks required to generate the measures legislated for the AM Plans
	Use Mobile LiDAR to capture Right-of-Way (ROW) assets	In Progress	Process the data collected by LiDAR to allow assets and features to be imported into GIS for analysis and visualization
	Develop consistent asset attributes across systems	In Progress	Provide strategic alignment among subsystems (e.g., VFA, RoadMatrix, EMSI, Faster, SAP, CityWide, etc.)

Navigating the Plan

This section of the CAM Plan defines how to read and interpret the information provided in the detailed asset management plans.

State of the Infrastructure (SOI)

Dashboards

For each asset class within a detailed asset management plan, a dashboard has been created to summarize the current state of the infrastructure. Each dashboard includes a breakdown of the number of current active assets, their age, estimated useful life, condition, and replacement value as of the determined cut-off date (i.e. 2021 year-end for this iteration). The condition of the assets is also illustrated through graphs, by replacement value and asset type, for more detail.

Data Quality Index

In addition, a data quality index (DQI) is included in the dashboards, and provides a measure of how reliable, complete and accurate the information used in the plans is to support asset management decision-making. The DQI applies a five-point rating scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement value methodology. **Table 6** provides a brief summary of the data quality index scale and how to interpret the grade scores.

Table 6: Data Quality Index and Descriptions

Grade Score	Description
A – Very Good	• Data is highly reliable and is based on sound records, procedures, investigations, and analysis, documented properly and agreed as the best method of assessment • Dataset is complete and estimated to be accurate ± 2 per cent
B – Good	• Data is moderately reliable based on sound records, procedures, investigations, and analysis, documented but has minor shortcomings, for example some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation • Dataset is complete and estimated to be accurate ± 10 per cent
C – Fair	• Data mildly reliable and is based on sound records, procedures, investigations, and analysis which is incomplete, unsupported, or extrapolated from a limited sample for which grade A or Grade B data are available. Dataset is substantially complete but up to 50 per cent is extrapolated data and estimated to be accurate ± 25 per cent
D – Poor	• Data is unreliable and is based on unconfirmed verbal reports and/or cursory inspections and analysis • Dataset may not be fully complete, most data is estimated or extrapolated and estimated to be accurate ± 40 per cent
E – Very Poor	• Unreliable/Uncertain data being utilized

Asset Condition

It is important to determine the physical condition of an asset in order to deliver the required service. The condition rating for asset classes is assigned using one of the four following methods:

- Existing condition rating systems (e.g., Pavement Quality Index, Bridge Condition Index, Facilities Condition Index, etc.)
- Estimated based on age and the remaining estimated useful life of the asset
- Estimated based on the weighted average of physical condition, capacity, and functionality, or any other available and pertinent attribute information
- Estimated based on subject matter expert opinion, in the absence of condition or age

Based on data availability, the appropriate method is used to determine the condition of assets based on a five-point scale that has been adopted by the City in alignment with best industry practice. **Table 7** provides an example of the five-point condition rating scale with accompanying definitions for each rating.

Table 7: Condition rating Scale and definitions

Condition Rating	Physical Condition Definitions
Very Good	**Fit for the Future -** The asset is generally in very good condition, typically new, or recently rehabilitated
Good	**Adequate for Now** - Some asset elements show general signs of deterioration that require attention. A few elements exhibit deficiencies
Fair	**Requires Attention -** The asset shows general signs of deterioration and requires attention with some elements exhibiting significant deficiencies
Poor	**Approaching End of Life** - The asset is in poor condition and typically below established standards, with many elements approaching the end of their useful service life
Very Poor	**Requires Imminent Renewal -** The asset is below established standard conditions with widespread signs of advanced deterioration. Many components have surpassed the end of its useful service life and requires urgent renewal

Risk Management

Asset management involves understanding and balancing the performance, cost, and risk of delivering services. By having holistic and comprehensive risk management models, City staff are able to prioritize their assets and projects more effectively to achieve their desired service levels. From a City-wide perspective, a corporate risk policy and framework has been developed by the Legal Services Division. The corporate asset management office (CAMO) will leverage this policy and framework as they develop a corporate asset management risk framework that can help prioritize across various types of assets and services at the City.

From an asset-specific perspective, each asset management plan identifies the methodology that staff currently utilize to prioritize assets within their purview. Some asset groups are more advanced, utilizing a formalized asset risk model whereas others are still in the early stages of developing a model and quantifying their risk methodology.

The CAMO has recommended that staff utilize a 5x5 risk matrix for asset-specific risk, by quantifying the consequences of failure (CoF) and likelihoods of failure (LoF) metrics and multiplying the results together.

The consequence of failure (also known as asset criticality) relates to the economic, environmental, social, or regulatory impact of an asset failure on service delivery. While the loss of some assets or components may have little impact on service delivery and negligible, the loss of others may severely impact services and lead to serious injuries, heavy financial losses or non-compliance with laws and regulations.

The likelihood of failure considers how probable assets are to fail based on a plethora of metrics that are unique to each asset group. LoF metrics can include performance indicators such as the physical condition of the assets or their age, location or geographical information, material and asset type information, and many more.

Risk management has been identified as a major continuous improvement item for all asset groups as they advance their asset management program and data quality with every plan iteration.

Levels of Service (LOS)

This section of the plan documents the level of service (LOS) metrics that have been prescribed by the O. Reg. 588/17 as well as those established by staff based on available data and best industry practice. As part of establishing levels of service metrics, it is critical to build a strong line of sight from the high-level strategic goals and objectives of the City to the operational and technical asset-specific objectives. With the assistance of CAMO, asset groups tied their strategic goals and service values, to their corporate LOS objectives, and down to their asset-specific LOS metrics as shown in **Figure 7**.

LOS metrics are broken into two types as prescribed by O.Reg. 588/17. They are:

- Customer LOS - qualitative metrics expressed in plain language that describe customer and other stakeholder expectations/understanding of services being provided by the City
- Technical LOS - quantitative metrics that translate the customer expectations into technical and trackable performance measures

For this 2024 plan iteration, only the current performance results for the customer and technical metrics have been reported on, based on either 2021 or 2022 data as available. For the next plan iteration, due by July 1st, 2025, to the Province, the City will be required to set target service levels for those metrics it has established and have them approved by Council.

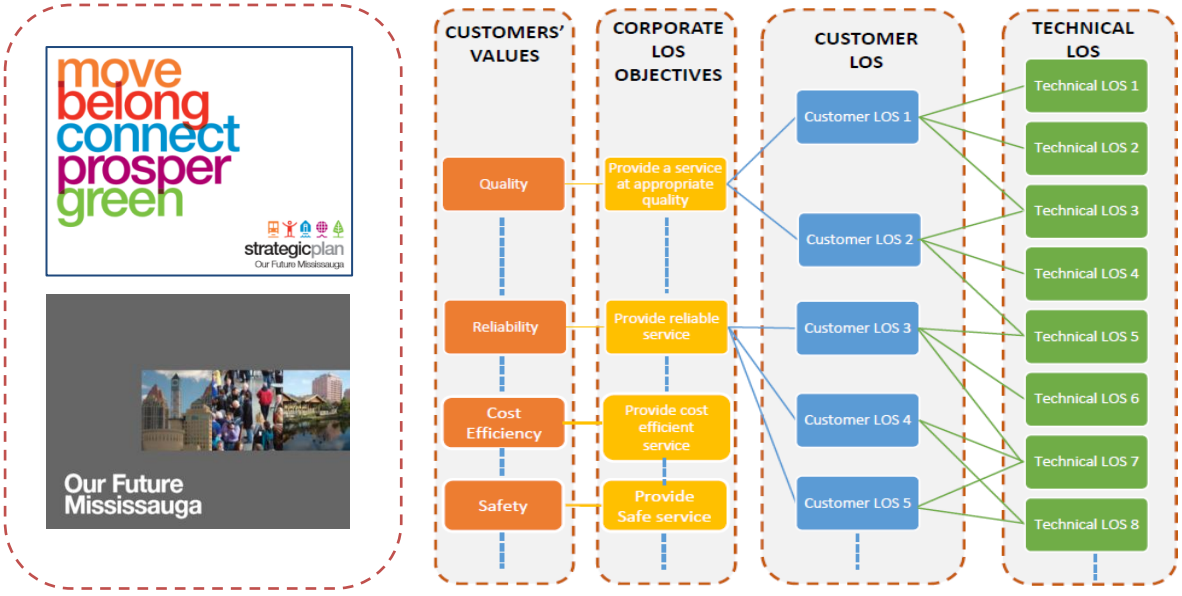


Figure 7: Line of Sight - Strategic goals to LOS metrics

Demand Drivers

Each demand driver section identifies a list of the top drivers and challenges that affect service delivery and asset management for each detailed asset management plan. The list also summarizes how the demand driver is projected to evolve, what impact it has on City services, and whether or not the City has a demand management plan in place to handle/treat these issues.

As staff continue to quantify the effects of these demand drivers and identify feasible demand management strategies, they will integrate them more concretely into their asset management programs through the levels of service frameworks and lifecycle management strategies.

Lifecycle Management Strategy

The lifecycle management strategy section identifies the many actions and activities staff employ on assets to sustain desired service levels at the lowest lifecycle cost ownership and while managing risk.

These lifecycle activities are broken down into the following seven types, as reported in each of the detailed asset management plans. **Table 8** provides numerous examples of different strategies and actions that the City employs on its assets, broken out by the six lifecycle activity types.

- **Non-Asset Solutions** - Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical
- **Operations and Maintenance (O&M)** - Operations and Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned/reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned/proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational
- **Renewal/Rehabilitation** - Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention
- **Replacement** - Replacement activities occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable treatment option. Replacement activities typically denote a like-for-like asset replacement
- **Acquisitions - Expansion/Rebuild/New** - These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets
- **Disposal/Demolition** - Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City

As per O. Reg 588/17, a 10-year forecast of the lifecycle activities that need to be performed to maintain current levels of service are identified in each detailed asset management plan. Any relative assumptions and/or limitations have been noted within those sections.

Table 8: Examples of Lifecycle Actions by Activity Type

Lifecycle Activity Types	Examples of Lifecycle Strategies or Actions
Non-Asset Solutions	• Standard Operating Procedures (SOPs) • Master Plans/Future Directions • Public notices, engagement surveys • Climate Change Action Plan • Road Needs Studies (RNS) • Building Condition Assessments (BCA) • Ontario Structural Inspection Manuals (OSIMs) • Natural Heritage & Urban Forest Strategy • Service demand studies on the assets (i.e., studies or modelling that consider capacity, future needs)
Operations & Maintenance	• Utilities, snow plowing and salting, sweeping, debris removal, pest control, tree pruning • Waterproofing of bridge decks, catch basin cleaning, storm sewer flushing • Flow monitoring program to determine the full scale of its network problems • Legislated fire equipment inspections • Anti-graffiti protective coating for public art assets • Repairing of lighting, power and electrical of parking lot lighting, park lighting, sports field and court lighting • Traffic signal repairs from spring and fall inspections • Install and repair security cameras, card readers and existing systems • Playground inspections in alignment with Canadian Standard Association (CSA) guidelines • Tree inspections and pruning every seven years
Renewal/ Rehabilitation	• Road rehabilitation treatments (resurfacing, mill and pave) • Pipe re-lining • Roof replacement, boiler replacement, HVAC replacement • Playground component replacement (e.g., swings, slides) • Replacement of structural components of bridges, guiderails, supporting poles, fixtures, and lighting poles • Parking lot rehabilitation • Refurbishment of fire vehicles • Multi-use trail rehabilitation

Lifecycle Activity Types	Examples of Lifecycle Strategies or Actions

Replacement	• Bridge replacement as recommended through bi-ennial inspections
	• Complete open-cut replacement, pipe replacement
	• Trail reconstruction
	
	• Asset condition/performance are monitored regularly, but in general, assets are replaced at end-of-life:
	  ○ Playground every 25 years; Park shelters every 20 years; Artificial turf fields every 10-12 years
	  ○ Vehicles, buses, furniture, and equipment (golf carts, radio), Transit Bus stops/pads
	  ○ Personal protective equipment (PPE) replacement

Disposal/ Demolition	• Road right-of way property disposal or repurposing • Dispose of assets under regulation or by-law because an asset is no longer functional • Disposal of demolished assets a part of replacement of the structure • Disposal of IT hardware to a vendor for the purpose of either destroying and issuing a certificate of destruction, or recycling it at no cost • Trade-in program for recreation fitness equipment
Acquisition/Expansion/ Rebuild	• Constructing or procuring new assets (e.g., roads, buildings, buses, traffic signals) • Expanding/new garage facilities (e.g., incorporating additional and/or new fleet technology) • On-street transit priority infrastructure (e.g., queue jump lanes, bypass lanes) • On-street bus stop infrastructure (e.g., new or larger shelters, bus shelter pads, pedestrian landing pads, concrete bus landing pads) • New tree planting and boulevard landscapes

Financing Strategy

The financing strategy section outlines the key funding and revenue sources used to finance asset management-related lifecycle activities within each detailed asset management plan. For this iteration, staff utilized the 2022-2031 capital budget forecast and 2022-2025 operating budget forecast.

In addition, an infrastructure gap exercise was conducted, for each asset class within the detailed plans, to compare the required lifecycle needs to the available budget for the next 10 years to maintain current levels of service. Any relative assumptions and/or limitations have been noted within this section.

As staff advance their asset management programs and improve their data quality, the infrastructure gaps will become more accurate and reliable.

Continuous Improvement

Each detailed asset management plan has a continuous improvement section that lists various opportunities or actions that staff have identified to improve their asset management program in the short-term and long-term. The lists include what the action items are, what assets are impacted/involved, the estimated timing to complete the continuous improvement task, the benefits of the tasks to the asset management program, and what resources are required to complete the work.

As part of evaluating current capabilities and developing the work plan towards asset management maturity, the CAM Office conducts periodic internal maturity assessments for each of the asset classes, with the latest being completed in 2021/2022 for all asset classes. The results of the latest maturity assessment are documented within each detailed asset management plan in this section. The results are recorded for benchmarking and annual progress updates are reported to Council.

Glossary

Term	Description
Asset	An item, thing, or entity that has potential or actual value to the City, including but not limited to tangible assets, natural assets, heritage or culturally significant assets and information assets
Asset Management (AM)	Co-ordinated activities by the City to realize value from its assets in the achievement of its organizational objectives
Asset Management Plan (AMP)	Documented information that specifies the activities, resources and timeframe required for an individual asset, or group of assets, to achieve the City's asset management objectives
Asset Management Steering Committee (AMSC)	Committee comprised of Directors and/or Senior Managers across the organization that come together to make decisions on asset management program
Asset Management Plans (AMPs)	An Asset Management Plan (AMP) is a tactical plan for managing an organization's infrastructure and other assets to deliver an agreed standard level of service.
Asset Management Working Group (AMWG)	Cross-departmental/divisional team of subject matter experts that governs and maintains the City's assets in compliance with the Strategic Asset Management Policy
Budget	Planned expenditures for a specified time period along with the proposed means of financing these expenditures
Capital Budget	Multi-year program adopted by Council comprised of an approved capital program for the current year and a planned program for the succeeding nine years.
City	Corporation of the City of Mississauga
Climate Change	Change in global or regional climate patterns
Consequence of Failure (CoF)	An element of a risk framework that identifies an asset failure that has the highest potential on impacting the delivery of services
Continuous Improvement (CI)	Specific actions taken to advance asset management reporting, data collection etc.
Corporate Asset Management (CAM)	Program developed in the Corporate Services Department, Finance Division
Current Replacement Value (CRV)	The cost of rebuilding or replacing an asset with one of equivalent capacity, functionality and performance (like-for-like)
Green Infrastructure	An infrastructure asset consisting of natural or human-made elements that provide ecological

Glossary

Term	Description
	and hydrological functions and processes and includes natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces and green roofs
Infrastructure Gap	A gap between how much is required to maintain assets and service levels and how much funding is available
Levels of Service (LOS)	Defined measure(s) for a particular activity or service. The delivery of an output that addresses the needs of a client or a community
Lifecycle activities	Activities undertaken with respect to a municipal infrastructure asset over its service life, including constructing, maintaining, renewing, operating and decommissioning, and all engineering and design work associated with those activities
Likelihood of Failure (LoF)	The probability of an asset to fail in the short-or long-term
Risk Management	A formal process to assess risk to an asset in order to determine risk tolerance, a range of outcomes, and the probability of occurrence, to determine required actions to mitigate risk exposure
State of Good Repair (SOGR)	The condition where a capital asset is able to operate and maintain the expected levels of service

Detailed AM Plans

Table of Contents

Corporate Asset
Management Plan 2024

Stormwater

Table of Contents

Stormwater Overview

The Stormwater Service Area plans, develops, constructs, maintains and renews the stormwater management system, which protects property, infrastructure and the natural environment from erosion and flooding and enhances water quality. The Stormwater management system includes Storm Sewers, Stormwater Management Facilities (SWMF) and Watercourses and is one of the largest assets owned and operated by the City. The total Stormwater replacement value of $7.6 billion and average stormwater management system overall condition of "Good" are summarized in **Table 1**. A further breakdown by asset class is shown in **Table 2**.

Table 1: Summary Overview of Stormwater

Stormwater	
Replacement Value	$7.6 B
Average Condition	64%[1]
Average Annual Funding Gap	N/A

The Stormwater Service Area Asset Management (AM) Plan includes the following information:

- **State of the Infrastructure**: Outlines the current state of the assets including what the City owns, the condition of the assets and the costs to replace them. This section also identifies the data limitations and data assumptions at this time. A risk distribution was developed for each asset class
- **Levels of Service**: Describes and measures the service performance and outcomes the City currently provides. This includes those prescribed in O. Reg. 588/17 and additional advanced metrics to benchmark and monitor Stormwater Service Area performance
- **Future Demand**: Summarizes the expected future demand on the Stormwater Service Area services
- **Lifecycle Management Strategy**: Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy**: Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves and identifies any financial gap. This plan utilizes the 2022-2024 Operating Budget and 2022-2031 Capital Budget
- **Continuous Improvement**: Documents the continuous improvements identified during the development of this Asset Management Plan and previous maturity assessments

[1] The average condition is replacement cost-weighted.

Table 2: Summary of Stormwater Replacement Value and Average Condition by Asset Class

Asset Class	Replacement Value	Condition
Storm Sewers	$6.8 Billion	
Stormwater Management Facilities (SWMF)	$221 Million	
Watercourses	$574 Million	

State of the Infrastructure

The following section summarizes stormwater management services, funded by the Stormwater Charge in the City of Mississauga, and the state of the stormwater asset classes: the Storm Sewer Drainage Network, Stormwater Management Facilities and the Watercourse Network (commonly referred to throughout the report as Storm Sewers, SWMF and Watercourses). This section includes the most updated replacement value for 2022 and an explanation of how condition and risk were assessed along with limitations to this assessment based on the availability of data.

Asset Inventory & Valuation

A summary of the Stormwater asset inventories using the City's available data for each of the asset classes and/or types is shown above in **Table 2: Summary of Stormwater Replacement Value and Average Condition** by Asset Class.

The **Table 2** summary by Asset Class shows replacement values for the storm sewers and SWMF asset classes were produced by unit costs maintained for each of the assets listed below. In lieu of a detailed asset inventory, the replacement values for the watercourse network (reaches) were developed using the methodology described later in this document in the Asset Data Limitations section.

Asset Data Assumptions

The following assumptions were made where attributes were missing:

- **Replacement Cost** – Replacement costs were calculated based on Estimated Unit Cost (EUC) and include design costs, professional services, engineering services, contingencies, administration, material and labour. They are reported in 2022 dollars
- **Useful Life** – An Estimated Useful Life (EUL) was assigned based on asset type and material
- **Material** - The most likely material was assumed (e.g., maintenance holes, catch basins, and outfalls have been assumed to be concrete)
- **Asset condition** – The condition of assets has been estimated based on age and remaining useful life (RUL) as described in **Table 3** on the basis that as an asset reaches its expected life, its condition will deteriorate. This approach is commonly used for assets, where measured condition data is not readily available. **Table 3** shows the translation used to assign a 1 to 5 condition rating based on asset age (expressed as the percentage of its lifespan remaining), and a description for each rating
- **Install date** – Where available, the install date was assumed to be the same as the asset it is connected to (e.g., a maintenance hole was assumed to have been installed at the same time as the connecting pipe). Where there were no connecting assets, or the install date of the connecting asset was also missing, the install date was assumed to be half the EUL (e.g., a catch basin with an EUL of 100 years and missing install date is assumed to have been installed in 1970, 50 years ago)

Table 3 - Condition Rating Scale

Condition Rating	% of Remaining Useful life (RUL)	Description
Very Good: Fit for the Future	RUL ≥ 75%	The infrastructure in the system or network has greater than or equal to 75% of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
Good: Adequate for Now	75% > RUL ≥ 35%	The infrastructure in the system or network has less than 75% (and greater than or equal to 35%) of its remaining service life. It is in good condition.
Fair: Requires Attention	35 > RUL ≥ 13%	The infrastructure in the system or network has less than 35% (and greater than or equal to 13%) of its remaining service life. It is in fair condition.
Poor: Approaching End of Life	13% > RUL ≥ 3%	The infrastructure in the system or network has less than 13% (and greater than or equal to 3%) of its remaining service life. It is in poor condition and mostly below operable state, with many elements approaching the end of their service life.
Very Poor: Requires Renewal	RUL < 3%	The infrastructure in the system or network has less than 3% of its remaining service life. It is in very poor, unacceptable condition and should be replaced or rehabilitated.

Asset Data Limitations

A review of the current available data has been completed for each of the asset inventories and has been evaluated and given a Data Quality grade which is in the State of Infrastructure (SOI) Overview sections found below. Each asset data set is scored on a grading system for the following categories: Asset Inventory, Condition, and Replacement. Additionally, some assets have not yet been formally captured in the Stormwater inventories. These are summarized in **Table 4**. These known asset types and assets vary in quantity and in their potential impact on the replacement values for each asset class.

As the Stormwater Service Area matures, these assets will be considered and integrated into future plans and will ultimately increase the total replacement value. In addition, continuous improvement tasks to inventory several of these asset types have been identified in the sections that follow, most notably the development of a formal watercourse asset inventory. For now, these assets have been excluded from this Asset Management Plan but are summarized in **Table 4**.

Table 4 - Stormwater Inventories/Assets Excluded from this Asset Management Plan

Asset Class	Asset/Asset Type
Storm Sewers	• Service Connections • Ditch & Driveway Culverts • Minor Culverts • Catch basin laterals (partial)[2] • Fittings • Overland Flow Routes • Assets with missing size attributes which could not be estimated have been excluded from the analysis
Stormwater Management Facilities (SWMF)	• Dry Ponds (partial) • Low Impact Development features (partial) • Manufactured Treatment Devices (i.e. OGS Units)
Watercourses	• Bank – erosion control, toe protection, revetments, etc. • Instream – riffle/pool, drop structures, grade control, flow deflection, etc. • Channel – fully lined, natural, etc.

[2] The replacement value for catch basin laterals is currently incorporated into the value of individual CB units with an average lateral length of 10.0m.

Asset Risk

Asset-level risk is calculated by multiplying the asset 'Consequence of Failure' (CoF) with the 'likelihood of failure' as shown in **Figure 1**. For this asset management plan, criticality is used as a proxy for 'Consequence of Failure' to calculate risk. However, in subsequent asset management plans, the CoF may also consider other aspects such as disruption, safety, financial impact, environmental impact, reputation to the organization, etc., in addition to criticality. The criticality of an asset is the inherent consequence of the loss of its function, including its impact on the function of a system or network of assets. While the loss of some assets or components may have little impact on service delivery and negligible risk of damage/injury, the loss of others may severely impact public services, and may lead to private property damages, significant financial losses or fatalities.

Figure 1 - Asset Level Risk Calculation

For each of the asset classes (Storm Sewers, Stormwater Management Facilities and Watercourses), criticality criteria have been identified for each major asset (such as size, type or location of the asset). Asset Criticality rates how critical the asset is to deliver the required service. A numerical score is assigned based on the applicable descriptions in **Table 5**.

Table 5 - Asset Criticality Ranking

Criticality	Description	Score
Very Low	• Easy to replace • Can be non-operational for multiple months without significantly impacting core service delivery to many users	1
Low	• Somewhat difficult to replace • Can be non-operational for multiple weeks without significantly impacting core service delivery to many users • Asset does not perform a safety function or meet a regulatory requirement	2
Medium	• Moderately difficult to replace • Outages of more than a couple of days may significantly impact core service delivery to many users • Asset may perform a safety function or meet a regulatory requirement	3
High	• Highly mission-sensitive asset with no redundancy • Mission-critical asset with very limited redundancy • Significant community investment	4
Very High	• Mission-critical and unique asset • Significant service disruption from any outage • No redundancy • Significant community investment	5

Using the outputs from the State of Infrastructure (SOI) analysis and the ranking descriptions in **Table 6** the likelihood of asset failure for each asset type or component is assigned. The remaining useful life in **Table 6** is used to assign likelihood of failure, where data is available.

Table 6 - Likelihood of Failure Ranking

Likelihood	Description	Score
Very Low	• Remaining useful life is >75% of the asset lifespan • Assets are generally in very good condition, typically new or recently rehabilitated	1
Low	• Remaining useful life is between 75% and 35% of the asset lifespan • Assets are in good condition	2
Medium	• Remaining useful life is between 35% and 13% of the asset lifespan • Assets are in fair condition and will be subject to mid-life interventions	3
High	• Remaining useful life is between 13% and 3% of the asset lifespan • Assets are in poor condition and mostly below standard, with many elements approaching the end of their service life	4
Very High	• Remaining useful life is less than 3% of the asset lifespan • Assets are in very poor, unacceptable condition and should be replaced or rehabilitated	5

Once the asset consequence and likelihood have been scored, the risk rating can be calculated. The risk matrix in **Figure 2** shows the scale for the total score and rating.

Risk Score and Rating / Liklihood		Impact				
		Very Low 1	Low 2	Medium 3	High 4	Very High 5
Rare	1	1 Very Low	2 Very Low	3 Very Low	4 Very Low	5 Very Low
Unlikely	2	2 Very Low	4 Very Low	6 Low	8 Medium	10 Medium
Possible	3	3 Very Low	6 Low	9 Medium	12 High	15 High
Likely	4	4 Very Low	8 Medium	12 High	16 High	20 Very High
Almost Certain	5	5 Very Low	10 Medium	15 High	20 Very High	25 Very High

Figure 2: Overall Risk Score & Rating Matrix

Dashboards

The following dashboards provide a quick summary of the state of the current infrastructure for each Asset Class. The information in this plan was prepared using 2022 year-end inventory data. A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete and accurate key asset information is as it relates to supporting asset management decision making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

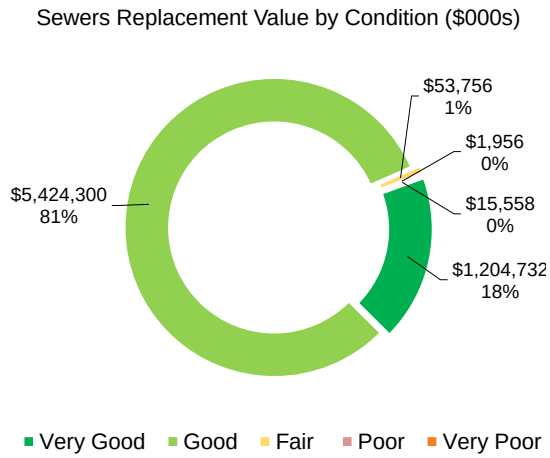
Asset Class:	Storm Sewers	Replacement Value	$6.8 Billion

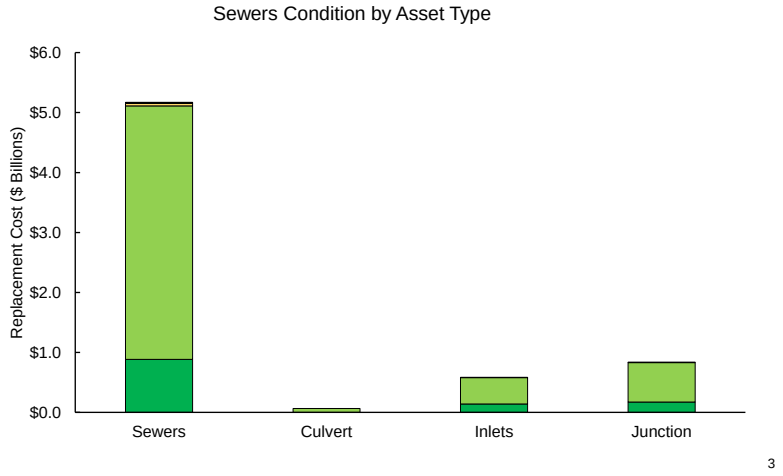
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	A

Trunk storm sewer under Dundas St W

Asset Type	Assets	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value ($000s)
Sewers	Main	1,652	Km	39	100	$3,400,000
	Trunk	142	Km	38	100	$1,753,900
	Foundation Drain Collector (FDC)	93	km	25	75	$79,000
Culverts	Major Culverts	0.76	km	51	100	$66,300
Inlets	Catch Basin (CB)	45,187	Ea.	37	100	$506,100
	Double Catch Basin (DCB)	5,436	Ea.	37	100	$79,800
Junction	Maintenance Hole (MH)	25,758	Ea.	38	100	$786,100
	CB Maintenance Hole (CBMH)	1,518	Ea.	40	100	$34,400
	FDC Maintenance Hole (FDCMH)	1,277	Ea.	26	100	$18,400
Outlet	Endwall, Apron, Energy Dissipator	855	Ea.	42	100	$37,400





[3]

[3] Above condition scores are based on physical assessments and are not weighted by replacement cost.

Asset Information

Storm Sewers is the largest of the three asset classes within the Stormwater Service Area. As shown in the dashboard, the asset class is valued at $6.8 billion with the majority attributed to storm mains and trunk sewers. The overall condition of the network is in a strong position with 99 per cent of the network in Very Good to Good condition. Estimated Unit Costs (EUC) were not available for some assets like fittings or service connections, and as a result, their value was not included in the overall replacement value. Asset attribute information is continually reviewed and updated which results in an overall increase in data quality and accuracy for this asset class.

Condition

Currently, the Stormwater Service Area is utilizing age/remaining useful life as a proxy of condition as illustrated in **Table 4.** The overall age-based condition rating of Storm Sewers is Good. There is a small percentage (less than one per cent) of assets that are rated in Poor and Very Poor condition, due to some assets reaching the end of their useful life. The Stormwater Service Area has begun to leverage available condition inspection records and has developed a digital repository for these inspections, which is linked to asset IDs in a geospatial database. Condition inspection ratings will replace age-based condition in future iterations.

Risk

Criticality ratings were developed for all storm sewer assets. Currently, consequence of failure is comprised entirely of the asset criticality score, which is based on the pipe size/diameter of assets. The likelihood of failure is based on the remaining useful life of each asset.

Figure 3 shows the risk rating breakdown from Very High to Very Low. Storm Sewers mainly comprises low risk assets, with 94 per cent being rated Very Low or Low risk. Less than 0.1 per cent (600 metres of sewer mains and trunks) of the assets are rated High risk.

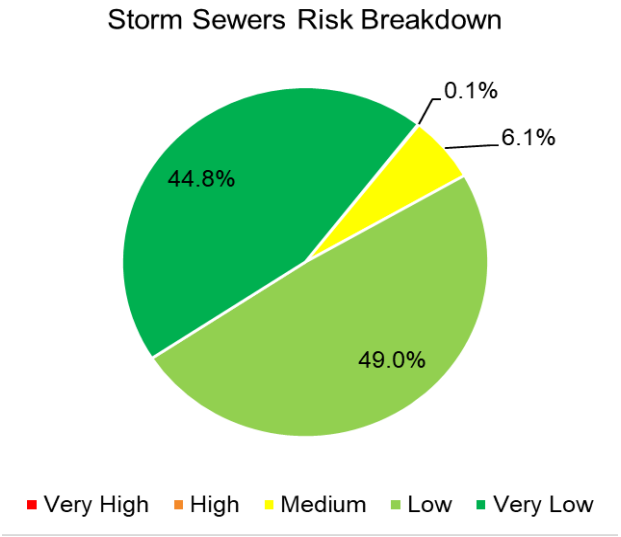


Figure 3: Storm Sewers Risk Breakdown

Asset Class:	Stormwater Management Facilities	Replacement Value	$221 Million

DATA QUALITY

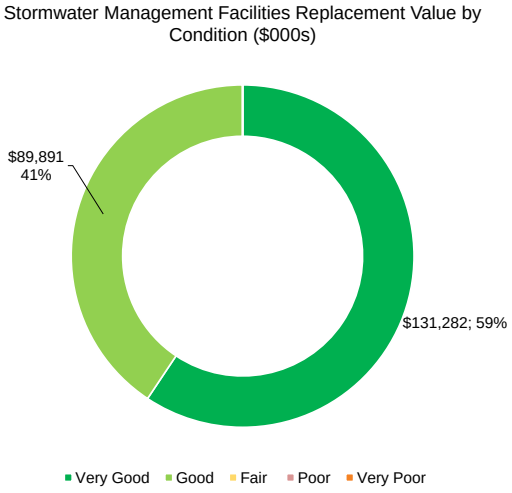
C Asset Inventory

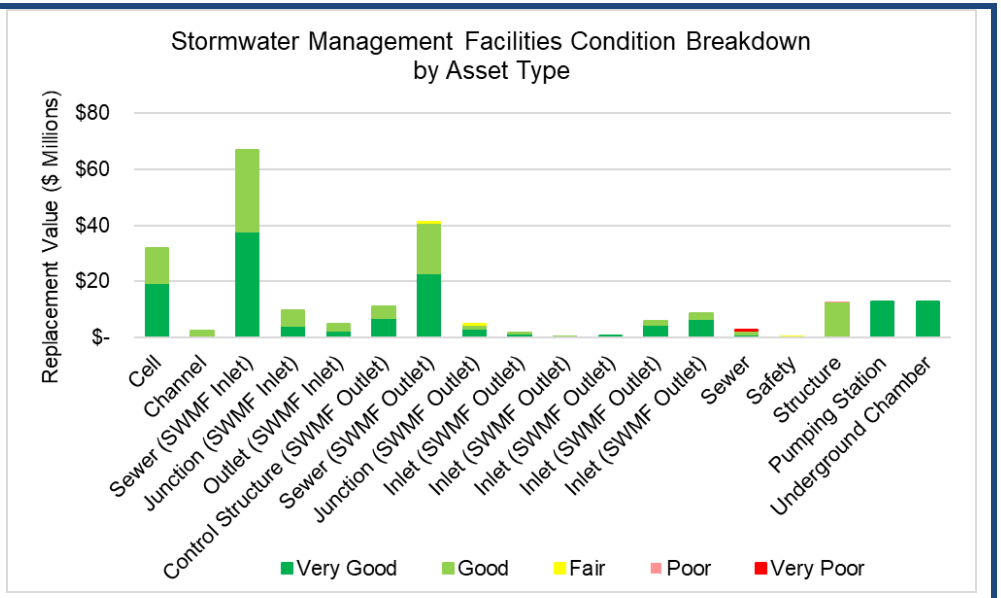
B Condition

A Replacement Value

Water Quality & Quantity Control Facility behind Tahoe Blvd

Asset Type	Asset Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Cell	Excavation, Lining, Fencing, Access Road, Vegetation	84	Ea.	21	98	$31,800
Channel	Inlet/Outlet, Overflow, Swales, etc.	2,950	m	25	94	$2,400
Sewer (SWMF Inlet)	Main, Trunk	15,263	m	18	91	$67,000
Junction (SWMF Inlet)	Maintenance Hole	163	Ea.	21	99	$9,700
Outlet (SWMF Inlet)	Endwalls	86	Ea.	22	99	$4,700
Control Structure (SWMF Outlet)	Non-standard Outlet Structure	33	Ea.	25	95	$11,000
Sewer (SWMF Outlet)	Main, Trunk	6,592	m	22	94	$41,000
Junction (SWMF Outlet)	Maintenance Hole	58	Ea.	22	98	$4,400
Inlet (SWMF Outlet)	Catchbasin, Ditch Inlet Catchbasin, Double Catchbasin, Headwall	196	Ea.	17	100	$8,600
Sewer	Berm Pipe/ MH/ CB	801	m	21	78	$2,400
Safety	Sign	100	Ea.	26	70	$0
Structure	Berm, Retaining Wall, Erosion Control	40	Ea.	21	65	$12,700
Pumping Station	Pumping Station	2	Ea.	4	43	$12,800
Underground Chamber	Underground Chamber	2	Ea.	4	75	$12,500





4

[4] Above condition scores are based on physical assessments and are not weighted by replacement cost

Asset Information

The 80 Stormwater Management Facilities (SWMF) range in function but are predominantly quantity (dry) and quality control (wet) ponds. The Stormwater Management Facilities asset class is comprised of cells, channels (swales, overflow routes), sewers (SWMF Inlet pipes, SWMF Outlet pipes, Berm pipe), Junctions (SWMF Inlet and outlet MHs), Outlets (SWMF Inlet endwalls), Control Structures (SWMF Outlet structures), Inlets (SWMF Outlet headwalls and catch basins), Underground Chambers, Pumping Stations, Safety (signs), and Structures (berms, retaining walls etc.).

Condition

SWMF assets are in Good or Very Good condition based on age. Most of the assets are less than 30 years old and are moving towards the middle of their service lives. Ongoing changes to condition are recorded through the inspection and monitoring program.

Risk

Criticality ratings were developed for all SWMF assets. The risk ratings were calculated by considering the following metrics: contributing drainage area; water storage volumes; location (proximity to houses and critical infrastructure such as major roadways or rail lines etc.); and function (quality/quantity control provided) of each facility. For each of these metrics, a criticality score was assigned and the average of these criticality scores was used to determine the overall criticality rating of each SWMF. The remaining useful life of the inlets and outlets associated with each SWMF was used to determine the likelihood of failure.

Figure 4 shows the percentage of SWMFs in each risk rating with 85.6 per cent being rated Very Low and Low risk. Of the remaining assets, 14.5 per cent are Medium risk and 0.1 per cent at High risk.

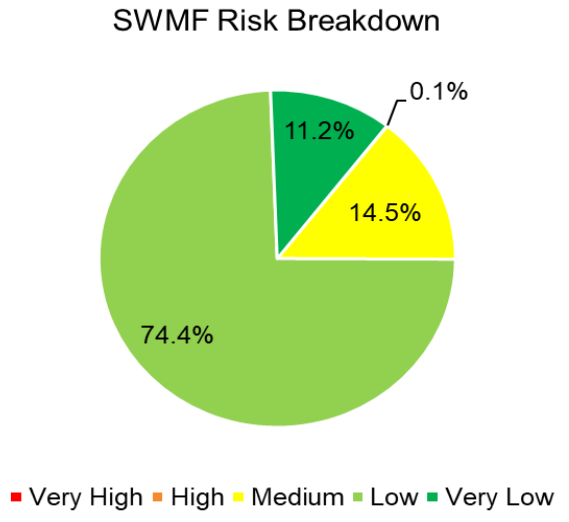


Figure 4: SWMF Risk Breakdown

Asset Class:	Watercourses	Replacement Value	$574 Million

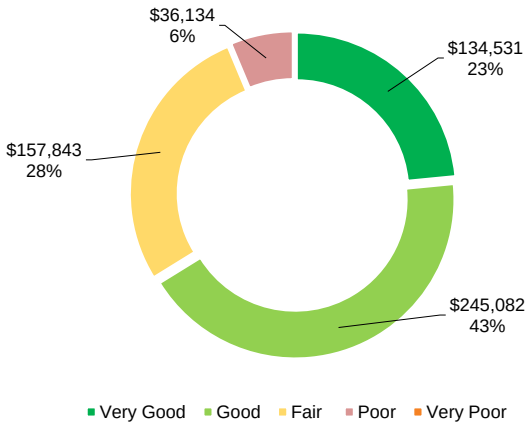
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	C

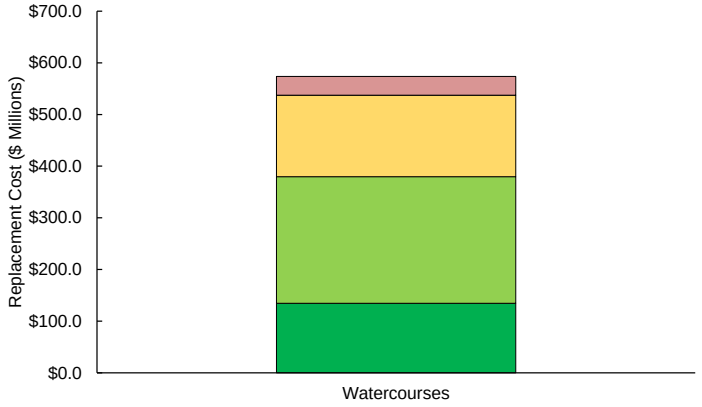
Cooksville Creek, downstream of Burnhamthorpe Rd E

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value ($000s)
Watercourses	150	km	N/A	N/A	$574,000

Watercourses Replacement Value by Condition ($000s)



Watercourses Condition by Asset Type



[5]

[5] Above condition scores are based on physical assessments and are not weighted by replacement cost.

Asset Information

The watercourse network is comprised of 32 creeks or rivers of which 150 kilometres are City owned/maintained and have been divided into smaller sections called “reaches". In Mississauga, there are approximately 50 km of additional watercourses under ownership of various stakeholders including other government bodies or private lands that are excluded from this AM Plan. A reach map of the full watercourse network is provided in **Figure** . The watercourse network includes natural and engineered assets. The engineered infrastructure is generally installed for erosion control or conveyance and is often comprised of materials like gabion baskets and armour stones. Natural assets include materials like stone, soil and plantings and provide a variety of watercourse functions and services. The asset inventory for the watercourse network has not been fully developed and componentized at this time. The replacement values of the watercourses were completed by applying an average unit cost to the reach length and a cost adjustment factor to estimate the value of engineered and natural assets based on known characteristics of the reaches. A spatially referenced watercourse inventory is currently in development in Arc GIS, and future plans will utilize this dataset for a more accurate inventory breakdown and detailed valuation.

Condition

Age information is not available because the detailed watercourse inventory is currently in development in Arc GIS. Stormwater staff routinely inspect the watercourse network based on the defined reach network to identify issues and re-assess known problem sites. As part of these inspections, the reaches are given a condition score/stability index based on visual indicators of geomorphic processes. These stability index scores are translated to a 5-point scale to create condition proxy ratings for the watercourse reaches in the interim.

Risk

Risk was calculated for each reach in the inventory. The criticality ratings were quantified using the internal assessment scores for ‘Problem Site’ score and ‘Zone’ defined for each reach. The ‘Problem Site’ score is based on the failure impact of assets within the reach. ‘Zone’ indicates the position of the reach along the watercourse. It is assumed that flows are expected to increase in lower reach positions, which generally correlates to higher criticality. The likelihood of failure was quantified using stability class and flow regime scores developed by staff. In general, reaches with higher indicators of instability and a turbulent flow regime have a higher likelihood of failure. Figure 5: Watercourses Risk Breakdown.

shows a summary of the percentage of the watercourse assets in each risk category. Most of the reaches are low-risk assets, with over 75 per cent having Low risk.

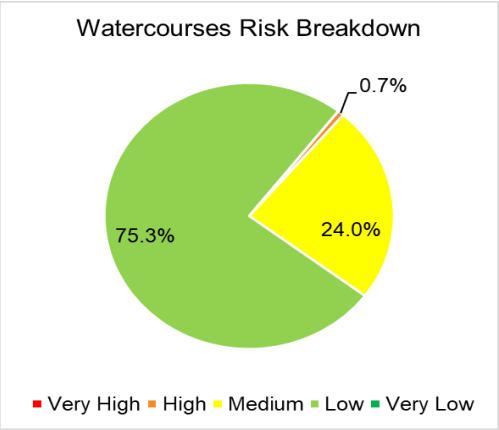


Figure 5: Watercourses Risk Breakdown

Levels of Service

The purpose of this section is to describe the levels of service (LOS) that City staff are currently providing and aim to provide for the Stormwater Service Area. LOS are performance measures that an organization intends to meet to deliver to its services to its customers. They should also be utilized as key drivers for influencing decisions and future investment in infrastructure assets. LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its ratepayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations.

Table 7 provides definitions criteria on how to develop LOS measures, this is based on examples from the 2015 International Infrastructure Management Manual (IIMM) which was written by a consortium of asset management professionals and is widely accepted as the guiding document to implement the ISO 55000 standard for infrastructure asset management.

Table 7 - Level of Service Criteria

Concept	Definition
Levels of Service (LOS)	Specific objectives of the service the organization intends to deliver, from the customer point of view. LOS provide the link between higher level corporate and asset management objectives with more detailed technical and operational objectives.
LOS Attributes	LOS attributes of the overall service that are relevant and meaningful to stakeholders.
Performance Measures	Criteria that can be measured and provide an indication of how the organization is doing in delivering the intended LOS form performance measures. They can be defined as: • *Customer performance measures* - Measures describing how the customer receives or experiences the service • *Technical performance measures* -Technical criteria the organization can measure to indicate how the service is being achieved

Level of Service Methodology

City staff followed the approach described below to identify key LOS objectives and appropriate performance measures.

Identify Stakeholders

Identify the stakeholders who are affected by the delivery of stormwater services. The stakeholder may use the service, rely on the service to provide their own service, regulate the service, depend on the service as part of their community service provision mandates, or connect to the service.

LOS Objectives and Attributes

Determine the key expectations (LOS objective) of each stakeholder. One or more service attribute is identified for each expectation statement. It is important to note that it is reasonable that the same attribute would apply to more than one expectation.

Legislative Requirements for Levels of Service

Review appropriate legislation and regulations that govern how the City provides stormwater management services. **Appendix B: Governing Legislation** identifies legislative acts that are critical or applicable to the provision of Stormwater services and project delivery. In addition to legislative requirements, there are several industry best-practice manuals and guidance documents that inform staff to effectively manage the City's stormwater system.

LOS Measures

LOS measures should identify an appropriate measurement for an attribute and describe how well the City is delivering that service attribute (e.g., how safe/reliable/affordable the service is). A useful LOS measure is quantitative and facilitates the development of "SMART" performance targets (that is, performance targets that are specific, measurable, achievable, relevant, and time-bound). The LOS measure identifies the 'thing' that the City should measure.

LOS measures can be grouped into the following categories:

- **Technical LOS measures:** Technical criteria the organization can measure to indicate how the service is being achieved. For example, minimize sources of pollutants in stormwater runoff
- **Customer LOS measures:** Measures describing how the customer receives or experiences the service. For example, the amount and type of stormwater services the City provides to protect the community from flooding

Current Performance

The LOS measures provided are predominantly from an asset planning perspective rather than operational. Through the Works Operations and Maintenance Division, the Stormwater Service Area also provides or contributes to several operation and maintenance services including, but not limited to, catch basin cleaning, street sweeping, storm sewer repairs and inlet/outlet inspection. City staff have plans to review, formalize and update the operation and maintenance LOS and as such there is potential for additional LOS measures in future Asset Management plans.

For each LOS measure, the result of the previous year (2022) is reported, unless otherwise stated.

Stormwater LOS

Ontario Regulation 588/17 prescribes customer and technical measures for stormwater as shown in**Table 8** (i.e., SW01-SW03). In addition to these requisite measures, staff have also compiled advanced measures in **Table 8** (i.e., SW04-SW18). The Stormwater Service Area has defined these LOS and their performance measures to be categorized as Scope, Reliability, Good Stewardship, Environment and Quality.

Table 8 - Stormwater Levels of Service

LOS Attribute	Service Area LOS Objective	Customer LOS Measure		Technical LOS Measure	
		Performance Measure	Current Performance (2022)	Performance Measure	Current Performance (2022)
Scope	O. Reg. 588/17 Requirements	**SW01:** Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	See maps and descriptions provided in **Figure** , **Figure** , and **Figure** . The resiliency of buildings[6] (via riverine and/or urban flooding) to 100-year storm events was estimated by development age as follows: Pre-1949, 95%; 1950-1969, 93%; 1970-1989, 89%; Post-1990, 95%. The resiliency of the SWM system[7] to 5-year storm events was estimated by development age as follows: Pre-1949, 92%; 1950-1969, 86%; 1970-1989, 89%; Post-1990, 91%.	**SW02**: Percentage of properties in municipality resilient to a 100-year storm.[6]	92.0%
				SW03: Percentage of the municipal stormwater management system resilient to a 5-year storm.[7]	94.0%
Reliability	Provide stormwater services to the community	**SW04:** Percentage of residents satisfied with stormwater services.[8]	63.0%	**SW05:** Percentage of municipal stormwater management system in Fair or better condition.[9]	98.0%
Good Stewardship	Assess the stormwater management system to limit impacts to the community	**SW06:** Percentage of residents satisfied with drainage of stormwater.[10]	67.0%	**SW08:** Percentage of storm sewer network closed-circuit television (CCTV) inspections completed annually.	7.0%
		SW07: Percentage of stormwater asset service requests resolved within 3-1-1 service level timelines.[11]	100.0%	**SW09:** Percentage of watercourse reach inspections completed annually.[12]	43.0%
				SW10: Percentage of SWMF inspections completed annually[13].	100.0%
Environment	Provide services to mitigate risk of stormwater pollution	**SW11:** Percentage of storm sewer by-law & spills service requests resolved within 3-1-1 service level timelines.[14]	100.0%	**SW13:** Number of Storm Sewer By-Law Contraventions mitigated.[15]	69

[6] SW02 is based on Credit Valley Conservation's (CVC) dual-drainage model for the Cooksville Creek watershed. The percentage of buildings resilient to riverine and urban flooding during a 100-year storm was modelled for various development eras (i.e., pre-1949, 1950-1969, 1970-1989, 1990+) and the results were applied City-wide based on the estimated age of development.
[7] SW03 is based on CVC's dual-drainage model for the Cooksville Creek watershed. The percentage of the storm network with 5-year storm or greater capacity was modelled for various development eras (i.e., pre-1949, 1950-1969, 1970-1989, 1990+) and the results were applied City-wide based on the estimated age of development. Storm sewers outside of the Cooksville area that were known to have a smaller capacity were also adjusted for in this estimate.
[8] SW04 is based on Citizen Satisfaction Survey results (2023) reported in the Stormwater Business Plan.
[9] SW05 is derived from condition-distribution for all stormwater asset classes (Storm Sewers, SWMFs and Watercourses) and weighted by replacement value for 2022.
[10] SW06 is based on Citizen Satisfaction Survey results (2023) reported in the Stormwater Business Plan.
[11] SW07 is based on 2022 Infor records for service codes related to watercourses and stormwater management ponds directed to the Environmental Services section. This excludes service codes that were directed to other service groups or not logged in Infor.
[12] SW09 is based on the length of reach inspections relative to the total number of City-owned/maintained reaches.
[13] SW10 for SWMF inspections are in accordance with inspection and maintenance frequencies prescribed by each individual SWMF's Environmental Compliance Approval (ECA).
[14] SW11 is based on 2022 Infor records for service codes directed to the Environmental Coordinator position. This excludes service codes that were directed to other service groups or those that were not logged in Infor.
[15] SW13 is based on the number of Storm Sewer By-Law Contraventions received in 2022, where pollutants are discharged to the storm sewer system. Every contravention is investigated, mitigated and resolved where possible. This figure excludes storm/sanitary sewer cross-connections, which are addressed separately.

LOS Attribute	Service Area LOS Objective	Customer LOS Measure		Technical LOS Measure	
		Performance Measure	Current Performance (2022)	Performance Measure	Current Performance (2022)
		SW12: Percentage of residents satisfied with cleanliness of City's creeks, rivers and streams.[16]	64.0%		
Quality	Maintain the stormwater management system to protect the community	**SW14:** Level of investment in the stormwater management system through the planning and delivery of Capital and Maintenance Programs.	Stormwater Business Plan & Budget is updated annually. [17] Staff utilize various criteria such as asset remaining useful life or performance indices to determine potential candidates for rehabilitation or replacement. **Table 9-Table 11** provide a breakdown of the condition rating scale used for each Asset Class.	**SW15:** Percentage of Storm Sewers assets in Fair or better condition.[18]	99.7%
				SW16: Percentage of Watercourses in Fair or better condition.[19]	93.7%
				SW17: Percentage of SWMFs in Fair or better condition.[20]	99.9%
				SW18: Percentage of Stormwater Quality Ponds with Fair or better function (based on sediment volumes).[21]	83.0%

[16] SW12 is based on Citizen Satisfaction Survey results (2023) reported in the Stormwater Business Plan.
[17] The Stormwater Business Plan & Budget documents how and where the City plans to allocate resources/funds to deliver stormwater programs and services.
[18] SW15 performance is based on age-based assessment of storm sewer assets in 2022.
[19] SW16 performance is based on most recent (various years) geomorphic stability class scores for City watercourse reaches.
[20] SW17 performance is based on age-based assessment of SWMF assets in 2022.
[21] SW18 performance is based on 2022 sediment volumes as reported in the Stormwater Business Plan. SWMF sediment volume assessments and removal works are prescribed by each individual SWMF's Environmental Compliance Approval (ECA)

Storm Sewer Network Description:

- The storm sewer network in the City of Mississauga includes over 1,887 km of linear storm sewers (mains, trunks, FDCs, and Structural Culverts), over 51,000 catch basins and 29,000 maintenance holes
- The vast majority of the City is serviced by storm sewers and/ or open ditches. However, the ditch and minor (driveway) culvert asset inventories have not been formally established at this time
- The majority of the City's storm sewer system is designed for a 10-year storm event

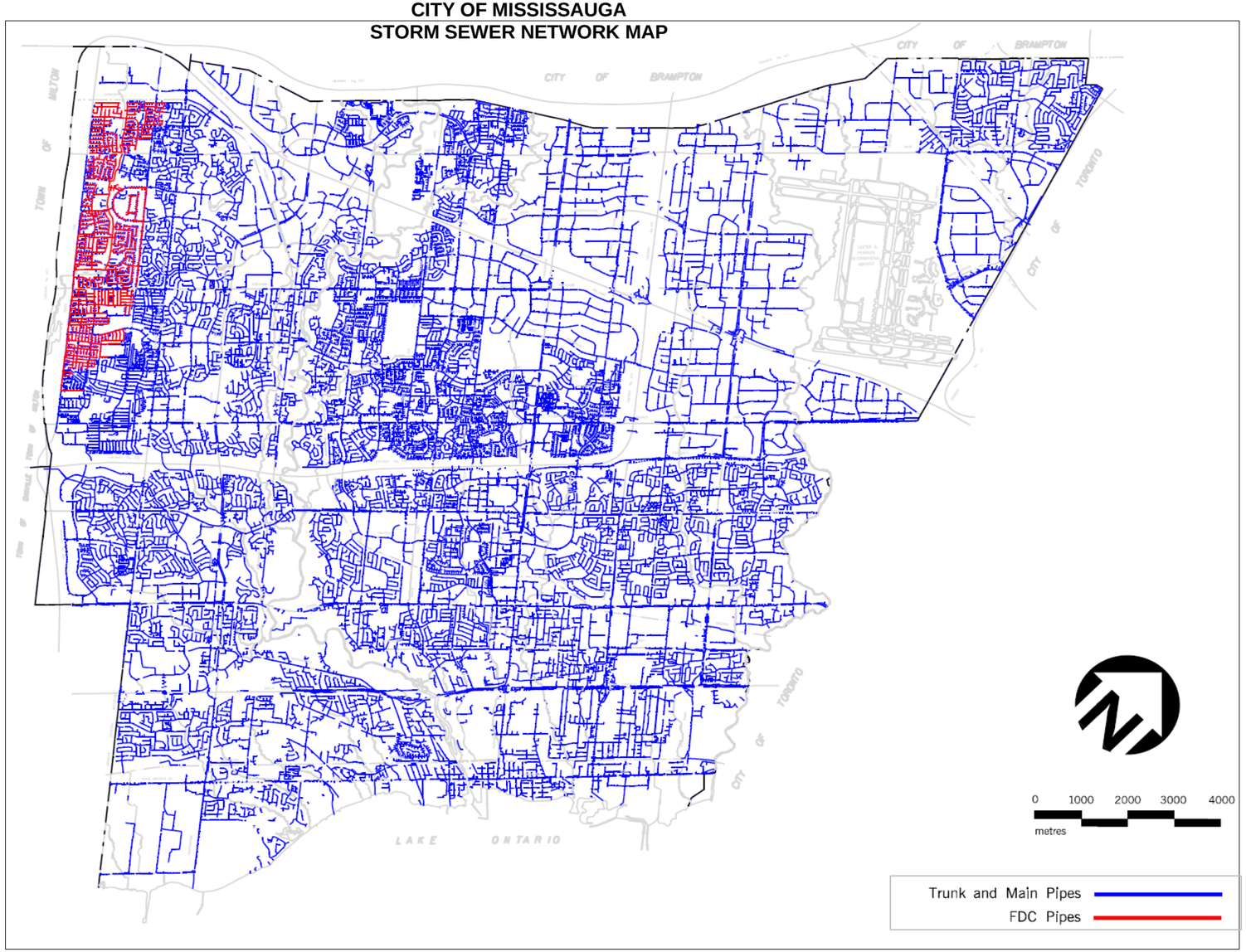


Figure 6 - City-wide Storm Sewer Drainage Network Map as per LOS Measure SW01

SWMF Inventory Description:

- The stormwater management system is comprised of 80 stormwater management facilities (SWMF) including water quality and/or water quantity control facilities, overland flow parks, Low Impact Developments (LIDs) and underground storage facilities
- These different stormwater controls were implemented over the decades (from the 1960s to present) resulting in some locations in the City lacking quality and/or quantity control, primarily depending on the age of development. The majority of the City's SWM facilities were built in the 1990s or later
- Overland flow parks for flood control have been implemented in new developments since the late 1970s
- Water Quantity ponds for flood control have been common in new developments since the 1980s. Some of these facilities have been retrofitted in later years to also provide water quality control
- Water Quality ponds for water treatment have been common in new developments since the 1990s
- LIDs and underground Storage facilities have largely

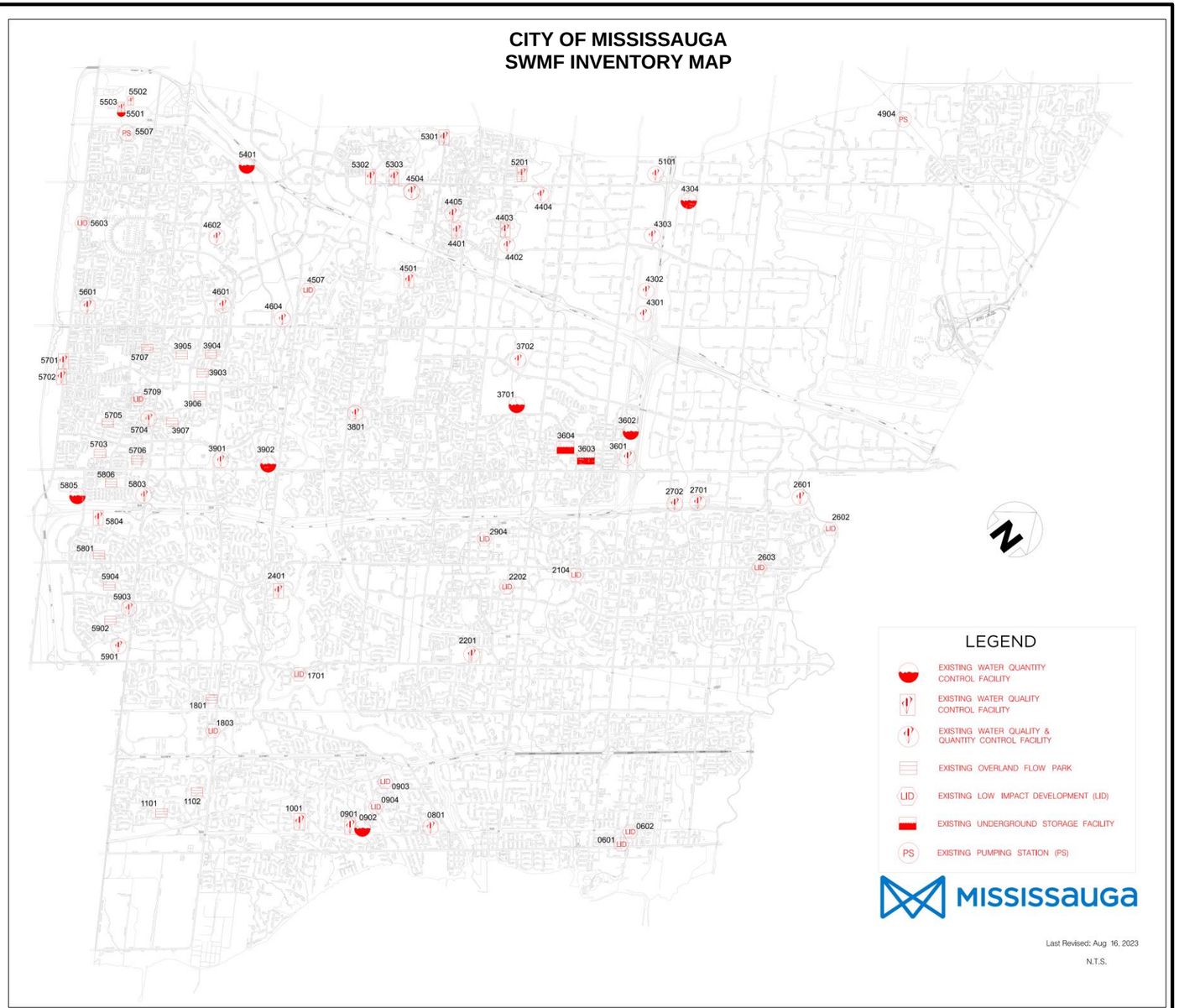


Figure 7 - City-wide SWMF Inventory Map as per LOS Measure SW01

Watercourse (Reaches) Network Description:

- There are approximately 200 km of linear watercourses in the City of Mississauga. The City is responsible for maintaining approximately 150 km of the watercourse network and associated bank, channel and instream assets
- The majority of these watercourses were existing naturally before the land was developed. However, many of the watercourses have been modified or enclosed for erosion and/ or flood control with materials such as concrete, armourstones and gabion baskets
- The City has initiated the process of mapping and assigning IDs to these assets

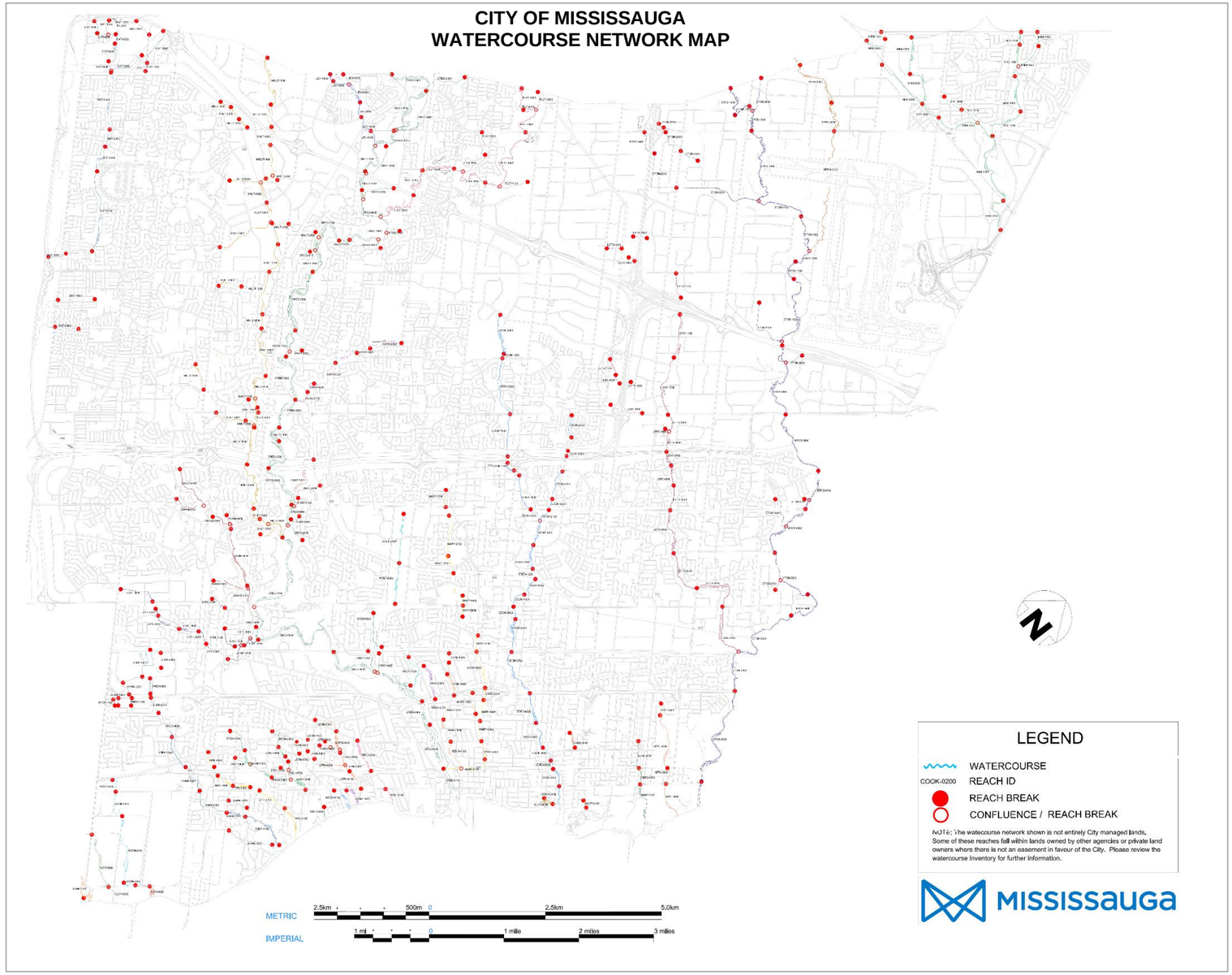


Figure 8 - City-wide Watercourse Network (Reaches) Map as per LOS Measure SW01

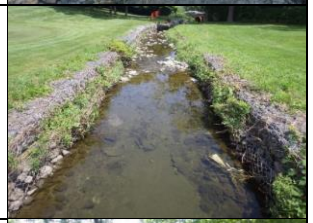
Table 9: Storm Sewer Condition Rating

Condition	Definition	Methodology (Remaining Useful Life)	Example of Condition
Very Good	Asset is in very good condition or better. It is new or recently rehabilitated. Asset is well-maintained. Asset is fit for the future.	RUL ≥ 75%	
Good	Asset is in good condition. Asset may have received repair or maintenance work. Asset is generally approaching mid-stage of expected service life.	75% > RUL ≥ 35%	
Fair	Asset is in fair or adequate condition. Asset shows signs of deterioration with some elements showing defects. Asset requires attention.	35% > RUL ≥ 13%	
Poor	Asset is in poor condition and is at risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life. Asset is not fit for future use.	13% > RUL ≥ 3%	
Very Poor	Asset is in very poor condition and is in major risk of affecting service. Large portion of the asset system exhibits significant deterioration and the condition is below standard. Asset is approaching end of service life. Asset is not fit for use.	RUL < 3%	

Table 10: Stormwater Management Facilities Condition Rating

Condition	Definition	Methodology (Remaining Useful Life)	Example of Condition
Very Good	Asset is in very good condition or better. It is new or recently rehabilitated. Asset is fit for the future.	RUL ≥ 75%	
Good	Asset is in good condition. Asset may have received repair or maintenance work. Asset is generally approaching mid-stage of expected service life.	75% > RUL ≥ 35%	
Fair	Asset is in fair or adequate condition. Asset shows signs of deterioration with some elements showing defects. Asset requires attention in the short-term.	35 > RUL ≥ 13%	
Poor	Asset is in poor condition and is at risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life and is not fit for future use.	13% > RUL ≥ 3%	
Very Poor	Asset is in very poor condition and is in major risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life. Asset is not fit for use.	RUL < 3%	

Table 11: Watercourses Condition Rating

Condition	Definition	Methodology (UCA/Stability Index)	Example of Condition
Very Good	Asset is in very good condition or better. It is new or recently rehabilitated. Asset is well maintained. Asset is fit for the future.	UCA/Stability Index Score: 0.0 – 0.10	
Good	Asset is in good condition. Asset may have received repair or maintenance work. Asset is generally approaching mid-stage of expected service life.	UCA/Stability Index Score: 0.11 – 0.20	
Fair	Asset is in fair or adequate condition. Asset shows signs of deterioration with some elements showing defects. Asset requires attention.	UCA/Stability Index Score: 0.21 – 0.30	
Poor	Asset is in poor condition and is at risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life. Asset is not fit for future use.	UCA/Stability Index Score: 0.31 – 0.44	
Very Poor	Asset is in very poor condition and is in major risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life. Asset is not fit for use.	UCA/Stability Index Score: 0.45 – 1.0	

Future Demand

The City's stormwater management system is designed to collect stormwater from private and public properties across the city. The system also accommodates stormwater from upstream municipalities (e.g., Brampton, Caledon). The Stormwater Service Area maintains a network of sewers and related assets that transport stormwater to the receiving watercourses (e.g., creeks, rivers) or directly to Lake Ontario. Stormwater Management Facilities support the system by providing water quality and/or quantity control. Together the system helps to protect the water quality of our creeks and Lake Ontario (the City's source of drinking water) and lowers the risk of flooding that can damage property and the environment.

The Stormwater Service Area is planning for the future by recognizing the pressures and challenges ahead resulting from aging stormwater infrastructure, extreme weather events, climate change and new legislation/regulations among other factors. There is an increasing need to plan and deliver effective and timely stormwater services, build a more resilient stormwater management system, and establish sustainable service levels. Strategies to meet these demands include continuous improvements of stormwater programs and services, increasing contributions to the Pipe Reserve Fund, the effective delivery of capital projects and studies and implementation of the Stormwater Master Plan and Asset Management Plan. These actions also align with the City's vision and strategic plan.

Demand Drivers

Drivers affecting demand include things such as changes to development form and density, regulations and legislation, technological changes, economic factors, environmental awareness and the direct impact of climate change on stormwater infrastructure. A summary of the internal and external drivers that affect demand for stormwater services is shown in **Table 12**.

In addition to the demand drivers listed above, the City of Mississauga has undertaken a Climate Change Vulnerability Assessment (CCVA) for select assets to support asset management decision making. Climate risks identified for stormwater infrastructure from the CCVA will be considered and where appropriate integrated into Stormwater's operating and capital decision-making.

Lake Saigon Stormwater Management Facility

Table 12 - Demand Drivers for Stormwater Services

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Aging Stormwater Infrastructure	The majority (94%) of the stormwater management system is currently in 'Good' or 'Very Good' condition. As such the Operations, Maintenance, Inspection (OMI) and Capital needs are relatively stable at this time.	As the City's stormwater infrastructure ages, the overall condition will decrease. The operating and maintenance costs are expected to increase as a result.	Aging infrastructure without intervention can lead to more unplanned service disruptions; emergency repairs; and associated budget stresses.	Develop and maintain a comprehensive asset management plan to formalize OMI, and Renewal and Rehabilitation (R&R) activities and maximize the useful service life of stormwater assets. In turn this will inform the level of investment required and Stormwater Charge revenue needed.
New Legislation & Regulations	There are a number of existing laws and regulations which dictate how the City provides stormwater management services. These are identified **Appendix B: Governing Legislation**. Current legislation has the greatest effect on capital rehabilitation and renewal projects where there may be significant impacts associated with the work.	In general, environmental awareness is strong and regulations are becoming stricter or formalized. Asset management regulations have recently been established and are expected to become more prescriptive. Legislation is subject to change based on changing governments.	New legislation may increase operating and capital pressures. Examples include continuously evolving species-at-risk habitat legislation that can limit construction timing windows, and excess soil management requirements that can add additional delays and costs to infrastructure improvement projects. New legislation could also require additional stormwater management practices to reduce stormwater runoff, improve water quality or implement infrastructure that is more resilient to climate change (e.g., low impact	Remain informed of changes to legislation and adjust maintenance and operating programs and budget accordingly.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
			developments (LID) infrastructure, on-site storage, etc.). This could increase the asset service life but potentially increase capital and operating costs. Minimum service requirements (e.g., inspection frequency) or minimum maintenance standards could also be legislated for critical stormwater infrastructure. Include the ECA process in this section.	
City Growth & Development	The majority of greenfield lands in the City have already been developed. Existing developments from different eras/generations have different stormwater characteristics and infrastructure standards. In general, older neighbourhoods (pre-1950s) have much less impervious cover than today. Storm sewers have been common since the 1950s, however, modern stormwater	Future development will largely be redevelopments of existing sites due to the limited land availability. Land use is also expected to intensify (i.e., more units/area). Development applications will be required to meet the latest stormwater management requirements to mitigate the effects of this increased intensification (i.e., by satisfying City's stormwater management criteria).	More intensive development will generally increase the amount of impervious cover on a site. Without effective stormwater management measures to mitigate these impacts, additional stormwater runoff will be produced which will add new stresses to the existing stormwater management system.	Continue to review and update the City's stormwater management requirements for development to mitigate the impacts of stormwater runoff from increased impervious area. Contemplate opportunities to upsize stormwater infrastructure to accommodate additional runoff.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	management practices were established in the 1990s to mitigate the additional runoff caused by additional impervious cover.			
Environmental Awareness	Environmental awareness is perceived to be generally strong in the younger, upcoming generation.	When the younger generation reaches voting age, they may demand a higher level of service for water quality and water quantity infrastructure (as it affects the environment).	Anticipated increased environmental awareness in future generations could lead to increased demand for a higher service level (e.g., greater expectations that the City make additional investment) for water quality and water quantity infrastructure.	Monitor changes in public satisfaction (e.g., survey, Business Plan) of stormwater services and consider adjusting investment accordingly to meet desired level of service.
Asset Management Planning	Asset Management is a relatively new concept for Ontario Municipalities. Ontario Municipalities are required to develop an asset management plan for core infrastructure by 2021 and an enhanced plan by 2025.	Effective asset management planning is expected to become standard practice.	Effective asset management planning should allow the City to make effective risk-based decisions. The asset management plan should include inspection programs and maintenance strategies to identify problems and intervene at the right times to fund rehabilitation and replacement works. The results should be cost-effective spending on the right assets, at the right time to maximize an assets useful service life.	Continue to implement asset management principles and procedures and identify/document continuous improvements through updated maturity assessments and Asset Management Plans.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Technology	New techniques such as trenchless rehabilitation are expensive, evolving and may be limited contractor availability. The technology and industry are relatively new and few qualified contractors are available.	The cost to rehabilitate aging stormwater assets should become more affordable in the future as the marketplace for qualified contractors becomes more competitive.	Stormwater rehabilitation projects may become more affordable in the future as the technology becomes more available and competitive in the marketplace.	Monitor and learn about changes to available renewal technologies. Communicate with other municipalities to discuss changes in best industry practice.
CLIMATE CHANGE DEMAND DRIVERS[22][23]				
More frequent and extreme rainfall events leading to flooding	The existing stormwater management system collects stormwater runoff and provides safe conveyance/control via storm sewers, ditches, facilities and watercourses before discharge to Lake Ontario. The capacity of Mississauga's minor system is generally designed for a 10-year storm using historical	The frequency, volume, and intensity of rainfall events is expected to increase across all seasons and all return periods. For example, one in 10-year, 15-minute duration rainfall is projected to increase by 30% and 90% in the 2050s and 2080s, respectively.	Risk of private/public property flood and erosion damage (e.g., damage to private homes, businesses, institutions, public lands and road right-of-way). Flooding can result in damage to structures and surrounding areas, particularly when these structures are undersized or blocked. Risk of litigation against the City as result of damage to private property. When over capacity, smaller culverts may blow out, with disruption in road access in	Coordinate with Roads Service Area to align storm sewer upgrade projects with road renewal activities, where possible. Trends for intense rainfall events are expected to increase into the 2080s, further limiting the capacity of bridges and culverts to pass the flows without overtopping. When data available, implement tracking of events and locations of overtopping to Identify infrastructure with

[22] Auld, H., Switzman, H., Comer, N., Eng, S., Hazen, S., and Milner, G. 2016. *Climate Trends and Future Projections in the Region of Peel. Ontario Climate Change Consortium: Toronto, ON*
[23] Climate Risk Institute (CRI), Emmons & Olivier Resources Inc. (EOR), Nodelcorp, and Climalogik. 2023. Climate Change Risk and Adaptation Assessment for Asset Management. Prepared for the City of Mississauga, Ontario.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	rainfall data. Where available, overland flow routes collect flows that exceed the capacity of the minor system. Some older developments were designed with now out-dated design standards.		the area of the failure and overland flow affecting other parties and assets. Infrastructure potentially failing earlier than expected due to increased demand/stress (e.g., pipe/facility failures, erosion control failures). Existing infrastructure may need to be up-sized or retrofitted to provide the same service level and/or resiliency (e.g., upsizing storm sewers/culverts, improving resiliency of facilities and erosion control works, etc.). New infrastructure may be required to mitigate risks (e.g., flood storage facilities, storm relief sewers, low impact developments, etc.). Risk of more unplanned failures/emergency responses (e.g., road washouts, sinkholes, flood related clean-up/repairs). Increased storms and heavy rainfall events can slow down and increase the maintenance and repair costs associated with delivering adequate level of service. Increased capital and operating costs.	a higher likelihood of failure. Plan and implement studies to identify priorities and implement system improvements to mitigate risk to the stormwater management system. Leverage development design standards to limit compounding impacts on the receiving stormwater management system.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
			The imperviousness of the watersheds draining to creeks and rivers in the City highlight the need to disconnect and reduce imperviousness such as with GI to slow and treat that runoff.	
Increased risk of long-duration freezing rain events leading to ice storms	Road salt is applied to roadways to mitigate freezing rain events and as a result is discharged into the stormwater management system.	The frequency of freezing rain events lasting six hours or more for the typically coldest months could increase in southwestern and south-central Ontario by 40% by the 2050s.	Additional road salt application may reduce the expected useful life of stormwater infrastructure (e.g., through corrosion, etc.) and further impact water quality in watercourses and Lake Ontario.	Works Operations and Maintenance have begun to use brine as part of their regular winter program to reduce salt concentrations. When data available, monitor impacts of freezing rain and adjust capital and operating programs and budgets accordingly.
Increased frequency and intensity of extreme weather events	High wind and ice events can cause tree limbs and woody debris to fall, which can accumulate in watercourses and other stormwater infrastructure.	A warmer, hotter, and seasonally varying future climate provides conditions favorable for extreme events such as lightning and thunderstorms, snowstorms, freezing rain, ice accretion, extreme winds, droughts, wildfires, riverine flooding, and storm surges. The occurrence of wind gusts is likely to increase in the future in line with	More debris (woody organic, urban) accumulating in the stormwater management system (catch basins, sewers, creeks, ponds) poses risks to maintaining network drainage and limiting potential flooding and/or erosion. Increased risk of debris jams/blockages and associated impacts; additional costs for debris clean-up. Stormwater conveyance systems can be impacted from wind and storm events when	Monitor changes to extreme events and adjust operating programs and budget accordingly.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
		more energetic atmospheric circulation patterns. Heat events in the summer are expected to increase which are favorable conditions for convective storms.	debris clogs inlets and pipes leading to a decrease in capacity. Although stormwater systems are typically designed to withstand heavy rainfall, systems can quickly become overwhelmed if undersized or blocked.	
More frequent extreme heat days (>30 degrees Celsius)	Extreme heat or drought events could raise temperatures, decrease seasonal baseflow in watercourses and impact water quality. Stormwater management facilities with permanent pools act as a heat sink for solar radiation and discharge into the City's watercourses.	An increase in the frequency and intensity of warm extremes are expected. Not only are warm temperature extremes projected to be more severe, but they are also projected to be frequent on average. For example, the number of days where the daily maximum temperature is more than 35°C is projected to increase by 10 times in the 2050s and 37 times in the 2080s. The number of heatwave days will likely increase by 38 days in the 2050s and 67 days in the 2080s.	An increase in extreme heat can lead to warmer water within and being discharged into the City's watercourse network, which can negatively affect water quality/availability and aquatic habitats.	When data is available, monitor changes in extreme heat day events and adjust capital improvement programs and budget accordingly. Consider actions to mitigate this risk (e.g., updates to stormwater management criteria, LID practices, cooling BMPs, increased riparian/pond vegetation, etc.).
Changing freeze-thaw cycles	Changing freeze thaw cycles may lead to more frequent ice jams in culverts.	Warmer winter temperatures could imply more freeze thaw cycles in the short and medium	Freeze-thaw events are expected continue into the 2050s with an expected decrease into the 2080s,	Tracking the events and locations of overtopping to identify locations with

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
		term. However, it is important to note that risk related to freeze-thaw decreases from medium in the 2050s to low in the 2080s since the number of days with a freeze-thaw cycle may decrease in the long term.	resulting in less ice related impacts and degradation from de-icing materials in the long-term.	higher/increasing likelihood of failure. Tracking related O&M expenditures identify when budgets needed to deal with the related impacts can be redistributed.

Lake Aquitaine SWMF Inlet

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions

Activities that do not alter the condition or performance of assets or services, but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions/Expansion/Rebuild

These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)

Operations & Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Renewal/Rehabilitation

Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement

Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition

Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Table 13-Table 24 provide a summary of the different strategies and actions that staff employ for their applicable lifecycle activities along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 13 - Current Lifecycle Management Activities (All Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities

Non-Asset Solutions	All	• Condition assessment tools and software
		  ○ CCTV management software for sewers
		  ○ MS Access database for Watercourse and SWMFs
		• Infor to track service requests and work orders
		• Utilize geospatial mapping software (ESRI GIS)
		• Master Plans (e.g., Stormwater Master Plan)
		• Flood Evaluation, Prioritization and/or Rehabilitation Studies (e.g., CRAMS, MCRS, etc.) and Water Quality Studies
		• Development Charge (DC) Studies
			• Inability to identify and record asset condition to inform decision-making for maintenance and capital programs
			• Inability to track service requests and works orders, to understand capital/maintenance work has been completed and that customer needs have been addressed
			• Without geospatial mapping staff are unable to visualize, store and maintain large asset inventories and integrate with condition/inspection programs
			• Strategic planning/budgeting, project prioritization and capital costing is not effective without Master Plans and other studies to inform long-term decision making
			• Without DC studies the City cannot collect funding for growth-related projects and satisfy legislated requirements

Acquisitions/Expansion /Rebuild	All	• Feasibility studies
		• Design and construction of new:
		  ○ Storm sewer assets and pipe upgrades
		  ○ Stormwater management facilities to manage water quantity and quality
		  ○ Watercourse assets to minimize erosion and to increase capacity
		• Maintain effective stormwater management development requirements
			• Inadequate planning and implementation of infrastructure to manage existing and potential growth pressures
			• Inability to mitigate climate change impacts and other demand factors

Table 14 - Current Lifecycle Management Activities (Storm Sewer Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Operations	Leads	• Inspections (as and when required)	• Failure to inspect leads can result in unexpected operational and structural issues
	Mains	• Inspections (10-year cycle) for smaller diameter mains. Inspections for larger infrastructure based on criticality and age • Operations–Annual street cleaning (Spring)	• Failure to inspect mains can lead to unexpected operational and structural issues • Failure to sweep streets may lead to debris accumulation in the storm system and water quality impacts
	Maintenance holes	• Road Patrols to check for general safety issues • Operations–Annual street cleaning (Spring)	• Failure to inspect MHs can lead to unexpected operational and structural issues • Failure to sweep streets may lead to debris accumulation in the storm system and water quality impacts
	Catch Basins	• Road Patrols to check for general safety issues, and visual inspection for blockages at high risk and known problem areas after major storms • Operations – catch basin cleaning every 3-years and annual street cleaning (Spring)	• Failure to inspect catch basins can lead to unexpected operational and structural issues • Failure to clean catch basins can lead to debris accumulation in the storm system and water quality impacts
	Inlets	• Visual inspection for blockages at high risk and known problem areas after major storms • Operations – Debris and graffiti removal	• Failure to inspect inlets can lead to unexpected drainage issues (i.e., ponding water, localized flooding)
	Outlets	• Visual inspection for blockages at high risk and known problem areas after major storms • Operations–Debris and graffiti removal	• Failure to inspect outlets can lead to unexpected drainage issues
	Culverts & Ditches	• Road Patrols to check for general safety issues • Operations–Annual street cleaning (Spring)	• Failure to inspect culverts and ditches can lead to unexpected operational and structural issues • Failure to sweep streets may lead to debris accumulation in the storm system and water quality impacts

Table 15 - Current Lifecycle Management Activities (Storm Sewer Assets)

Activities	Asset Type/	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Maintenance	Leads	• Emergency Repairs	• Failure to repair broken leads can cause drainage and structural issues in the roadway
	Mains	• Preventative Maintenance - Flush system proactively to prevent blockages • Reactive Maintenance – Flushing where pipes have blocked, emergency repairs, root cutting, leaf clearing	• Failure to flush pipes can lead to blockages, ponding water in the streets, potential flooding and premature failure of the assets • Failure to repair pipe emergencies can lead to flooding issues and/or damage to the roadway • Failure to remove intruding roots can lead to blockages, flooding and/or premature failure
	Maintenance Holes	• Preventative Maintenance-Flush system proactively to prevent blockages • Reactive Maintenance–Flushing where MHs have blocked, emergency repairs, root cutting, leaf clearing, and spill response	• Failure to flush MHs can lead to blockages, ponding water in the streets, potential flooding and premature failure of the assets • Failure to repair MH emergencies can lead to flooding issues and/or damage to the roadway • Failure to remove intruding roots can lead to blockages, flooding and/or premature failure
	Catch Basins	• No Preventative Maintenance • Reactive Maintenance–emergency repairs	• Failure to repair catch basin emergencies can lead to flooding issues and/or damage to the roadway
	Inlets	• No Preventative Maintenance • Reactive Maintenance – emergency repairs	• Failure to repair inlet emergencies can lead to flooding issues and/or damage to the roadway
	Outlets	• No Preventative Maintenance • Reactive Maintenance – emergency repairs, spill response, fence repairs/replacements	• Failure to repair MH emergencies can lead to flooding issues and/or damage to the roadway • Failure to provide spill response can detriment water quality and lead to compliance issues
	Culverts & Ditches	• No Preventative Maintenance • Reactive Maintenance – emergency repairs	• Failure to repair culvert emergencies can lead to flooding issues and/or damage to the roadway or private lands

Table 16 - Current Lifecycle Management Activities (Storm Sewer Assets)

Activities	Asset Type/	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Renewal/ Rehabilitation	Leads	• No Rehabilitation Activities	• N/A
	Mains	• No Early Life activities • No Mid-Life activities • Later Life–Trenchless rehabilitation	• Failure to rehabilitate storm mains can leads to structural failure
	Maintenance Holes	• No Early Life activities • Mid/Later-Life-Replacement of grade adjustment units as required; Replacement of MH covers as required	• Failure to adjust MHs can lead to damage to roadway and vehicles • Failure to replace broken MH lids can lead to damage to roadway and vehicles
	Catch Basins	• No Early Life activities • Mid/Later-Life-Replacement of grade adjustment units as required; Replacement of grates as required	• Failure to adjust catch basins can lead to damage to roadway and vehicles • Failure to replace broken catch basin lids/grates can lead to damage to roadway and vehicles
	Inlets	• No Early Life activities • No Mid-Life activities • Later Life–Local repairs, erosion protection and grate replacements	• Failure to repair grates can lead to blockages, flooding and/or compliance issues
	Outlets	• No Early Life activities • No Mid-Life activities • Later Life–Local repairs, erosion protection and grate replacements	• Failure to repair grates can lead to blockages, flooding and/or compliance issues
	Culverts & Ditches	• No Early Life activities • No Mid-Life activities • Later Life–Trenchless rehabilitation	• Failure to renew culverts can leads to structural failure

Table 17 - Current Lifecycle Management Activities (Storm Sewer Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Replacement	Leads	• Replace at End of Life	• Failure to replace broken leads can cause drainage and structural issues in the roadway
	Mains	• Replace at End of Life	• Failure to replace mains can cause drainage, structural and safety issues in the roadway
	Maintenance Holes	• Replacement of grade adjustment units (if broken or compromised) or addition of grade adjustment unit at Mid-Life • Replacement of maintenance hole cover/lid as required at Mid-Life and Later Life • Replace at End of Life	• Failure to replace MHs can cause drainage, structural and safety issues in the roadway
	Catch Basins	• Replacement of grade adjustment units (if broken or compromised) or addition of grade adjustment unit at Mid-Life • Replacement of grates as required at Mid-Life and Later Life • Replace at End of Life	• Failure to replace catch basins can cause drainage, structural and safety issues in the roadway
	Inlets	• Replace at End of Life	• Failure to replace inlets can cause upstream drainage and structural issues
	Outlets	• Replace at End of Life	• Failure to replace outlets can cause drainage, structural and safety issues in the roadway
	Culverts & Ditches	• Replace at End of Life	• Failure to replace culverts can cause drainage, structural and safety issues in the roadway

Table 18 - Current Lifecycle Management Activities (Storm Sewer Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Disposal/Demolition	Leads	• Decommission at End of Life if asset is no longer required	• Failure to decommission assets properly can lead to conflicts with other utilities in the right of way
	Mains		
	Maintenance Holes		
	Catch basins		
	Inlets		
	Outlets		
	Culverts & Ditches		

Table 19 - Current Lifecycle Management Activities (Stormwater Management Facility Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with lifecycle activities
Operations	Cells	• Annual condition inspections • Sediment survey every 5-years	• Failure to complete condition inspections can lead to unexpected operational and structural issues • Failure to complete sediment surveys can lead to unexpected loss of water quality and quantity function in ponds
	Channels	• Annual condition inspections • Debris removal if/when required	• Failure to inspect channels may lead to unexpected operational and structural issues (i.e., blockages)
	Structures	• Annual condition inspections • Debris removal if/when required • Graffiti removal if/when required	• Failure to inspect structures may lead to unexpected operational and structural issues • Failure to clear debris may lead to blockages and/or flooding issues
	Signs	• Annual condition inspections • Graffiti removal if/ when required	• Failure to inspect condition of signage may impact the City's compliance with applicable legislation and expose the City to liability risk
	Inlets	• Annual condition inspections, and functional inspections twice annually • Operations–Clean and remove debris if/when required • Remove vegetation from fencing	• Failure to inspect inlets may lead to unexpected operational and structural issues (i.e., blockages) • Failure to clear debris may lead to blockages and/or flooding issues • Failure to clear debris from fencing can lead to safety issues
	Outlets	• Annual condition inspections, and functional inspections twice annually • Operations – Clean and remove debris twice annually (in-line with functional inspection) or if/ when required • Remove vegetation from grates and fencing	• Failure to inspect outlets may lead to unexpected operational and structural issues (i.e., blockages) • Failure to clear debris may lead to blockages and/or flooding issues • Failure to clear vegetation from grates and fencing can lead to flooding and/or safety issues

Table 20 - Current Lifecycle Management Activities (Stormwater Management Facility Assets)

Activities	Asset Type	Specific AM Practices or Planned Actions	Specific risks associated with incomplete lifecycle activities
Maintenance	Cells	• Preventative Maintenance – Sediment removal (when required) • Reactive Maintenance – Algae treatment, minor repairs, fence repairs, vegetation removal along access routes	• Failure to remove sediment can lead to loss of water quality and/or quantity function in pond and compliance issues • Failure to treat algae issues can lead to water quality and aesthetic issues • Failure to maintain fences can lead to public safety issues • Failure to maintain access roads can lead to increased capital costs
	Channels	• No Preventative Maintenance Activities • Reactive Maintenance–Vegetation and debris removal, emergency repairs, and erosion repairs	• Failure to maintain channel can lead to erosion, blockages and/or flooding issues
	Structures	• No Preventative Maintenance Activities • Reactive Maintenance – Emergency repairs, erosion repairs	• Failure to maintain structures can lead to blockages, erosion and/or flooding issues • Failure to remove graffiti can lead to aesthetic concerns
	Signs	• No Preventative Maintenance Activities • Reactive Maintenance – Vegetation removal, sign repairs	• Failure to maintain signs can lead to compliance and public safety issues
	Inlets	• No Preventative Maintenance Activities • Reactive Maintenance – Headwall/grate, fence repairs, rip-rap repairs	• Failure to maintain inlets can lead to safety, erosion, blockages and/or flooding issues
	Outlets	• No Preventative Maintenance Activities • Reactive Maintenance – Headwall/Grate/fence repairs, rip-rap repairs, beaver mitigation	• Failure to maintain outlets can lead to erosion, blockages and/or flooding issues • Failure to manage beaver impacts can lead to safety, blockages and/or flooding issues

Table 21 - Current Lifecycle Management Activities (Stormwater Management Facility Assets)

Activities	Asset Type	Specific AM Practices or Planned Actions	Specific Risks Associated with Incomplete lifecycle activities
Renewal/ Rehabilitation	Cells	• No Early or Mid-Life Activities • Later Life–Liner Replacement	• Failure to replace liners can lead to unintended water infiltration and excavation difficulty during sediment removal projects
	Channels	• No Early, Mid, or Later Life Activities	• N/A
	Structures	• No Early Life Activities • Mid-Life–Localized patching and repairs • Later Life–Larger scale patches and repairs	• Failure to renew/rehabilitate structures can lead to structural failure
	Signs	• No Early, Mid, or Later Life Replacement activities	• N/A
	Inlets	• No Early Life activities • Mid-Life–localized point repairs of pipes, manholes and inlet structures; erosion protection repairs • Later Life–inlet grate repair and/or replacement	• Failure to rehabilitate inlets can lead to structural failure, blockages, and excess downstream erosion
	Outlets	• No Early Life activities • Mid-Life–localized point repairs of pipes, manholes and outlet structures • Later Life–Sluice gate and outlet grate repair or replacement	• Failure to rehabilitate outlets can lead to structural failure, blockages, and upstream flooding
Replacement	Cells	• No replacement of cells	• N/A
	Channels	• Replacement of rip-rap or gabions around channels	• Failure to replace channel materials can lead to structural failure of the channel, erosion or flooding issues
	Structures	• Replacement of rip-rap or gabions around structures	• Failure to replace these materials can lead to erosion or flooding issues
	Signs	• Replacement of sign	• Failure to replace signs may lead to compliance or public safety issues
	Inlets	• Replacement of inlets	• Failure to replace inlets can lead to structural failure, blockages and flooding issues
	Outlets	• Replacement of outlets	• Failure to replace outlets can lead to structural failure, blockages and flooding issues

Table 22 - Current Lifecycle Management Activities (Stormwater Management Facility Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with lifecycle activities
Disposal/Demolition	Cells	• No disposal activities	• N/A
	Channels	• Channel materials are generally landfilled at the end of their life	• N/A
	Structures	• Structures are generally landfilled at the end of their life	• N/A
	Signs	• Signs are generally landfilled at the end of their life	• N/A
	Inlets	• Inlet structures are generally landfilled at the end of their life	• N/A
	Outlets	• Outlet structures are generally landfilled at the end of their life	• N/A

Table 23 - Current Lifecycle Management Activities (Watercourse Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with lifecycle activities
Operations	Watercourse	• Reach inspection program to document and assess the condition of assets and problem sites. Occurs at a frequency varying from one to five years • Woody debris program to monitor for debris blockages at established critical locations at least twice per year • Adaptive Management program to inspect and assess the stability of recently completed maintenance projects. Typically conducted annually for a minimum of three years • Deposition program to monitor and measure the progression of deposited material (typically stones) in the channel. Occurs at a frequency aligning with the reach inspection schedule • Beaver program to monitor potential impacts of beavers or their dams on adjacent property and infrastructure. Monitoring frequency is determined on a case-by-case basis but typically occurs at least once per week for the first few weeks and then revised accordingly as needed	• The reach inspection program is the primary tool for capital prioritization. Failure to complete the program may lead to unexpected failure of watercourse assets, which can cause flooding and/or erosion issues • Failure to complete woody debris inspections can lead to blockage of critical infrastructure being unreported and associated flooding • Failure to complete adaptive management inspections can lead to undocumented changes in maintenance works • Failure to complete deposition program inspections can lead to undocumented changes at deposition sites • Failure to complete beaver monitoring program can lead to adjacent flooding or erosion
Maintenance	Watercourse	• Preventative Maintenance - Practice to clear debris blockages (including beaver dams) in watercourse to prevent localized erosion and upstream flooding issues. Beaver trapping on an as-needed basis • Reactive Maintenance – Debris removal	• Failure to remove debris blockages from the watercourse can lead to erosion and/or flooding to private or public property

Table 24 - Current Lifecycle Management Activities (Watercourse Assets)

Activities	Asset Type	AM Practices or Planned Actions	Risks Associated with lifecycle activities
Renewal/ Rehabilitation	Watercourse	• No Early Life activities • Mid-Life/Later Life - Minor Erosion Control Works (Partial Replacement of Bank- approximately 20m-30m length)	• Failure to complete works in a timely manner can lead to additional erosion or flooding issues; damage to private or public property
Replacement	Watercourse	• Replacement of entire bank where there is risk to surrounding property and adjacent infrastructure (Capital Works)	• Failure to complete replacement works in a timely manner can lead to additional erosion or flooding issues; damage to private or public property
Disposal/Demolition	Watercourse	• The majority of materials left over from watercourse infrastructure are removed and landfilled • Some erosion control materials may be re-used or repurposed during renewal projects (e.g., armourstones, rip rap)	• N/A

Lifecycle Needs vs Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations.
- All lifecycle activity costs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

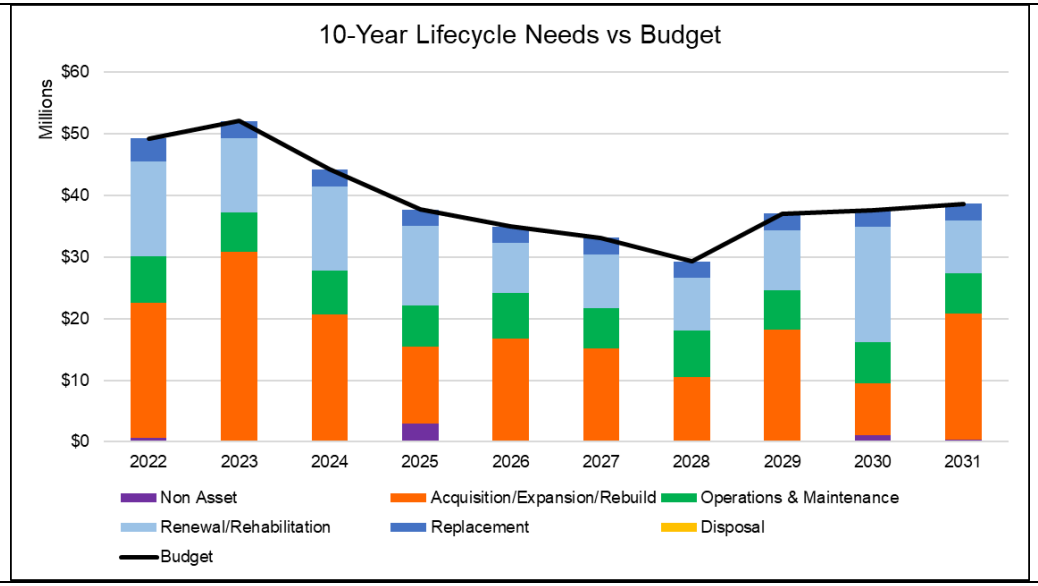
Budget assumptions

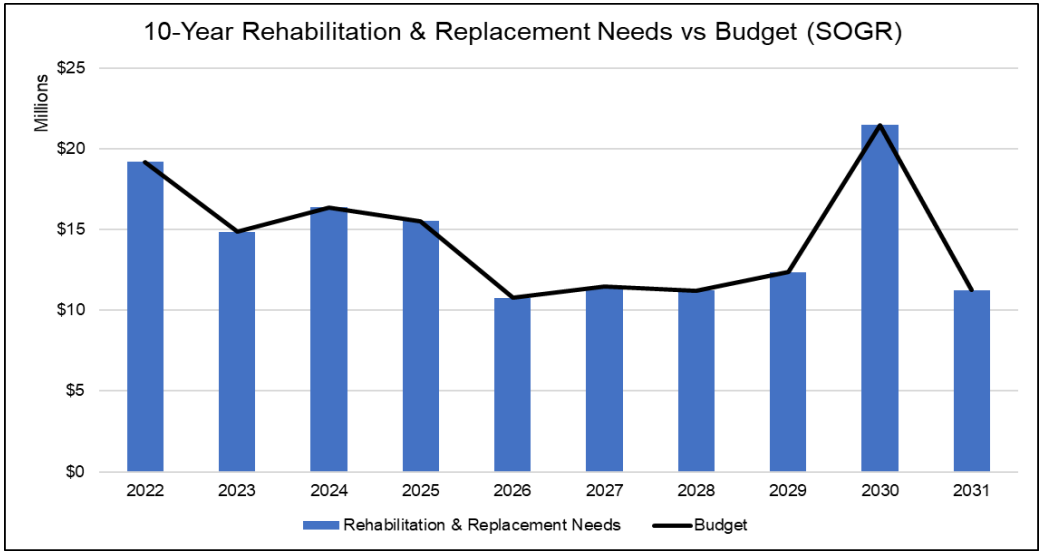
- 10-year Operating Budget consists of the 2022-2025 operating budget and utilizes Year 4 budget to forecast the remaining annual budgets for Years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Land acquisitions and related studies
    - Overhead costs

Due to the high degree of data quality and reliability, only renewal, rehabilitation and replacement activities have been truly considered in the 10-year lifecycle forecast while all other activities (i.e. non-asset solutions, operations and maintenance, acquisitions, and disposals) have been assumed to equal budget. City staff will work to incorporate those remaining lifecycle activities into the lifecycle forecast as their data quality and hierarchy is improved.

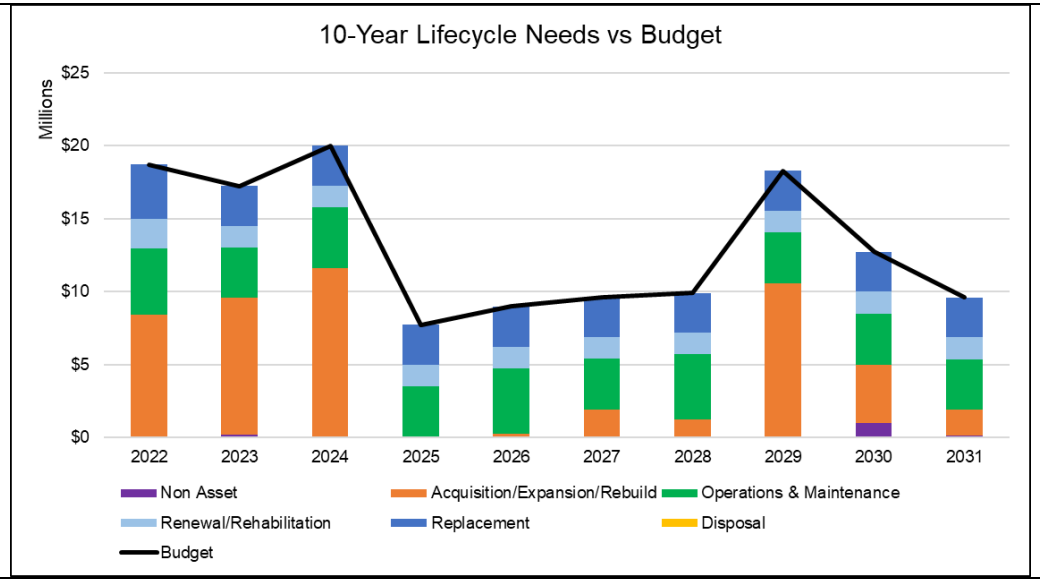
To illustrate the 10-year forecast Total Lifecycle Needs vs Budget Graph has been created by Service Area and by each Asset Class in the following pages.

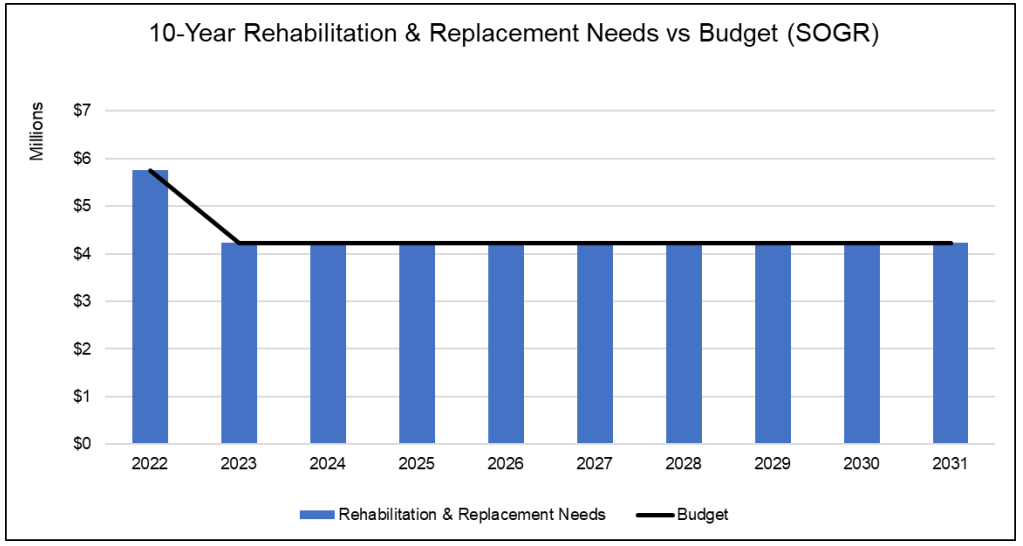
Stormwater


10-Year Lifecycle Needs vs Budget
Millions
$60
$50
$40
$30
$20
$10
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Non Asset
Acquisition/Expansion/Rebuild
Operations & Maintenance
Renewal/Rehabilitation
Replacement
Disposal
Budget

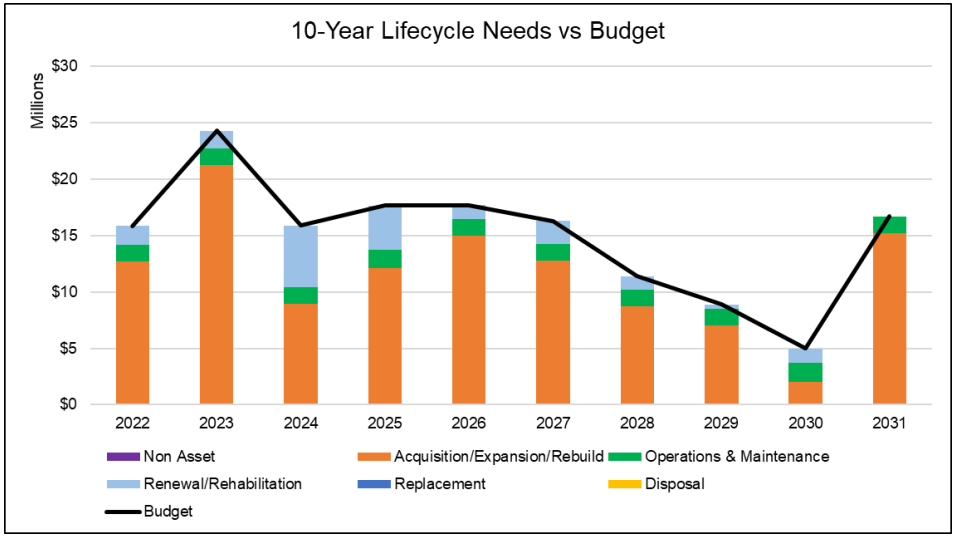

10-Year Rehabilitation & Replacement Needs vs Budget (SOGR)
Millions
$25
$20
$15
$10
$5
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Rehabilitation & Replacement Needs
Budget

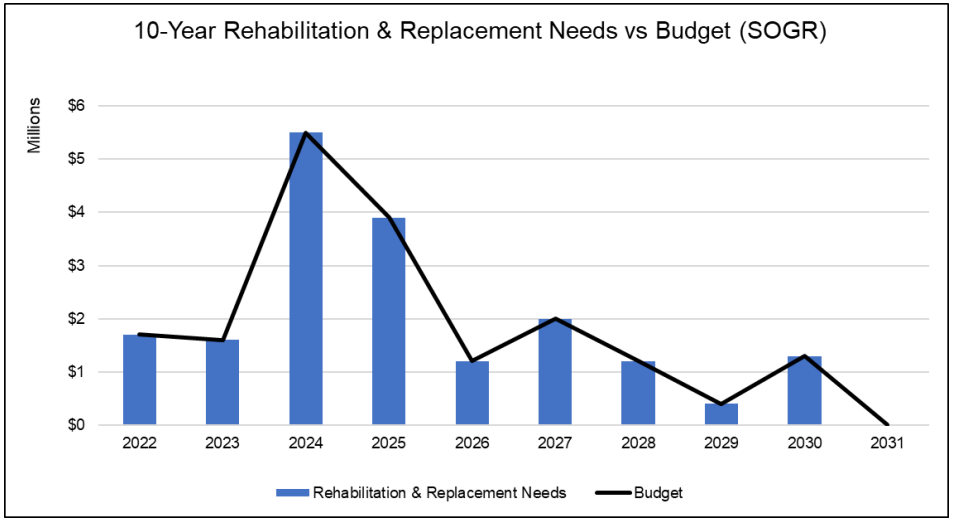
Storm Sewers



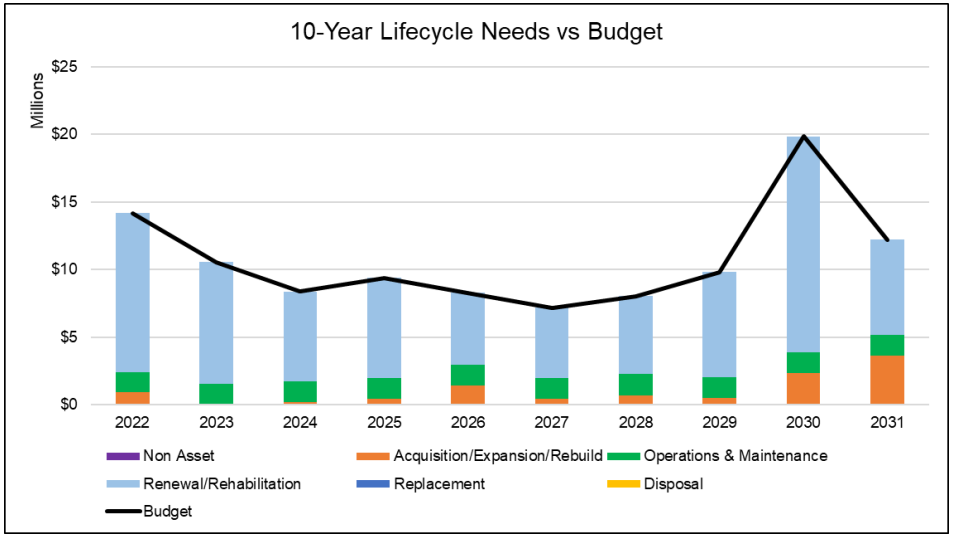


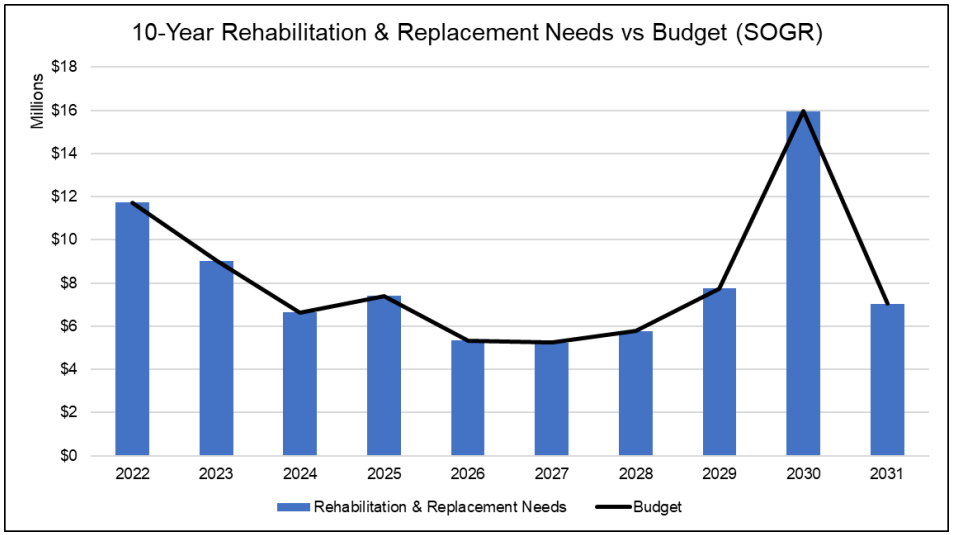
Stormwater Management Facilities (SWMF)





Watercourses





Over the next 10 years, the Stormwater average annual Capital and Operating budget is $39.4 million as shown in **Figure 9.**

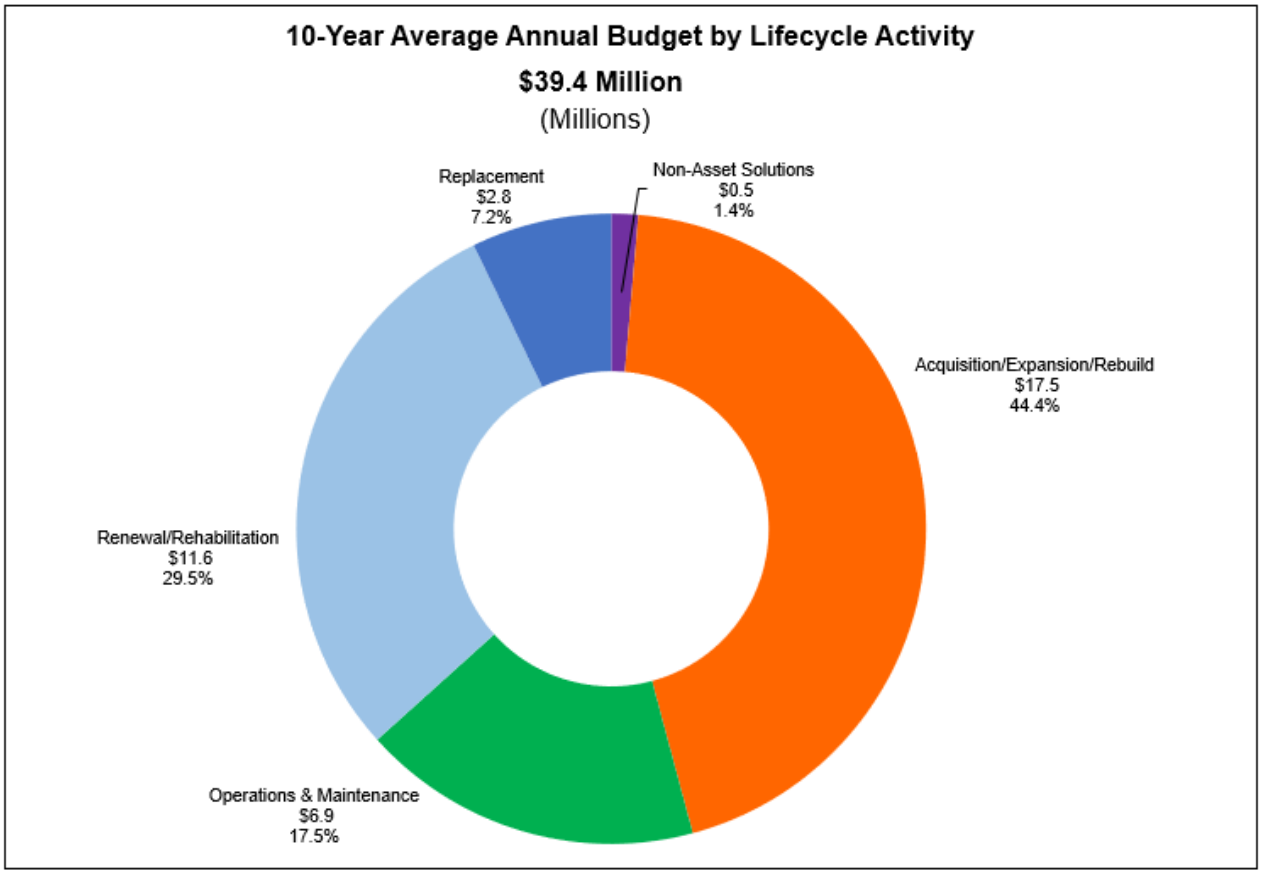


Figure 9: Breakdown of Budget by Lifecycle Activity

Table 25 shows 10-year annual average budget breakdown by Asset Class. The majority of the operating and capital budget is spent on State of Good Repair (SOGR) of Stormwater assets versus Growth[24].

Table 25: Budget Breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Storm Sewers	4.9	3.4	8.2	5.0	13.3
Stormwater Management Facilities (SWMF)	1.4	2.1	3.5	11.5	15.0
Watercourses	1.5	9.2	10.8	-	10.8
Other[25]	-	0.0	0.0	0.4	0.4
Total	**7.8**	**14.7**	**22.5**	**16.9**	**39.4**

[24] "Growth", also referred to as "Improve" projects, are projects that apply to service enhancements that increase current service levels or service capacity that provide new capital initiatives

[25] "Other" asset class denotes lifecycle activities that span over multiple asset classes within the Service Area such as plans, studies and other non-asset solutions

Financing Strategy

The City of Mississauga is committed to providing quality Stormwater services through safe, reliable infrastructure. Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans.

At the core of the City's need to achieve a sustainable stormwater business model is the need to implement sound asset management practices. This involves inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, developing financial strategies to effectively manage those programs over the lifecycle of stormwater infrastructure, and monitoring and reporting on projected asset conditions. These commitments are key concepts underling the Stormwater Program and what's funded by the Stormwater Charge.

To determine the stormwater charge rate, service levels and operating and capital needs are set to reflect infrastructure priorities, inflationary pressure and reserve fund contributions needed now to plan for funding challenges foreseen with replacing costly assets (e.g., pipes) in the future. Furthermore, service level changes and the resulting stormwater rate reflect a balance between fiscal responsibility and resident service expectations. The stormwater rate is established on an annual basis during the budget approval process and to Council approval.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on 2022-2025 Operating and 2022-2031 Capital Budget Forecast. Several financing strategies are available for funding the City's various capital programs such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget

Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget–for example, operations and maintenance, administration costs, etc.

The City uses a combination of Stormwater Charge Revenue and user fees to fund the Stormwater operating budget.

Capital Program Financing

The Capital Budget provides for significant expenditures to address current and future infrastructure needs that include stormwater ponds, flood relief, pipe infrastructure, watercourse erosion control and drainage studies.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. The Stormwater capital program is funded by the Stormwater Charge Revenue (drawn from Stormwater Capital Reserve Fund and the Pipe Reserve Fund), Development Charges (DCs) and Developer contributions.

Reserves and reserve funds

The Stormwater Service Area has separate reserves and reserve funds that were established by Council to assist with long-term financial stability and financial planning. These funds are set aside to help offset future capital needs, obligations, pressures and costs and are fully funded from the Stormwater rate charge. They are drawn upon to finance specific-purpose capital and operating expenditures as designated by Council, to minimize Stormwater Charge fluctuations due to unanticipated expenditures and revenue shortfalls and to fund ongoing and future infrastructure programs.

Reserves

The Stormwater Fiscal Stability Reserve is funded entirely from the Stormwater Operating Budget. If needed, these funds will offset any unanticipated fluctuations in revenue or expenses which occur during the year.

Reserve Funds

Reserve funds are segregated, restricted and provide for capital replacements. The Stormwater Capital Reserve Fund provides funding for infrastructure needs related to ponds and erosion control along watercourses. The Stormwater Pipe Reserve Fund provides for the renewal of the City's pipe infrastructure.

The Development Charges Reserve Fund accumulates funds collected under the City's Development Charges By-law as permitted under the Development Charges Act, 1997 and funds growth-related projects. These funds are obligatory in nature and reported as deferred revenue on the City's Financial Statements. Other reserve funds include Developer Contributions.

As illustrated in **Figure 6,** the estimated available funding for the next 10-year period (2022-2031) for Stormwater is $394.1 million. The primary sources of funding are Stormwater Reserve Funds (Capital and Pipe Reserves) at 72.9 per cent and Operating Revenue Sources at 19.8 per cent.

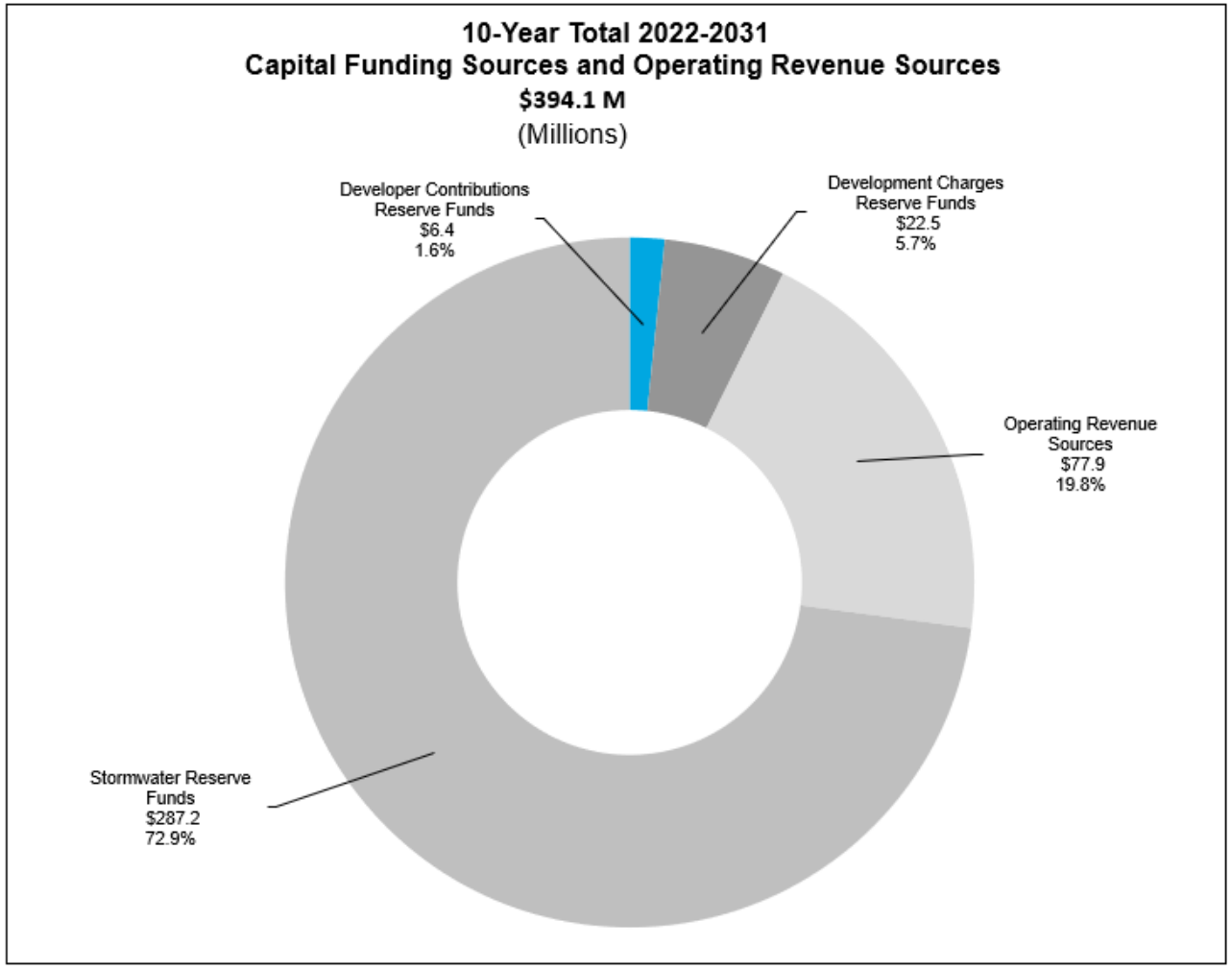


Figure 6: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City continues to maintain current service levels. While the Business Plan and Budget address funding needs for the short-term, there is a long-term infrastructure gap. An infrastructure funding gap is a gap between how much funding is required to maintain the assets and service levels and how much funding is available. An infrastructure gap can impact the City's ability to perform lifecycle activities and as a result impact service delivery.

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (Funding Needed) and the annual average budget (Funding Available). There are two types of gaps – a short-term gap, looking at the 10-year needs, and a long-term gap looking beyond the 10-year needs.

Short-Term Infrastructure Funding Gap

The Stormwater Service Area has been self-funded since the implementation of the Stormwater Charge Program in 2016. A founding principle of the program is to fully fund the stormwater operating and capital programs plus an annual reserve contribution for future storm sewer renewal. The City's Business Plan and Budget are approved on an annual cycle, this allows the service area to review and prioritize operating pressures and capital projects and allocate the required funding in an agile manner. The short-term infrastructure funding gap is the difference between the stormwater needs and the available revenue over the 10-year period based on the current capital, operating and pipe reserve programs. As a result of Stormwater's self-funded model, the service area does not have a funding gap for the 2022-2031 business planning and budget cycle. For example, new Watercourse and SWMF projects as well as renewals are funded primarily by Capital reserves, and partially by development charges so it is expected that as the stormwater system grows or requires renewal/rehabilitation, the Stormwater Charge will fund these pressures accordingly.

Long-Term Infrastructure Funding Gap

The long-term infrastructure funding gap considers the estimated lifecycle of the asset. For storm sewers it is estimated utilizing a 100-year renewal forecast (typical sewer lifespan) of existing infrastructure compared to the projected available funding over this same period. The storm sewer renewal program is funded from the Pipe Reserve.

An annual contribution model to the pipe reserve and preliminary target was established prior to the onset of the Stormwater Charge and was based on initial estimates of a one per cent annual contribution of the total replacement value. For example, the replacement value was approximately $2.1 billion in 2019 which equates to a target reserve fund contribution of roughly $21 million per year.

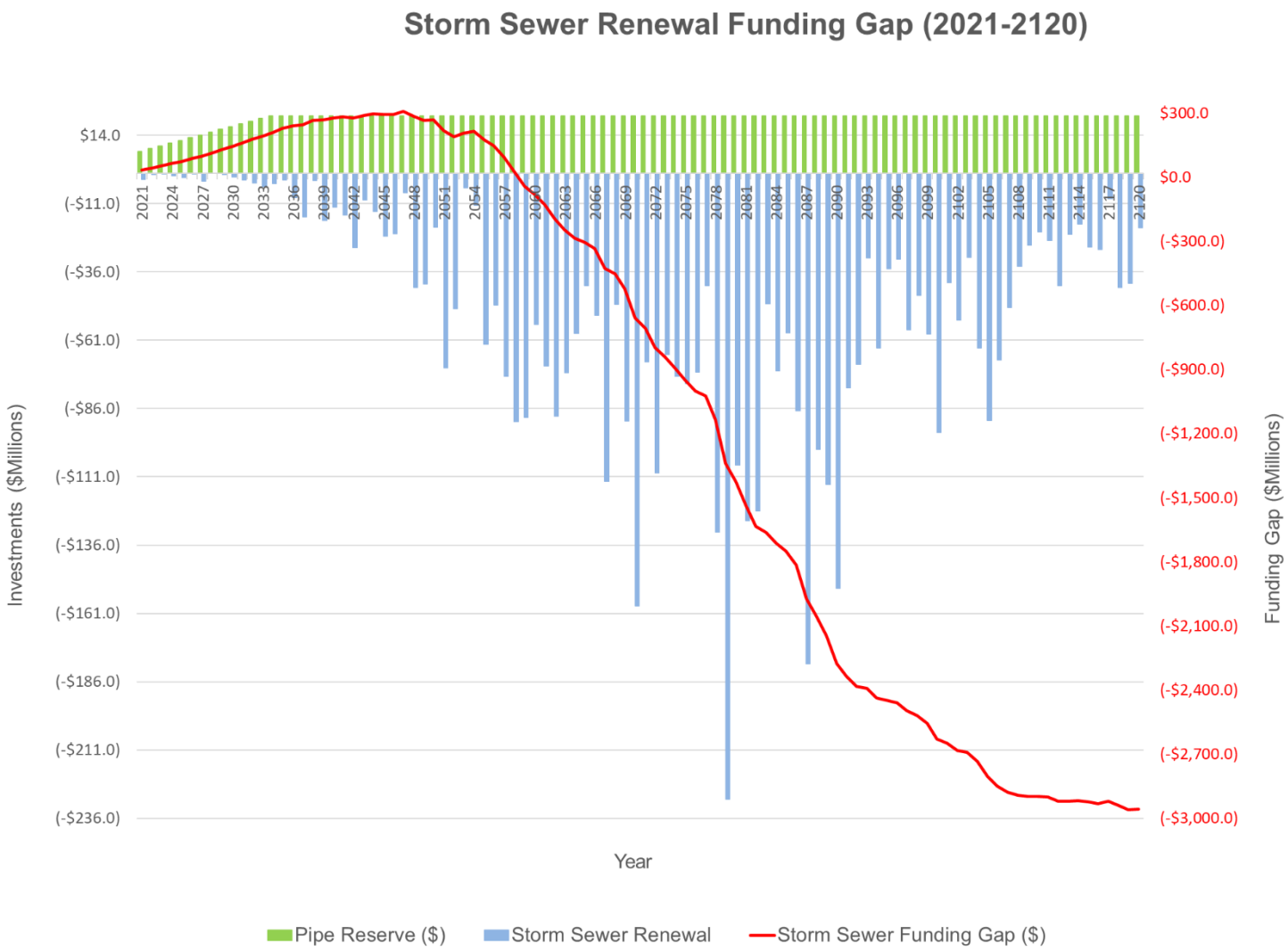


Figure 7: Potential Long-term Funding Scenario for Storm Sewers
[26]

[26] The Storm Sewer Renewal Funding Gap (2021-2120) was produced in 2021 to provide an estimate 100-year renewal forecast

As shown in **Figure 7,** this strategy for funding long-term pipe renewal proposes to increase contributions by $1 million annually (i.e., $11.1 million in 2024, $12.1 million in 2025, etc.) until reaching the estimated target of $21 million and then maintaining that contribution moving forward. In this potential scenario, increasing pipe renewal costs over the 100-year period far exceed contributions resulting in a significant funding gap for storm pipe infrastructure.

Through the completion of the State of Infrastructure and efforts to quantify replacement values more accurately, the Stormwater Service Area acknowledges the preliminary replacement value and related contribution target was grossly underestimated. Today's pipe replacement value is estimated at $6.8 billion and growing due to rising material and inflation costs. With a much larger total replacement value, continuing with the above contribution model and one per cent target is no longer practical to achieve. Regardless, the scenario reinforces that a long-term funding gap remains that requires the appropriate strategies to invest for the future.

In the interim, contributions to the pipe reserve will continue to increase by $1 million each year. Meanwhile, staff continue to better quantify and plan for Stormwater's long-term infrastructure needs through continuous improvement. In this regard, leveraging sewer condition data, development of pipe renewal/replacement strategies and Stormwater Charge revenue forecasting will allow for further refinement of the long-term funding gap and establishing the appropriate pipe reserve target and contribution.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement. Since 2019 the Stormwater Service Area has been documenting and tracking its efforts to implement targeted and meaningful improvements. Since the publication of the 2021 Asset Management Plan, Stormwater has made further improvements that have enhanced practices in core competency categories.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office conducts periodic internal audits of service area asset management practices.

A Service Area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for each stormwater asset class (Storm Sewers, SWM Facilities and Watercourses). The results for each asset class and an overall result for the Stormwater Service Area are scored from 0.0 to 4.0 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved. **Figure 8** provides a radar chart that shows the maturity scores of the stormwater asset classes in 2019 and the overall target maturity of the Stormwater Service Area. As the service area matures in each of the eight categories, they will expand outwards towards the outer ring (Target).

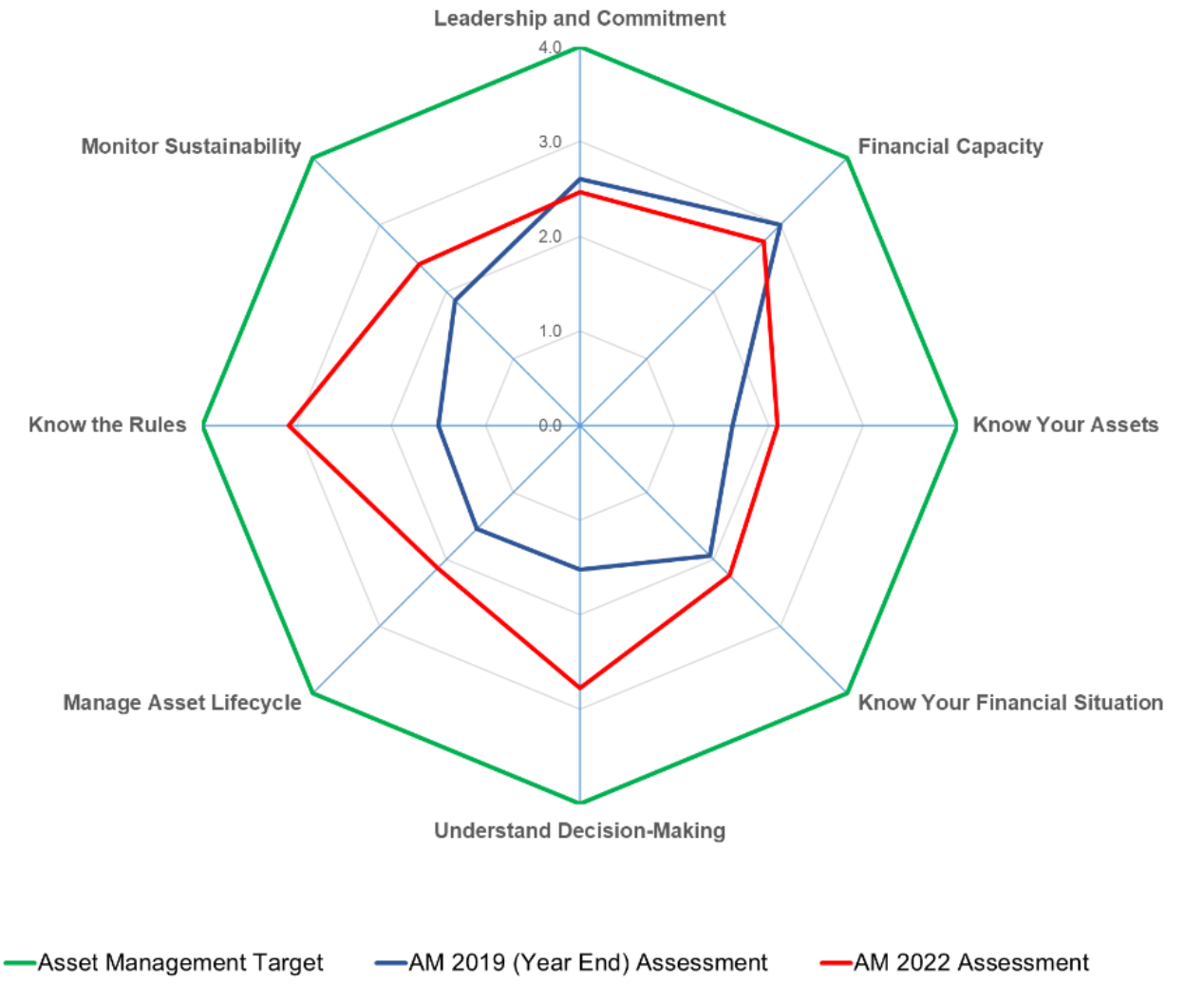


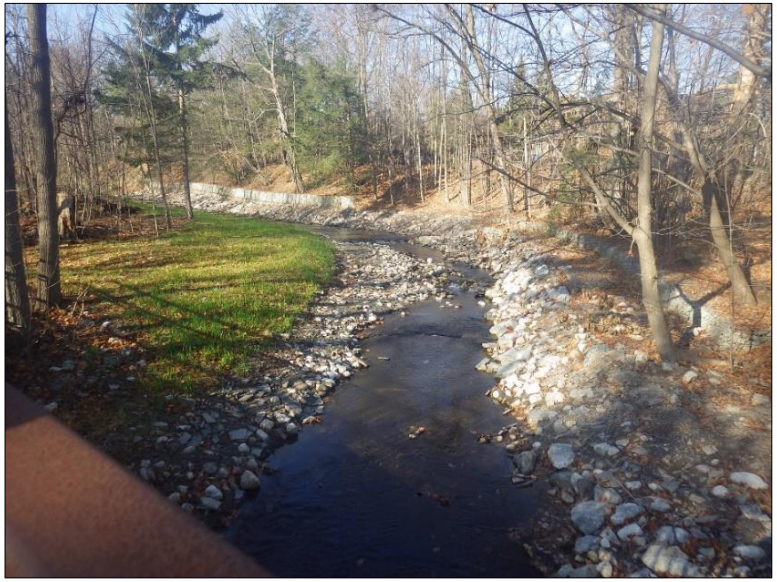
Figure 8 - Maturity Assessment Comparison - Stormwater Service Area (2019-2022)

The overall maturity scores are derived from a detailed assessment survey that tracks progress of high-level tasks. The current Improvement Plan is included in the Appendix - Appendix A: List of AM Strategy Improvement Tasks. As a result, the assessment can be reviewed and updated to reflect progress in stormwater asset management overall and ultimately demonstrate the service area's maturity at a corporate level.

Advancing Service Area Asset Management Capabilities

The proposed work plan in **Table 26** was developed in consultation with City staff through the development of the asset management plan and updated for 2022. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks may differ from those in the maturity assessment improvement plan, as they are predominantly internal tasks to the Stormwater Service Area that provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories.

Through the maturity assessment and associated work plans, the Stormwater Service Area aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service, to achieve both service area and corporate objectives.



Sawmill Creek, Upstream of Burnhamthorpe Rd W

Table 26 - Work Plan – Stormwater Service Area

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources	Status Update
SOI-01	Consolidate CCTV assessments into GIS inventory	Storm Sewer	2020-2022	Centralizes condition data and provides single source of information	Internal	Completed
SOI-02	Develop process to update asset register from the latest CCTV condition database	Storm Sewer	2022	Ensures that database is up to date at the conclusion of each new CCTV inspection project	Internal	Completed
SOI-03	Conduct visual condition assessments for culverts, MHs, CBs, inlets and outlets and a condition assessment program for all culverts	Storm Sewer	2024	Improved tracking of assets	Internal	In-progress
SOI-04	Conduct city-wide review of asset ownership (e.g., Storm Sewer, Stormwater Management Facilities, Watercourse, Transportation assets)	All	2020-2021	Improved tracking of assets and responsibility to maintain/manage assets	Internal	Completed
SOI-05	Identify major and minor culverts	Storm Sewer	2022	Some culverts are large in size and require condition inspections, which should be differentiated from the rest of the culverts	Internal	Completed
SOI-06	Formalize inventory, assign unique IDs and create assets/features by asset component (GIS)	SWMF, Watercourses	2024-2025	Improved completeness and accuracy of the information within the database to improve tracking and management of assets and identifying funding requirements	Internal	In-progress

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources	Status Update
SOI-07	Underground facilities and pump stations, LID features, dry ponds – establish inventory	SWMF	2021-2024	Provides a more complete database	Internal	In-progress
SOI-08	Roll-up individual component condition assessments to an overall assessment score	SWMF, Watercourses	2021-2024	Ensures all assets are considered in overall assessment score of parent assets	Internal	In-progress
SOI-09	Enhance condition assessment method to account for built and natural components within the reach	Watercourses	2024-2025	Ensures all assets are considered in overall assessment score of parent assets	Internal	Not Started
SOI-10	Link condition and inspection data to asset ID	All	2020-2024	Provides a complete, digitized inventory	Internal	In-progress
SOI-11	Expand condition scoring system to a 5-point scale (to align all 3 Stormwater Groups)	All	2021-2024	Establish consistency in scoring and comparability among assets in the Stormwater Department	Internal	In-progress
SOI-12	Identify and populate missing attribute data (type, size, material)	All	2021-2024	Provides a complete, single source of information	Internal	In-progress
SOI-13	Link EUL to asset ID	SWMF, Watercourses	2021-2024	Provides a more complete data register to monitor, track and analyze	Internal	In-progress
SOI-14	Link work and failure history data to asset ID	All	2023-2025	Links the history of the asset to its identifying information for improved monitoring	Internal	Not Started
SOI-15	Populate Infor Inventory from GIS Datasets (Asset IDs)	All	2023-2025	Improved monitoring of assets	Internal	In-progress

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources	Status Update
SOI-16	Review and Improve Risk Factors (Impact/Criticality)	All	2021-2025	More accurate risk assessment, as more data becomes available	Internal	In-progress
SOI-17	Complete valuation for culverts, fittings, and pipe/null inlets in future AMP update	Storm Sewer	2023-2025	Improved accuracy of valuation	Internal	Not Started
SOI-18	Separate the cost of lateral pipes and service connections for future valuation assessment	Storm Sewer	2023-2025	Improved accuracy of valuation	Internal	Not Started
SOI-19	Attribute all node IDs to an associated pipe ID	Storm Sewer	2021-2022	Improved valuation and risk assessment of nodes based on the size and criticality of connected linear assets	Internal	Complete
SOI-20	Consider contracting out condition assessment for structures (control outlets) and formalize valuation and remaining useful life	SWMF	2021-2023	Improved tracking and renewal needs based on observed remaining life rather than age-based remaining life	Internal	In-progress
SOI-21	Develop unit costs for asset types/materials and establish formal process for maintaining rates	All	2021-2024	Improved accuracy of valuation	Internal	Complete
LOS-01	Consider implementing additional recommended customer and technical levels of service metrics	All	2023-2024	More accurate measurement of level of service achieved	Internal/External	In-progress
LOS-02	Review operations and maintenance LOS	All	2022-2024	Allow for improved accuracy of operations and maintenance funding needs to meet LOS	Internal	In-progress

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources	Status Update
LMGT-01	Implement recommended lifecycle management strategy improvements	All	2024-2025	Improve management of assets, which can increase the lifespan of assets and better prepare the City for replacement and rehabilitation	Internal	Not Started
LMGT-02	Improve alignment of Operating Budget cost center codes	All	2023-2025	Align cost center names with defined Operations and Maintenance tasks for easier reporting.	Internal	Complete
LMGT-03	Develop a predictive performance model to forecast assets future condition based on budget, levels of service and/or lifecycle strategies changes	All	2023-2025	Improve understanding of impact on assets resulting from budgetary, lifecycle strategies or LOS changes	External	Not Started
IGC-01	Develop a process for understanding renewals and funding needs for Watercourse assets	Watercourses	2024-2026	Understand funding needs and any potential gaps in current funding	Internal	Not Started
IGC-02	Increase confidence in long-term funding strategy for Watercourses and SWMF and report infrastructure gaps if they exist	SWMF, Watercourses	2024-2026	Understand future revenue structure for SWMF and Watercourses	Internal	Not Started
RIS-01	Assess appropriate criteria for facility signs when assessing criticality	SWMF	2023-2024	Improved risk assessment	Internal	Not Started

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources	Status Update
RIS-02	Develop likelihood of failure criteria to assess risk of natural assets	Watercourses	2024-2025	Improved accuracy of risk rating and avoided assumptions	Internal	Not Started
RIS-03	Collect data required to improve asset criticality criteria	All	2023-2025	Improved criticality rating of assets	Internal	Not Started
RIS-04	Develop methodology and collect data required to improve asset likelihood of failure criteria	All	2023-2025	Improved likelihood of failure assessment	Internal	Not Started
FS-01	Assign Capital Program attributes to each project: Renewal (%), Expansion (%) and Lifecycle Activity	All	2021	Improve capital budget information and future AM reporting	Internal	Completed

Appendix A: List of AM Strategy Improvement Tasks

Task #	Improvement Category	Desired Improvement	Task Type
1	**Asset Data**	Audit what you have and define what you need. Design a data capture/improvement plan and improve existing asset information including as appropriate condition assessment. Develop asset information updating procedures.	
1.1		Develop prioritized Data Capture Program including key asset attribute data as well as condition data.	Start-up
1.2		Develop and implement standard operating procedure (SOP) document for editing, updating, and maintaining asset data registry.	Start-up development of SOP transitioning to Business as Usual (BAU) for implementation
1.3		Implement Data Capture Program according to prioritization and available funding.	Ongoing
2	**Leadership**	Establish a cross-functional asset management team and senior champion and manage the implementation of the AM improvement plan, including an annual update.	
2.1		Implement a departmental cross-functional asset management steering group to make collaborative decisions on asset management issues such as: the oversight for development of AM governance and guidance documentation; the responsibility for managing the AM improvement program and reporting on AM performance and effectiveness; and the evaluation and procurement of any AM support tools and overseeing implementation. The implementation of the cross-functional team should include senior leadership approval of membership and development of terms of reference.	Start-up transitioning to BAU for ongoing group meetings and actions
2.2		Provide management oversight to AM Improvement Plan.	Ongoing
3	**Decision Processes**	Progress toward evidence-based decision-making, review and document decision processes, track data and performance measures to decisions.	
3.1		Consult cross-functional AM steering group to list key decisions that require data support. Prioritize the decisions listed based the degree of evidence-based support that each decision requires.	Start-up

Task #	Improvement Category	Desired Improvement	Task Type
3.2		Review decision processes for each decision listed (refer to Task 3.1) beginning with the decisions of highest importance; document current process (including detailing the data and analysis required, the people who need to be involved or consulted, and the process for approval of the decision, and reporting/recording outcomes); and design improved processes where needed.	Start-up transitioning to BAU for periodic reviews and improvement
3.3		Implement improved decision processes.	Ongoing
4	**Data Governance**	Identify roles and responsibilities for data management.	
4.1		Develop Data Governance Policy, including definition and assignment of data governance roles and responsibilities, and submit for approval.	Start-up
4.2		Implement approved Data Governance policy. This will require communication and training, and development of business processes or SOP documents, detailing roles, responsibilities, and accountability.	Start-up transitioning to BAU for ongoing implementation
5	**People**	Identify your resource needs short-term and longer-term for implementing AM practices and set up an AM training program.	
5.1		Develop AM Resource Plan for implementing AM Improvement tasks and quantify short-term and long-term resource needs for ongoing AM within service areas.	Start-up
5.2		Identify AM Roles and Responsibilities and include as part of AM support tool implementation and as part of AM Improvement tasks, to assign roles and responsibilities and require information feedback for reporting on both outcomes/achievements and effectiveness of activities.	Start-up
5.3		Cross-reference AM Resource Plan requirements (refer to Task 5.1) and assignment of AM Roles and Responsibilities (refer to Task 5.2), identify AM skill levels required and compare with current skillsets to identify gaps and the AM training required to support staff to be successful in AM roles and to promote organizational sustainability in AM practices.	Start-up

Task #	Improvement Category	Desired Improvement	Task Type
5.4		Develop AM Training program, prioritize required training, and submit program for senior leadership approval. On approval, implement training according to prioritization and available funding.	Start-up transitioning to BAU for implementation and periodic review/update
6	**Lifecycle Management**	Begin process of documenting lifecycle strategies beginning with maintenance strategy and preventative maintenance schedules. Incorporate PM schedules into new AM tool.	
6.1		Complete a Lifecycle Strategies workshop for each major asset group (i.e., storm sewers, SWMFs, watercourses, etc.) to identify the preventative maintenance activities, scheduled/routine operations activities, and planned inspections throughout the asset lifecycle, and the treatment/rehabilitation options to extend the lifespan or to replace the asset at end of life.	Start-up
6.2		Following the Lifecycle Strategy workshops begin developing detailed preventative maintenance, scheduled operations, and planned inspection activity lists by asset, asset location, or asset type as applicable. This work may take some time to complete (depending on what ratio of internal to external resources are used). Therefore, the most important assets, asset locations, and activities should be prioritized for completion first.	Start-up transitioning to BAU periodic review/update
6.3		Develop an asset renewal strategy documenting approach for evaluation of renewal options, and the decision process to be applied including criteria and issues to be considered, calculation and reporting requirements, and the approval and implementation process.	Start-up transitioning to BAU periodic review/update
7	**Cost Tracking**	Look at how things are done now, identify needs and options. Implement cost tracking of work orders against relevant assets in conjunction with the new asset management tools (refer to Task 1.)	
7.1		Review current cost tracking and recording. Compare the current state with the data needs for asset management tracking and planning. Identify data or process gaps and potential solutions. Consult on potential solutions, agree on actions to take, and provide recommendation for approval. On approval, add next steps to improvement plan and prioritize the work against the other tasks in the improvement plan. Note: This task must be completed before the AM Support Tool is implemented (refer to Task 15.6).	Start-up
7.2		Implement approved changes as required to capture necessary cost-tracking information in a format suitable for performance analysis and investment decision-making.	Start-up transitioning to usual business for ongoing cost tracking

Task #	Improvement Category	Desired Improvement	Task Type
8	**AM Governance**	Make a start on getting key documents in place.	
8.1		Develop key documents for AM governance and operation such as (1) AM Policy, (2) AM Strategy, (3) AM Program Guide or Manual (i.e., the framework for managing consistency across multiple service areas.	Start-up for first documents transitioning to BAU for periodic review/update
8.2		Design AM performance measures and reporting requirements to track, measure, and report on three areas of AM performance: (1) progress in implementing improvements; (2) performance in achieving AM objectives and targets; and (3) effectiveness of AM to achieve desired outcomes.	Start-up for design transitioning to BAU for measure/report, review/update
8.3		Develop business process for annual and three-yearly reviews and reporting of AM performance measures.	Start-up for developing Business Process
8.3		Develop business process for annual and three-yearly reviews and reporting of AM performance measures.	Start-up for developing Business Process
9	**Risk**	Identify options for risk management and the measurement of risk to include in decision-making and define functional requirements to integrate risk considerations into AM analysis.	
9.1		Develop a Risk Framework suitable for Mississauga's Stormwater assets. Consider the variety of asset types and service areas. Consider also, what risk information will be of benefit to decision-makers and how risk information should be used in various AM analyses. Finally, also consider how risk scores need to be reported and what risk information needs to be communicated.	Start-up
9.2		Implement risk framework and begin assessing risk. This will require communication and training, and development of business processes or standard operating procedure documents, detailing roles, responsibilities, and accountability. Also, the assets and services need to be prioritized for completion of risk assessments to ensure that the highest priority areas are risk rated first.	Start-up for SOP and initial implementation transitioning to BAU for ongoing implementation
9.3		Develop or update decision processes and the analysis to support those decisions, to include consideration of risk and risk rating data.	Start-up
10	**Awareness**	Identify communication plan, stakeholders, and what reporting you need.	

Task #	Improvement Category	Desired Improvement	Task Type
10.1		Develop a communication preparation plan for stakeholder communications. Identify who the stakeholders are (both internal and external); what information will be of interest to different groups; what information is of interest to COM to communicate to different groups; develop a plan and timeline to obtain this information, including any analysis required and appropriate reviews; identify roles and responsibilities for tasks.	Start-up to develop plan, transitioning to ongoing implementation of AM Improvements
10.2		Develop a stakeholder communication plan to implement after the relevant information to be communicated is available (refer to Task 10.1)	Start-up to develop plan, transitioning to ongoing for implementation
11	**Levels of Service**	Define levels of service and document operations and maintenance activities that impact the level of service delivered. Begin linking level of service and cost of service in tangible ways that can be measured and monitored.	
11.1		Complete a workshop for each service area to define current levels of service and current (or required) service performance measures. The process includes: identify stakeholder groups with an interest in the service; define what each group is primarily wanting from the service (LOS - level of service statements); identify criteria that could be measured and would be good indicators for whether the service was delivering what each stakeholder group is wanting (KPI - key performance indicators); define the method of measurement for each performance indicator; document whether the performance measure is existing or new; and define the performance target value for each indicator.	Start-up
11.2		Develop standard operating procedures for service performance management, including measuring, recording, reporting, and periodic review and if necessary, updating, of service performance indicators and targets. Include roles, responsibilities, and accountability.	Start-up
11.3		Implement procedures for service performance management including at least annually to review level of service statements, performance indicators, and performance targets.	Ongoing (new usual business task)
11.4		Complete a workshop for each service area to define and document operational level of service activities (to include documenting scope of task, frequency, cost, reason/requirement, relationship to existing LOS, and impacts on assets, organization, and customer; and whether activity is completed more frequently or less frequently). Use the outcome tool (spreadsheet) to develop needs-based operational budgets and manage delivery of required level of service with available budget.	Start-up to define operational LOS and develop tool, transitioning to ongoing for use of tool

Task #	Improvement Category	Desired Improvement	Task Type
11.5		When sufficient information is available, i.e.: (1) after AM improvement tasks for cost tracking, risk assessment, and defining operational LOS are completed; and (2) staff have a detailed understanding of the relationship between costs, risks, and level of service; and (3) staff have identified options for sustainable service delivery (i.e., a balance between costs, risks, and service targets), then develop and implement a communication strategy to consult with key stakeholders and elected representatives on the options and the agreed (sustainable) balance between costs, risks and level of service.	Start-up to define communication strategy and to undertake first consultation, transitioning into ongoing periodic review and re-consult
12	**Strategic AM Goals**	Establish AM and business goals.	
12.1		Design business goals and asset management (AM) goals for each service area that support COM strategic goals and align with AM improvement plan priorities. Identify and document appropriate performance measures to track whether goals are achieved. Document the procedure and timing for regular reporting of performance achieved, and the review and updating of business goals.	Start-up
12.2		Communicate business goals to all service area staff; demonstrate how achievement of business goals supports achievement of both AM and COM strategic goals; implement procedures for performance tracking and reporting, and review and update of goals.	Ongoing (new usual business task)
13	**Optimized Work Programs**	Design decision processes for coordinating work and assessing alternative treatment/construction/material options.	
13.1		Develop an asset renewal strategy that includes analysis and decision processes for: coordinating work across different service areas and asset groups; considering alternative treatment/construction/material options; and finding an optimal cost/risk/benefit balance between (1) maximizing the lifespan of assets, (2) practical funding and resource limitations for maximum work that can be achieved in a fiscal year and (3) achieving service targets.	Start-up to develop and document strategy and to undertake first analysis, transitioning into BAU for implementation
14	**AM Plans**	As improvement tasks are completed and when the relevant asset data is available, begin doing asset management plans. Include in plans for establishing AM and business goals that are linked to strategic goals.	

Task #	Improvement Category	Desired Improvement	Task Type
14.1		Begin development and documentation of AM Plans. These plans are business plans that support decision-making and provide key direction and critical information for operational activities and tactical planning. Completing all the AMPs required/desired may take some time: therefore, all asset groups and service areas requiring an AM Plan should be listed and prioritized to ensure effort is spent to complete the AM Plans in order of importance and as resources and funding are available.	Start-up to develop first AMP for each service area, transitioning into BAU for annual review/update
15	**AM Tools**	Identify functional requirements and evaluate options then implement a best-fit solution for an asset management support tool to provide for needs and within available funding.	
15.1		Identify functional requirements for tool (i.e., what do all interested parties need the tool to do or need to be reported out of the tool). Agree on priority ratings for each functional requirement. This can be completed in one day using a facilitated workshop approach.	Start-up
15.2		Determine initial procurement process (RFI [Request for Information] or EOI [Expression of Interest], one-stage, two-stage, RFP [Request for Proposal] with or without demonstrations, evaluation methodology for each phase, etc.). Develop and issue initial solicitation documents (relating to agreed procurement method) for AM Support Tool options.	Start-up (once only task)
15.3		Evaluate/review submissions (RFI or EOI) and determine next steps (e.g., Proceed to RFP depending on initial response). [If required] develop and issue an RFP Document for AM Support Tool options. Evaluate RFP submissions (confirm demonstration scenarios, short-list, complete demonstrations and evaluate results).	Start-up (once only task)
15.4		Identify data needs for support tool and data structure and content needed for reporting to support decision-making. Consider both current and future AM analysis needs. Recommend subject matter expert advice for future AM needs.	Start-up (once only task)
15.5		Work with successful vendor and AM subject matter expert to implement selected AM Support Tool.	Start-up
16	**Whole-of-Life costs**	Develop financial data for whole-of-life costs (this has to follow after Task 7 Cost Tracking is done and measured cost data is available for at least one year's activities).	
16.1		Design business process to assess total cost of service. Include in the calculation of total cost of service to (1) calculate the cost of operations, maintenance repairs, preventative maintenance work, replacement costs, and disposal costs for the whole lifecycle of each asset divided by the asset's expected lifespan (to obtain an average annual cost for each asset); (2) sum the annual costs for all assets; and (3) add an average annual allowance for all non-asset specific operational, planning, overhead, and administration costs.	Start-up

Task #	Improvement Category	Desired Improvement	Task Type
16.2		Implement the process to calculate the total cost of service for each service area (after the end of each fiscal year), based on available asset and cost data.	Ongoing (new usual business task completed once a year)
16.3		Annually analyze the comparative results of (1) true total cost of service and (2) required level of service, with (3) actual level of service delivered; provide recommendations for investment planning, level of service targets, and performance metrics. NOTE: The three elements for this analysis are tracked and measured under separate tasks and this task is to look at those results together to better understand the relationship between true total cost of service (expressed as an average annual value), the required level of service (expressed as service performance targets), and the achieved level of service (i.e., measured performance results and overall performance outcomes).	Ongoing (new usual business task completed once a year)
17	**Asset Valuation and Forecast Renewals**	Set up lifespan and unit rate tables to complete replacement cost valuations on existing assets and establish business processes to keep replacement cost values up to date to support long-term financial forecasting. Develop long-term renewal plans for assets and services and compare funding needs to funding sources and revenue forecasts to identify any gaps and measure financial sustainability.	
17.1		Develop reference tables for asset unit cost and lifespan information.	Start-up
17.2		Complete a valuation of current assets (using the asset unit cost and lifespan information) and report outcomes.	Start-up
17.3		Design and implement business process to maintain asset unit cost and lifespan information up to date.	Start-up to develop business process, transitioning to ongoing to implement process

Task #	Improvement Category	Desired Improvement	Task Type
17.4		Develop long-term renewal plan and cost forecasts for assets and services. The accuracy of forecast renewals will be influenced by the accuracy of the asset data, understanding the asset lifecycle, having an asset renewal strategy, and the accuracy of asset unit cost and lifespan information. The renewal plan should be optimized based on a detailed understanding of (1) level of Service to be provided, (2) options for rehabilitation treatments to extend the useful life of assets, and the relevant timing, cost, and lifespan of such options, and (3) options for asset replacement and the relevant timing, cost and lifespan for those options. This work may take some time to complete (depending on what ratio of internal to external resources are used). However, an initial estimate should be undertaken as soon as the first estimate of asset unit rates and lifespan is completed. This will provide early indication of any major work plan and cash flow issues. Thereafter the asset renewal plans and forecast costs should be updated at least annually to include improved data. This way, both the work plan and financial forecasts will progressively improve in accuracy.	Start-up to develop initial renewal plan and cost forecasts, transitioning to ongoing for annual review/update
17.5		Develop needs-based asset renewal budgets and reserve fund contributions, from optimized long-term renewal plan and cost forecasts for assets and services.	Ongoing for annual review/update
17.6		Compare needs-based budgets with revenue projections, identify issues/gaps, establish a measure for the state of financial sustainability, and report outcomes.	Ongoing new usual business annual task
18	**Continuous Improvement**		
18.1		Develop an AM Program to complete high-priority AM improvement tasks, based on the AM improvement plan and the AM resource plan. Include to define budgets, timelines, and accountability for all tasks and projects included in the program. Submit the program for approval and secure both funding and agreement for staff time (or external resources as necessary) to complete it according to schedule. NOTE: This is only for designing the initial program and submission for funding. The annual review and updating of the improvement program will be a new business process undertaken annually under the oversight of the AM steering group.	Start-up

Task #	Improvement Category	Desired Improvement	Task Type
18.2		Design, document, and implement a new business process for AM continuous improvement. The process should include to (1) review and update the status of AM practice at least annually; (2) update AM Improvement plan, adding new improvement tasks and re-prioritizing uncompleted tasks based on updated AM practice results; (3) update AM Resource plan, adding resources for new improvement tasks and updating resource estimates for uncompleted tasks based on achievements to date; (4) update AM Program and submit for approval and funding; and (5) if funding in full is not provided, modify the AM program and communicate back to staff.	Start-up to develop initial business process, transitioning to ongoing for implementing the annual review/update
19	**Sustainable Service Delivery**	Start building the data foundation for assessing long-term triple-bottom-line sustainability. This includes developing the financial data to measure true whole-of-life costs and begin the process to define the relationship (and trade-off options) more clearly between level of service, cost, and risk.	
19.1		Identify relevant criteria (indicators) and develop and document calculations/analysis process that will provide a measure of financial sustainability.	Start-up
19.2		Identify relevant criteria (indicators) and develop and document calculations/analysis process that will provide a measure of environmental sustainability in relation to the services provided.	Start-up
19.3		Identify relevant criteria (indicators) and develop and document calculations/analysis process that will provide a measure of social sustainability as relevant to the level of service provided.	Start-up
19.4		Complete an analysis of total cost of service in relation to level (or quality) of service provided and the risks associated. Identify (and compute) a range of trade-off options, and the related cost/risk/level of service impacts that relate to each trade-off option.	Start-up to complete initial analysis and define options, transitioning to ongoing for review/update
20	**Legislation**	Move to active management of compliance.	
20.1		Develop a compliance management plan including a full list of compliance requirements; definition and assignment of roles and responsibilities for measurement, recording, monitoring, and reporting; and business procedures to support active compliance management. Implement compliance management plan.	Start-up to develop plan, transitioning to ongoing for implementation

Appendix B: Governing Legislation

Legislation	Requirements
***Accessibility of Ontarians with Disabilities Act*, 2005**	Provides accessibility standards to benefit all Ontarians.
***Building Code Act,* 1992**	Provides requirements to adhere to construction and safety practices.
***Conservation Authorities Act*, 1990**	Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.
***Development Charges Act*, 1997**	Provides municipalities the ability to levy charges to fund growth-related municipal infrastructure, on the principle that growth pays for growth.
***Drainage Act,* 1990**	Provides a procedure whereby the municipality may with a valid petition of landowners in the "area requiring drainage", provide a legal outlet for surface and subsurface waters not attainable under common law.
***Emergency Management and Civil Protection Act*, 1990**	Provides requirements for emergency management.
***Environmental Protection Act*, 1990**	Provides for the protection of the natural environment through regulations regarding discharge of contaminates into the natural environment.
***Fish and Wildlife Conservation Act,* 1997**	Regulates hunting, trapping, and fishing practices and aims to preserve at-risk wildlife, as well as the conservation of wildlife.
Fisheries and Oceans Canada (DFO)	Provides guidelines and laws to protect fisheries habitat in proximities to roadways and bridges.
***Lakes and Rivers Improvements Act*, 1990**	Provides legislation for the design, construction, operation, maintenance and safety of dams in Ontario.
Municipal By-Laws	Regulations approved by Council to safeguard and protect persons and properties.
***Municipal Government Act*, 2001**	Practices and procedures; Accountability and transparency; Finance
***Occupational Health and Safety Act,* 1990**	Rules governing health and safety in Ontario's workplaces.
***Ontario Heritage Act,* 1990**	Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.
***Ontario Water Resources Act,* 1990**	Provides guidance in the inspection and maintenance frequency of stormwater management facilities (i.e., storm ponds).
***Planning Act,* 1990**	Provides direction on municipal planning activities.

Corporate Asset
Management Plan 2024

Roads

Table of Contents

Roads Overview

At the core of a vibrant and modern City is its transportation network. Roadways are a key component of that transportation network and provide many benefits. They support services that are essential for the community in terms of quality of life, public safety, sustainability, and economic benefit. Valued at over $5.3 billion, as shown in **Table 1**, Mississauga's roadway infrastructure is the second-largest asset class owned and operated by the City of Mississauga. Roadways are comprised of a variety of asset types that include road pavements, bridges and culvert structures, sidewalks, multi-use trails, cycle tracks, traffic signals, streetlights, on-street parking facilities, signs, noise walls, and more.

Table 1: Summary Overview of Roads

Roads	
Replacement Value	$5.3 Billion
Average Condition	62%
Average Annual Funding Gap	$71.2 Million

In Mississauga, Roads is responsible for managing the roadway-related infrastructure. Road's mission is to plan, develop, construct and maintain a multi-modal transportation system that safely and efficiently moves people and goods, respects the environment, supports the development of Mississauga as a 21st century city, and serves the municipality's social, economical and physical needs.

With a continued focus on urban mobility, asset management, service delivery, and our people and culture, Roads will continue to provide responsible roadway-related infrastructure services. The goals of the Roads Service Area are to:

- Maintain our infrastructure in a state of good repair (SOGR), with focus on a safe and efficient urban mobility system
- Plan, design, and construct an adaptable transportation network for all users and modes of transport
- Deliver quality and timely services
- Apply progressive asset management practices to achieve cost containment and value for money
- Recognize and develop employees and create an empowered employee culture to meet current and future challenges

This asset management plan includes the following:

- State of the Infrastructure: Outlines the current state of the infrastructure assets including what the City owns, the condition of the assets and the costs to replace them
- Levels of Service: Describes the outcomes the City intends to deliver
- Future Demand: Summarizes the expected future demand on Roads
- Lifecycle Management Strategy: Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- Infrastructure Gap & Challenges: Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves and identifies any financial gaps
- Continuous Improvement: Documents the continuous improvements identified during the development of the Roads Asset Management Plan and maturity assessments

Asset Hierarchy

Roads is represented by eight asset classes, each with two to four asset types as shown in **Figure 1** below. **Table 2** provides a breakdown of the replacement value, condition and infrastructure gap for each asset class.

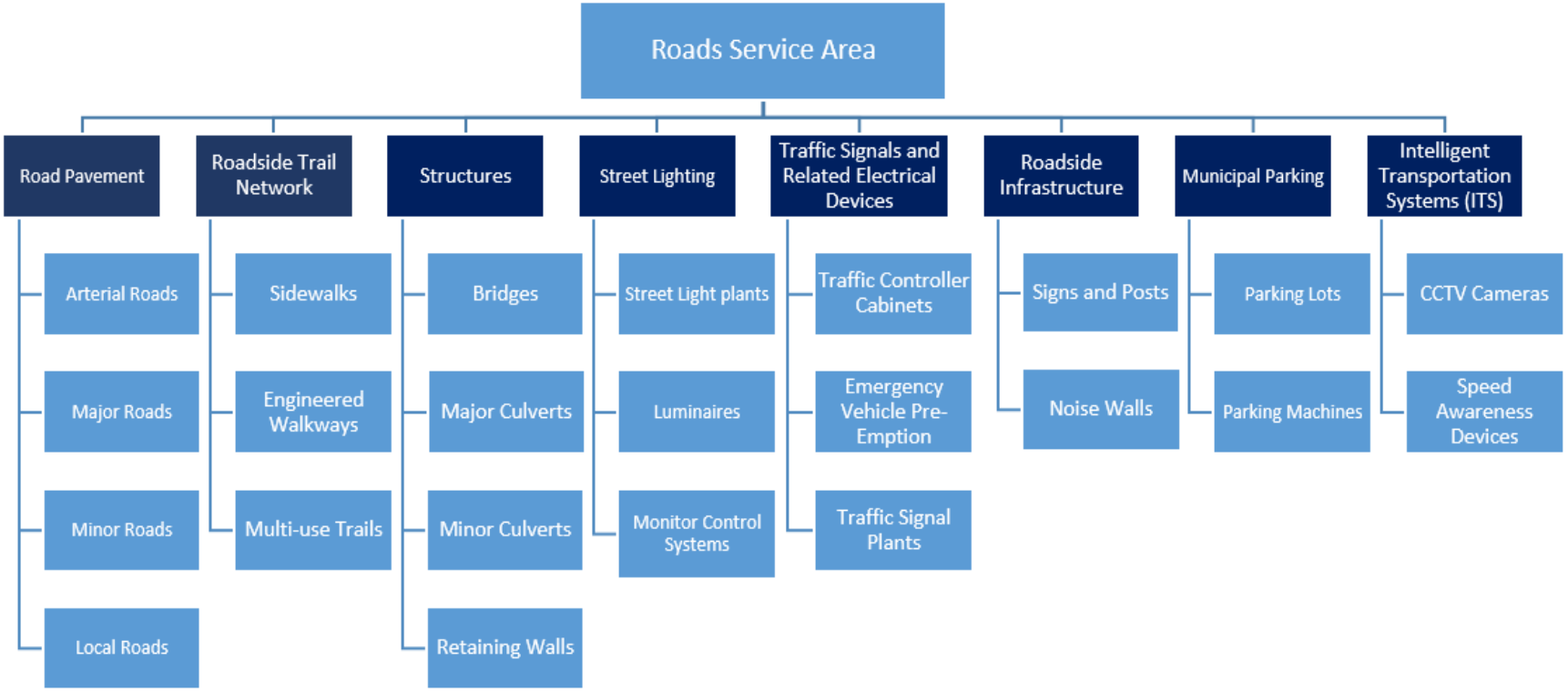


Figure 1: Roads Service Area Asset Hierarchy

Table 2: Summary of Roads Replacement Value, Condition and Infrastructure Gap by Asset Class

Asset Class	Road Pavement	Roadside Trail Network	Structures	Street Lighting	Traffic Signals and Related Electrical Devices	Roadside Infrastructure	Municipal Parking	ITS (Intelligent Transportation Systems)
Replacement Value (Millions)	$3,122	$583	$779	$493	$188	$109	$11	$0.9
Condition								
10-year Average Annual Funding Needs (Millions)	$128.9	$17.2	$12	$15	$4.3	$10.2	$0.5	$0.7
10-year Average Annual Infrastructure Funding Gap (Millions)	$53.3	$7	$4.6	$5.7	$0	$0.5	$0.1	$0

State of the Infrastructure

Inventory Data and Systems

The City maintains its inventory information in various systems, with each system serving a specific function and purpose. Spatial information for the City's roadway assets is created and maintained within the City's Geographic Information System (GIS) environment. In recent years, the City has decided to migrate all of its spatial information to Esri GIS mapping software. The Esri software will form the foundation of the City's linear and non-linear transportation assets database. The GIS information is used to populate four computerized systems: Infor, RoadMatrix, BridgeTMS (Bridge Total Management System) and CityWide.

Infor is the computerized maintenance management system used by the Roads Service Area and other services throughout the City to record and manage service requests, work orders and permits. Requests for service are tracked from two primary channels: the offices of the Mayor and members of Council and the 3-1-1 Citizen Contact Centre. Work orders are processed daily for a variety of defined maintenance activities. Details tracked include labour, materials, maintenance contracts, and vehicles and equipment used to perform daily work activities. The ability to track work performed to a specific asset has not yet been fully deployed but it will form part of the overall strategy as the City advances its asset management practices. Infor's permit system enables the City to track and record work performed by third-party utility and construction agencies working within the City's roadway corridors. Collectively, these three modules enable the Roads Service Area to oversee a variety of work activities happening within the roadway corridor. Staff will continue to advance and expand the use of Infor.

RoadMatrix is the asset analysis system used to manage the City's road pavement and multi-use trails. The system contains extensive information about the City's road pavement and multi-use trail assets including its physical characteristics, classification, age, condition, and major work history information. The RoadMatrix system is used to develop maintenance and long-range capital plans for the renewal of the City's pavement assets. It also enables the City to monitor road pavement deterioration over time, forecast future renewal activities, and determine the financial resources required to sustain the road pavement infrastructure to a certain level of service or condition.

BridgeTMS is the asset analysis system used to manage the City's bridge, culvert, and retaining wall structures. Not only does the system contain detailed information about each of the City's structures, but it also contains detailed OSIM (Ontario Structural Inspection Manual) information collected every two years as required under O. Reg. 472/10. Similar to RoadMatrix, this system is primarily used to develop maintenance and long-range capital plans for the renewal of our structures. It too allows the City to forecast the future renewal and replacement activities needed to support its long-range capital plans. This system will be used in the future to store OSIM-related data for retaining wall inspections.

CityWide is the City's Tangible Capital Asset (TCA) System. The system was introduced in 2008 to capture infrastructure valuation information about the City's major assets

Numerous additional systems including Precise ParkfolioNeo, Streetlight Control Monitoring System (SCMS), and Aviglion Control Centre Video Management Software are used to help manage the City's transportation assets:

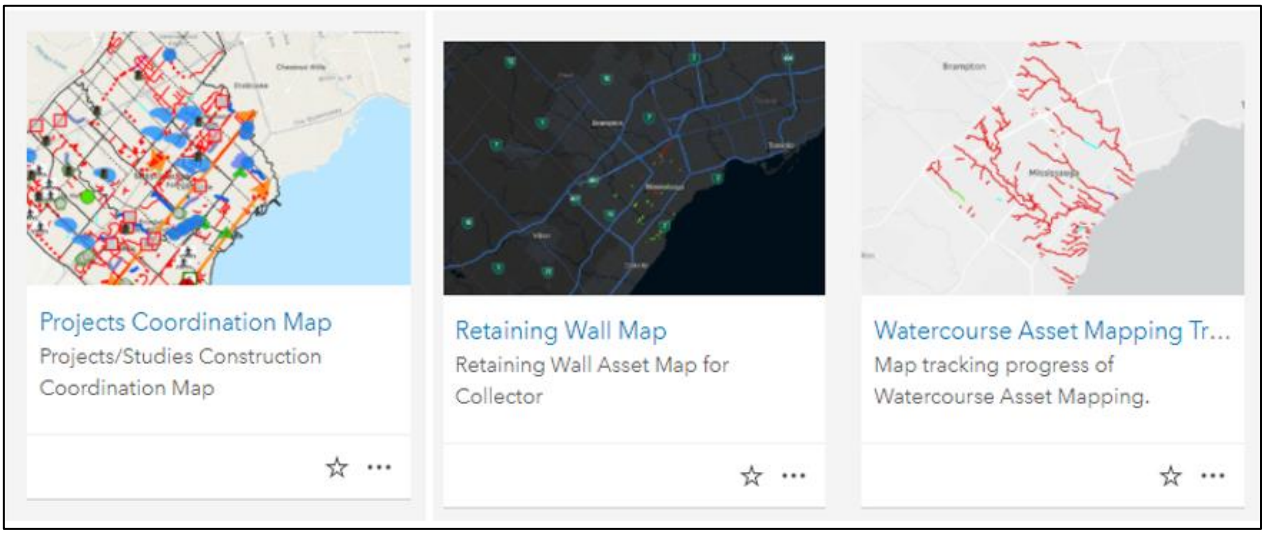
Precise ParkfolioNeo is the solution that is provided by the Municipal Parking vendor, containing all pay & display machine history and data.

The City uses an adaptive lighting control system that controls light levels and monitors the status of streetlights. The lighting control system was provided by Dimonoff Inc., a supplier of adaptive lighting control systems. The controls include a node on each luminaire and wireless gateway to connect the nodes and monitor the luminaires at a remote location. The system acts as a network to connect street

lighting assets and report (in real-time) their state of operation. The system software communicates with the 50,000 streetlights that are distributed across the City.

Avigilon Control Center Video Management Software is designed to provide easy and secure remote access to the CCTV Traffic Monitoring cameras. This allows Traffic Management staff to respond to planned and unplanned events in a timely manner in order to provide proactive traffic management. The Avigilon Control Center Video Management Software is operated and maintained by the City's Security Services Section with Traffic Management serving as a client. To date, there are 87 CCTV Traffic Monitoring Cameras, under the jurisdiction of the City of Mississauga, installed on the Avigilon Control Center Video Management Software and used by Traffic Management staff to monitor traffic conditions along the arterial roadways.

Each of these systems plays an integral role in supporting decision-making about City services and infrastructure. The inventory information contained within each of these systems is comprehensive, reliable, and reasonably accurate and has been used to support the development of this plan.



Example Esri GIS Software Mapping

Asset Risk

Asset-specific risks are determined by assessing the asset's 'consequence of failure' (CoF) and 'likelihood of failure' (LoF). While the loss of some assets or components may have little impact on service delivery and negligible risk of damage or injury, the loss of other assets such as roads and bridges can severely impact public services and may lead to private property damages or even fatalities. The criticality of an asset is therefore linked to the inherent consequence of the loss of its function, including related impacts on the function of a system or network of assets.

For the purposes of this asset management plan, the overall condition of an asset is used as a proxy for determining risk; in particular, its likelihood of failure. In subsequent updates to this asset management plan, a formal risk assessment tool will be developed to inform decision-making and prioritization for a variety of asset classes and their components.

Road Pavement Risk

The Roads Service Area addresses risk information related to road pavement in a number of ways, including:

- Professional judgement is used in decision-making throughout all lifecycle activities and takes into consideration aspects of criticality, such as disruption to users, public safety, financial impact, environmental impact, and reputation to the organization
- Road pavements are regularly inspected in accordance with Provincial Minimum Maintenance Standards (MMS) and critical defects are addressed in accordance with prescribed treatments and timelines
- Road pavement condition surveys are performed every four years to monitor the overall pavement performance. Information from the condition survey is fed into the City's Road Pavement Management System (RPMS) to produce both capital and maintenance plans, as well as to determine if a funding gap exists
- Traffic volume data and road classification are entered into the RPMS, along with pavement condition, to inform the priorities for road renewal
- Pavement sections with higher Cost Effectiveness (CE) get higher on the ranking for treatment selection, as addressing these sections at the optimal time will minimize rehabilitation costs and maximize the useful life of the asset
- The City's capital prioritization methodology includes an assessment of each project's importance by taking into consideration the risks associated with not undertaking the project, should funding not be approved

Structures Risk

Staff retains structural engineering consulting services to assess the condition of the City's bridge, culvert, and retaining wall structures every two years, using the Ontario Structure Inspection Manual (OSIM) as a consistent guide. This also helps assess risks and to inform the priorities for rehabilitation and/or replacement in the capital plan.

Staff are developing a formal risk model for bridges and culverts. A high-level example of it is shown in **Figure 2**. This analysis looks at a high-level risk and does not dive deeper into individual-component risk within bridges and culverts.

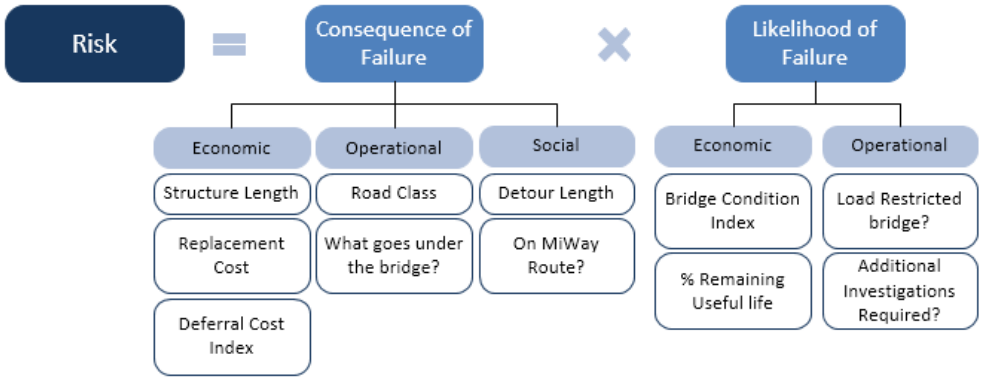


Figure 2: Bridges and Culverts Risk Model

The risk analysis shown in **Figure 3** demonstrates that the City's structures are in relatively good condition with low likelihood of failure. Four bridges and culverts have slightly elevated (high) consequences due to their large size and criticality. The likelihood of risk occurring for the majority of structures is rare or unlikely, with only 23 structures having a possible or likely probability. In order to keep bridges and culverts in a state of good repair, it is important to consistently evaluate the effectiveness of current funding available to ensure the overall risk does not increase to unacceptable or unsafe levels.

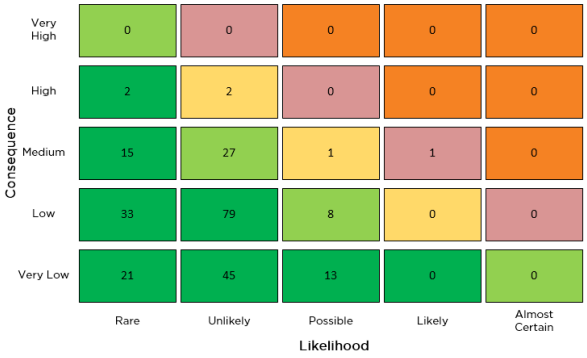


Figure 3: Bridges and Culverts Risk Rating Matrix

Currently, the risk assessment is specific to bridges and culverts within the Structures Asset Class. In the future, risk will be determined for each asset class and compared across asset classes within the Roads Service Area.

Dashboards

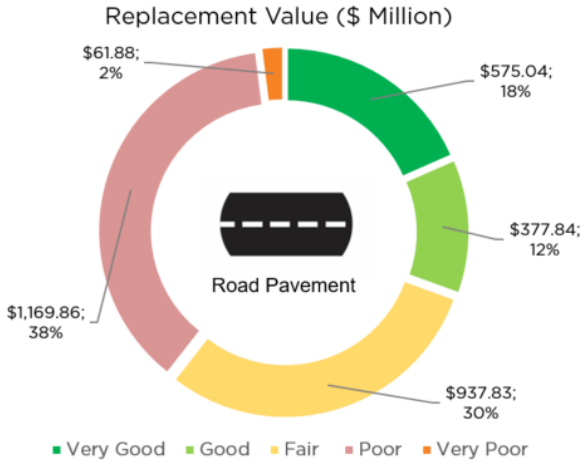
The following dashboards provide a quick summary of the state of the current infrastructure for each asset class. The information in this plan was prepared using 2021 year-end data.

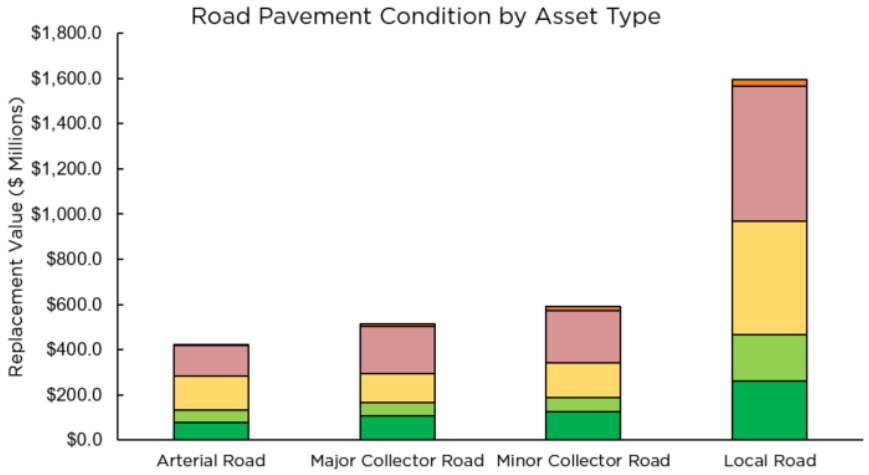
Asset Class:	Road Pavement	Current Replacement Value (CRV):	$3.1 Billion

DATA QUALITY

Asset Inventory	Condition	Replacement Value
A	A	A

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Arterial Road	799	Lane km	19	50	$422,590
Major Collector Road	958	Lane km	18	50	$513,303
Minor Collector Road	1,056	Lane km	20	50	$590,866
Local Road	2,827	Lane km	21	75	$1,595,682





The City's Road Pavement assets include Arterial, Major Collector, Minor Collector, and Local roads.

Asset Condition: Road Pavement

The City collects condition and digital image information of its road pavements to populate RoadMatrix every four years. The most recent pavement condition survey took place in 2021, with the next survey planned for 2025. The City procures consulting services to collect the pavement condition data. The consultant typically uses a specialized vehicle called an Automated Road Analyzer (ARAN) to collect pavement surface distresses, defects, and ride-quality information. Surface distresses and defects such as cracks and surface distortions are recorded, categorized, loaded into RoadMatrix, and computed into a Surface Distress Index (SDI), which reflects the surface condition of the entire pavement section. The pavement's ride quality, which is a measure of the roughness of the pavement, is collected using a laser profiler on the ARAN vehicle. The collected data is loaded into RoadMatrix, and a Ride Condition Index (RCI) value is computed.

The SDI and RCI are then used to calculate an overall Pavement Quality Index (PQI) that represents the overall condition of the entire pavement section. A PQI score of 100 would represent a perfectly constructed road with no surface distress and excellent ride quality. A score of 20 would represent a road that has been severely compromised and is no longer providing its intended level of service.

In order to standardize the condition scoring across different asset categories, condition information is compiled into a five-point grading system. Appendix A illustrates how the information is translated into the City's 1 to 5 rating scale.

The replacement values are calculated using the latest unit rates from the 2022 Development Charges (DC) study. The replacement cost captures the whole road pavement structure which is comprised of granular sub-base, asphalt or concrete base, asphalt or concrete surface, and curbs.

Example of Road Pavement in Very Good Condition

Age Summary: Road Pavement

While each component of a roadway deteriorates at a different rate, the City uses the pavement's overall condition rating and age as indicators to determine when maintenance, rehabilitation or reconstruction are required. **Figure 4** shows the average age of the City's road surfaces and the average age of the overall road pavement structure (by road classification) in comparison to the entire pavement structure's expected useful life. The expected useful life of the overall pavement structure was determined through an internal review and consultation process. The useful life values were derived from the lifecycle information contained within the City's pavement management system along with the professional judgement of the City's engineering, transportation infrastructure management, and maintenance staff that were involved in the review.

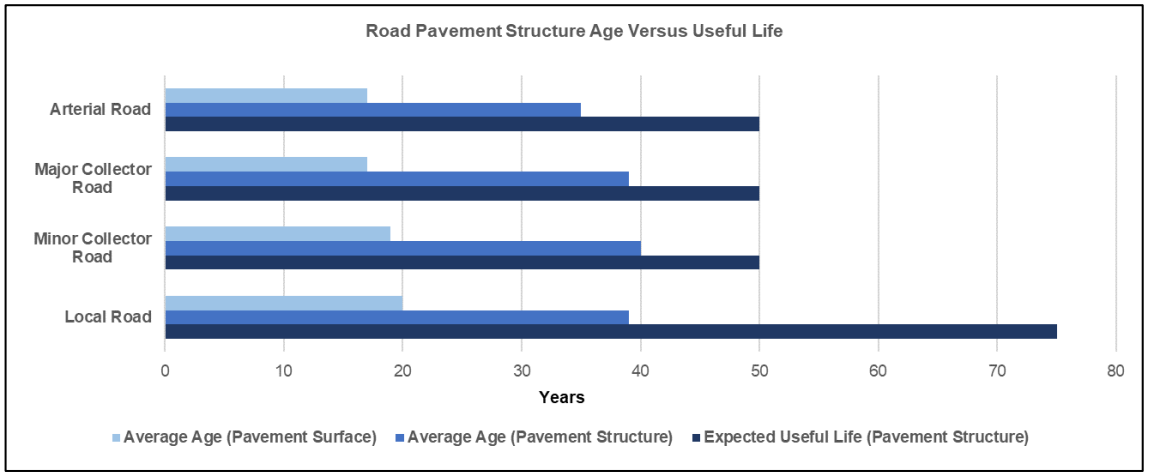


Figure 4: Road Pavement Structure Age vs. Useful Life

The expected useful life of the overall pavement structure is dependent on the periodic renewal or replacement of the pavement surface and/or base layer of the pavement structure (typically asphalt) and the curb components as required. The useful life of pavement asphalt material ranges from 15 years for arterials, major collectors and minor collector roads, to 25 years for local roads. Over the lifecycle of the pavement structure, the City expects to renew a portion of the asphalt and curb components at least twice before full reconstruction of the entire pavement structure is required. The expected useful life of the entire pavement structure ranges from 50 years for arterial, major collector and minor collector roads to 75 years for local roads. When a road is identified for renewal, the City's engineering and technical staff will determine the extent of pavement, granular materials and curbs that are required to be replaced.

The average age of the pavement surface takes into consideration the last time a major lifecycle event occurred on all of the roads in the network including the year that the road was first built and the last time it was resurfaced. While the overall pavement structure is aging, the road network appears to be much newer because the pavement surface is being replaced multiple times over the life of the overall pavement structure.

It is important to note that the longevity of a pavement structure will depend on a variety of factors, including construction methods, materials used, the local soil and climate conditions, water infiltration into the base and sub-base, and traffic loads and volumes.

The City has had a formal pavement rehabilitation program since 1985. This program has enabled the City to maintain its road network in a state of good repair. The graph in **Figure 5** provides a view into the extent of road pavements that have been renewed over the last 30 years. As the collector and arterial

roads approach their expected end of life, one can theoretically expect to see the number of reconstruction activities increase. Transportation Infrastructure Management personnel monitor these trends and update lifecycle models within the RPMS accordingly.

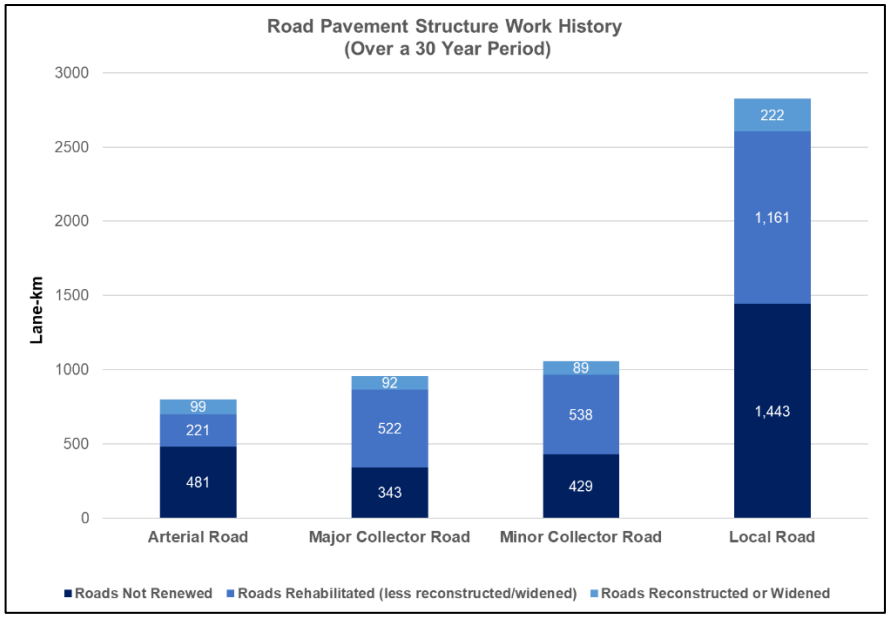


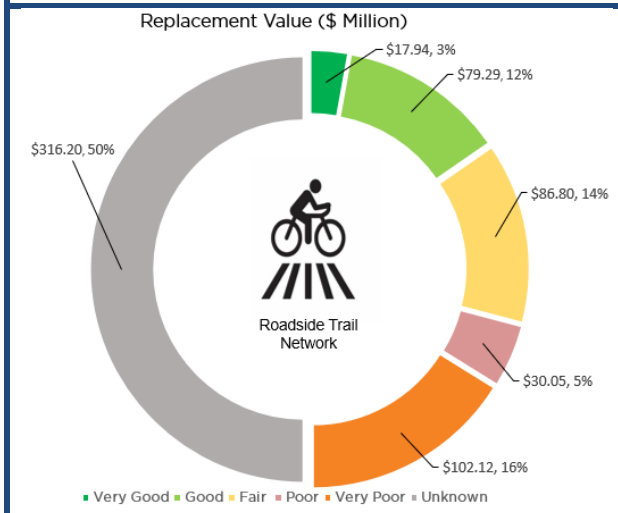
Figure 5: Road Pavement Structure Work History (Over a 30-year period)

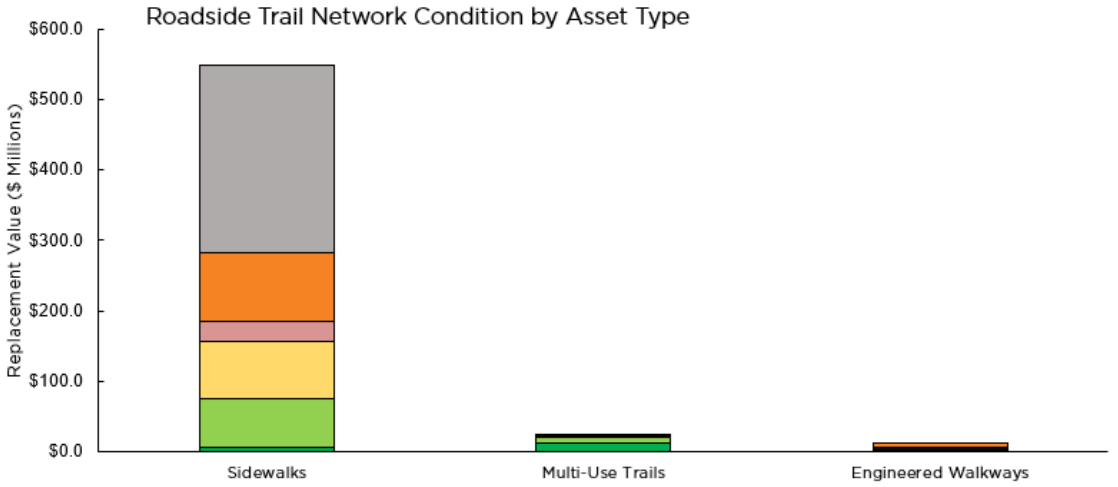
Asset Class:	Roadside Trail Network	Current Replacement Value (CRV):	$583 Million

DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	A

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Multi-Use Trails	99	km	13	30	$22,278
Sidewalks	2,402	km	42	50	$548,931
Engineered Walkways	22.4	km	47	50	$11,684





The Roadside Trail Asset Class includes Multi-use Trails, Sidewalks, and Engineered Walkways.

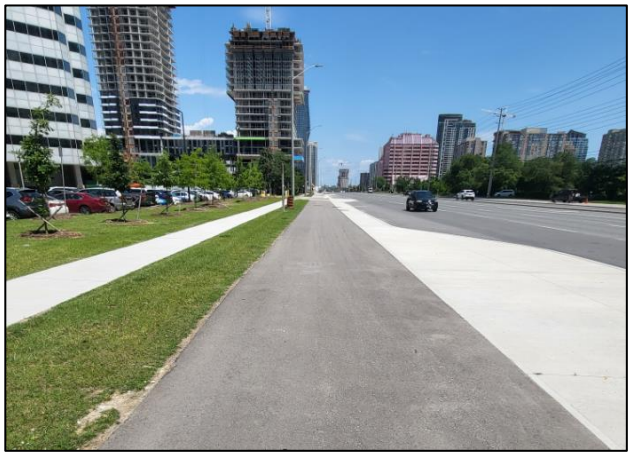
Asset Condition: Roadside Trail Network

The City collects pavement condition and digital image information of its multi-use trail assets to populate in the Roadmatrix application every four years. The most recent condition survey took place in 2020, with the next survey planned for 2024. The City procures consulting services to collect pavement condition data for the City's trail network. The scope of work includes the assessment of current pavement roughness, surface distresses and other criteria, as well as the provision of a full set of digital imagery. Data collection for trails — specifically regarding pavement condition — consists of a pavement-surface distress survey (both visual and semi-automated) completed by experienced raters. The consultant also adopts the Ontario Ministry of Transportation (MTO) surface-condition rating methods for flexible surfaces and rigid surfaces for evaluating along the pavement surface distresses index (SDI). The pavement's ride quality, which is a measure of roughness of the pavement, is collected using rRuf, a specialized and automated data-collection application for mobile phones (iPhone) that uses the device's accelerometers to produce a segmented Class 3 response based on roughness. The mobile phone is mounted on a tricycle for the roughness surveys and image collection.

Currently, sidewalks and engineered walkway inventories are kept in Esri. The condition of sidewalk and engineered walkway assets has been estimated based on age and remaining useful life (RUL) as described in Appendix A on the basis that as an asset reaches its expected life, its condition will deteriorate. This approach is commonly used for assets, where measured condition data is not readily available. Appendix A shows the translation used to assign a 1 to 5 condition rating based on asset age (expressed as the percentage of its lifespan remaining), and a description for each rating.

Age Summary: Roadside Trail Network

Roadside Trail Network structure is typically comprised of granular sub-base materials, asphalt or concrete-base materials and asphalt or concrete-surface materials. While each component deteriorates at a different rate, the City uses the pavement's overall condition rating and age as indicators to determine when maintenance, rehabilitation or reconstruction is required. The expected useful life of the overall pavement structure is determined through an internal review and consultation process. The useful life values are derived from the City's tangible capital asset (TCA) information along with the professional judgement of the City's engineering, transportation infrastructure management, and maintenance staff that were involved in the review.



Example Multi-Use Trail

Data Assumptions and Limitations

- **Installation Date** – Where available, the installation date is assumed to be the same as the asset it is built adjacent to (e.g., a sidewalk is assumed to have been built at the same time as the road). Where the installation date of the road asset is missing, or where the install date is inaccurate (e.g., 1800s), the install date is assumed to be unknown, and excluded from the condition calculations
- **Replacement Values** – are calculated using the latest unit costs available These do not include excavation costs for any Roadside Trail Network assets, and for engineered walkways replacement values do not include the cost of curb installation
- **Trail Width** – for trails missing width information, a 1.5m width for sidewalks and 3m for engineered walkways is assumed based on minimum standard widths
- **Estimated Useful Life** – for all assets are based on the City's TCA policy

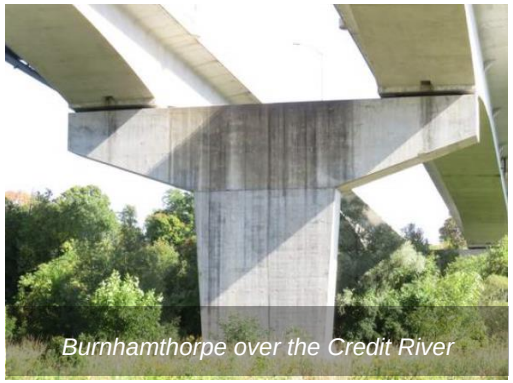
Example Engineered Walkway

Example Sidewalk

Asset Class:	Structures	Current Replacement Value (CRV):	$779 Million

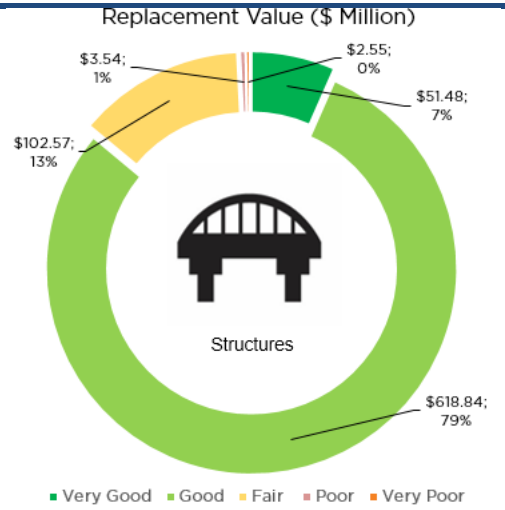
DATA QUALITY

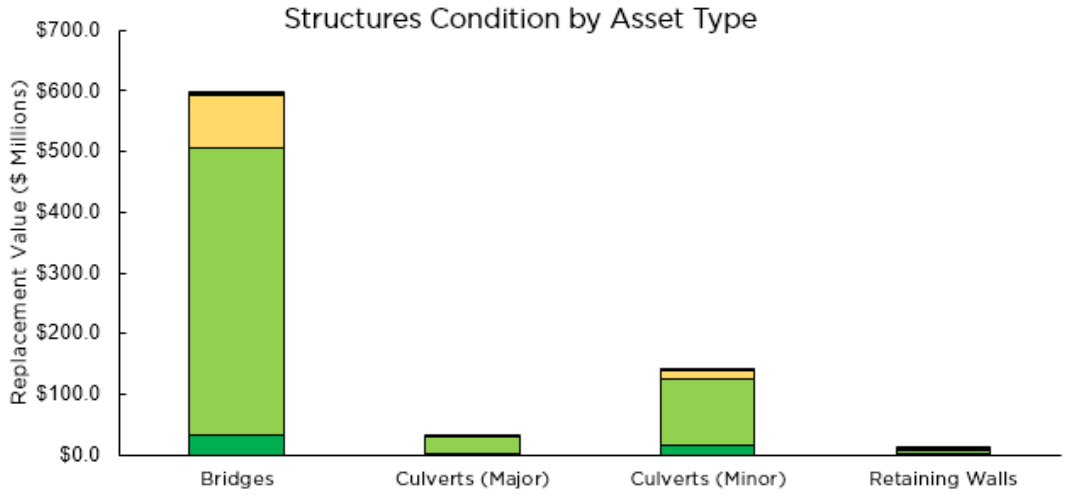
Asset Inventory	Condition	Replacement Value
B	B	A



Burnhamthorpe over the Credit River

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Bridges	130	Ea.	44	100	$596,044
Culverts (Major)	11	Ea.	47	60-70	$34,032
Culverts (Minor)	107	Ea.	39	60-70	$139,409
Retaining Walls	110	Ea.	46	60	$9,486





At an estimated replacement value of $769 million, the City's 250 bridge and culvert structures cross a variety of natural and man-made features. From watercourses, rivers and streams to highways and railways, these structures connect our residents to communities, commerce and recreational opportunities. The overall condition rating of the City's bridge and culvert structures is Good. Similar to our road pavements, the City's structures are also aging but at a different rate than our road network.

Retaining Wall assets are found throughout the City and vary in height and material. The 94 walls that have been identified to date have an estimated replacement value of $9 million. These assets retain both public and private property and are important for the safety and proper operation of other City infrastructure. The overall condition rating of these structures is also Good. These assets are aging in a similar rate to the bridge and culvert structures.

Example Retaining Wall

Asset Condition: Structures

In accordance with O. Reg. 472/10, road-related bridges and large culverts are inspected every two years. The inspection and condition information is catalogued and verified using the methodology outlined in the Ontario Structural Inspection Manual (OSIM). The bridge and culvert condition data is based on the 2021 OSIMs. Currently, retaining walls are inspected by staff in the field using a 1-10 scale (10 being excellent) and the inspection and condition information is stored on the City's GIS system. Starting in 2023, staff plan on adding these assets to the OSIM inspection list to be evaluated using the same criteria and methodology as the other structure assets.

The OSIM inspections visually evaluate each component of the structure and classify their condition. These individual, component-condition scores are compiled into a Bridge Condition Index (BCI) score, which is an overall measure of the condition or health of the structure. A BCI score of 100 would represent a newly constructed structure, while a BCI score of 20 would represent a structure that requires significant rehabilitation or replacement. In addition to the visual inspection, completed OSIM inspections identify needs for repair and/or further detailed investigation of the structure to inform renewal requirements.

The City uses the Net Asset Salvage Value Index (NASVi) methodology to assess the overall performance of bridge and culvert structures instead of the traditional Bridge Condition Index (BCI) methodology. NASVi is a direct reflection of the dollar value of work anticipated as a percentage of the overall replacement value of the structure. It is quite common for BCI and NASVi results to present different perspectives. As an example, a structure may deteriorate over the next 20 years, lowering its BCI value; however, the type of deterioration will not necessarily demand rehabilitation. This is common with most culverts and rigid frame structures — they tend to deteriorate more slowly compared to other

structures and, even when they do, the types of deterioration are not necessarily significant (such as spalling and delamination on underside surfaces). It is important that the reader understand the difference between BCI and NASVi if trying to draw comparisons between the two methodologies.

Age Summary: Structures

Bridge, culvert and retaining-wall structures come in all shapes and sizes and can be constructed using a number of different materials like concrete, steel or even wood. They are also comprised of a variety of components that require periodic maintenance repair, replacement and rehabilitation. Depending on the type of structure, the components can include footings, structural retaining walls, parapet walls, abutments, piers, steel, wood or concrete beams, bearing seats, handrails, sidewalks, decks, drains, and expansion joints, just to name a few.

The expected useful life for structures varies between 60 and 100 years depending on the type of structure. The useful life values for bridges and culverts are derived from the lifecycle information contained within the City's BridgeTMS system. The useful life value for retaining walls was derived from a market survey completed by staff. The longevity of these structures will depend on a variety of factors including construction methodology, the materials used, the local climate and other environmental conditions like exposure to chlorides (salts), loads and frequency of use. Taking all factors into account, the expected useful life for the various types of structures is determined through review and consultation, employing the professional judgement of City engineering staff and structural engineering consulting services retained by the City.

Example Rail Bridge

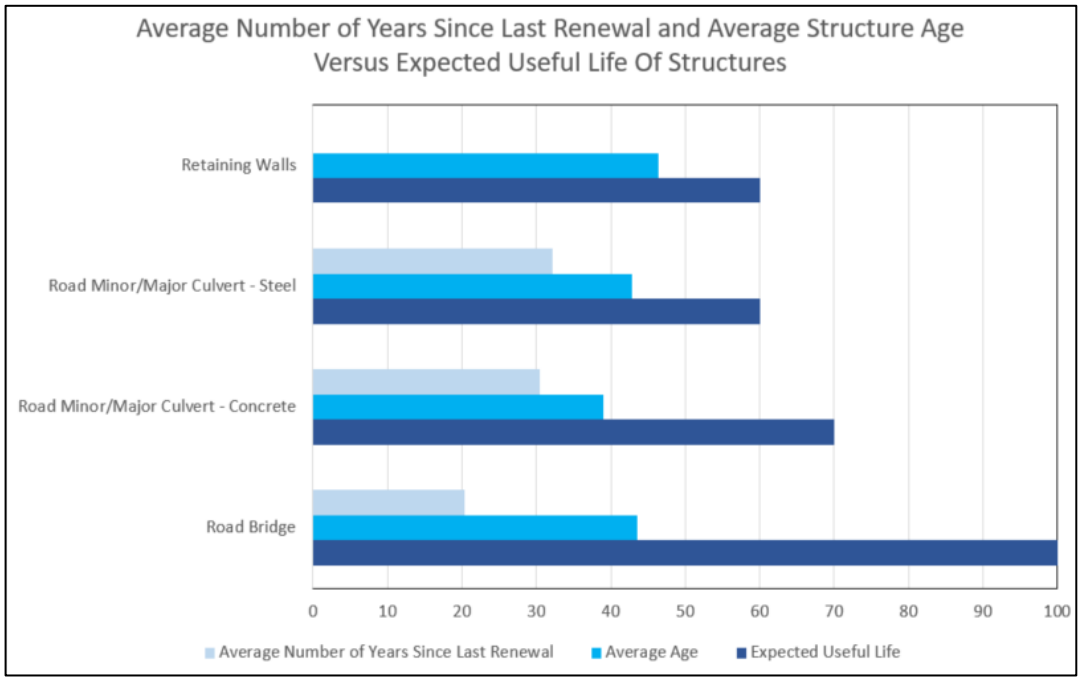


Figure 6: 2021 Graph - Useful Life vs. Structure Age vs. Years since Renewal

The graph in **Figure 6** shows the average age for bridge, culvert, and retaining wall structures in relationship to the expected useful life by structure type. The graph also shows the average number of years since the structures were last renewed. While all of the City's structures are aging, the bridge and culvert network appears to be much newer in appearance and condition because the structures are being monitored regularly and timely maintenance and renewal activities are taking place. Typically, structures are scheduled for renewal when they reach their mid-life and are replaced when they reach their end of life. Transportation Infrastructure Management staff monitor these trends and update lifecycle models and treatments accordingly. The retaining wall network is aging and is closer to the end of the assets' useful lives as shown. This reflects the lack of renewal events for these assets and the need for the City to prioritize them more proactively.

Data Assumptions and Limitations

- **Replacement values** – for bridges and culverts are determined by the City's inspection consultant, considering current construction costing, bridge type, and size. Replacement value for retaining wall structures is determined by using unit costing derived from past construction data and values gathered from market research. The values are applied to each retaining wall based on their dimensions to determine an overall replacement cost. Costing information for different materials for retaining walls is not available. The same unit costing has been used for all retaining walls, regardless of material
- **Installation Dates** – It is assumed that construction dates for retaining walls are the same as the registered/built date of the road, unless more accurate installation dates are available
- **Useful life** – for retaining walls is set at 60 years. This is based on market research of other municipal asset management plans conducted by asset management staff. It is assumed that these will become more accurate as the City renews these assets over time. The existing useful lives of bridges remains set at 100 years with concrete culverts at 70 years and steel culverts at 60 years
- **Retaining Walls vs. Knee Walls** – All walls found to be under 60 cm in height are considered to be knee walls and are not a part of this plan. Retaining walls that have not been identified are not included in the inventory. The City's Light Detection and Ranging (LiDAR) project will identify additional retaining walls for inclusion in the inventory
- **Ownership** – There are a number of retaining walls where ownership is unknown or unconfirmed. These have been assumed as privately owned if they are retaining private property or landscaping

Example Pedestrian Bridge

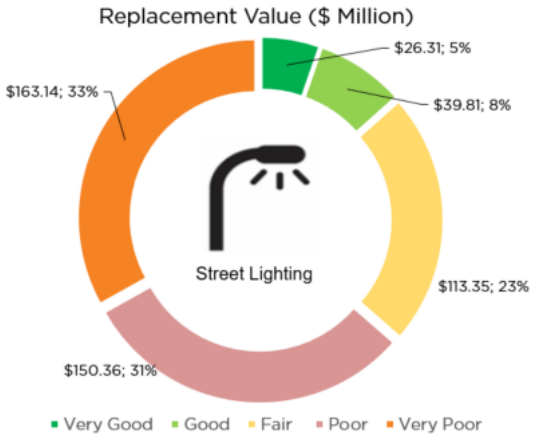
Example Culvert

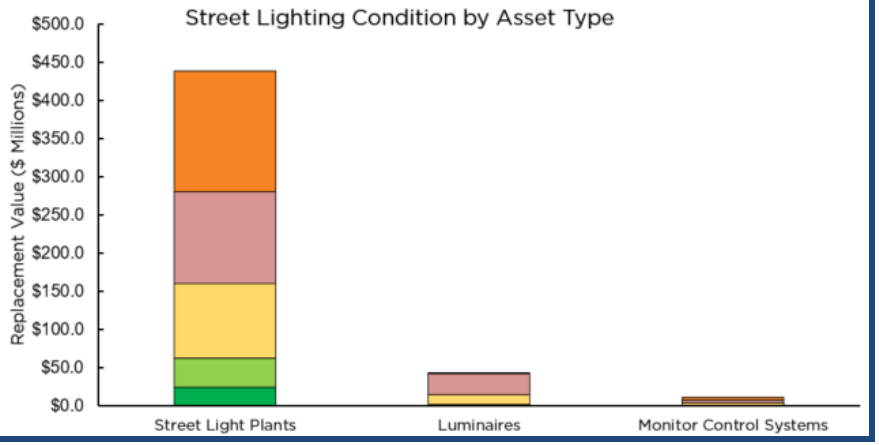
Asset Class:	Street Lighting	Current Replacement Value (CRV):	$493 Million

DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	C	A

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Street Light Plants (Poles/Arms/Cables)	33,378	Ea.	36	50	$438,000
Luminaires	46,806	Ea.	9	15	$43,436
Monitoring Control System	45,829	Ea.	9	10	$11,522





The City's Street Lighting Asset Class consists of the following:

- Street Light Plants – includes poles, brackets and cables required to provide adequate lighting throughout the City
    - Poles (Concrete, wood, steel, aluminum)
    - Brackets (Standard and Decorative)
    - Cables (Underground wiring)
- Luminaires – includes luminaires attached to a Street Light Plant asset, consisting of LED's, Non-LED's, underpass, lawn, bollard, and mercury vapour lights
- Monitoring Control System – includes adaptive control nodes attached to each luminaire to provide analytical data for the accuracy and validity of operational and energy consumption, as well as gateways to provide a mesh network-communication system to all streetlights

Asset Condition and Age Summary: Street Lighting

The City does not currently have a formalized program to monitor the condition of its Street Lighting assets. Asset condition is estimated using age information generated from Esri. The average age is determined from the installation dates from the City's database. The condition scale used is the average age of the total number of poles compared to the life expectancy of the asset.

Table 3: Useful Life Based on Pole Material

Material	Estimated Useful Life
Concrete	50 years
Erin Style Pole (Direct buried) steel)	40 years

Pole material is used to estimate the useful life of street light plants as shown in **Table 3**.

Street light luminaires were converted to LED in 2013 along with the monitoring control system. As this was a new and emerging technology, several issues led to decreased useful life conditions. When communication was lost as part of the mesh network, lights would default to the "On" position. Therefore, lights were on for 24 hours per day instead of the expected average of 12 hours. This has resulted in street lights where the actual condition of the asset is worse than what is reflected by its age.

The age profile identifies a large number of assets from 1970s to 1990s. Based on their age-based condition, these assets will require renewal funding over the next 5 to 15 years. The renewal funding will be ongoing due to growth of the city from the 1990s to mid-2000s. The useful life of poles is 40 to 50 years, and due to the deferral of $20M renewal budget to future years, many poles have reached an overall age as high as 60 years. LED luminaires and new adaptive control nodes were installed between 2013 and 2015, as part of the conversion project and should be considered for replacement within the next 5 years.

Data Assumptions and Limitations

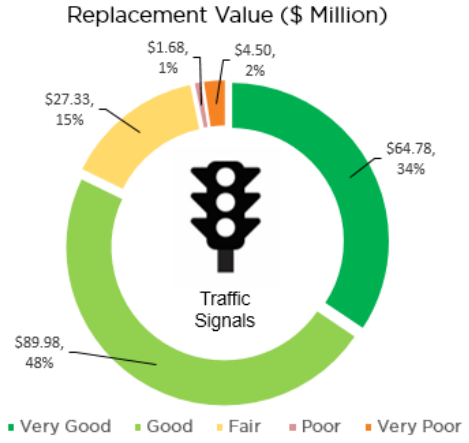
- **Condition ratings** are estimated using an age-based method and may not reflect the real-world condition of the assets. The City performs inspections on an as-needed basis, to address assets that may pose a public safety concern. In-depth condition assessments will be part of the improvement plan for asset management
- **Replacement values** were based on current unit costs from tenders

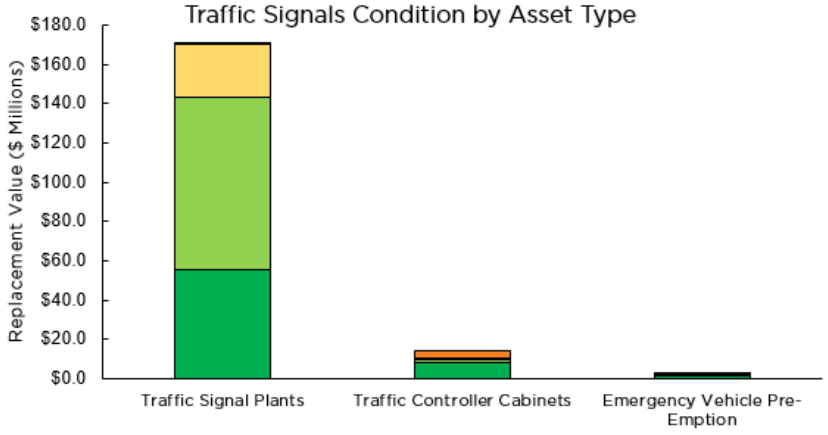
Asset Class:	Traffic Signals and Related Electrical Devices	Current Replacement Value (CRV):	$188.3 Million

DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	B

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Traffic Signal Plants	635	Ea.	18	50	$170,990
Traffic Controller Cabinets	574	Ea.	14	20	$14,400
Emergency Vehicle Pre-Emption	574	Ea.	14	20	$2,880





The City's Traffic Signals and Related Electrical Devices Asset Class consists of Traffic Signal Plants, Traffic Controller Cabinets, and Emergency Vehicle Pre-Emption.

The Traffic Signal Plant is a combined assembly (of poles, heads, conduits, cables, pushbuttons, LEDs, vehicle detection, handwells, and power supplies) with a useful life span of 50 years when properly maintained under normal conditions. The Traffic Controller Cabinets and Emergency Vehicle (fire) Pre-Emption System can be expected to have a useful life of 20 years. This takes into account the rapid technological advances in the transportation industry. Currently, the City attempts to use traffic signal equipment until it has reached its expected end of life or deemed a risk to the overall system. In lieu of replacing the entire assembly, viable parts may be salvaged from retired assets to keep current signals operational.

Asset Condition and Age Summary: Traffic Signals and Related Devices

The condition of traffic signals and related electrical device assets is estimated based on age and remaining useful life as described in Appendix A on the basis that as an asset reaches its expected life, its condition will deteriorate. Appendix A shows the translation used to assign a 5-point condition rating based on asset age (expressed as the percentage of its remaining useful life).

The City carries out an annual inspection program for all traffic signals and related electrical devices. The following checks and tests are performed to ensure safe and operational equipment comply with the latest safety standards:

- Spring and fall inspections at all traffic-signalized intersections (including Pedestrian Crossovers (PXO) type 'B' and 'C') as part of routine maintenance
- Spring and fall monitor checks for all traffic-signalized intersections as part of routine maintenance
- Annual testing of the emergency vehicle (fire) pre-emption system for all traffic-signalized intersections as part of routine maintenance
- Annual inspection of all school flashers and warning beacons as part of routine maintenance
- Annual inspection of lane designation poles as part of routine maintenance
- Annual inspection of closed-circuit television (CCTV) cameras as part of routine maintenance

All defective traffic signals and related electrical devices are repaired or replaced within the times specified in accordance with the City's standards, the Minimum Maintenance Standards for Municipal Highways, and Ontario Traffic Manuals.

The City also collects data through routine maintenance programs, as well as preventative and emergency maintenance. The information provided includes replacements costs, age, maintenance history, and condition of the traffic-signal infrastructure. The data generated by the traffic signals electrical maintenance contractor helps decision makers determine the lifecycle of the intersections.

Data Assumptions and Limitations

- **Installation dates** of the entire traffic signal plant is assumed to be the same date as when it was built (e.g. a pole was assumed to have been installed at the same time as the traffic signal plant was built, even though a pole may have been replaced due to motor vehicle collisions). This may also apply to any other Traffic Signal Plant components, or Traffic Controller Cabinet, or Emergency Vehicle (fire) Pre-Emption System
- **Replacements costs** for traffic signal plants is based on the current market value (i.e., labour, materials, equipment and general overhead and handling charges)
- **Data limitations:**

- All traffic signal and related electrical devices are currently stored in separate excel spreadsheets
- Additional information needs to be entered or populated manually into these spreadsheets
- Maintenance logs performed by service personnel for repairs are not fully electronic

The traffic signals and related electrical devices are designed to accommodate various road users. There is a potential risk for unforeseen failures and damages due to power outages, severe weather events, construction activities, motor vehicle collisions, and malfunctioning equipment which can increase maintenance costs and affect the City's ability to sustain its desired service levels.

Example Traffic Signal Plant

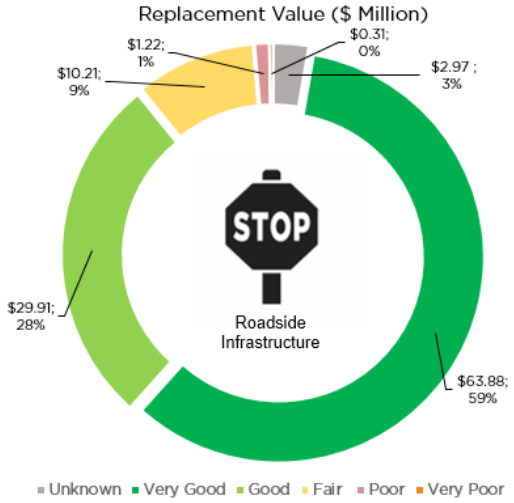
Asset Class:	Roadside Infrastructure	Current Replacement Value (CRV):	$108.5 Million

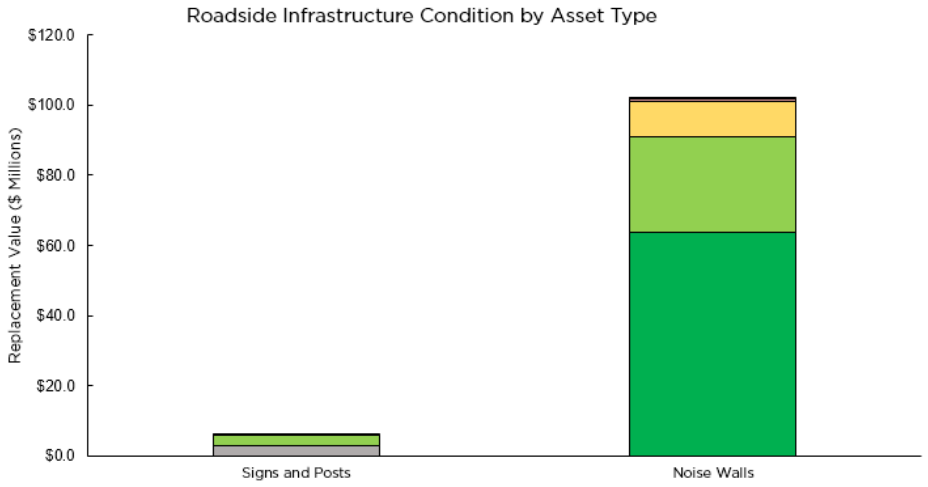
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	A

Example Concrete Noise wall

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Signs and Posts	116,323	Ea.	N/A	10 - 50	$6,445
Noise Walls	36,444	m	14	30 - 50	$102,041





The City's Roadside Infrastructure Asset Class consists of Noise Walls, Signs and Posts.

Noise Walls

Asset Condition

The condition of noise walls is evaluated every two years during a visual inspection by City staff. The Noise Wall Condition rating scale is used during visual inspections and gives each asset a condition score between one and 10. A rating of one is considered poor condition, and a rating of 10 is considered excellent condition.

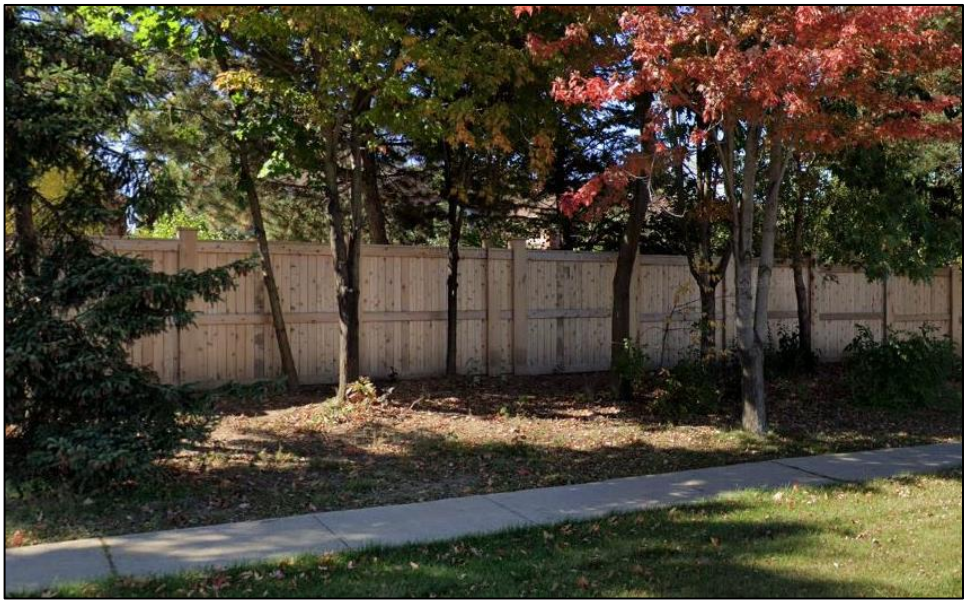
Age Summary

Construction material is used to estimate useful life as shown below:

Material/Asset Sub Type	Estimated Useful Life
Concrete/Composite/Brick	50 years
Wood/Vinyl	30 years

Data Assumptions and Limitations

- **Ownership** for all noise walls has not yet been confirmed. Some private walls are currently assumed as City-owned, and require review
- **Installation dates** are missing for some noise walls. Various dates are assumed by looking at historic Google mapping, and identifying the earliest sign of installation
- **Replacement values** are calculated based on a unit cost per metre. The unit costs include materials, labour, administration, and other applicable costs. They are updated yearly based on the latest tendered construction contract



Example Wooden Noise wall

Signs and posts

Asset Condition

Visual condition data is collected yearly for all regulatory signs and posts using a pass or fail rating scale. A pass indicates no deficiencies were found, while a fail indicates the sign is damaged, missing, illegible, obscured, worn, etc. Retro-reflectivity testing for warning and regulatory signs is also typically performed annually. Condition is not currently collected for wayfinding signs.

Age Summary

Many signs are mounted on existing supports that have been captured by the Street Lighting or Traffic Signals Asset Classes. The remainder are mounted on one of four types of posts: Wooden 4x4, U-channel, 3-in OD Post, and Telespar. The construction material is used to estimate the useful life of the sign posts as shown below.

Material/Asset Sub Type	Estimated Useful Life
Signs	10 to 15 years
Aluminum Post	50 years
Wooden Post	20 years

Generally, all posts are replaced with wooden 4x4 posts if they are damaged or reach the end of their useful lives, with the exception of 3-in OD posts, which are replaced like for like.

Data Assumptions and Limitations

- **Useful life** assumptions for signs are made based on manufacturer material warranties. For example, the sheeting manufacturer has a 10-year warranty on their signs
- **Replacement value** for signs and posts is based on current pricing of replacement material, generalized by sign type. Where replacement values are not available, such as non-regulatory signs, an average cost of $50/sign is assumed. Replacement value does not include the cost of fasteners and brackets
- **Installation dates** of signs and posts are unknown
- **Condition** of posts is unknown

Example Signs

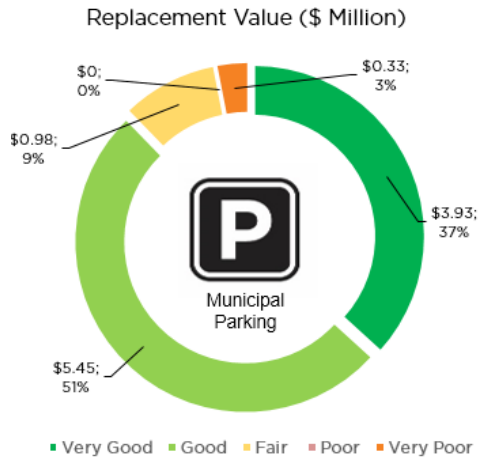
Asset Class:	Municipal Parking	Current Replacement Value (CRV):	$10.7 Million

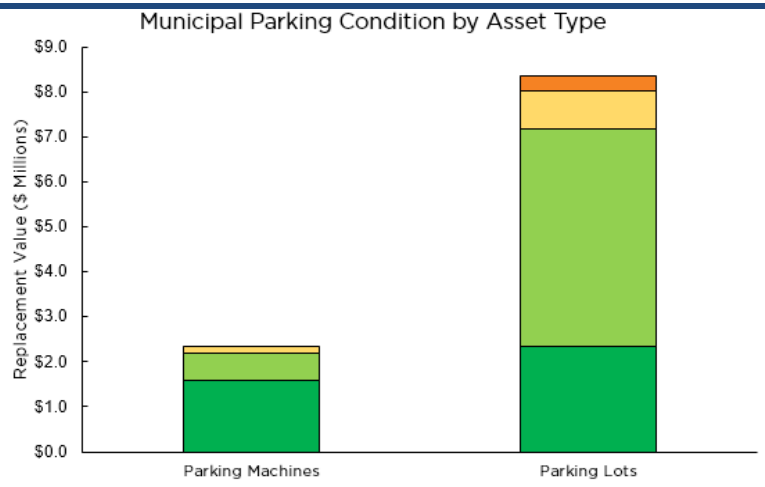
DATA QUALITY

Asset Inventory	Condition	Replacement Value
A	A	B


Sheridan North Parking Lot

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Parking Machines	247	Ea.	9	22	$2,329
Municipal Parking Lots	20	Ea.	15	20	$8,353





The City's Municipal Parking Asset Class consists of Municipal Parking Lots and Parking Machines.

Asset Condition

Municipal Parking Lots

The condition of municipal parking lots is assessed annually, and includes inspection of pavement condition, curbs, lighting, fences, and pavement markings. The average condition of the parking lot surface also takes into consideration the history of the parking lot including the last time it was resurfaced. While the overall parking lot is aging, pavement longevity is determined by factors such as the weather, winter maintenance and most importantly vehicular usage.

The condition scale used to grade the above-mentioned components is a five-point scale with one being Very Good, and five being Very Poor.

Pay-and-Display Machines

The condition of parking machines looks at the external condition of the unit (paint & rust), the solar panel condition, and age of components.

The average condition of a pay-and-display machine is estimated yearly by the last time the machine was refurbished along with the frequency of repairs as logged within the Precise ParkLink database. While the pay-and-display machines are aging, the life cycle of the machines is determined by factors such as the weather, maintenance and most importantly, usage. Machine condition is also influenced by emerging advancement in the technology and the legislated required upgrades to the machines.

The typical life cycle of a pay-and-display machine is 20 years, assuming three refurbishments (one every 5 years).

Data Assumptions and Limitations

- **Replacement value** for parking lots is determined by historical cost plus the amortization of the parking lot. Replacement value for parking machines is determined by the set price given by the vendor, in agreement with the purchase contract

Example Parking Machine

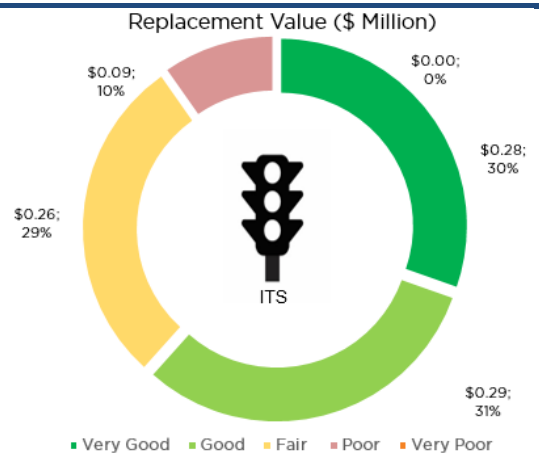
Asset Class:	Intelligent Transportation Systems (ITS)	Current Replacement Value (CRV):	$0.9 Million

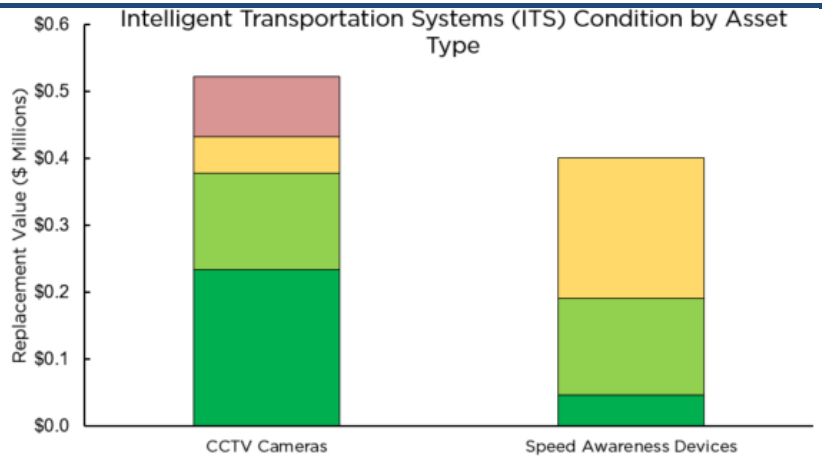
DATA QUALITY

Asset Inventory	Condition	Replacement Value
A	A	A

Example Speed Awareness Device

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
CCTV Cameras	87	Ea.	5	15	$522
Speed Awareness Devices	54	Ea.	9	10	$400





The City's Intelligent Transportation Systems (ITS) Asset Class consists of CCTV Cameras and Speed Awareness Devices.

CCTV Cameras

Asset Condition

Since Traffic Management is a client of Security Services, who operate and maintain the system on the City's behalf, costs to replace CCTV Traffic Monitoring Cameras are confirmed by Security Services. The make, model and installation date of the CCTV Traffic Monitoring Cameras are tracked by staff using the ATMS Dashboard. Tracking the make, model and installation date of the CCTV Traffic Monitoring Cameras allows staff to identify any cameras that are either non-HD or between 10-15 years old, which is the life expectancy for pan-tilt-zoom (PTV) cameras. As part of an annual expansion program of CCTV Traffic Monitoring Cameras within the City, spare cameras are purchased for the purpose of replacing older, non-HD cameras.

CCTV Camera mounted on Street Light Pole

Since CCTV Traffic Monitoring Cameras are not static and provide pan-tilt-zoom (PTZ) capabilities, average conditions of a CCTV Traffic Monitoring Camera depends on usage, internal hardware components and weather conditions. Asset conditions can also be influenced by emerging advancements in technology. In addition, a visual inspection of the camera, control equipment and wiring is also performed to assess the condition of the CCTV camera and potential replacement.

Age Summary

The life expectancy for PTZ cameras is 10 to 15 years. There are 15 cameras that were installed between 2008 and 2011 that are approaching the end of their service life.

Data Assumptions and Limitations

- **Replacement values** for the CCTV Traffic Monitoring Cameras is based on the current market value obtained from Security Services and the City's Traffic Signal Electrical Maintenance Contractor (e.g., equipment, programming and labour costs)
- **Installation dates** - Although all the CCTV Traffic Monitoring Camera data is kept on the ATMS Dashboard and excel spreadsheet, there are several installation dates that are currently unknown. As a result, additional information needs to be entered or populated manually into the ATMS Dashboard and spreadsheet
- **Data limitation** - One of the limitations is when space/capacity is not available on the Network Video Recorders (NVRs), or additional hard drives are needed to increase capacity on the NVRs. If this were to occur, video will not be recorded on the NVRs and provided upon request

Incorporating routine inspections and identifying or replacing end-of-life CCTV Traffic Monitoring Cameras ensures staff are able to proactively monitor traffic conditions and respond to planned and unplanned events in a timely manner. This will become more critical as the number of CCTV Traffic Monitoring Cameras approach end of service life and the number of annual installations increase to provide the ability to monitor traffic conditions on a larger scale.

Speed Awareness Devices

Asset Condition

Condition ratings for Speed Awareness Devices are calculated based on age. No inspections are currently performed.

Age Summary

The estimated useful life of speed awareness devices is approximately 7 to10 years. The City's inventory includes a variety of different types of equipment purchased from different vendors and with different specifications and capabilities, as this technology changes over time.

Data Assumptions and Limitations

- **Replacement values** for speed awareness devices are based on recent equipment-purchase costs for similar equipment
- **Location** data is not relevant as the equipment is mobile and rotated monthly, however staffs tracks the location of all equipment installed

Example Speed Awareness Devices

Levels of Service

Regulatory Requirements

A requirement of O. Reg. 588/17 is that plans shall include the current levels of service being provided by the asset, determined in accordance with the qualitative descriptions and technical metrics mandated by the Province and determined by staff.

The Regulation divides levels of service into two categories — community and technical — with guidance that the service attributes "scope" and "quality" be provided for roads and bridge & culvert structures. Qualitative descriptions are required for community level of service attributes, while technical metrics are to be used to describe the attributes of the technical levels of service.

Community Levels of Service

For roads, the Regulation prescribes that the asset management plan include a description of the municipality's road network and its level of connectivity, which may include the use of maps to establish the scope of the community level of service provided by the asset. In terms of quality of the asset from a community level of service perspective, the asset management plan shall include a description or images that illustrate the different levels of pavement condition.

For bridges & culverts, a description of the traffic that is supported by structures (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists) is sufficient to establish the scope of the level of service provided to the community. In terms of quality from the community's perspective, descriptions or images of the condition of the assets are required, including how the condition would affect their use.

Technical Levels of Service

For roads, the number of lane km of each road class as a proportion of the total land area of the municipality is to be stated in the asset management plan in order to describe the scope of the technical level of service provided. In terms of quality, the average pavement condition index value shall be stated for the paved roads in the municipality, and the average surface condition (e.g., very good, good, fair or poor) for the municipality's unpaved roads.

For bridges and culverts, the asset management plan shall state the percentage of structures in the municipality with loading or dimensional restrictions in order to describe the scope of their technical levels of service. In terms of quality, the average bridge condition index values shall be stated.

Legislative Requirements for Levels of Service

Table 4 identifies legislative acts that are critical or applicable to the Roads Service Area and project delivery. In addition to legislative requirements, there are several industry best-practice manuals and guidance documents that inform staff on how to effectively manage the City's Roads network.

Table 4:Governing Legislation

Legislation	Requirements
***Accessibility of Ontarians with Disabilities Act*, 2005**	Provides accessibility standards to benefit all Ontarians.
***Building Code Act,* 1992**	Provides requirements to adhere to construction and safety practices.
***Conservation Authorities Act*, 1990**	Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.
***Development Charges Act*, 1997**	Provides municipalities the ability to levy charges to fund growth-related municipal infrastructure, on the principle that growth pays for growth.
***Emergency Management and Civil Protection Act*, 1990**	Provides requirements for emergency management.
***Environmental Protection Act*, 1990**	Provides for the protection of the natural environment through regulations regarding discharge of contaminates into the natural environment.
***Fish and Wildlife Conservation Act,* 1997**	Regulates hunting, trapping, and fishing practices and aims to preserve at-risk wildlife, as well as the conservation of wildlife.
Fisheries and Oceans Canada (DFO)	Provides guidelines and laws to protect the habitat of fisheries in proximities to roadways and bridges.
Municipal By-Laws	Regulations approved by Council to safeguard and protect persons and properties.
Municipal Government Act*, *2001	• Practices and procedures • Accountability and transparency

Legislation	Requirements
	• Finance
O. Reg 239/02: Minimum Maintenance Standards	Provides requirements for minimum standards of repair for municipal highways.
O. Reg. 472/10 and O. Reg. 104/97: Standards for Bridges - Ontario Structure Inspection Manual	Defines which structures must be inspected routinely.
O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure	Provides policies and guidelines for levels of service considerations in stormwater management assets.
Occupational Health and Safety Act, 1990	Rules governing health and safety in Ontario's workplaces.
***Ontario Heritage Act,* 1990**	Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.
***Ontario Water Resources Act,* 1990**	Provides guidance in the inspection and maintenance frequency of stormwater management facilities (i.e., storm ponds).
***Planning Act,* 1990**	Provides direction on municipal planning activities.

Roads LOS

Table 5 identifies Community Levels of Service measures for the Roads service area, while **Table 6** identifies technical Levels of Service measures for the Roads service area. Measures identified in red are a requirement of O. Reg. 588/17.

Table 5: Community Levels of Service Measures

LOS Attribute	LOS Objective	Asset Class	Performance Measure	Current Performance
Scope	Transportation assets provide a network with a reasonable level of connectivity and are capable of supporting all modes of transportation.	Road Pavement	Description, which may include maps of the road network in the municipality and its level of connectivity.	Maps are included in Appendix B.
		Structures	Description, which may include maps of the structure network in the municipality.	Maps are included in Appendix B.
		Structures	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The City road bridges, and AT bridges have been designed in accordance with the standards and requirements of the Bridge Design Code at the time of construction. The bridges have been designed to carry heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, and cyclists.
		All other asset classes	Description, which may include maps of transportation assets in the municipality and their level of coverage.	Map is included in Appendix B.
Performance	Transportation assets are maintained in a state of good repair and are safe and reliable for drivers, pedestrians and cyclists.	Road Pavement	Description or images that illustrate the different levels of road class pavement conditions.	Images are included in Appendix C.
		Structures	Description or images of the condition of bridges and how this would affect use of the bridges.	Images are included in Appendix C.
		Structures	Description or images of the condition of culverts and how this would affect use of the culverts.	Images are included in Appendix C.
		All other asset classes	Description or images of the condition of transportation assets and how this would affect their use.	For the majority of these assets, the condition is based on age. Images of condition are included in Appendix C for those that are not age-based.
Operational	Transportation assets are operationally safe for drivers, cyclists, and pedestrians, year-round and during all weather conditions.	Streetlights	Average service response time to repair a street light section where four or more adjoining luminaires are malfunctioning along one or both sides of any roadway and any luminaire at a signalized intersection.	Maintenance contractor is performing: 1 business day.
		Streetlights	Average service response time to repair a streetlight where three or less adjoining luminaires are malfunctioning along one or both sides of any roadway.	Maintenance contractor is performing: 1 to 10 business days.

Table 6: Technical Levels of Service Measures

LOS Attribute	LOS Objective	Asset Class	Performance Measure	Current Performance	Relevant Additional Information
Scope	Transportation assets provide a network with a reasonable level of connectivity and are capable of supporting all modes of transportation.	Road Pavement	Number of lane-kilometers of arterial roads (Class 1 and 2) as a proportion of square kilometers of land area of the municipality.	1%	
		Road Pavement	Number of lane-kilometers of collector roads (Class 3 and 4) as a proportion of square kilometers of land area of the municipality.	2%	
		Road Pavement	Number of lane-kilometers of local roads (Class 5 and 6) as a proportion of square kilometers of land area of the municipality.	3%	
		Road Pavement	Per cent of existing centre-line kilometers of roads that meet the 2041 growth capacity targets.	99%	
		Structures	Per cent of bridges and major culverts in the municipality that meet the 2041 growth capacity targets.	91%	
		Structures	Per cent of bridges in the municipality with loading or dimensional restrictions.	3%	Loading capacity unknown for many structures. Includes bridges only, not culverts.
		Roadside Trail Network	Per cent of roads with sidewalks on both sides of the road.	50%	Excludes all non municipal roads.
		Road Pavement Roadside Trail Network	Per cent of road corridors that meets the requirements identified in the Cycling Master Plan.	45%	Includes all cycle tracks, bike lanes, multi-use trails, and shared routes on road corridors in Mississauga, including regional roads.
		Street Lighting	Number of streetlights per lane kilometers.	8.2	

LOS Attribute	LOS Objective	Asset Class	Performance Measure	Current Performance	Relevant Additional Information
Performance	Transportation assets are maintained in a state of good repair and are safe and reliable for drivers, pedestrians and cyclists.	Roads Service Area	Average risk rating by asset class.	TBD	No formal risk process at the moment.
		Road Pavement	Actual vs. target capital reinvestment rate by asset class.	1.6% vs. 3.3%	Annual
		Structures		1.1% vs. 1.8%	
		Roadside Infrastructure		2.4% vs. 6.0%	
		Roadside Trail Network		0.3% vs. 0.7%	
		Streetlights		0.5% vs. 1.8%	
		Municipal Parking		0.9% vs. 1.9%	
		Traffic Signals		0.74% vs. 0.72%	
		Intelligent Transportation Systems (ITS)		17.8% vs. 19.4%	
		Road Pavement	For paved roads in the municipality, the average pavement condition index value.	59.7	This is calculated using PQI.
		Road Pavement	Per cent of paved lane kilometers where the condition is rated fair or better.	62%	
		Road Pavement	Per cent of paved lane kilometers where the condition is rated very poor.	2%	
		Structures	For bridges in the municipality, the average bridge condition index value.	85.8	This is calculated using NASVi as a bridge condition index.
		Structures	For structural (major) culverts in the municipality, average bridge condition index value.	81	This is calculated using NASVi as a bridge condition index.
		Structures	Per cent of bridges and major culverts where the condition is rated fair or better.	95%	
		Structures	Per cent of minor culverts where the condition is rated fair or better.	86%	
		Structures	Per cent of retaining walls where the condition is rated fair or better.	86%	
		Roadside Infrastructure	Per cent of noise walls where the condition is rated fair or better.	99%	

LOS Attribute	LOS Objective	Asset Class	Performance Measure	Current Performance	Relevant Additional Information
		Roadside Infrastructure	Per cent of signs and posts where the condition is rated fair or better.	80%	Condition is currently only collected for regulatory and warning signs only. This does not include wayfinding signs. A condition of fair or better identifies no deficiencies.
		Roadside Trail Network	Per cent of sidewalks and engineered walkways where the condition is rated fair or better.	55%	Condition is based on age.
		Roadside Trail Network	Per cent of multi-use paths where the condition is rated fair or better.	99%	Condition is based on 2020 condition data.
		Street Lighting	Per cent of street-light luminaires where the condition is rated fair or better.	35%	This condition is based on a combination of age-based information and verifying the SCMS Database with the City's E Database when the LED conversion began.
		Street Lighting	Per cent of street-light poles where the condition is rated fair or better.	37%	This condition is based on a combination of age-based information and verifying the Alectra Database with the City's Esri Database. Also, no field inspections are currently being done.
		Street Lighting	Per cent of erin-style poles that are within their useful or functional life.	19%	
		Municipal Parking	Per cent of municipal parking lots where the condition is rated fair or better.	95%	
		Municipal Parking	Per cent of parking machines where the condition is rated fair or better.	100%	
		Traffic Signals and Related Electrical Devices	Per cent of signalized intersections that are within 60% of their useful life.	86%	Condition is based on age.
		Traffic Signals and Related Electrical Devices	Per cent of traffic-controller cabinets that are within 60% of their useful life.	54%	Condition is based on age.
		Intelligent Transportation Systems (ITS)	Per cent of speed-awareness devices where the condition is rated fair or better.	100%	

LOS Attribute	LOS Objective	Asset Class	Performance Measure	Current Performance	Relevant Additional Information
		Intelligent Transportation Systems (ITS)	Per cent CCTV cameras that are within 60% their useful life.	72%	Condition is based on age.
Operational	Transportation assets are operationally safe for drivers, cyclists, and pedestrians—year-round and during all weather conditions.	Road Pavement	Operations and maintenance costs per lane kilometre of road.	$4,472	Annual
		Street Lighting		$1,026	
		Structures	Operations and maintenance costs per structure.	$886	Annual
		Roadside Infrastructure	Operations and maintenance costs per kilometre of noise walls.	TBD	Annual
		Roadside Trail Network	Operations and maintenance costs per kilometre of roadside trail network.	$2,011	Annual
		Municipal Parking	Municipal parking operations and maintenance costs per parking space in a municipal parking lot.	$325	Annual
		Traffic Signals and Related Electrical Devices	Operations and maintenance costs per signalized intersection.	$5,084	Annual
		Intelligent Transportation Systems (ITS)		$423	
		Structures	Per cent of critical maintenance items that are addressed within service level agreement (SLA).	TBD	
		Roadside Infrastructure	Per cent of regulatory/warning signage that pass the retro-reflectivity testing.	TBD	
		Roadside Trail Network	Per cent of multi-use trails that undergo snow clearing to entire 3 m width.	17%	All multi-use trails are cleared to meet minimum maintenance standards
		Roadside Trail Network	Per cent of sidewalks that undergo snow clearing during winter event.	70%	
		Street Lighting	Per cent of street lights that are functioning and operating after dark.	99%	Functioning is defined as turning on and off.

LOS Attribute	LOS Objective	Asset Class	Performance Measure	Current Performance	Relevant Additional Information
		Intelligent Transportation Systems (ITS)	Per cent of speed-awareness devices that meet functional needs.	85%	Technical requirements meet operational needs.
Efficiency and Environmental Stewardship	Transportation assets are designed and operated in an energy-efficient and environmentally sustainable manner.	Street Lighting	Per cent of street lights that use energy-efficient LED lighting.	97%	
		Municipal Parking	Per cent of permeable surfaces that are functioning.	100%	Municipal Parking defines functioning as: reasonable amount of water infiltration, with no cracks or holes that cause an unsafe surface for drivers and pedestrians.
Accessibility	Road network and parking lots are adequate and accessible to all residents.	Structures	Per cent of structures that meet current railing height requirements for Cycling facilities.	TBD	
		Roadside Trail Network	Per cent of sidewalks and engineered walkways that meet standard width requirements.	TBD	
		Roadside Trail Network	Per cent of multi-use trails that meet standard width requirements.	88%	While the width requirement may be met, a trail or sidewalk may be partially obstructed by a pole or other fixed object. The number of partial-obstruction locations within the roadside trail network is currently unknown.
		Municipal Parking	Per cent of municipal parking lots that meet current accessibility requirements.	30%	Lots are still in compliance until a parking lot is renewed, at which time, the lot is updated with the most current accessibility standards.
		Municipal Parking	Per cent of parking machines that meet current accessibility requirements.	100%	
		Traffic Signals and Related Electrical Devices	Per cent of intersections that are equipped with Accessible Pedestrian Signals (APS) pushbuttons.	23%	

Future Demand

Mississauga continues to mature as a city. Aging infrastructure and the need to balance service levels with affordability pose significant pressures and challenges for the Roads Service Area.

The safety of the City's road users and traffic congestion remain high on the public agenda. Growth within Mississauga and surrounding municipalities continues to put additional pressure on the City's road infrastructure.

Vision Zero and the Transportation Master Plan

Adopted by Mississauga in 2018, Vision Zero is a strategy to eliminate all traffic-related serious and fatal injuries. The strategy prioritizes the safety and access of our most vulnerable road users.

The City completed a comprehensive Transportation Master Plan (TMP) in 2019 to guide the planning for Mississauga's transportation networks over the next 25 years. The TMP developed a vision for the future of mobility in Mississauga and established an overarching policy framework and action plan to guide investment in transportation infrastructure and services. The City looks for new ways to enhance its infrastructure to provide people with more options for modes of travel to, from, around and through Mississauga such that past investments continue to serve present needs well into the future.

The TMP complements the City's Vision Zero strategy and outlines a variety of road-safety objectives, including:

- Ensuring that roads, sidewalks, and trails are designed to prioritize the safety of pedestrians, cyclists, and other vulnerable travellers
- Ensuring that speeds are well-matched with the types of activity happening in the roadway and along the street
- Ensuring that people feel safe and secure when travelling in Mississauga by any transportation mode

Demand Drivers

Drivers affecting demand on the City's roads, bridges, and road infrastructure include population growth; development patterns leading to denser, more compact neighbourhoods; changes in demographics; climate change; decreasing vehicle-ownership rates; increasing use of transit and other mobility options; consumer preferences and expectations; technological changes; economic factors; environmental awareness; and regulatory changes.

Demand Forecasts

The current position and projections for demand drivers that may impact future service delivery and use of assets are routinely assessed by the City through transportation planning exercises, including Development Charges Background Studies, Corridor Transportation Studies, and other initiatives.

Demand Impact and Demand Management Plan

The impacts of demand drivers that may affect future service delivery and use of assets are described in Table 7 below. Demand for new services will be met through a combination of managing existing assets, upgrading existing assets, providing new assets, and transportation demand management (TDM). The City's TDM Strategy and Implementation Plan (2018) contains practices to manage the demand for the use of single-occupancy vehicles, including outreach, education, incentive programs, and other non-asset solutions. Opportunities identified to date for demand management are shown in Table 7. Further opportunities will be developed in future revisions of this asset management plan.

Table 7: Demand Management Plan for Roads

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
Road users looking for safe roads that eliminate fatal and serious injury collisions	Vision Zero was adopted by Mississauga in 2018. The TMP (2019) identified key recommendations to reduce fatal and serious injury collisions as part of a Vision Zero program	To achieve no collisions that cause death or serious injury	Ensuring that people feel safe and secure when travelling in Mississauga by any transportation mode. Shifting the prioritization of vulnerable road users like pedestrians and cyclists over level of service for vehicular traffic	Incorporate the 5 Es of road safety into all lifecycle-planning activities to achieve Vision Zero. The five Es are: 1. Engineering 2. Evaluation 3. Education 4. Empathy 5. Enforcement
Forecasted population growth increase and intensification throughout the City, triggering increased road use and traffic congestion	Mississauga is a popular destination for employment, business and services. The average vehicle capacity of the arterial and major collector road network is currently around 5,626 vehicles per lane. This is based on the 10-year historical average of vehicles per lane. Increases in vehicle volumes and speeds, combined with changes in transportation modes, creates increased	The average daily traffic volume is expected to reach 7,504 vehicles per lane by 2041. Demand for speed mitigation measures have increased each year since 2016 and the trend is expected to continue	With limited capacity to continue to widen roads in the City, traffic congestion, and noise will continue to increase. With limited capacity to deploy speed mitigation measures, response time is increased, and the duration of deployed resources decreases	Introduce, encourage and implement other modes of transportation such as higher order transit, high occupancy vehicle lanes, ride share, cycling and walking. Complete the planned network buildouts for transit, roads, cycling and walking, including grade separations and intersection improvements, as identified in the Development Charges Transportation Background Study, TRIP study, and the Cycling and Pedestrian Master Plans.

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
	demand for speed-mitigation measures			Introduce new speed mitigation programs and technology to meet increased demand. May need to advance planned program expansions to meet demands
Growing infrastructure needs (e.g., cyclists, transit, LRT, pedestrians, emergency response) and shifts in modes of transportation	Shifting from a vehicle-oriented right of way to a multi-modal and complete street environment. Accommodating the user demands by implementing and operating new traffic signal infrastructure needs	Increase in cycling, pedestrian and public transportation activity. Projects delivery and Maintenance, operating costs expected to increase	Need for higher-order transit (BRT and LRT) high-occupancy vehicle lanes and additional cycling and pedestrian infrastructure. Increase in pedestrian and bicycle transit-signal demands. Impact on level of service/operation at intersections with high vehicle, pedestrian, transit and cycling demands	Incorporate pedestrian, cycling and transit improvements into major road and bridge improvement and renewal projects. New traffic signal installation and modernization programs. Continued collaboration among the Transportation Projects, Traffic Planning, Traffic Operations, Road Safety, Active Transportation and Transit teams to identify traffic signal improvement needs
Increase in transit -elated projects, as well as other coordinated road-	Noise walls, retaining walls, and other roadway assets are constructed along the Transitway and other major collector and arterial corridors	Asset inventories are projected to increase along transit corridors, such as the Hazel McCallion Line and the Dundas BRT, as well as through the City of	Creation of new assets	Creation of new assets will need to be budgeted under the 10-year program

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
improvement projects		Mississauga's noise wall program		
Changing development patterns leading to denser and more compact neighbourhoods	CCTV Traffic Monitoring Cameras are typically installed at major/major intersections, 'hot spot' locations where reoccurring congestion occurs, adjacent to GO Stations where traffic patterns increase during GO train arrivals and where proposed intensification is planned (e.g., Lakeshore Road)	As the City of Mississauga starts to incorporate more of a 'complete street' concept, the need to expand coverage to monitor traffic conditions will be required	Although expanding the CCTV Traffic Monitoring coverage will result in staff being able to verify and respond to an incident in a timely manner, this will also lead to an increase in cost for maintaining the devices	Adjust the maintenance and operating budgets accordingly to offset the costs for purchasing and maintaining the devices
Increase in commuters and traffic from outside the City	Mississauga is a popular destination for employment, business and services from commuters from outside the City	Commuters will continue to come to the City from nearby municipalities	Need to manage traffic during peak periods and offer options for various modes of transportation	Advocating for regional transit connections, improving transit service and active transportation infrastructure
Growing infrastructure needs across the municipalities in the Greater Toronto & Hamilton Area and limited	Construction costs to deliver road-related projects have increased by an average 10% from the previous contract	Project-delivery costs are expected to increase significantly each year based on recent trends Maintenance and operating costs are also expected to increase annually	Reduced number of road-related capital projects that can be funded and delivered annually. Reduced number and volume of maintenance initiatives that can be	Tender road capital renewal and maintenance contracts early in the year to ensure that bids remain competitive

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
supply of available contractors are driving increased project-delivery costs			funded and completed annually	
Changes in residential living situations. Example: multiple tenants, children living longer at home, parents moving in with children, etc	Due to various economic factors, there have been changes in the way people select their living situation. Various factors, including high rent costs, mortgage-approval difficulties, and renting a residential home to multiple tenants	With a greater increase in residents within a single household, there is more often a demand for more parking options in order to avoid parking enforcement fines	A revised approach to parking is required to better adopt to the changes in residential areas. Providing a centralized permit system along with alternative parking options for residents is critical	Municipal Parking currently has a Parking Matters 2.0 project to provide a better permit system for residents along with an expanded lower-driveway boulevard program
Industry Guideline Changes (AODA, Vision Zero, OTM, Ontario One Call, Hydro, Railway)	Follow current and new practices outlined	Applying new standards and procedures	Adapt to new guidelines, cost impacts to signals (e.g., protected phasing, reflective backboards, new hydro line upgrades/rebuilds)	Implement new standards, procedures and guidelines with new or reconstructed traffic signals. Update Standard Operating Procedures (SOPs)
Increasing public expectations around	Noise policy states that noise walls are warranted where the noise level in the OLA adjacent to	Increase in service requests and residents	Increased creation of noise wall assets.	Continue to rely on the Noise Wall policy and noise testing to determine the need for noise walls in established

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
expected noise levels in Outdoor Living Area (OLA)	arterial and major collector roadways exceeds 60 dBA	inquiring about the installation of noise walls		residential areas where none currently exist (i.e., noise wall retrofit)
Increasing public expectations around condition of Roadside Trail Network	The City is responsible and does not currently have a renewal program for its sidewalks and engineered walkways within the road right-of-way and/or pedestrian network	There will be new levels of service for the Roadside Trail Network. Maintenance level of service may increase in the future	New tools/software required and increased cost to deliver service	Leverage a roadside trail network management system and develop a sidewalk and engineered walkway inspection program to determine optimal time and strategies to renew roadside trail network assets in a cost-effective manner and to manage user expectations
Advancements in technologies of Traffic Signals and CCTV cameras	There are currently 136 locations within Mississauga where CCTV Traffic Monitoring Cameras have been installed. Out of the 136 cameras, there are 22 non-High Definition (HD) cameras, resulting in a less than desirable footage quality	As technologies continue to advance, older assets may become obsolete, or more expensive to maintain. With the non-HD cameras reaching end of life, the cost to maintain and operate these devices is expected to go up	Introducing new technology will increase cost and maintenance required. Additional space is required for new equipment and extra inventory, or parts are required to maintain and operate new technologies. Reducing the number of CCTV Traffic Monitoring Cameras within Mississauga would result in staff	Continue to evaluate and test new technologies (pilot), align with industry standards, work with surrounding areas and with boundary jurisdictional agencies (i.e., Peel, MTO, GTAA, Halton, Brampton, Toronto), continually review spacing requirements. Establish an annual replacement program to replace older CCTV Traffic Monitoring Cameras that have/ are reaching end of life and budget accordingly

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
			not being able to verify an incident and pro-actively make signal timing revisions to help manage traffic congestion in a timely manner	
Introduction of new applications and technology for more convenient ways to pay for parking	Residents are exposed to paid parking technologies within other municipalities/private lots and therefore begin to expect the same technologies are introduced within Mississauga	New technology introduction and future vendor contract amendments/improvements with Municipal Parking is at the decision of LT and Council The procurement of new technologies is also dependent on the availability of other internal stakeholders	New technology introduction with Municipal Parking allows for better understanding of user habits, along with more data centric decision-making for future strategies	Municipal Parking currently has a Parking Matters 2.0 project, which aims to procure a new pay-by-phone application. In addition, Municipal Parking is looking to undertake a technology study to allow for the identification of future opportunities
Changes to development parking rates for both commercial and residential spaces	When the City receives a development application (depending on the characteristics of the location), a developer may ask to build a structure with a reduced parking rate	Reduction in parking rates required to be provided by the developer, impacts the resident behaviours regarding living situation/decision for vehicle ownership/exploring car-share options	With intensification across the city, there is a significant demand for on-street parking, which impacts business owners, visitors and tenants	Municipal Parking currently has a Parking Matters 2.0 project to provide a better permit system and the involvement in other studies within Planning and Development that allow for effective management of Municipal Parking

Table 8: Climate Change Management Plan for Roads

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
More frequent and extreme rainfall events leading to flooding	When an extreme rainfall event is forecasted, the City's incident manage centre is activated. Work crews are dispatched to clear all inlet and outfall locations to remove debris. During the event, work crews are dispatched to flood-prone areas	Drainage demands on roads will impact the life cycle management of various road assets. With projected increases of approximately 2°C by mid-century, the frequency of extreme rainfall events is projected to increase (e.g., events that currently occur every 20 years will occur every 14 years[1])	Increases in rainfall leading to flooding will interrupt road service and increase need for demand maintenance.	Monitor the flooding activities and adjust maintenance and operating budget accordingly for road repair. Work with Stormwater Service Area to identify roads that do not meet minimum storm sewer design requirements and/or adequate overland flow routes and align storm sewer and drainage upgrade projects with road-renewal activities. May need to advance road-renewal projects to align with critical drainage-improvement projects.
Increased risk of long duration, freezing rain events	When a freezing rain event or ice storm is forecasted, the City activates the incident management centre and the winter	The frequency of freezing rain events lasting 6 hours or more for the typically coldest months could increase in	An increase in freezing rain events will draw limited resources away from planned maintenance	Monitor freezing rain activities, adjust maintenance and operating plans, and budget

[1] Auld, H., Switzman, H., Comer, N., Eng, S., Hazen, S., and Milner, G. 2016. *Climate Trends and Future Projections in the Region of Peel. Ontario Climate Change Consortium: Toronto, ON*

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
leading to ice storms	response team. Work crews are dispatched to monitor roadways, apply salt accordingly and both look for and respond to fallen tree limbs or other infrastructure assets that have disrupted road services	southwestern and south-central Ontario by 40% by the 2050s	activities and disrupt road service. An increase in long duration, freezing rain events will disrupt road service and increase the need for demand maintenance on roadside assets. It also increases the risk of other infrastructure failing such as signals and light poles	accordingly for road repairs and service restoration. Adjust the incident response plan as needed
Changing winter temperatures leading to changes in freeze-thaw cycles	Freeze-thaw cycles lead to potholes and crack-sealing repairs. Heavy rains forecasted during a thaw cycle may result in flooding due to blocked storm inlets. Work crews are dispatched to clear all inlet locations to remove ice debris and minimize a disruption in road service	The regional average number of freeze-thaw cycles is expected to decrease from 90 days per year to between 65 to 45 days per year by the end of the century — due to the overall warming of the local atmosphere	If freeze-thaw cycles are expected to decline, then we should see a decrease in the need for demand-maintenance activities (for pothole repairs, crack sealing, minor asphalt & concrete repairs, as well as storm-inlet clearing during the winter)	Monitor changes to freeze/thaw events and adjust maintenance, operating programs and budget accordingly
Increased frequency of high winds (e.g., gusts of 90km/h or	When high wind events are expected, the incident management centre is activated and work crews are dispatched to patrol,	The frequency of wind gusts ≥ 70 km/h are projected to increase in the area from Windsor to east of Toronto by about	We expect that high wind events will cause roadside appurtenances like tree's, noise walls, fences and signs to be damaged and	Investigate opportunities to improve designs for more wind-resistant fences, noise walls and sign-mounting systems

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
greater) including tornadoes, microbursts, etc	monitor, and correct damages affecting road service	17% by the 2050s compared to the historical period 1994-2007	an increase in litter clean-up following the events. Service disruption may occur should a tree or branch fall and block the roadway or power lines	
More frequent, extreme-heat days (over 30 degrees Celsius)	Extreme-heat days will trigger failures in our infrastructure like the buckling of roads, curbs and sidewalks. Work crews are dispatched to make the area safe and to remove any loose debris. Temporary repairs are made followed by the scheduling of permanent repairs	As the overall temperature locally increases due to climate change, it is expected with confidence that the frequency and intensity of extreme temperature events will also increase	Increase in risk to users of roads and sidewalks. Increase in demand maintenance required	Investigate opportunities to improve designs and materials used for pavement and concrete. Monitor changes in extreme-heat day events and adjust maintenance, operating programs and budget accordingly

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset. Staff conduct Cost-Benefit Analyses (CBAs) to determine which strategy or treatment option is needed to address a variety of concerns. CBA is a process by which treatment options are analysed to gain insight into the related costs of each versus the related benefit for selecting each treatment option. Utilizing treatments with the highest benefit to cost ratio ensures that the City is selecting the right treatment at the right time in an asset's life.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions/Expansion/Rebuild
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)
Operations & Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

The Roads Service Area incorporates the operations activities into its asset management strategies using the following:

- Visual and automated asset condition assessment and inspections
- Legislated maintenance inspections
- Housekeeping activities like litter pick up, snow clearing, and street sweeping to ensure public safety and reduce pollution to the City's creeks and rivers

Renewal/Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Vacuum trucks picking up fallen leaves

Unique Lifecycle Models

Most roads assets undergo regular operations and maintenance activities throughout their lifecycle and are replaced at the end of their useful lives. Road pavements and structures are unique in that they have a more defined lifecycle model that includes numerous renewals or interventions throughout the asset's life. The following sections discuss these lifecycle models.

Typical Road Pavement Lifecycle Model

For illustration purposes, a typical lifecycle model for the management of road pavements is provided in **Figure 7** below.

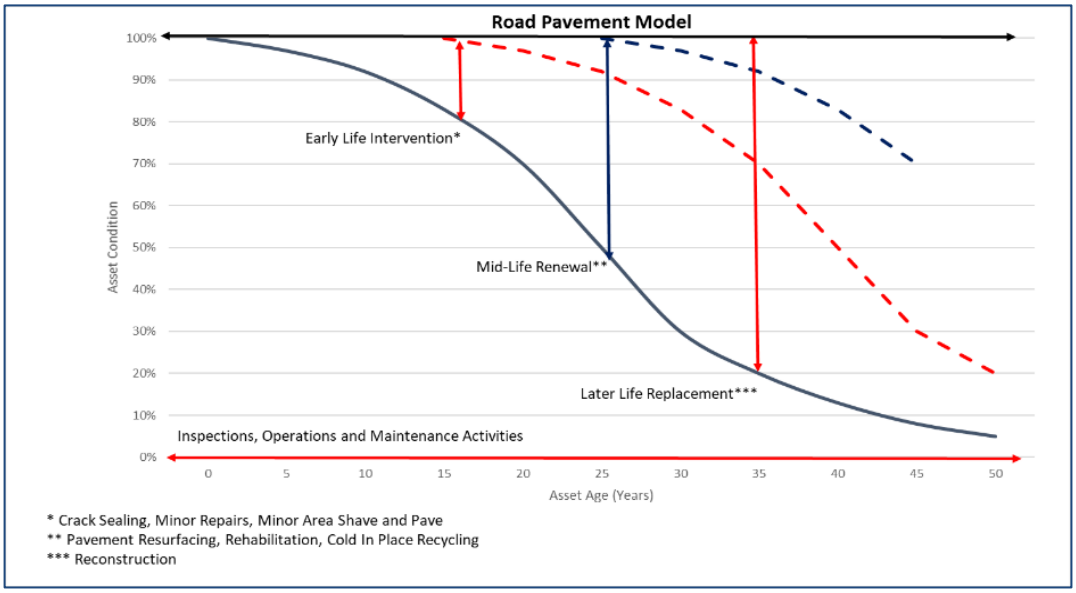


Figure 7: Typical Road Pavement Lifecycle Model

Operations & Maintenance activities typically occur throughout the life of the asset. They ensure that the asset is functioning as intended and is safe for users.

Early Life Interventions like crack sealing, minor repairs and minor resurfacing over a localized area or small section of pavement are some of the treatment options considered when an asset is in the first quarter of its life.

Mid-Life Intervention activities are considered when an asset is in the second or third quarter of its life. For road pavement assets, these interventions would include larger section resurfacing, full roadway rehabilitation and cold, in-place recycling rehabilitation.

Later Life Intervention activities are considered when an asset is approaching or at the end of its lifespan. For road pavements, this includes road reconstruction, decommissioning or removing the stretch of roadway that no longer is required, or upgrading the asset to include additional service or service capacity.

Typical Bridges & Culvert Structures Lifecycle Model

For illustration purposes, a typical lifecycle model for the management of bridge and culvert structures is provided in **Figure 8** below. This is an average representation and does not necessarily illustrate the differences between the various structure types in the City's inventory.

Operations & Maintenance activities typically occur throughout the life of the asset. They ensure that the asset is functioning as intended and is safe for users. These activities include biennial inspections, annual power-washing of critical components, and minor repairs such as broken or loose concrete removals and crack sealing. Maintenance activities on AT structures may also include wooden deck repairs.

Early-Life Intervention activities typically involve structure rehabilitation. Concrete deck patching, waterproofing and paving, corrosion protection, joint repairs, concrete sidewalk, abutment, parapet wall and soffit repairs are some of the treatment options that may be considered when a structure is in the first quarter of its life.

Mid-Life Intervention activities typically involve a second rehabilitation. Treatments that may be considered when an asset is in the second or third quarter of its life include deck overlay, joint replacement, bearing replacement, sidewalk and parapet wall replacement and concrete patching.

Later-Life Intervention activities are considered when an asset is approaching, or at the end of its lifespan. For road structures, this includes bridge replacement, decommissioning or removal of the structure and upgrading the asset to include additional service or service capacity for vehicle travel and/or active transportation.

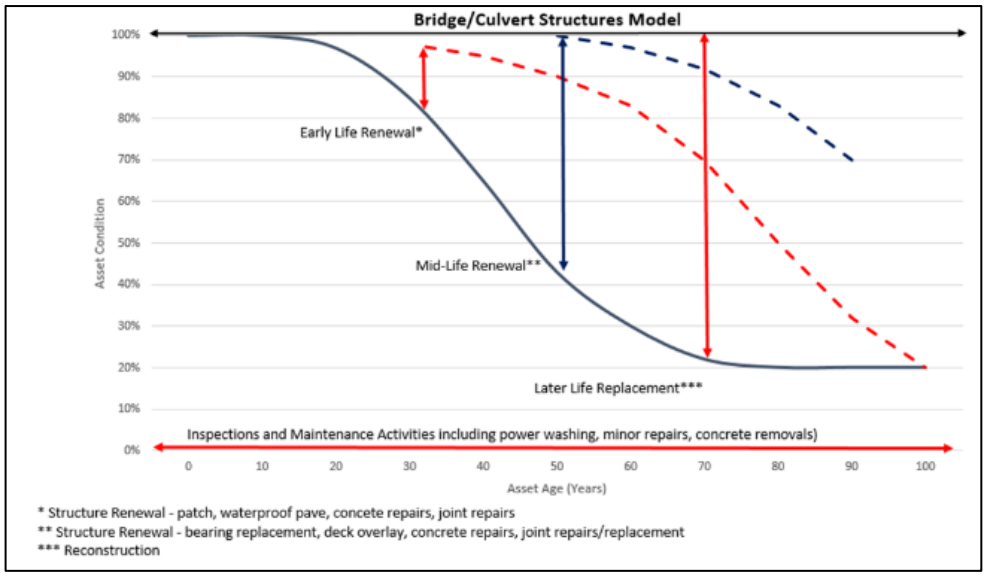


Figure 8: Typical Bridge Lifecycle Model

Asset Lifecycle Strategies by Asset Class

Table 9 to 17 provide a summary of the different lifecycle strategies and actions that staff employ as well as the associated risks of performing those activities — broken down by asset class. The tables are not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 9: Road Pavement - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Road Pavement Management System (RPMS), including a spatial database • Infor Maintenance Management System (MMS) • New pavement moratorium practice • Implementing action items of Transportation Master Plan (TMP) and Cycling Master Plan (CMP) • Implementing the road-network improvement priorities developed in the Development Charges Transportation Background Study (DCTBS)	• The RPMS is used to monitor and report on the overall performance of road pavement over time. It is also used to prioritize maintenance and renewal plans and forecasts, improve decision-making and track progress towards organizational goals and service levels • The Infor MMS is used to track service requests, inspections and work orders completed against assets • The pavement moratorium process is utilized to prevent Public Utility Agencies (PUAs) from damaging new pavements during the first five years of the pavement's life • The TMP, CMP, and DCTBS are used to plan for growth-related projects and transportation projects that align with the City's strategic goals and objectives
Operations & Maintenance	• Pavement Condition Survey • Coordinate construction and renewal activities with Public Utility Agencies (PUA) and other levels of government • Road Patrols • Minimum maintenance standards inspections including routine patrols, winter-weather monitoring, sidewalk inspection and sign testing • Road sweeping • Debris, waste removal and spills response • Leaf collection • Graffiti removal • Winter operations including anti-icing, salting, plowing and snow removal	• A pavement condition survey is completed every four years to monitor and report on the overall performance of road pavement over time. The helps make maintenance and capital planning decisions, thereby minimizing hidden or unexpected failures • Coordinating construction activities with PUA members allows stakeholders to identify scheduling conflicts as well as opportunities to partner with agencies to reduce cutting into pavement and reducing its expected service life • Maintenance inspections include routine road patrols which are in place to identify and respond to hazards within the roadway, and winter weather patrols to ensure winter conditions are documented and adequately responded to

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• Road Occupancy Permit administration • Warranty inspections on works performed by contractors and others • Crack sealing • Pothole or asphalt patching • Roadway pavement and curb repairs • Utility restorations • Pavement marking re-application	• Minimum maintenance standard inspections are in place to ensure that the roadway is reviewed on a regular cycle and to identify and manage risks • Routine roadway sweeping and debris and waste removal activities at regular intervals prevent storm drains from being blocked, protect the natural environment, and maintain an acceptable aesthetic appearance. Spills response ensures that spilled chemicals and other substances are removed from roadway assets, minimizing damage/safety concerns • Leaf collection is completed in mature parts of the City and assists in keeping catch basins clear as well as removing leaves from the roadway that can be a safety issue • Graffiti removal in a timely manner maintains acceptable appearance of roadway/structure assets • Having a winter operating plan and activities allows the City to keep roads safe and passable over the winter season in line with MMS and Council-approved levels of service • Road Occupancy Permit administration allows the City to ensure activities within the right-of-way are conducted in compliance with City requirements and to ensure that City assets are adequately protected or restored if damaged • Crack sealing prevents water from getting into the road base, leading to asset failure, especially during freeze-thaw cycles. This practice, when applied properly, will ensure the expected pavement life is achieved

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
		• Pothole patrolling and asphalt repairs are undertaken to provide a short-term fix for road defects • Timely road and curb repairs can extend the useful life of the roadway asset • Part of the Road Occupancy Permit administration process includes undertaking permanent hard-surface restorations. This ensures oversight over restorations to keep assets in best possible condition • Pavement markings require re-application annually to ensure visibility to roadway users
Renewal/Rehabilitation	• Roadway Rehabilitation Program (includes the renewal of pavement, curbs, boulevards, sidewalks and multi-use trails) • Milling and paving of large sections of pavement up to 90 mm in depth • Cold-in-place recycling for arterial and major collector roads	• Failing to renew roadway pavements in a timely manner can put users at risk of injury, can lead to premature asset failure and loss of use of the asset and increase deferral cost for the reconstruction of the roadway asset at a later date • The use of cold in-place recycling can restore old pavement to the desired profile, eliminate existing wheel ruts, restore the crown and cross slope, and eliminate pothole, irregularities and rough areas. It can also eliminate transverse, reflective, and longitudinal cracks
Replacement	• Full reconstruction of a roadway (includes the installation of new drainage systems, curbs, boulevard treatments, trails and sidewalk infrastructure)	• Failing to replace the pavement structure in a timely manner can lead to premature asset failure, loss of use of the asset and can put users at risk of vehicle damage
Disposal/ Demolition	• Stop-up and close the road, declare the right of way land as surplus, and sell the parcel of land	• Declaring unused road parcels as excess land can allow the City to reduce its liability exposure and generate revenue to support other priorities.

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Acquisition/Expansion/ Rebuild	• New Road Construction • Roadway realignment • Road widenings (may be done in conjunction with a renewal activity) • Complete Streets retrofit (allocating space for additional modes of travel and/or assets or amenities) • Roadway feasibility studies, Environmental Assessments, and design works	• Timely implementation of new road construction allows the City to manage growth related demands on the road network • Roadway realignments are required to improve safety or operational issues • Road widening activities are required to improve service capacity and alleviate congestion • Undertaking a variety of transportation studies enables the City to thoroughly assess the needs of the road network at every level and determine service improvements requirements

Crack Sealing Repairs and Road Rehabilitation

Table 10: Roadside Trail Network - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Accessibility of Ontarians with Disabilities Act (AODA) compliance • Vision Zero • Future Multi-use Trail Management System (MUTMS), including a spatial database • Implementing an overall Roadside Trail Management system • Implementing connectivity identified in the Cycling Master Plan • Implementing the Trail Network improvement priorities developed in the Development Charges Study • Road Pavement Management System (RPMS) for multi-use trails	• Guiding principles within AODA are followed to meet technical design requirements • Vision Zero principles are considered to plan projects in order to eliminate fatalities and serious injuries in our Roadside Trail Network system • The MUTMS is used to monitor and report on the overall performance of the Multi-use trail asset only. It is used to prioritize maintenance and renewal plans and forecasts, improve decision making and track progress towards organizational goals and service levels of the MUT • The overall Roadside Trail Network Management System will be used to monitor and report on the overall performance of roadside trail assets over time. It will also be used to prioritize maintenance and renewal plans and forecasts, improve decision making and track progress towards organizational goals and service levels • The Cycling Master Plan and Development Charges Transportation Background Study are used to plan for growth-related projects and transportation projects that align with the City's strategic goals and objectives
Operations & Maintenance	• Implement future Roadside Trail Network Condition Surveys for all asset types • Annual Sidewalk Inspection program as part of Minimum Maintenance Standards requirements • Winter operations including anti-icing, salting, plowing and snow removal • Implement Crack Sealing program for roadside trails for multi-use trail assets • Roadside trail replacement	• Multi-Use trail assets are surveyed every 4 years to monitor and report on the overall performance over time. The information is used to make maintenance and capital planning decisions. In addition to annual inspection, other asset types will be surveyed/added to the survey routine • Minimum Maintenance Standard Inspections are in place to ensure that sidewalks are reviewed on a regular cycle and to identify and manage risks

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• Roadside trail jacking and/or grinding • Utility restorations on roadside trails	• Having a winter operating plan and activities allows the City to keep roadside trails safe and passable over the winter season in line with MMS and Council-approved levels of service • Crack sealing prevents water from getting into the base, leading to asset failure, especially during freeze-thaw cycles. This practice, when applied properly, will ensure the expected life is achieved • Deficient sidewalks identified during inspection or through complaints, such as tripping hazards and poor drainage, can be corrected by jacking or grinding or via replacement of cracked or damaged bays • Part of the Road Occupancy Permit Administration process includes undertaking permanent hard-surface restorations. This ensures oversight over restorations to keep assets in best possible condition
Renewal/ Rehabilitation	• Implementing a Roadside Trail Rehabilitation program • Milling and paving the top surface of Multi-use trails	• Failing to renew roadside trails in a timely manner can put pedestrian and cyclists at risk of injury, lead to premature asset failure and loss of use of the asset, and increase deferral cost for the reconstruction at a later date
Replacement	• Full reconstruction of a roadside trail including sub-base & sub-grades, installation of new drainage systems, curbs, fences and boulevard treatments. • Roadside trail replacement as part of a major infrastructure projects	• Failing to replace the roadside trail structure in a timely manner can lead to premature asset failure, loss of use of the asset and can put pedestrian and cyclists at risk
Disposal/ Demolition	• Roadside trail disposal as part of a major infrastructure projects	• Roadside trail asset will be demolished or disposed of as a result of the new major infrastructure project
Acquisition/ Expansion/ Rebuild	• Roadside trail construction as part of land development	• Implementation of new roadside trail improves network connectivity and manages growth demands on trail network • Roadside trail constructions are required to improve safety, operational issues and network connectivity

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• Roadside trail construction to complete network connection identified in the City's Cycling Master Plan • Part of the major infrastructure project such as Enhance/Integrated Projects	• Timely implementation of Enhance or Integrated projects will help support roadside trail needs and vision zero initiative for maintaining safety and accessibility

Table 11: Structures - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Implemented a Bridge and Culvert Management System (BCMS), including a spatial database. • Implementing action items resulting from the Transportation Master Plan (TMP), Cycling Master Plan (CMP), and Pedestrian Master Plan (PMP) • Implementing the road network improvement priorities developed in the Development Charges Transportation Background Study (DCTBS) • Ongoing implementation of INFOR maintenance management system (MMS)	• The BCMS is used to monitor and report on the overall performance of bridge, culvert and retaining wall structures over time. It is also used to prioritize maintenance and renewal plans and forecasts, improve decision making and track progress towards organizational goals and service levels • The TMP, CMP, PMP, and DCTBS are used to plan for transportation infrastructure improvement projects that align with the City's strategic goals and objectives • The Infor MMS is used to track service requests, inspections and work orders completed against assets
Operations & Maintenance	• Bridge and culvert (OSIM) inspections every two years (OSIM = Ontario Structure Inspection Manual) • Major retaining wall (OSIM) inspections every two years and staff inspections of minor retaining walls every four years • The bridge, culvert and retaining wall power washing and graffiti removal program	• Biennial bridge, culvert and major retaining wall inspections are completed every two years to identify and prioritize maintenance works and to comply with provincial regulations • Bridge-structure power washing removes debris, de-icing chemicals and chlorides from bridge structure components to keep the structures clean, operating properly and extends the life of the structures

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• Bridge and culvert snow removal and clearing • Repair bridge, culvert, and retaining wall components (sidewalks, retaining walls, handrails, fences and guiderails) identified from biennial and staff-led inspections • Reactive/demand maintenance identified by City staff or members of the public	• Snow removal from bridge and culvert structures allows pedestrians and drivers to cross bridges safely throughout the year • Completing minor repairs of bridge and culverts ensure they are in satisfactory condition, including safety devices such as guide rails, barrier walls and speed attenuators • Failing to repair components of a bridge, culvert, or retaining wall may put users at risk of injury • Failing to repair components can lead to premature asset failure and loss of use of the asset • Failing to repair components can lead to an increased cost of renewal of the structure at a later date
Renewal/ Rehabilitation	• The Bridge, Culvert and Retaining Wall Renewal Program is based on the structure's age, condition and deferral cost and the results of the condition survey • Replacing pressure-treated lumber on AT bridge deck surfaces with more slip-resistant materials	• Failing to address potential issues with deck surface materials may put users at risk of injury • Failing to renew structures in a timely manner can put users at risk of injury • Failing to renew structures in a timely manner can lead to premature asset failure and loss of use of the asset • Failing to renew structures can lead to the increased deferral cost of renewal of the structure at a later date or lead to a premature need for the structure to be replaced.
Replacement	• The Bridge, Culvert and Retaining Wall Renewal Program is based on the structure's age, condition and hydraulic capacity and the results of the condition survey • Replacing coated steel Active Transportation Structures with galvanized steel structures	• Failing to replace structures in a timely manner can lead to premature asset failure, loss of use of the asset and puts users at risk of injury • Failing to revise construction materials used in certain applications, such as coated steel on structures that are regular salted as part of winter maintenance activities, can lead to premature end of structure life.

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Disposal/ Demolition	• Demolition and disposal of structures completed as part of construction. • Closing a structure that is identified by an inspection as being no longer fit for use. • Re-grading to allow for the removal of retaining walls	• Residual materials remaining from demolition like concrete and metal can be recycled. • Structures that no longer meet load or capacity requirements can fail and lead to loss of use and puts users at risk
Acquisition/Expansion/ Rebuild	• Installation of a new bridge or culvert where none previously existed. • Bridge and culvert widenings associated with a road widening or flood mitigation project. • Installation of grade separations • Newly constructed or newly found retaining walls • New Active Transportation structures and Active Transportation improvements to existing structures	• Timely implementation of a new structure allows the City to manage the growth-related demands on the road network • Missing opportunities to expand structures to include active transportation improvements can lead to reduced access for and uptake of cycling and pedestrian modes of travel • The installation of grade separation can alleviate congestion at rail crossing locations. • Incorrect growth assessments may result in over or under-utilized asset capacity

Power Washing of Bearing Seats on Burnhamthorpe Road West Structures

Removed Lose Concrete and Salt

Failed Retaining Wall

Table 12: Street Lighting - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Master Plan – Vison Zero – become more pedestrian friendly • City must adopt new policies to address lighting levels on new and existing infrastructure	
Operations & Maintenance	Operations: • Currently Alectra Power Services (APS) is responsible to respond 24/7 to all emergency requests • Potential planned action - City staff are available to respond and attend to customer requests 24/7. On-call coverage to address programming issues • Energy consumption Maintenance: • Scheduled preventative maintenance • Hydro Rebuilds – Relocating luminaires as Alectra Utilities replaces/relocates poles • Currently remediating entire street-lighting network to ensure system is working efficiently and effectively • Scheduled inspections done on as-needed basis. • Looking to formalize an inspection program to regularly review poles • Warranty on luminaires -10 years, Warranty on nodes – 5 years • Warranty will cover replacement of nodes and luminaires if malfunctioning	Operations: • Enough resources are required to complete a series of unplanned, urgent work requests that are submitted in close succession Maintenance: • Completing planned maintenance activities while managing reactive maintenance activities creates challenges • Premature asset failure may occur due to incorrectly planned maintenance activities • Increasing the mesh network and number of devices will require additional maintenance resources • A potential hazard exists when the City becomes aware that an area is not up to standard in terms of street lighting requirements and needs to react in a timely manner

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Renewal/ Rehabilitation	• N/A	• N/A
Replacement	• Use of modelling software by adopting the latest technology that maintains current levels of service (i.e., AGI Software) • Replacement of poles at the end of their useful life (e.g., Erindale Style pole) with standard 32.5 ft concrete pole • Replacement of luminaires at the end of their useful life • Replacement of non-LED light to LEDs	• Replacing non-LED with LED lights leads to cost savings and lower maintenance • Failing to replace luminaires at the end of their useful life can lead to issues with illumination
Disposal/ Demolition	• Dispose of assets under regulation or bylaw if asset is no longer functional • Warranty items allow us to return to the vendor and reuse	• Being in non-compliance with legislative requirements and environmental best practices
Acquisition/ Expansion/ Rebuild	• Forecasting land use for residential/commercial construction or improvements • All City projects must be reviewed by Street Lighting to ensure illumination levels are being achieved • Projects that accommodate pedestrian traffic, new signalized intersections, additional fixtures or new sidewalk installation must be reviewed to ensure lighting levels achieved (Vision Zero projects, multi-use trails, etc.) • Acquisition of new assets from development (LRT, Lakeview, Brightwater)	• With street light standards and requirements changing frequently, the cost for expansion and rebuild projects could increase significantly

Table 13: Traffic Signals and Related Electrical Devices - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Implementing action items of Transportation Master Plan (TMP), Cycling Master Plan (CMP), Pedestrian Master Plan (PMP), Vision Zero Action Plan (VZAP) • Exploring the implementation /digitalization of an asset management inventory system • Developing and maintaining SOPs • Minimum Maintenance Standards • OTM Manuals, AODA, HTA, NEMA and ATC standards, ESA and CSA standards • iNet traffic management – used to manage traffic signal controller infrastructure, view real-time traffic signal information, upload/download traffic signal timings to traffic signal controllers, alert when specific intervention is required, and access historical information regarding the status and performance of the traffic signal controllers	• Increased risk to the City which includes liability (legal inquires), safety hazards to the road users, negative public reputation • Developing and maintaining SOPs provide guidance to staff to avoid mismanagement of the traffic signal assets • Asset management inventory system would enhance the process of management of the traffic signal assets by improved time of reporting
Operations & Maintenance	• Electrical contractor available to respond 24/7 to all emergency requests • Inspectors and staff, and 311 call service are available to respond during normal business hours • Dispatch is available after business hours • Routine inspections and testing • Preventative maintenance activities — changing filters in controller cabinets, cleaning CCTV cameras, etc.	• All defective traffic signals and related electrical devices shall be repaired or replaced within the times specified in accordance with the Minimum Maintenance Standards for Municipal Highways • Failure to maintain traffic signals increases risk to the City which includes liability (legal inquires), safety hazards to the road users, and negative public reputation • Keeping communication operational is essential for troubleshooting of the traffic signal assets. The lack of

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• Emergency maintenance activities - replacing damaged signal poles, push buttons, failed LED modules or vehicle detectors • Connection to communication systems (IT, ATMS) — ensure connection to iNet Traffic Control System, CCTV cameras • Hydro maintenance activities performed by Alectra — Maintenance of Street Lighting luminaires on traffic signal poles and maintenance of traffic signal power supplies. • Graffiti removal • Aboveground and underground infrastructure repair due to third-party damages (MVA, construction, etc.), outdoor elements, and unanticipated natural events	communication can increase the road users' delay, safety hazard, and have a negative impact on environment • Losing power at signalized intersections creates a safety hazard to all roadway users • Graffiti removal in a timely manner maintains acceptable appearance of roadway/structure assets • Failure to maintain and test the railway infrastructure with the owner near signalized intersections creates safety concerns and negative reputation
Renewal/ Rehabilitation	• LED Replacement Program (7-10 years) • Signal equipment accessories renewal (APS, countdowns, etc.) —Renewed when damaged, malfunctioning, or during intersection rebuild • LED modules and countdowns — renewed based on life cycle replacement (7-10 years as part of the capital budget) • New Sidewalk Program — moving signal pole and cabinet location based on conflicts with the aboveground infrastructure and new sidewalk installation	• Failure to renew traffic signals increases the risk to the City which includes liability (legal inquires), safety hazards to the road users, and negative public reputation • Infrastructure depreciates quicker when not maintained or renewed and is prone to more failures (maintenance costs increase) and additional risk • Damages to traffic signal assets with these capital programs

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Replacement	• Yearly Traffic Signal Modernization Program based on infrastructure age, condition and deferral cost • Yearly Traffic Cabinet Replacement Program • Emergency Vehicle Pre-Emption System Replacement Program • Roadway Rehabilitation Program — replacement of damaged loops once work is completed	• Risks of not replacing infrastructure can lead to catastrophic failures, standards and specifications not up to date with current practice, increased maintenance costs, safety to public and negative reputation
Disposal/ Demolition	• Demolition and disposal of entire traffic signal plant completed as part of construction and maintenance activities in an environmentally friendly manner • Traffic signal inventory items disposed by City	• Improper disposal can lead to adverse affects to the environment and can pose a risk for reuse of obsolete equipment by others (i.e., safety to public)

Acquisition/ Expansion/ Rebuild	• New traffic signals are installed when warranted as part of:
	  • New road construction, roadway realignment, or road widening (may be done in conjunction with a renewal activity)
	  • New developments
	  • MUT expansion (bicycle signals), PXOs, etc.
	• Upgrades to existing signals, expansion to existing assets
		• Overall maintenance budget increase
		• increase of supply and demand to repair equipment
		• Increase of inventory and staff workload
		• If traffic device in not implemented based on guidelines, this may increase and risk liability to the City, and public safety to all road users

Table 14: Roadside Infrastructure (Noise Walls) - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Facilitating training courses and fostering cultural change • Managing and forecasting the demand services within the City	• Plan/Reports/Recommendations • Asset life is not extended or cost of managing asset increases
Operations & Maintenance	• Biennial inspection of City noise walls • Graffiti removal • Triggered by customer requests and biennial condition assessments • Fix broken posts or broken panels • Replace damaged panels	• Biennial inspections of City-owned noise walls drive the capital budget and planning process • Completing planned maintenance activities extends the service life of the assets, and ensures appropriate noise attenuation levels are met
Renewal/ Rehabilitation	• Renewal of noise walls is not typically done. Work is generally done through maintenance or replacements	
Replacement	• Replacement is based on biennial condition assessment, and typically occurs at the end of the asset's useful life • At the moment, the City is not replacing any City-owned noise walls as most are in good condition and do not require replacement  **Noise Wall Replacement**	• Once noise walls have reached the end of their useful life, their condition will deteriorate, and the walls may be prone to failure  **Noise Wall Replacement**
Disposal	• The City typically does not currently dispose or demolish noise walls	

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Acquisition/ Expansion/ Rebuild	• Acquisition of new assets through various programs: - Noise wall program — Retrofit (Private fence to City noise wall) - Noise wall program — Replacement (Private noise wall to City noise wall), prioritized based on biennial inspections - New subdivision developments or transit-related projects. • Prioritized based on coordination with road improvement projects, followed by the condition of existing infrastructure (fences or privately owned noise walls that qualify for replacement under the City's noise policy)	• Without the retrofit of fences to noise walls, or the installation of new noise walls, OLA noise levels may increase above the desired 60 dBA threshold as per the City's noise policy • The replacement program allows for noise walls originally built on private property to be re-built on City property. The City is slowly taking ownership of all noise walls along major collector and arterial roadways, to reduce the impact of the City's roadway noise

Table 15: Roadside Infrastructure (Signs and Posts) - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Standard drawings • Internal SOPs: sign fabrication, sign installation, support installation, maintenance	• Guidelines and manuals provide consistency throughout the City and Ontario
Operations & Maintenance	• Annual visual inspection of signs and support • Annual retro-reflectivity testing (beginning in 2024) • Sign fabrication on request • Re-affix/adjust loose signs • Graffiti/sticker removal • Temporary sign installation when required	• Damaged road signs can create a hazard for roadway users • Inspection identifies deficiencies, maintenance reduces deficiencies. Signs in poor condition could lead to collisions • Increased risk to the City, condition of signs can be challenged in the event of a collision • Maintenance activities help meet minimum maintenance standards • Snow build up on signs

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Renewal/ Rehabilitation	N/A	N/A
Replacement	• Replacement of signs as identified during annual inspections • Replacement currently based on warranty. In the future, this will be based on retro-reflectivity results, prioritizing regulatory signs • Replace posts when damaged, leaning, or in poor condition • If signs fade or fail retro-reflectivity within warranty period, sign contractor will replace • During replacement: - Aluminum from signs is recycled or re-sheeted with a new image - Non-salvageable signs are recycled - 14 ft. posts are cut down to 6 ft. and re-used as island markers - Damaged posts are recycled	• Replacement keeps signs in good condition to meet the requirements of the Traffic Act and OTM Guidelines • Replacement keeps signs in a condition so that they are enforceable
Disposal/ Demolition	• Removal or decommissioning of signs determined by Traffic Operations • Transferring signs to existing traffic control or street light poles, in order to remove signpost	• When a sign is damaged, removing signs and posts from site ensure the area is clear of hazards • Re-using signs and posts leads to cost savings and environmental benefits
Acquisition/ Expansion/ Rebuild	• Fabrication and installation of new signs at the discretion of Traffic Operations — no parking signs, speed limit reductions, new initiatives (slow street, etc.)	• Failure to fabricate and install signs would fall short of service provider expectations. Traffic Operations would be unable to complete new initiatives

Table 16: Municipal Parking - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Parking Master Plan, approved by Council in 2019 • PM2 study to review the parking permit program, the parking fee structure, and deliver a strategy to implement new technologies to manage and deliver parking programs • Current build design guidelines are used by the Transportation Works Department to construct Municipal parking lots	
Operations & Maintenance	• Regular parking lot inspection to calculate cost and expected date for improvement (if required) • Graffiti removal from parking machines • Machine errors are flagged within the parking management system, maintenance staff are alerted and respond to the error accordingly (reset proponent or replace part)	• Regular lot inspections: - Ensure compliance with all safety - Helps with forecasting of future expenses for lot maintenance and repair - Mitigates any lot hazards which could lead to future problems, lawsuits, resident complaints
Renewal/ Rehabilitation	• Parking lot resurfacing or rehabilitation including concrete work, shave-and-replace asphalt, adjust catch basins, and line painting • Parking machine refurbishment, including replacement of various components, typically occurs every 5 years	• Lot resurfacing or rehabilitation costs are higher than forecasted due to changes in material costs • Anticipated completion timelines may be subject to longer periods due to material availability issues
Replacement	• Parking machine replacement typically occurs after the third refurbishment cycle, in the event of technology upgrade, or if machine is damaged to the extent, it cannot be repaired	• Supply chain shortages can make it difficult to meet the required number of machines during the roll-out process
Disposal	N/A	N/A
Expansion/ Rebuild/New	• Expansion of paid parking areas across the City as per the PMPIS and the Parking Demand Forecasting Study	• Not being able to acquire land to meet the projected parking demand

Table 17: ITS (CCTV Cameras) - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Implementing action items from the Transportation Master Plan (TMP), Vision Zero Action Plan, Avigilon Control Centre • Exploring the implementation/digitalization of an asset management inventory system • Developing and maintaining SOPs • CCTV Traffic Monitoring Cameras Within Municipal Road Allowance Policy	• The TMP and Vision Zero Action Plan are used to plan for growth-related projects and transportation projects that align with the City's strategic goals and objectives • Cost of managing an asset increases rather than decreases
Operations & Maintenance	• City Maintenance contractor is available to respond during normal business hours to replace broken cameras, repair connection issue, etc. • City of Mississauga staff available to respond during normal business hours, to troubleshoot with the contractor • City's Security Services and vendor are available during the normal business hours, to perform camera programming, and ensure CCTV cameras are viewable on Aviglion • Yearly inspections performed by contractors and others • CCTV cameras are replaced as a result of damages caused by motor vehicle collisions, construction, outdoor elements and unanticipated natural events.	• Ensures enough resources available to complete work requests that are submitted • Annual inspections are in place to identify, document and correct any defects to ensure normal operating conditions • Timely repairs can extend the useful life of the asset • Inspections help with forecasting future expenses for maintenance and repair, while completing planned maintenance activities and managing reactive maintenance activities • Incorrect assumptions regarding expected useful life of asset • Higher costs due to changes in material costs • Anticipated delivery date may be subject to longer periods due to material availability issues
Renewal/ Rehabilitation	N/A	N/A
Replacement	• CCTV cameras are replaced based on age and condition	• Failing to replace asset in a timely manner can lead to loss of use of the asset and increase deferral cost for the asset at a later date

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• CCTV cameras are replaced when adopting the latest technology that maintains current levels of service	
Disposal/ Demolition	• Asset disposed by City once it reached end of useful life or no longer meets operational needs	• Increases the need to dispose of the roadside asset once end of life is reached
Acquisition/Expansion/ Rebuild	• Annual CCTV Camera Expansion Program	• Timely implementation of new assets allows staff to manage traffic demand on the road network • Incorrect growth assessments may result in over- or under-utilized asset capacity

Table 18: ITS (Speed Awareness Devices) - Current Lifecycle Management Activities

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Implementing action items from the Transportation Master Plan (TMP), Vision Zero Action Plan, Avigilon Control Centre • Developing and maintaining SOPs	• The TMP and Vision Zero Action Plan are used to plan for growth-related projects and transportation projects that align with the City's strategic goals and objectives • Cost of managing an asset increases rather than decreases
Operations & Maintenance	• WOM Signs and Pavement Markings unit is available to respond during normal business hours to repair, relocate or troubleshoot equipment in the field • TSRS staff are responsible for responding to enquiries or requests and request field work from WOM • WOM Signs and Pavement undertakes routine maintenance of equipment in the field, with TSRS staff responsible for any work required by the supplier or purchase of replacement parts	• Enough resources available to complete work requests that are submitted • Annual inspections are in place to identify, document and correct any defects to ensure normal operating conditions. Timely repairs can extend the useful life of the asset. Completing planned maintenance activities while managing reactive maintenance activities. Forecasting future expenses for maintenance and repair

Lifecycle Activity	AM Practices/ Planned Actions	Risks Associated with Lifecycle Activities
	• Equipment is rotated to new locations or inspected on a regular basis. Typically rotated or inspected monthly • Snow cleared off solar panels • Batteries swapped out if not charged sufficiently, especially in the winter	
Renewal/ Rehabilitation	• Technology is continually changing, impacting components and communication features. Batteries also have a limited lifecycle and require regular replacement • Battery replacement (average every 3 years), as needed • Replacement of other components if not functioning	• Higher costs due to changes in material costs • Equipment availability can vary as supply chain issues are constantly changing and technology is vendor-specific
Replacement	• Replacement due to damages caused by motor vehicle collisions, outdoor elements and unanticipated natural events. Replacement parts are obtained through operating budget • Capital budget has been requested for 2024 to allow for lifecycle replacement. Equipment is replaced once no longer operational or when outdated technology impacts operations	• Failing to replace asset in a timely manner can lead to loss of use of the asset and increase deferral cost for the asset at a later date • Upgrading the technology allows us to add functionality and improve monitoring
Disposal/ Demolition	• Disposal of equipment occurs at the end of lifecycle when equipment is no longer operational	N/A
Acquisition/Expansion/ Rebuild	• No regular planned expansion program since it began in 2005 • Expansion has been ad-hoc, as funding has been made available	• Timely implementation of new asset allows staff to meet resident and Council expectations

Lifecycle Needs vs. Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current levels of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations
- The costs of any non-asset solutions, acquisition/expansions/rebuilds, and operations & maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of 2022-2025 Operating Budget and assuming year 4 as annual budget for years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Land acquisitions and related studies
    - Overhead costs

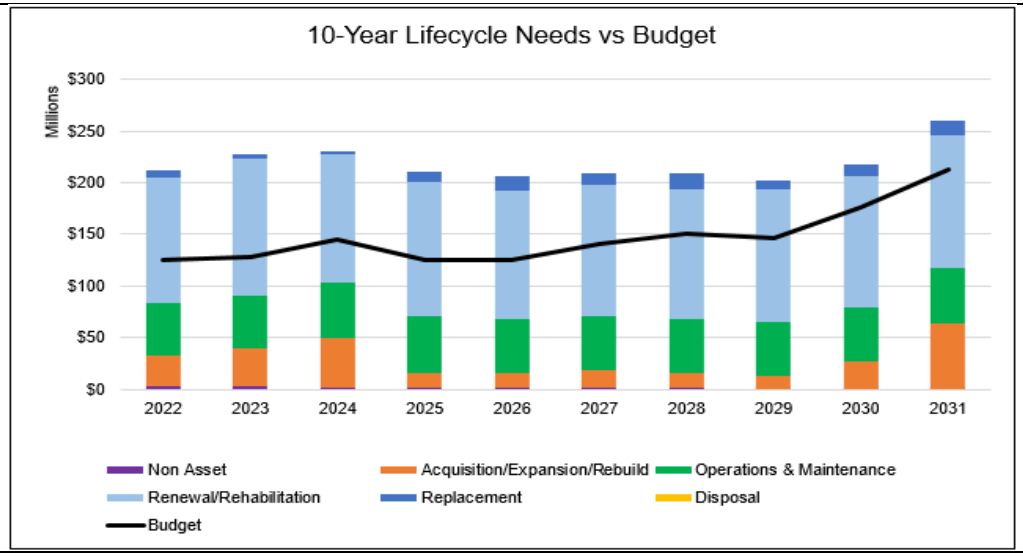
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

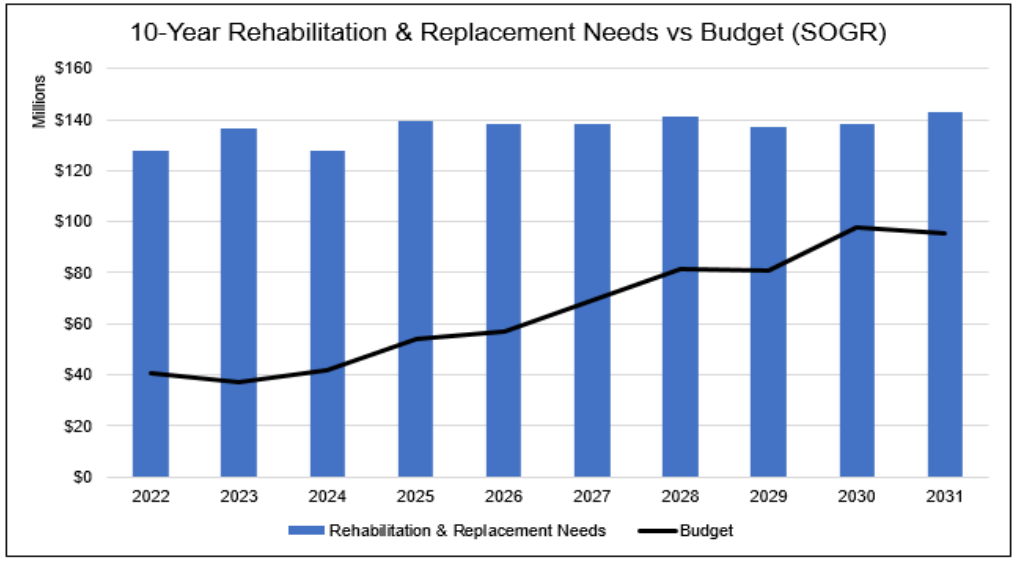
To illustrate the 10-year forecast, two graphs have been created by service area and by each asset class, which includes:

- Total Lifecycle Needs vs. Budget Graphs
- Rehabilitation & Replacement Needs vs. Budget (State of Good Repair[2]) Graphs

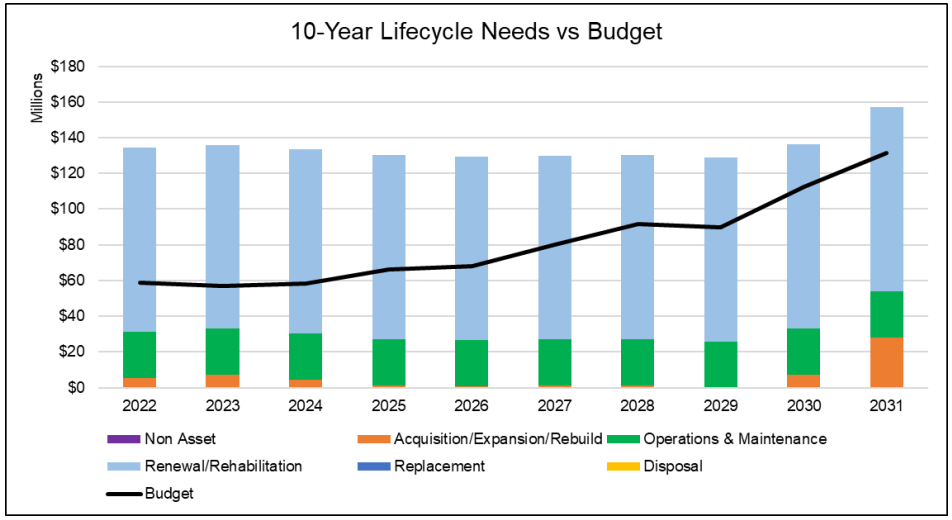
[2] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.

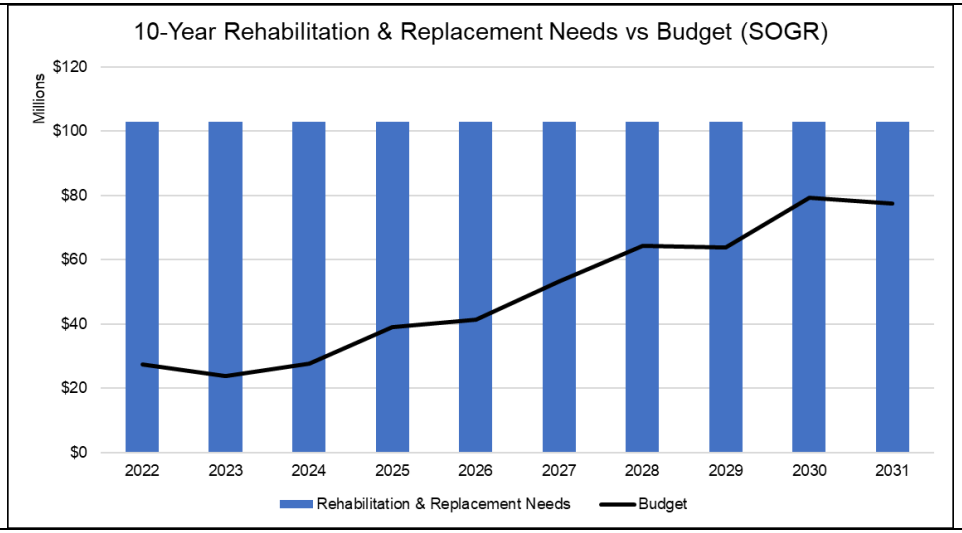
Roads


10-Year Lifecycle Needs vs Budget
Millions
$300
$250
$200
$150
$100
$50
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Non Asset
Acquisition/Expansion/Rebuild
Operations & Maintenance
Renewal/Rehabilitation
Replacement
Disposal
Budget


10-Year Rehabilitation & Replacement Needs vs Budget (SOGR)
Millions
$160
$140
$120
$100
$80
$60
$40
$20
$0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
Rehabilitation & Replacement Needs
Budget

Road Pavement





One of the benefits of being able to forecast the City's road pavement needs is that the locations of these future projects can be coordinated with the renewal and improvement needs of other assets located within the roadway corridor. Roads Service Area staff meet quarterly with utility agencies and stakeholders responsible for stormwater, water/wastewater, gas, hydro, telecommunications, urban forestry, and other assets to discuss and schedule future maintenance, renewal and growth plans and to ensure that all infrastructure activities are coordinated to minimize disruption for users, avoid scheduling conflicts, maximize opportunities, and minimize throw-away costs.

Averaging approximately $50 million per year, the Roadway Rehabilitation Program is one of the City's largest capital expenditures. The program not only ensures that road pavement structure is renewed, but it also ensures that sidewalk and roadside appurtenance assets are renewed or replaced as required. For the purpose of this Asset Management Plan, 92 per cent of the Roadway Rehabilitation program has been assumed as road pavement work; the remainder has been assumed under the Roadside Trail Network asset class.

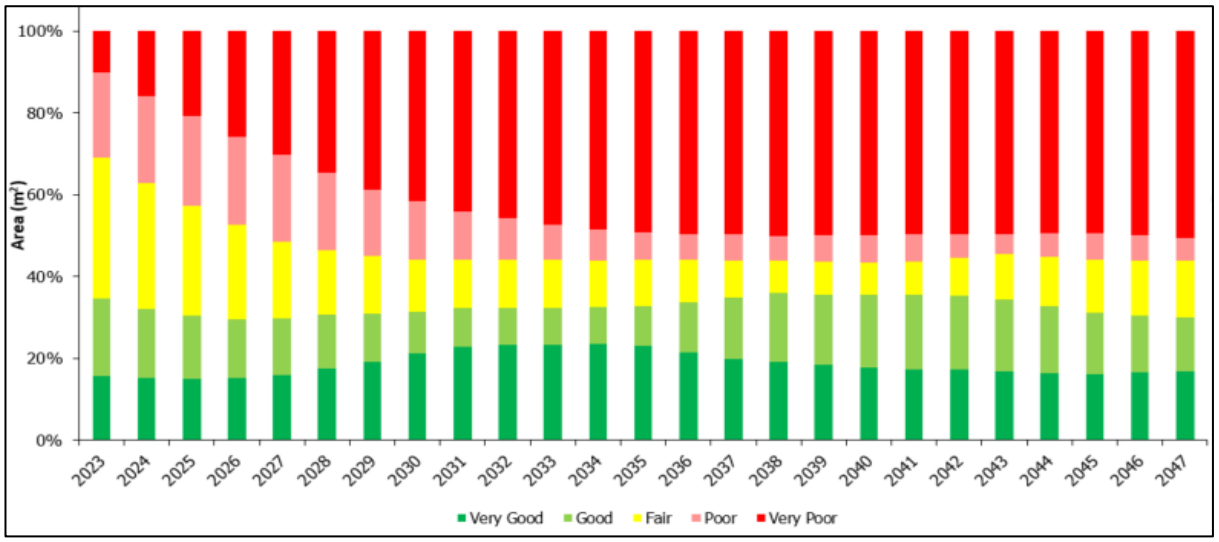


Figure 9: Forecasted 25-year Condition Profile (Road Pavement)

Figure 9 represents the expected road pavement condition profile over the next 25 years based on the current average annual investment of $50 million in the Road Rehabilitation Program. As a result of the annual investment shortfall, the City's **RPMS** system model predicts that the City's road network will reach a state of deterioration, whereby the proportion of the road pavements in Poor to Very Poor condition will increase from 31 per cent in 2023 to 51 per cent in 2027.

The forecasted condition profile indicates that the current level of planned capital investment is not sufficient to maintain the City's road pavements in fair or better condition. Should the needs for pavement renewal continue to out-strip available funding, Roads will need to increase operating costs to provide repair treatments and increase road patrols to extend the useful life of pavement assets and manage road user risk. City Maintenance and Operations staff will be monitoring maintenance and repair requirements annually and make adjustments to their operating budgets.

Service Level Analysis and Options

An approach to establishing the optimal capital investment is to forecast the major lifecycle activities required to maintain the desired road pavement performance or level of service. The graph in **Figure 10** below shows the condition profile of road pavement assets changing over the next 25 years. The analysis considers the current condition of pavements, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future.

For the purposes of this asset management plan, three levels of capital investment for the Roadway Rehabilitation Program were analysed:

1. Maintaining the currently forecasted 10-year funding level of approximately $50 million annually
2. Investing an additional $25 million and lowering the average pavement condition to 56 PQI or overall **Fair** condition
3. Investing an additional $53 million to maintain an average network pavement condition to 72 PQI or overall **Good** condition

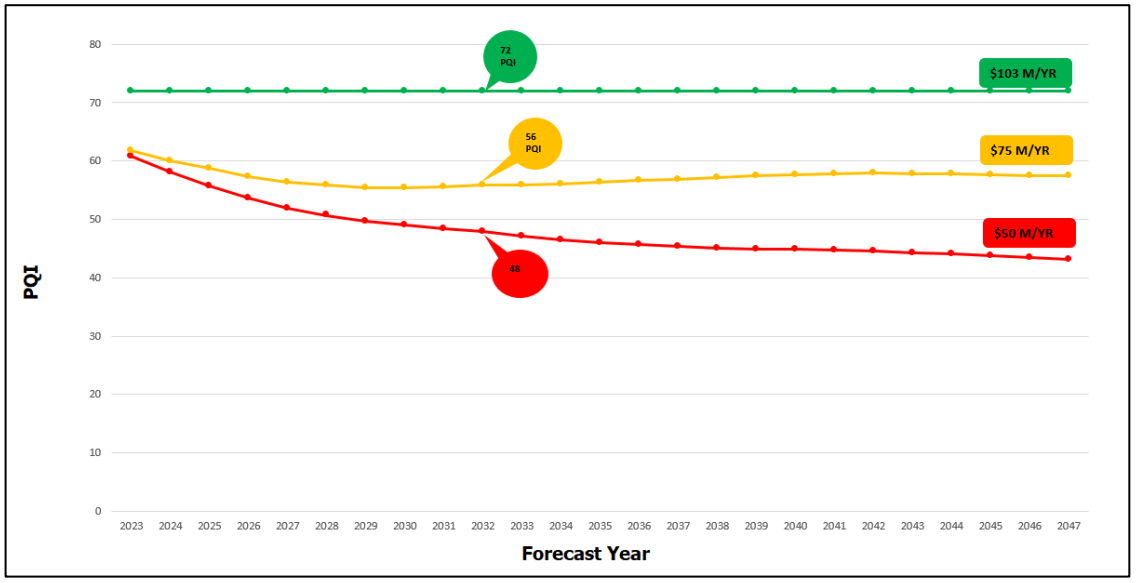


Figure 10: Roadway Pavement Performance based on Three Funding Scenarios

The results for all three scenarios are shown in **Figure 10**. The **red** line represents the current funding of $50 million annually and indicates that the average condition of the road network would deteriorate to the **Poor** category. The **orange** line represents an increase in the annual funding level by $25 million and indicates that the roads would deteriorate to the average condition in the **Fair** category by 2032. The **green** line represents an additional $53 million investment which would result in the average network condition being in the **Good** category.

Figure 11 shows the percentage of roads that will be deficient under the three funding scenarios discussed above. Roads that are deemed to be deficient are roads that have reached their renewal period; however, there are insufficient funds available to undertake the needed works. The red line represents the currently projected funding level of $50 million per year and indicates that, by 2032, 50 per cent of the road network will fall below the renewal and/or replacement time period. The orange line represents an additional $25 million investment and shows that 39 per cent of the road network would fall below the renewal and/or replacement time period. The green line represents an additional $53 million investment and shows that the level of defects remains at around 16 per cent. The pavement deficiency levels peak and stabilize for periods of time in the forecast for both the $75 million and $103 million funding scenarios.

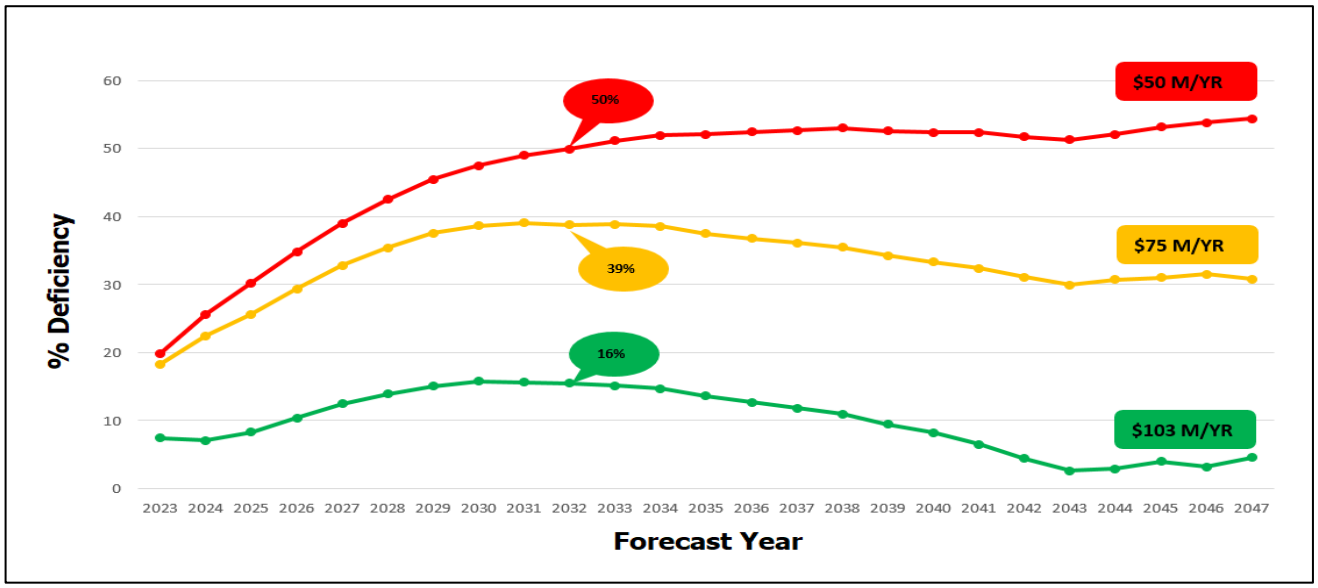
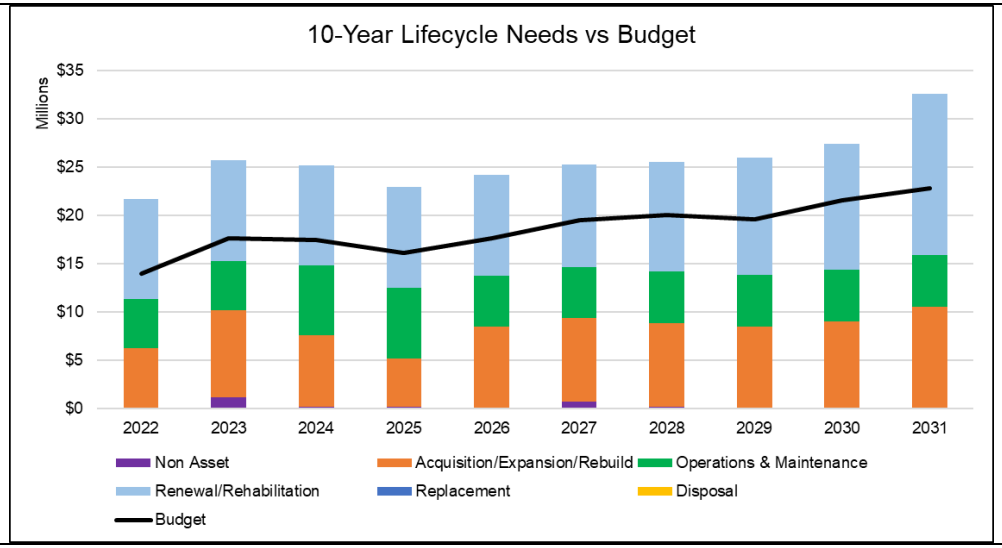
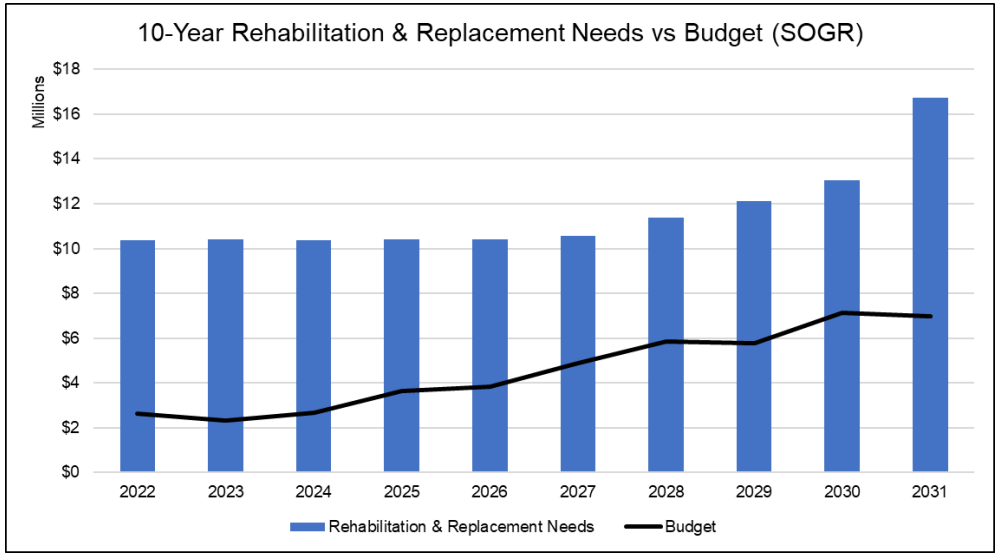


Figure 11: Percentage of Deficient Roadway Pavement for Three Funding Scenarios

The next pavement condition survey is scheduled for 2025. The data collected by the survey will be reviewed and analyzed in 2026 to reassess future pavement condition trends under various annual renewal funding scenarios. These results will be provided during the next Asset Management Plan update cycle.

Roadside Trail Network



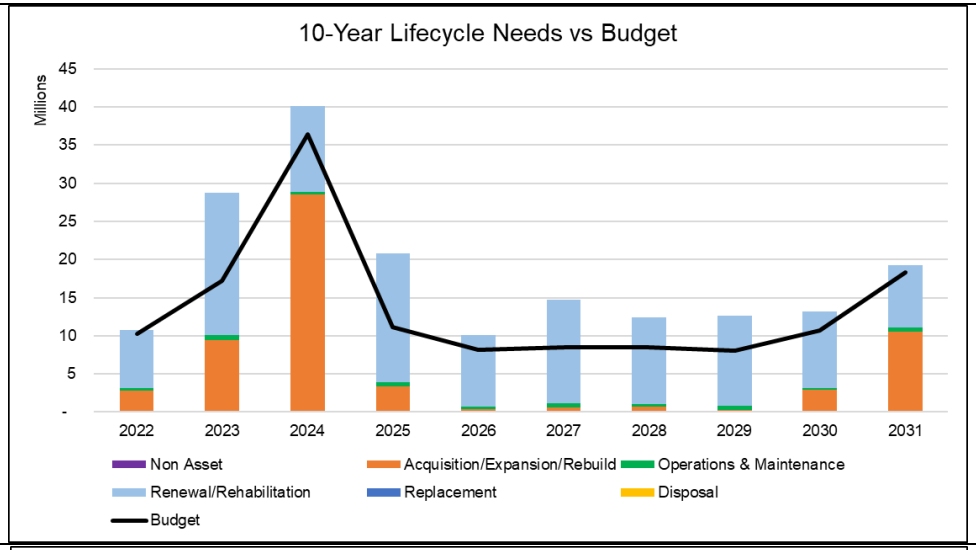


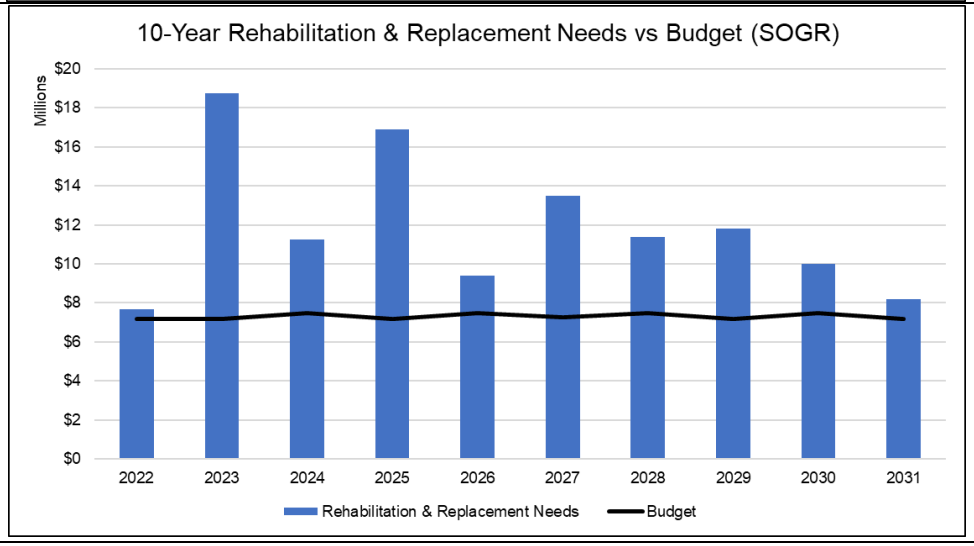
Due to incomplete data sets for the age of sidewalks and engineered walkways, and a lack of condition information at this time, replacement costs are assumed to be evenly distributed over the useful life period of 50 years. This analysis will be updated once a detailed sidewalk condition assessment is conducted in the next few years. Based on current budget allocation for capital projects and road resurfacing, 8 per cent of the road pavement renewal budget is assumed towards sidewalk renewal.

Renewal needs for multi-use trails are derived from RoadMatrix, using a similar model to road pavements. Using current condition information, the analysis provided a forecasted cost to maintain the current PQI.

The forecast shows the anticipated budget required to replace sidewalks as described above and maintain multi-use trails at 78 PQI.

Structures



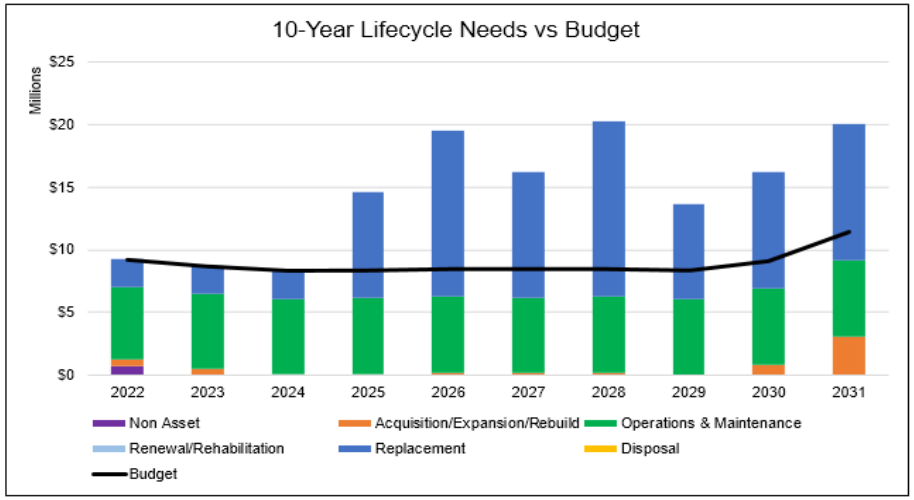


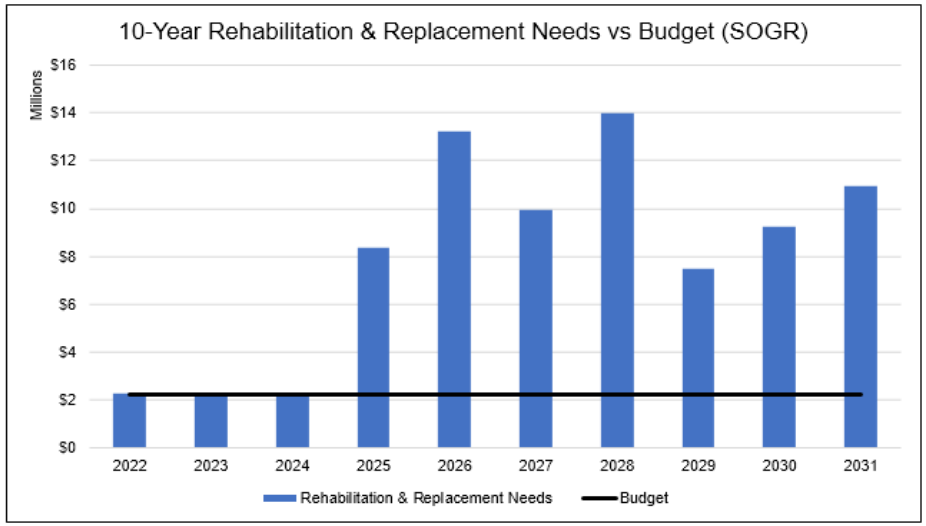
The City is now past Early-Life Renewal and is into the Mid-Life Renewal phase for many of these assets. Ideally, this phase is the second time the structure is rehabilitated and as referenced previously, the activities that are associated with it can include deck repairs/overlays, joint and bearing replacements and sidewalk replacement, along with general concrete repairs. For many structures, these needs are being identified earlier than expected due to missed renewal opportunities earlier in the structure lifespan.

The bulk of these assets are currently in the middle third of the asset lifecycle. The current average age of these structures is 41.4 years, with the older structures found on the City's larger arterial roads.

The current renewal needs exceed the available funding for structures in every year of the 10-year capital forecast. This gap is expected to increase beyond the 10-year window.

Street Lights



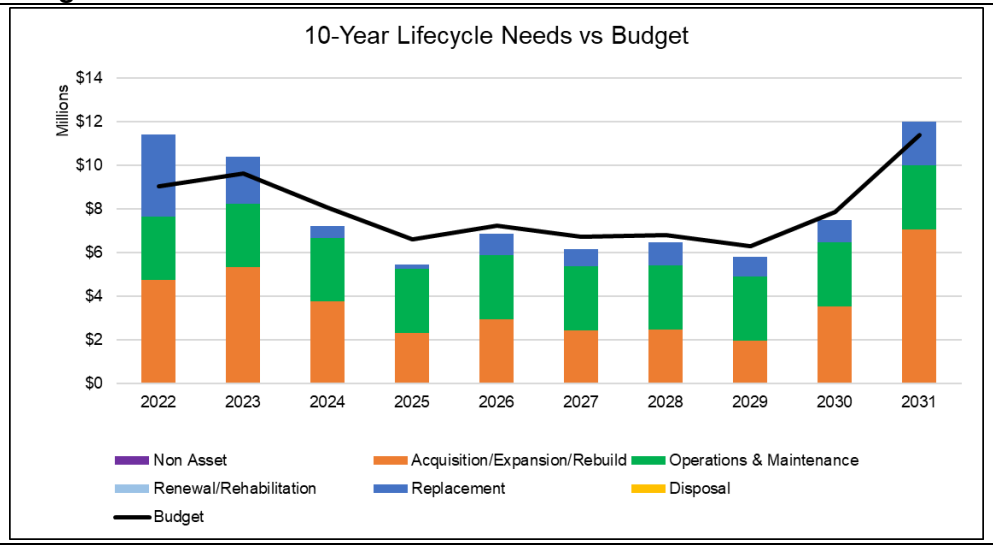


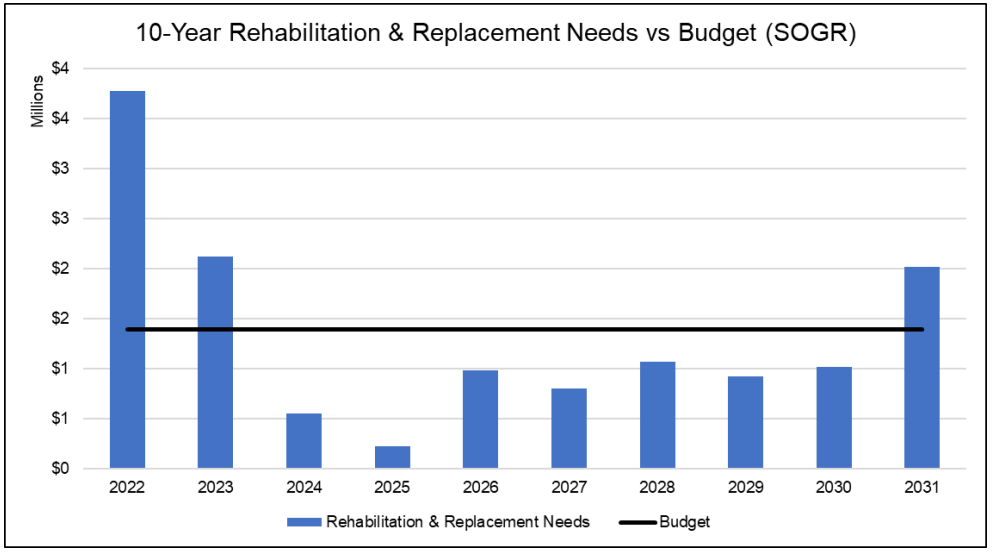
Approximately 63 per cent of all street light poles (concrete, aluminum, steel and wood) which were installed over 30 - 40 years ago and are deemed to be in either Poor or Very Poor condition based on their age. Furthermore, 64 per cent of LED luminaires primarily installed in 2013/2014 are deemed to be in fair condition and due for lifecycle replacement by 2024/2025, while non-LED lights are in Poor to Very Poor condition based on their age. Other streetlight plant components such as cables and brackets are also coming up for lifecycle replacements.

It is critical that the City implement a proactive Street light Asset lifecycle replacement program to ensure continuity and long-term sustainability of street light operations. To achieve this, staff have commenced a detailed lifecycle model for each asset category. In consideration of streetlight assets approaching or that have exceeded the end of their useful life, a long-range financial forecast has been developed based on the following assumptions:

- Based on inventory data from Esri Software
- Current replacement cost and renewal cost based on 2023 pricing
- Street Light Plant Renewal calculation is based on age of the infrastructure; no physical inspections have been conducted yet
- Luminaire renewals are based on the recent remediation process and warranty expiring in 10 years after installation (as per Tangible Capital Assets (TCA) the life expectancy for LED luminaires is 15 years. However, the life expectancy was shortened because of lights staying on during the day)
- Adaptive Nodes renewals will happen at the same time as Luminaire renewal

Traffic Signals and Related Electrical Devices

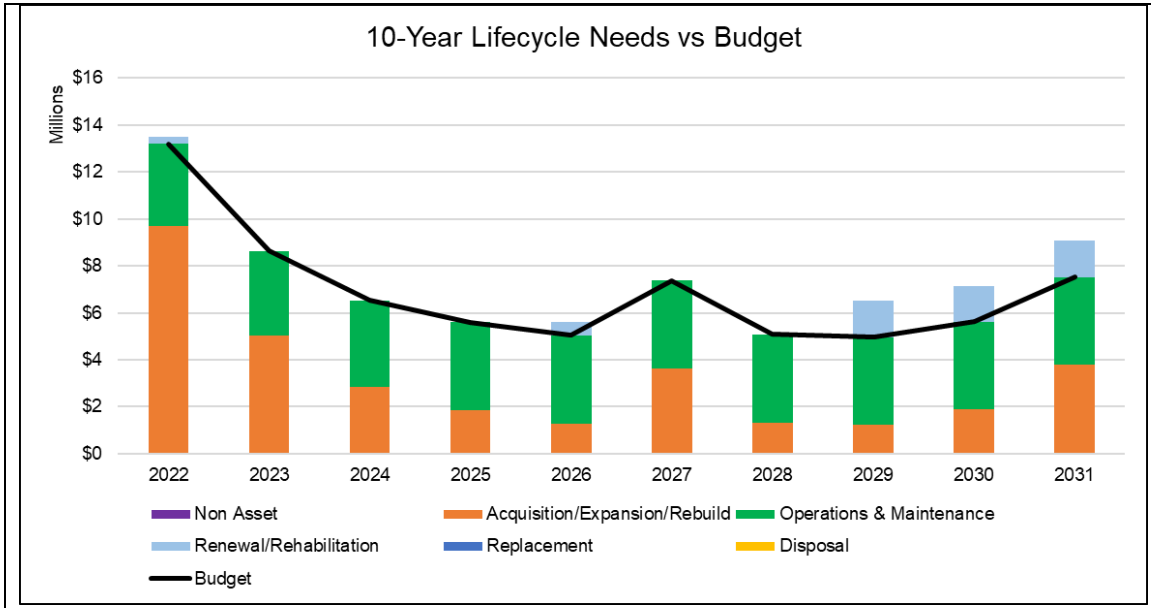




The City of Mississauga's traffic signals and related electrical devices were analyzed using age and useful life as an indicator for replacement. Traffic Signal assets are replaced at the end of their useful life, while Traffic Signal LED Modules within the Traffic Signal Plants are replaced every 10 years.

The forecast does not illustrate the current Emergency Vehicle Pre-Emption (EVP) system, as a new EVP is now being reviewed to upgrade and replace the existing system, which will include vehicles such as Fire, Transit and other public services deemed priority. Also, the forecast does not include signal infrastructure for agencies within the City's boundaries such as Region of Peel, Ministry of Transportation, Greater Toronto Airport Authority and Halton Region, which the City currently operates and maintains.

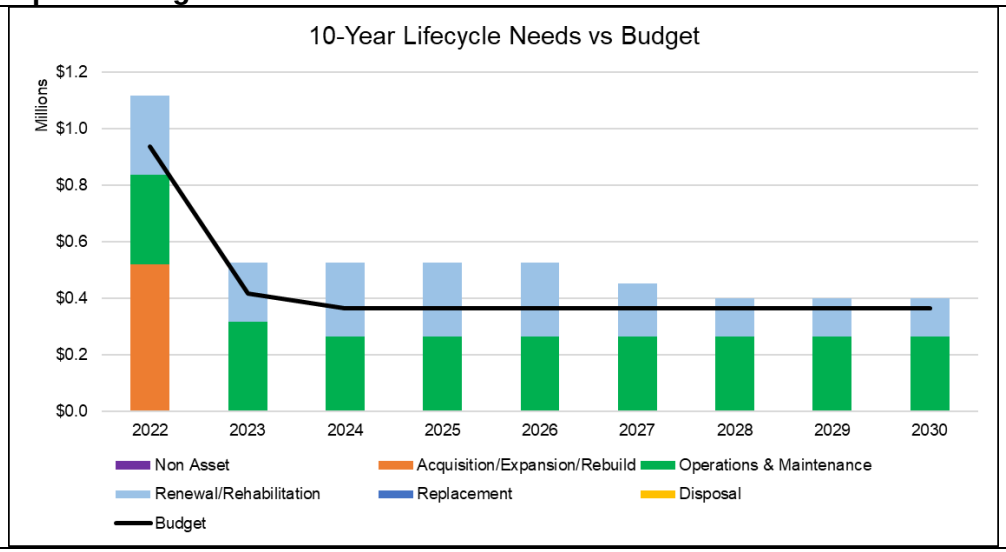
Roadside Infrastructure

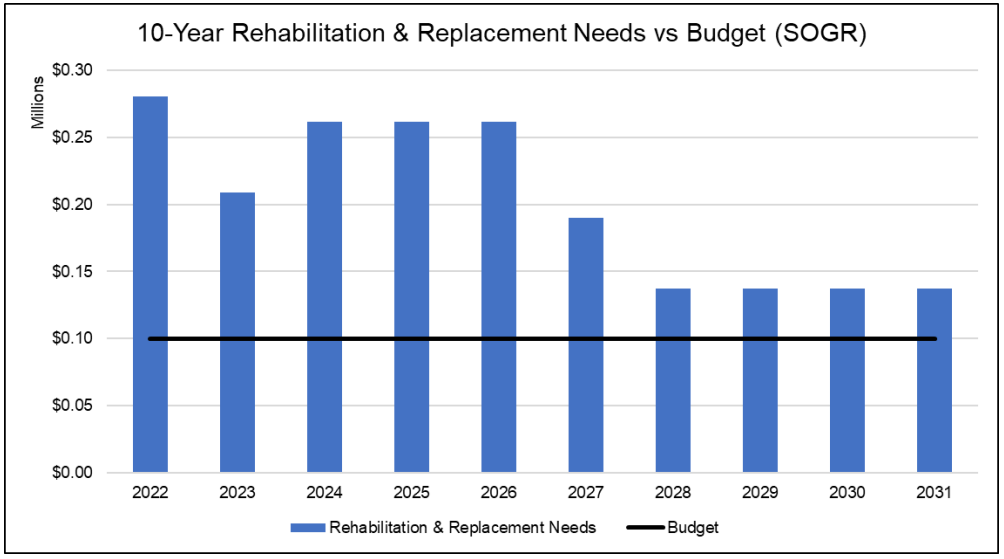


Since the installation cost of new signs and posts is typically bundled into roadway improvement projects, they do not have any capital budget, and the replacement of existing signs and posts is typically funded by operating budgets. The following forecast (replacements and acquisitions) shown in this section relate specifically to noise walls only.

Currently, most City-owned noise walls are in Fair to Very Good condition. There are only two noise walls identified for replacement in the next seven years (one in 2022 and one in 2026), however the City has not confirmed if they are City owned. Confirmation of ownership is required prior to any replacements. Aside from these two walls, there are no expected noise-wall replacements until the year 2029.

Municipal Parking



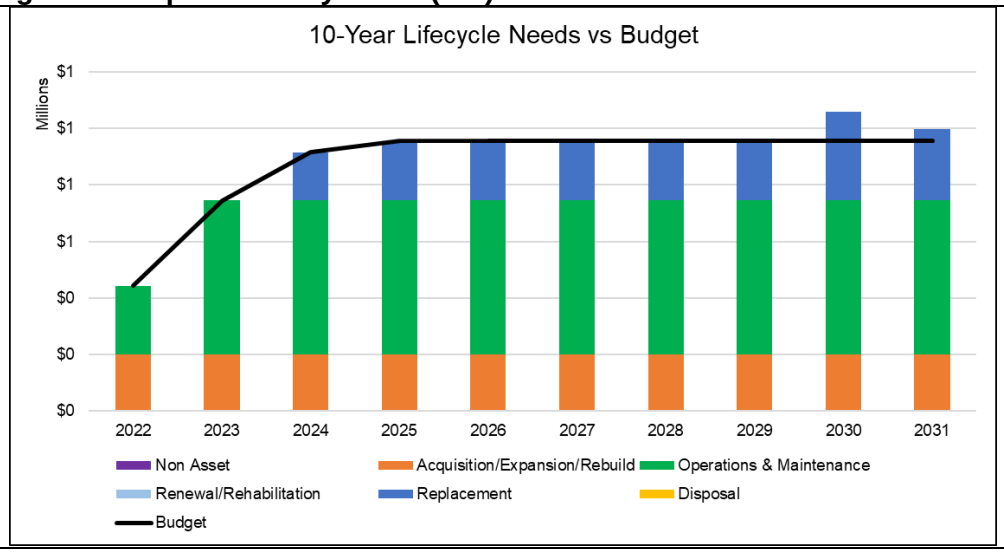


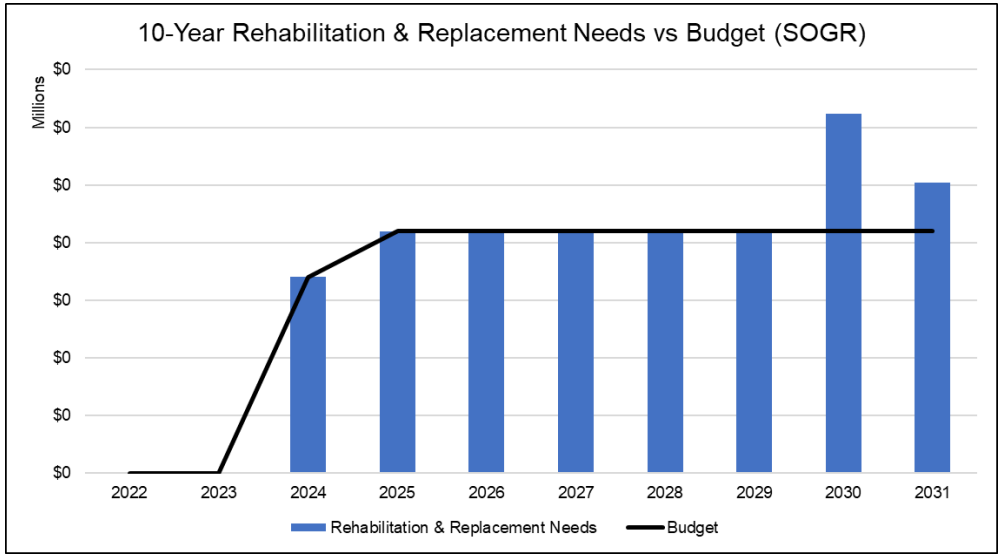
The current Municipal Parking financial position is one that aims to support the objectives of the Council-approved Parking Master Plan, with the goal of expanding Municipal Parking's footprint, along with staying current with market trends.

As the City's paid parking market matures, Municipal Parking undertakes yearly visual inspections of all municipal parking lots in order to ensure all locations meet required standards. A refurbishment cost per space was calculated based on previous refurbishments in conjunction with current construction costs and is used to estimate future refurbishment needs. Refurbishment year is estimated based on the current parking lot condition as shown by the renewal/rehabilitation forecast.

Parking machines are all connected into one paid parking network. The system is very sophisticated and generates alerts should there be any machine errors. Currently, the machines are planned for installation and to stay in appropriate working order for approximately seven years. At which date, conversations with the vendor will be necessary in order to determine the possible lifecycle refurbishment or renewal of the hardware.

Intelligent Transportation Systems (ITS)





Based on a 15-year useful life of CCTV cameras, there are currently no CCTV traffic monitoring cameras scheduled for replacement. However, as the oldest cameras were installed in 2015, an annual replacement program should be introduced in 2030 to start replacing CCTV cameras that have reached their end of life, as shown by the forecast.

Over the next 10 years, Roads is planning to spend an average of $147.1 million annually on road assets as shown in **Figure 12**. When all of the lifecycle costs are combined into a single graph, they create a picture of the lifecycle activities required to manage road-related infrastructure and meet service requirements.

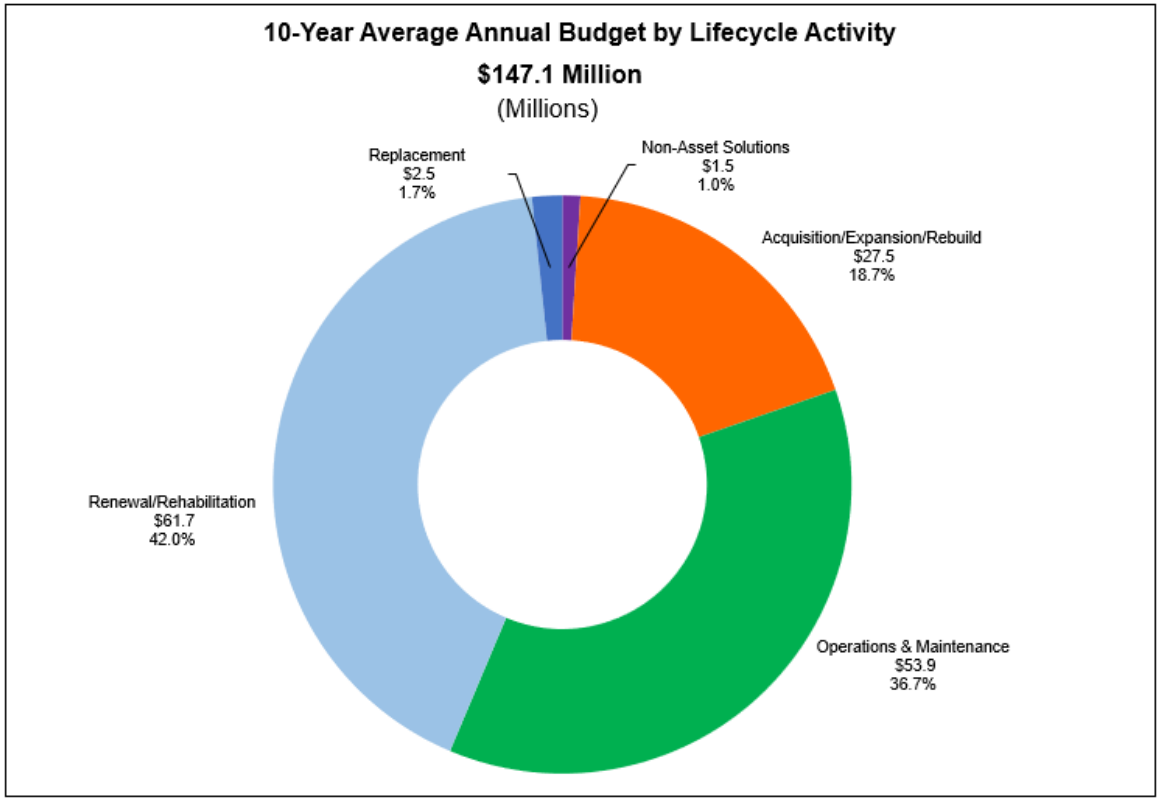


Figure 12: Breakdown of Budget by Lifecycle Activity

Table 19 shows the 10-year annual average budget breakdown by asset class. The majority of the operating and capital budget is spent on State of Good Repair of Roads assets.

Table 19: Budget breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Million)			Growth Capital Budget ($ Million)	Total Budget
	Operating	Capital	Total		
Road Pavement	25.2	50.5	75.7	5.6	81.3
Roadside Infrastructure	3.7	-	3.7	3.3	7.0
Structures	0.3	7.5	7.8	5.9	13.7
Roadside Trail Network	5.3	5.0	10.2	8.4	18.7
Traffic Signals and Related Electrical Devices	2.9	1.4	4.3	3.7	8.0
Intelligent Transportation Systems (ITS)	0.5	0.2	0.7	0.2	0.9
Street Lights	6.0	2.3	8.3	0.5	8.9
Municipal Parking	0.3	0.1	0.4	0.1	0.4
Other[3]	6.9	0.3	7.2	1.1	8.3
Total	**51.1**	**67.2**	**118.3**	**28.8**	**147.1**

[3] "Other" asset class denotes lifecycle activities that span over multiple asset classes within the service area such as plans, studies, and other non-asset solutions.

Capital Expansion and Improvement Projects

In addition to targeting and prioritizing the investments needed to maintain existing assets, staff also identify infrastructure expansion or improvement needs in the Capital Plan for roads and structures. These expansion projects, typically identified through a variety of planning studies, may be required to accommodate development growth or service improvements.

Table 20 below lists the road improvements identified in the Roads 10-year Capital Plan.

Table 20: Priority Road and Structures Improvement Projects Identified in the 10-Year Capital Plan

Growth Projects	Approximate Project Timing	Growth Project Name	Approximate Project Timing
Goreway Drive Grade Separation	2014 - 2025	Kariya Drive – South of Elm Dr, to Central Pkwy W	2023 - 2034
Square One Drive •Confederation Parkway to Rathburn Road West – Construction •Hurontario St. to Rathburn Rd. E	2017 - 2024	Creekbank Road Extension •North Limit of Creekbank to South of Hwy. 401 •Matheson Blvd East to North Limit of Creekbank •Highway 401 Westbound Off Ramp - Highway 401 to Enterprise Road	2021 - 2022 2026 - 2028
Intersection Improvements (Various Locations)	2019 - 2028	Clarkson Road/Lakeshore Road Intersection - Design & Construction	2024 - 2025
Ninth Line Widening – Eglinton Avenue West to Derry Road West	2019 - 2024	Creditview Road Widening from Bancroft Road to Old Creditview Road	2024- 2028
Credit River AT Bridge Along North Side Of The QEW	2020 - 2022	Sheridan Park Drive - West Leg to East Leg of Speakman Drive	2025 - 2028
Courtneypark Drive East / Highway 410 Interchange Courtneypark Drive East Widening •Kennedy Road to Dixie Road – Design •Tomken Road to Dixie Road	2022 - 2031	Burnhamthorpe Rd W - Ninth Line to Loyalist Drive	2026 - 2028
Stavebank AT Bridge across QEW	2021 - 2024	Argentia Road crossing of Highway 407	2031

The projects identified in Table 20 represent the 2022-2031 forecast. As these projects advance through the planning and design phases and as the City reviews priorities, funding availability and updates to the master plan; it is expected that the forecast will evolve and change annually. Future Asset Management Plans will reflect those changes.

The 2021 Development Charges Transportation Background Study[4] identified approximately $1.3 million in growth-related projects for Roads. The planning horizon for that study was 2022-2041. Of the growth driven needs identified in the study, approximately 43 per cent relate to arterial roads, 29 per cent relate to major collector roads, and the remaining 28 per cent relates to other roads and related infrastructure such as stand-alone signalized intersection improvements, grade separations, Master Plan studies, signals phasing changes, transit signals, new noise walls, and new cycling infrastructure and sidewalks.

Hurontario median removals for LRT

[4] 2021 Development Charges Update, Transportation Background Study, City of Mississauga.

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan, as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management-related lifecycle activities based on the 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

The operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget (e.g., utilities, building and sidewalk maintenance).

The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The capital budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment including IT network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to, or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets (e.g., sidewalk maintenance or licensing fees) are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs; renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

Capital Funding Sources and Operating Revenue Sources

As illustrated in **Figure 13,** the estimated available funding for the next 10-year period (2022-2031) for Roads is $1.4 million. The primary sources of funding are operating revenue sources at 34.7 per cent, Tax Reserve Funds at 24.5 per cent which is primarily used to support capital infrastructure renewal needs, Canada Community-Building Reserve Funds 25.4 per cent and Development Charges Reserve Funds at 13.9 per cent, supporting growth projects.

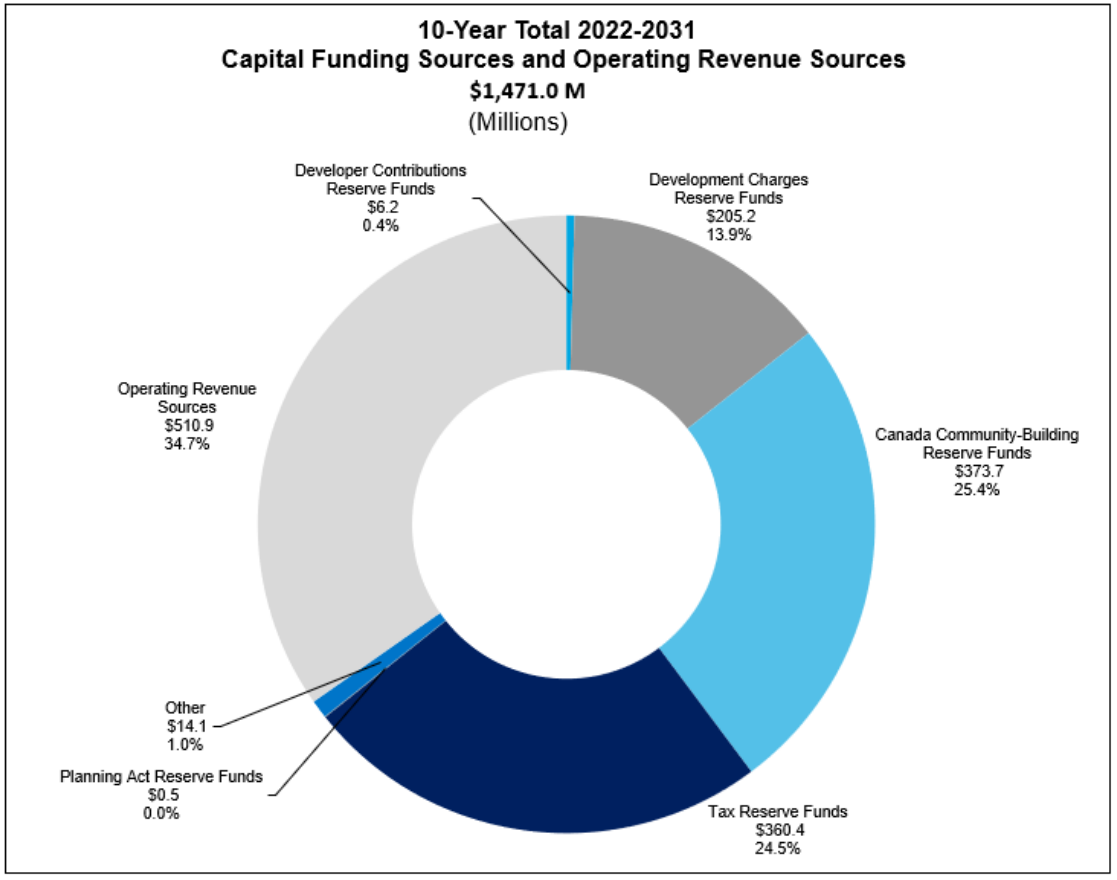


Figure 13: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure and increased to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g., the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available.

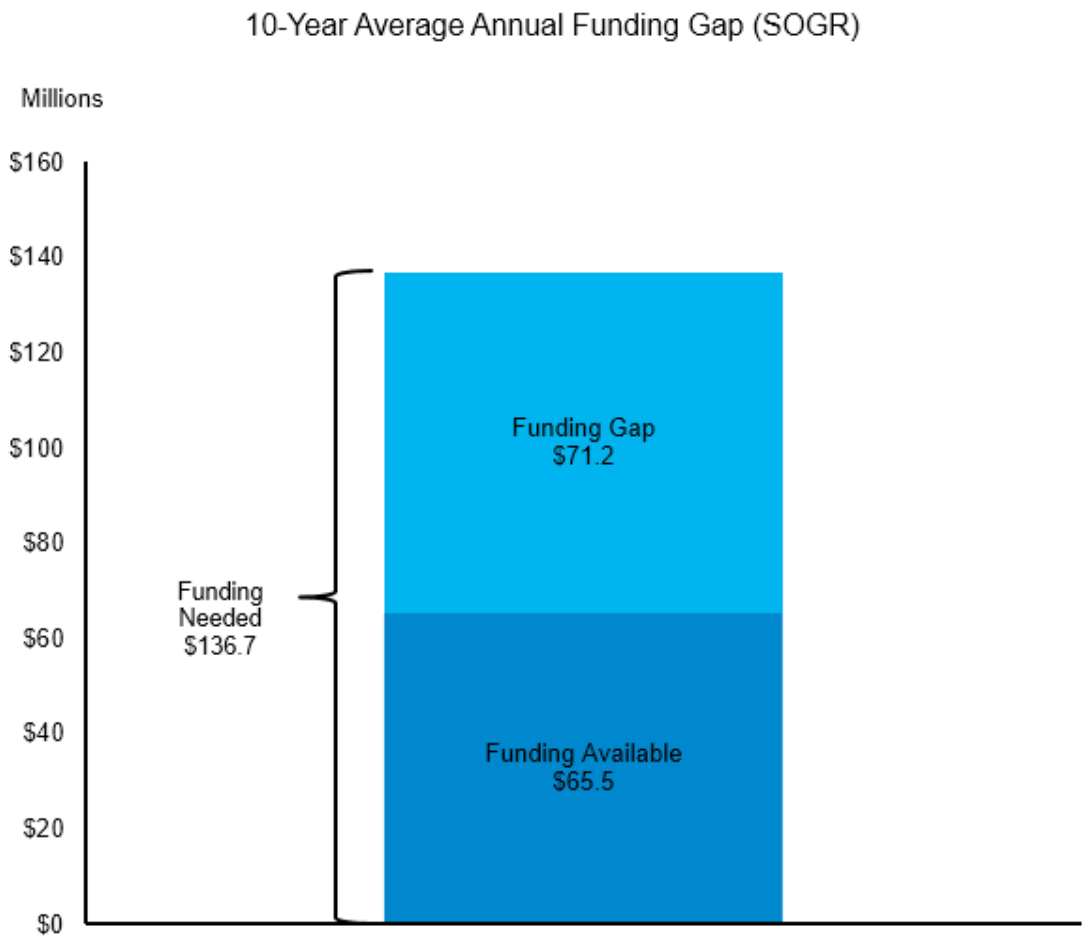
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to levels of customer satisfaction
- Impacts to quality of life
- Impacts to road pavement quality, and increase in resident service requests
- Deferral of projects such as bridge and culvert renewals
- Increased liability and claims (e.g., from sidewalk tripping hazards)
- Insufficiency to maintain existing streetlight services at current levels and replace assets at the end of their useful life

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (funding needed) and the annual average budget (funding available) for the next 10 years, as is shown in the following graphs by service area and by each asset class. Continued implementation of asset management best practices, as well as assistance from senior levels of government through continued infrastructure funding programs, will provide opportunities to address some elements of the funding gap.

Roads

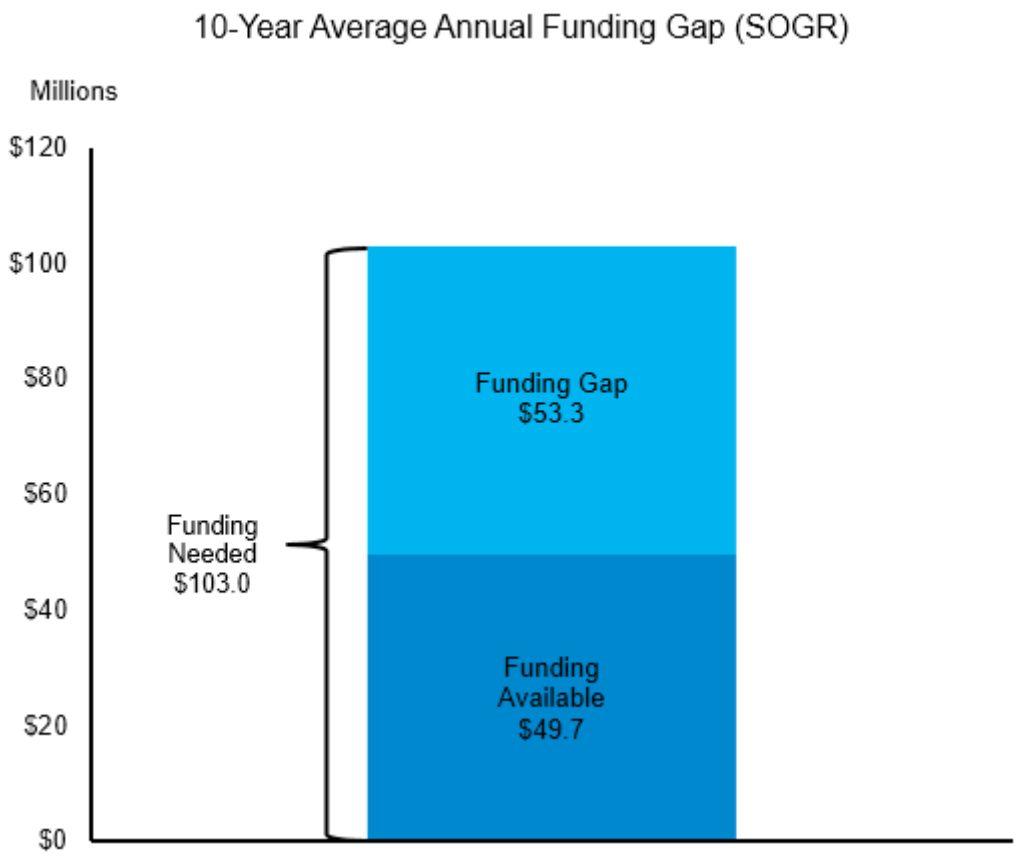


As demonstrated in the state of infrastructure section of this plan, road-related infrastructure is aging. In addition to aging infrastructure, the cost to deliver road-related capital projects is escalating faster than the rate of inflation. City staff have been monitoring construction price increases over the past few years and have seen year-over-year increases in construction tenders ranging between 10 and 20 percent. This means that the City's forecast for future construction projects is outpacing the rate of inflation. As a result, the City's ability to maintain all road pavements in a state of good repair is constrained by the level of investment dollars available to fund this growing pressure.

The City's infrastructure funding gap for roads and structures is estimated to grow to $7.1 million between 2022 and 2031. The City's ability to fund all needs for road infrastructure is constrained and can only invest approximately $120 million in road related projects annually, leaving a funding gap of $71.2 million annually.

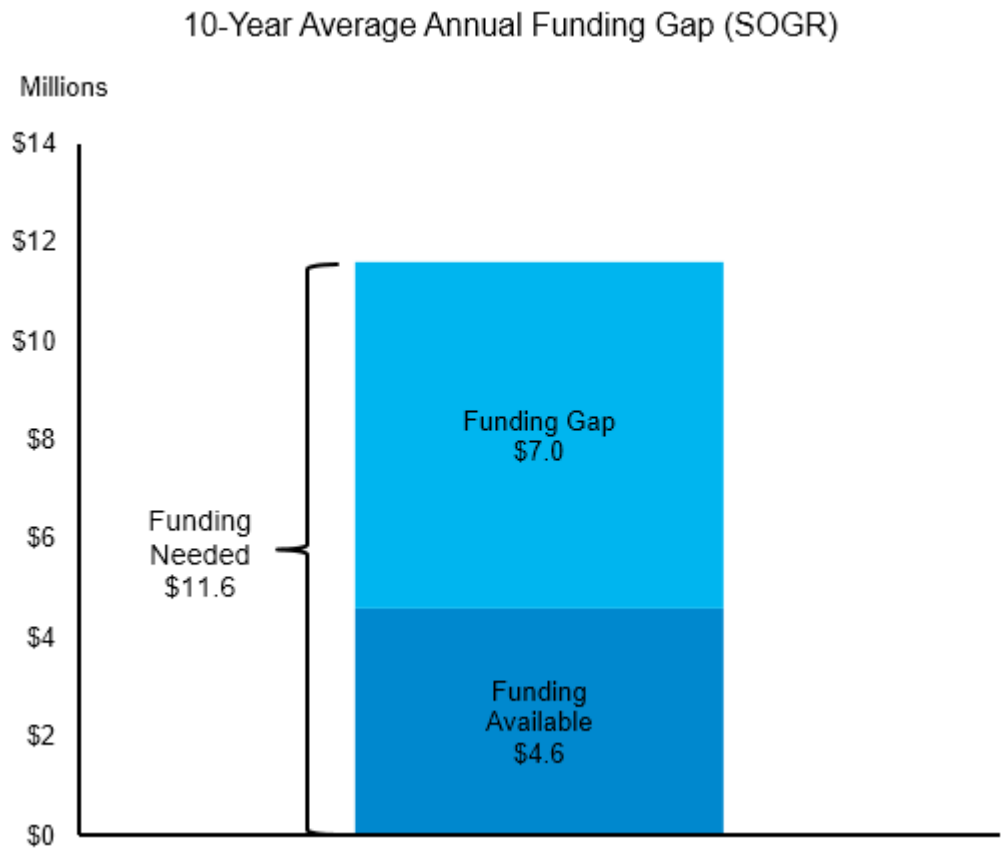
As the City continues to advance their asset management maturity, the accuracy of the funding gap will continue to improve.

Road Pavement



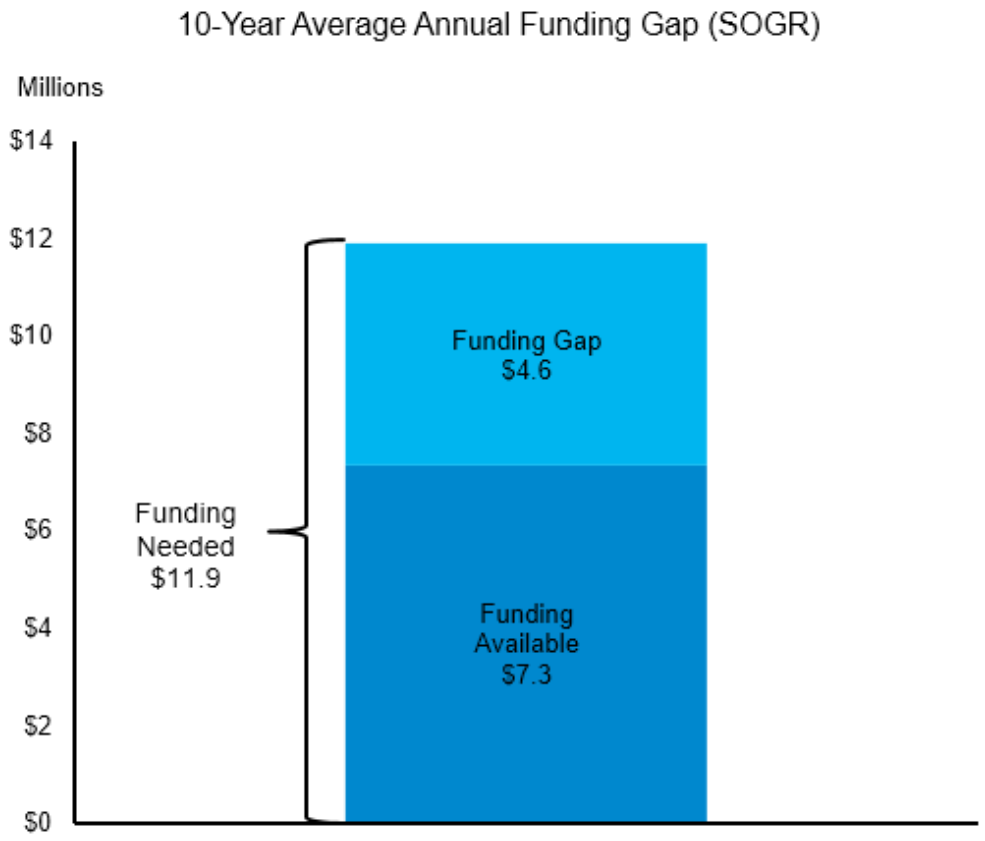
The 10-year average annual funding needed to maintain road pavements in a state of good repair creates an average annual funding gap of $53.3 million. This assumes maintaining the average network pavement condition at 72 PQI.

Roadside Trail Network



The 10-year average annual funding needed in comparison to the funding available creates an average annual infrastructure gap of $7 million. As the City's roadside-trail network assets age past their recorded useful life and are not replaced or renewed, the infrastructure gap and the need to maintain the network in a state of good repair will continue to increase.

Structures



After analyzing the needs of the road structures asset category, it has been determined that the current budget allotment is insufficient to meet the requirements for timely infrastructure renewal. The current funding stands at approximately $7.3 million per year while the estimated funding to address identified needs has been calculated at an annual average of $11.9 million, a shortfall of approximately $4.6 million annually.

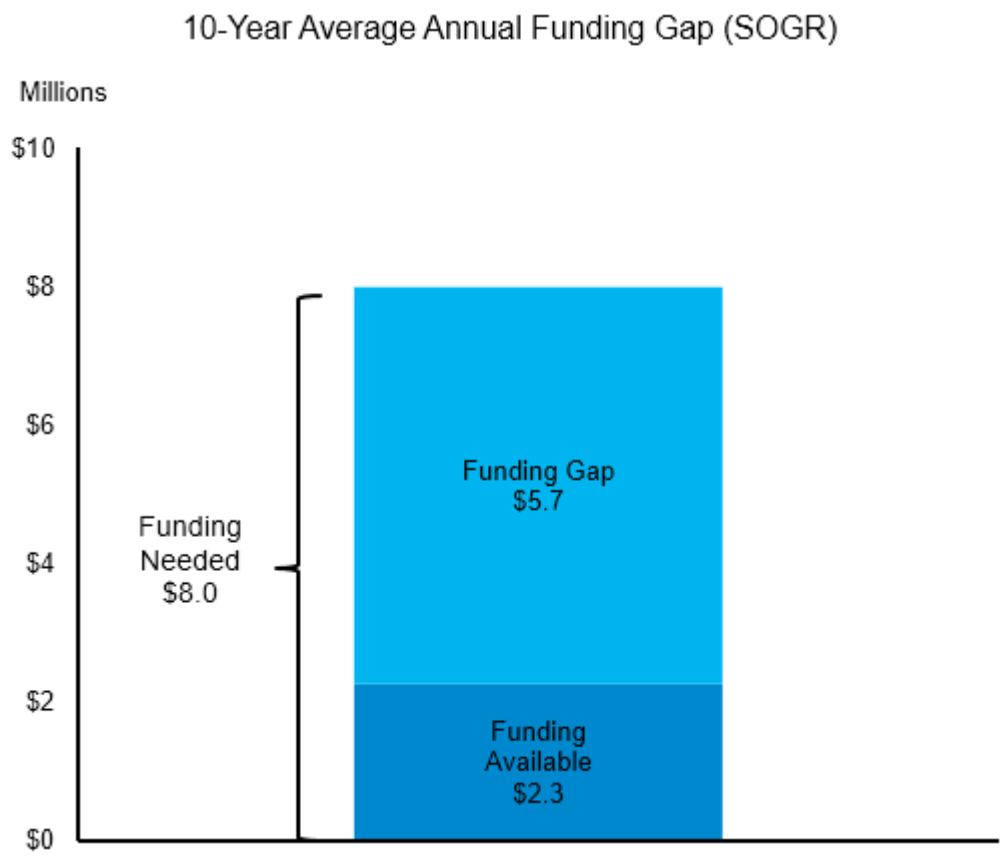
The City's road structures are continuing to age. The increasing age of existing infrastructure has resulted in more structure replacements or significant rehabilitation works. This and the rising costs of construction have both contributed to the increased infrastructure gap.

Additionally, few structure projects programmed in the capital budget are like-for-like replacements or rehabilitations. There is an identified need to align with both current structure construction standards and Council-approved master plans such as the Pedestrian Master Plan and Cycling Master Plan. Many of the City's constructed structures do not have sufficient space in their current configurations to accommodate active transportation infrastructure.

Extending this infrastructure through often results in more costly capacity improvements to existing structures. This is typically accomplished through the widening of current structures or through full structure replacements. There is currently a study underway to evaluate all current structures for compliance with these master plans and proactively identify needs, priorities, and high-level costs.

Costs used to determine the infrastructure gap are high level only and will be refined during the detailed investigation and design phases of renewal projects.

Street Lighting



There is no comprehensive and robust asset lifecycle replacement plan for street lighting assets to date. For 2024 and previous years, the small replacement budget was dedicated to replacing Erindale style streetlight poles. These poles are directly buried into the ground and with the interaction of salt and ground minerals, they have started to deteriorate below grade. As such, an annual replacement program was established in 2019.

The estimated asset renewal cost in 2024 and 2025 would be approximately $92 million dollars. This accounts for 19 per cent of streetlight plant assets and 88 per cent of luminaires (i.e., almost the entire inventory all adaptive nodes that control LED luminaire operations).

From 2028 onwards, LED luminaires begin to approach their end of life, thus requiring a huge financial outlay for replacements. Given this end of useful life information of street light assets, a Phased Asset Replacement Program is recommended, which stretches out the plan beginning in 2025, and allows for a more realistic and feasible implementation.

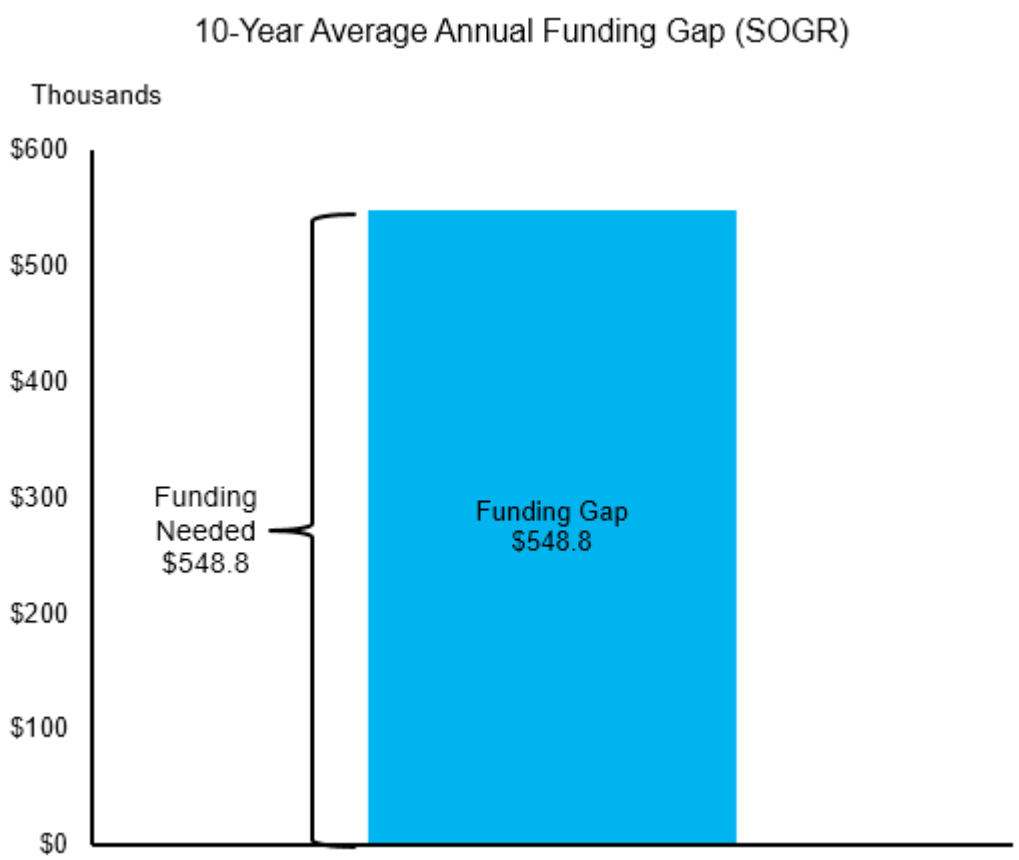
The recommended asset life cycle replacements implementation starting in 2025 and continuing beyond 2025, will allow for a realistic asset replacement program. With the 2022 10-year budget, this indicates an average annual funding gap of $5.7 million.

Traffic Signals and Related Electrical Devices

Within the next 10 years, there is minimal infrastructure gap. This means the City is projected to have sufficient funds to maintain the traffic signals and related electrical devices infrastructure in a state of good repair, as most of the assets are still within their expected useful life.

However, the budget to replace traffic signals includes replacement of other assets related to the intersection such as sidewalks, tactile plates, pavement markings, signs and road pavements. The analysis only takes into account the traffic signals replacement need. Additionally, as standards and technology change, traffic signal infrastructure must be re-designed, updated, and replaced to meet new standards. As such, the infrastructure gap demonstrated through this analysis is lower than in reality.

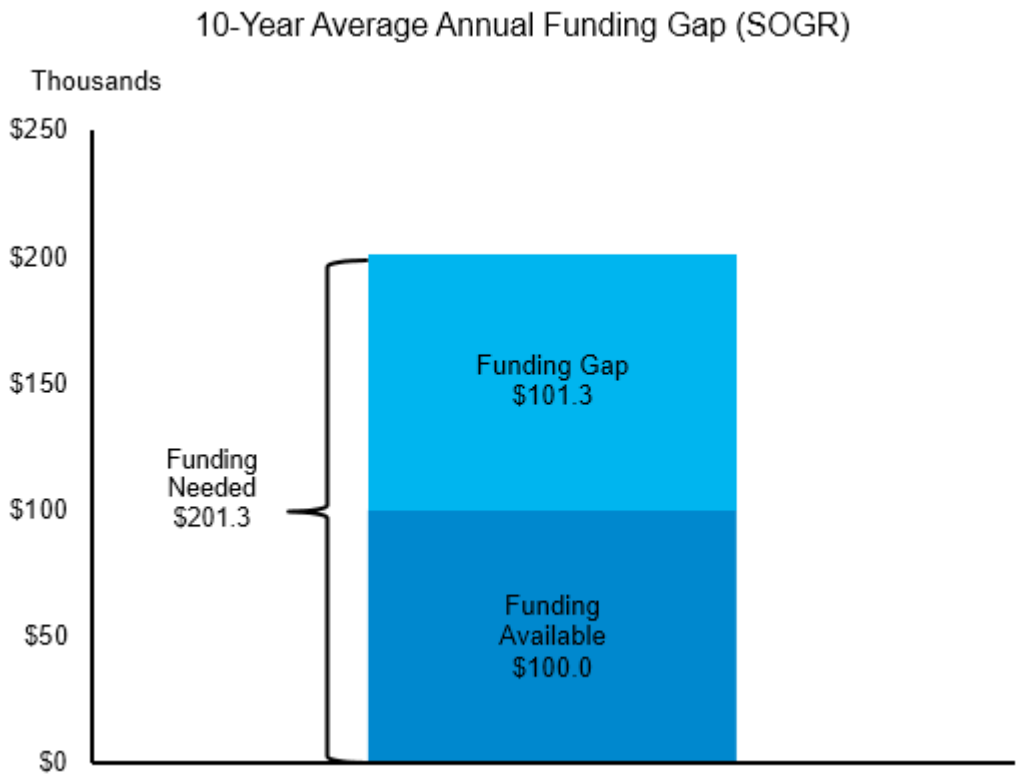
Roadside Infrastructure



The 10-year average annual funding needed in comparison to the funding available creates an average annual infrastructure gap of $549 thousand. As the City continues to acquire private noise walls and fences, and City-owned noise walls age past their recorded useful life, the infrastructure gap and the need to maintain the network in a state of good repair will continue to increase.

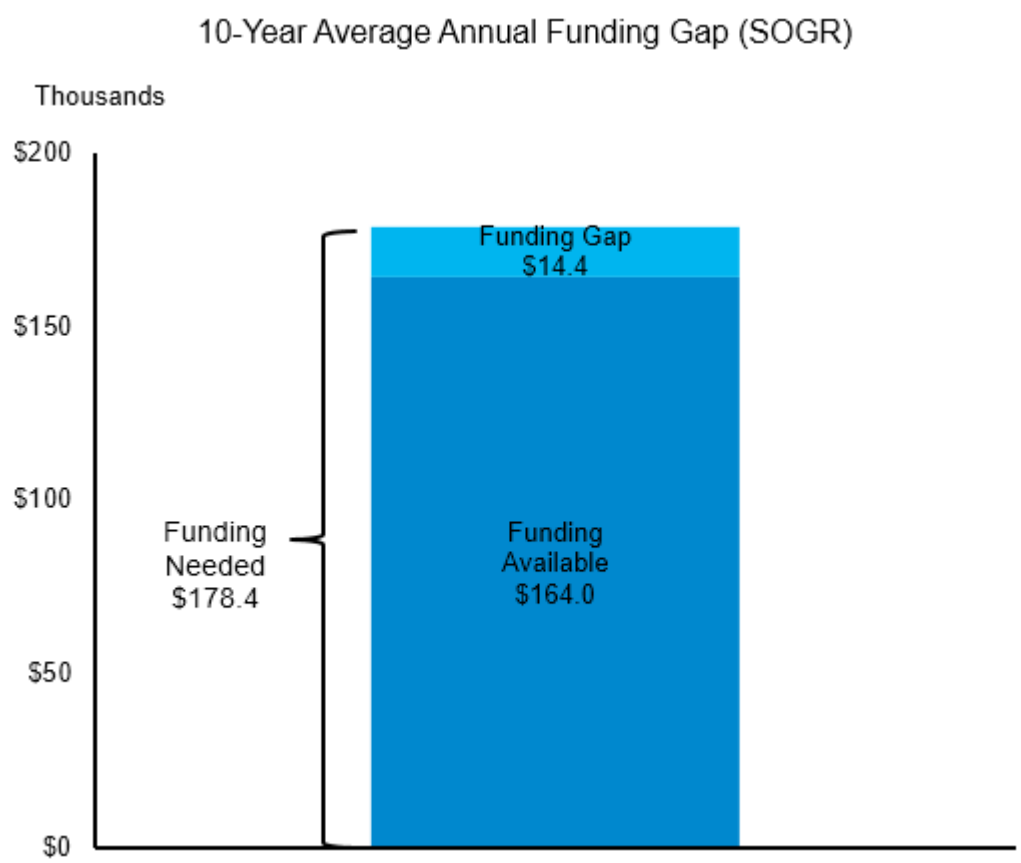
As part of the City's noise wall retrofit program, the City converts privately owned noise walls and fences that meet required noise levels to City-owned assets. The replacement of privately owned noise walls is based on condition, with the intent to replace the walls that are in very poor condition. The noise walls will stay under private ownership until the City takes responsibility of the assets. Until then, it is the responsibility of the property owner to maintain these noise walls. As such, these replacements rank lower when prioritizing SGR replacements, and have not been included in the forecast.

Municipal Parking



In the current state of Municipal Parking, there is an annual average infrastructure gap of approximately $101,300.

Intelligent Transportation Systems (ITS)



The 2022 Capital Budget shows funding beginning in 2024 for the replacement of the speed awareness devices. Assuming this budget is approved between 2024 and 2031, there is no infrastructure gap for this asset type. The current budget is sufficient to replace them and keep them in a state of good repair.

Assuming the approval of the speed awareness devices replacement budget, the overall average annual infrastructure gap for Intelligent Transportation Systems is $14,400, and really only begins in year 9 and 10.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement. In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management Office plans to conduct periodic, internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment, which has been completed for each Roads asset class. The results for each asset class and an overall result for Roads are scored from 0.0 to 4.0, based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved.

Appendix D provides radar charts that shows the maturity scores of the Roads asset classes in 2022 and the overall target maturity of Roads. As the service areas mature in each of the eight categories, they will expand outwards towards the outer ring (Target).

Advancing Service Area Asset Management Capabilities

The proposed work plan in **Table 21** was developed in consultation with City staff through the development of the asset management plan. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks may differ from those in the maturity assessment improvement plan, as they are predominantly internal tasks to Roads that provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories. The proposed work plan in Table 21 aims to build upon Roads existing strengths to develop a leading body of practice for asset management that balances opportunities, costs, and risk against the desired levels of service, to achieve organizational objectives.

Through the maturity assessment and associated work plans, Roads aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service, to achieve both service area and corporate objectives.

Continuous Improvement Initiatives

A proposed work plan is provided in **Table 21** below, aimed to build upon the City's existing strengths to develop a leading corporate asset management practice that balances costs, opportunities and risk against the desired levels of service and to achieve organizational objectives.

Table 21: Workplans for Roads

Task No	Work Plan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
SOI-01	Review replacement cost models and develop a sustainable framework for periodically updating and reporting on replacement costs	Roads Service Area	2023-2025	Medium	Replacement costs contained within CityWide, the City's Tangible Capital Asset System, are based on historical costs. Replacement and renewal costs change over time and may be significantly understated.	Internal
		Structures	2023-2024	High	Updates the current costing data in relation to the recent expenses from capital projects. Allows staff to isolate administrative costs vs. replacement costs.	
		Signs and Posts	2023-2025	Medium		
SOI-02	Review and identify all structures that do not currently meet various AT master plan (Pedestrian & Cycling) requirements and barrier height standards.	Structures	2023-2024	High	Identifies needs for upgrades prior to structures being identified for renewal. Structures must be brought up to current standards when undergoing a significant rehabilitation.	Internal
SOI-03	Review and update ownership and installation-date information.	Roadside Trail Network	2024-2025	High	Ensures accurate asset information to help make informed decisions.	Internal
		Roadside Infrastructure	2024-2025			
SOI-04	Expand use of Infor to track capital delivery contracts against roadway assets.	Road Pavement	2022-2024	Medium	Better asset lifecycle costing and improve processing time for TCA reporting.	Internal
		Structures		Low		

Task No	Work Plan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
SOI-05	Catalogue all asset types within the City's GIS environment.	Roads Service Area	2023-2024	High	Developing the catalogue, inventory and data model will enable the service area to better manage the data.	Internal
SOI-06	Use of LiDAR for data collection of non-core assets in the right of way.	Roads Service Area	2023-2024	High	Having accurate information about the location of each asset will be used to better plan inspection, renewal and replacement activities. The activity will also serve to validate the accuracy of existing asset inventory information.	External
SOI-07	Expand use of Infor Contract Management and Infor Mobile Technology.	Roads Service Area	2024-2025	Medium	This activity facilitates the allocation of capital costs to the appropriate asset type and provides for better lifecycle costing and valuation. Will also reduce processing time for TCA reporting.	Internal
SOI-08	Expand hierarchy to include additional assets, and asset sub types.	Roads Service Area	2025-2027	Medium	Includes all asset types within asset class, ensuring a complete asset class.	Internal
SOI-09	Update the Maturity Assessment and Continuous Improvement Plan and report back to Leadership Team.	Roads Service Area	2023-2024	High	Providing Leadership Team and Council with regular updates on the progress made towards asset management planning will ensure that we continue to mature in our asset management practices.	Internal
LOS-01	Review condition assessment framework.	Road Pavement Structures Roadside Infrastructure	2022-2024	High	In addition to being required to meet O. Reg. 588/17, level of service targets enable the service area to track progress against established targets.	Internal
LOS-02	Develop condition assessment framework for all high-priority assets identified.	Roads Service Area	2024-2025	High	Provides a consistent approach to collect information that will allow service groups to identify and prioritize infrastructure needs.	Internal and External

Task No	Work Plan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
LOS-03	Define target level of service for all major asset categories.	Roads Service Area	2024	High	In addition to being required to meet O. Reg. 588/17, having levels of service established will enable the service area to track progress against targets.	Internal
LOS-04	Work with Corporate Finance to formalize performance targets and sustainable funding for all roads assets.	Roads Service Area	2024	High	O. Reg. 588/17 requires the establishment of service level targets by 2025.	Internal
LCA-01	Utilize the lifecycle information within RPMS and BTMS to explore and develop enhanced repair and preservation approaches and strategies.	Road Pavement Structures	2024-2025	High	Enhanced and expanded inspection, preservation, repair and renewal strategies can extend the life of both road and structure assets and improve overall performance of assets.	Internal
LCA-02	Prepare asset needs analysis to determine long-term capital renewal, replacement and expansion programs for all new asset types.	Roads Service Area	2022-2023	High	Developing a needs analysis for all major asset types will ensure that the Roads Service Area is taking into consideration all lifecycle costs.	Internal and External
LCA-03	Review lifecycle costing assumptions and allocations.	Roads Service Area	2023-2024	Medium	Ensuring the correct allocations and lifecycle costing assumptions are used will lead to more detailed forecasts for operating and capital budgets.	Internal
LCA-04	Develop a risk assessment framework for all priority assets within the Roads Service Area.	Roads Service Area	2024-2026	Medium	A risk framework will enable the Roads Service Area to better prioritize funding availability across asset classes.	Internal and External
FS-01	Leverage asset management data to drive business plans and budgets.	Roads Service Area	2024-2025	High	Aligns asset information that directly impacts budget decisions and planning.	Internal
All	Acquire new Asset Investment Planning (AIP) system.	Roads Service Area	2024-2025	High	An AIP system will integrate strategic planning, budget, service level targets, and support long-term capital expenditure decision-making, using data from asset lifecycles.	Internal and External

Appendix A – Condition Rating Scale per Asset Class

Asset Condition

Table 22 below outlines the different condition ratings used across Roads. Where condition information is not available, a condition score is assumed based on the age and remaining useful life.

Table 22: Condition Rating Scale per Asset Class

Condition Rating			Very Good	Good	Fair	Poor	Very Poor
Physical Condition Definitions			**Fit for the Future** The asset is generally in very good condition, typically new, or recently rehabilitated.	**Adequate for Now** The asset is in good condition and performing as intended. Some elements show minimal signs of deterioration. A few elements exhibit deficiencies.	**Requires Attention** The asset shows general signs of deterioration and requires attention with some elements exhibiting significant deficiencies.	**Approaching End of Life** The asset is in poor condition and typically below established standards, with many elements approaching the end of their useful service life.	**Requires Renewal** The asset is below established standard conditions with widespread signs of advanced deterioration. Many components have surpassed the end of their useful service life and requires urgent renewal.
Asset Class	Asset Type	Condition Rating Scale					
Road Pavements	All	PQI (Pavement Quality Index)	80 - 100	70 - 79	55 - 69	20 - 54	0 - 20
Roadside Trail Network	Sidewalks and Engineered walkways	% RUL (Remaining Useful Life)	>75%	36% - 75%	14% - 35%	3% - 13%	< 3%
	Multi-use Trails	PQI	80 - 100	70 - 79	55 - 69	54 - 20	0 - 19
Structures	Bridges and Culverts	NASVi (Net Asset Salvage Value Index)	100	80 - 99.9	40 - 79.9	20 - 39.9	< 20
	Retaining Walls	10-point scale	9 - 10	7 - 8	5 - 6	3 - 4	1 - 2

Condition Rating			Very Good	Good	Fair	Poor	Very Poor
Street Lighting	Street Light Plants	% RUL	> 80%	60% - 79%	40% - 59%	20% - 39%	< 19%
	Luminaires	% RUL	> 86%	73% - 85%	60% - 72%	46% - 59%	< 45%
	Monitoring Control Systems	% RUL	> 25%	10% - 24%	5% - 9%	0% - 4%	< 0%
Traffic Systems and RED	Traffic Signal Plant	% RUL	> 72%	2% - 71%	12% - 41%	2% - 11%	< 2%
	Traffic Controller Cabinets and Emergency Vehicle Pre-Emption	% RUL	> 25%	10% - 24%	5% - 23%	0% - 4%	< 0%
Roadside Infrastructure	Noise Walls	10-point scale	9 - 10	7 – 8	5 – 6	3 – 4	1 – 2
	Signs and Posts	Pass or Fail		Pass		Fail	
Municipal Parking	Parking Lots	5-point scale %RUL	Very Good 85%	Good 55%	Fair 24%	Poor 8%	Very Poor (Needs Replacement) 1%
	Parking Machines	% RUL	>77 %	32%-76%	9% - 31%	0% - 8%	< 0%
Intelligent Transportation Systems (ITS)	CCTV Cameras	% RUL	> 80%	53% - 79%	33% - 52%	6% - 51%	< 5%
	Speed Awareness Devices	% RUL	> 60%	20% - 59%	0% - 19%	Not functional	Not functional

Appendix B - Customer Levels of Service

Mississauga's Road and Bridges Network, Level of Connectivity and Road Classification Distribution

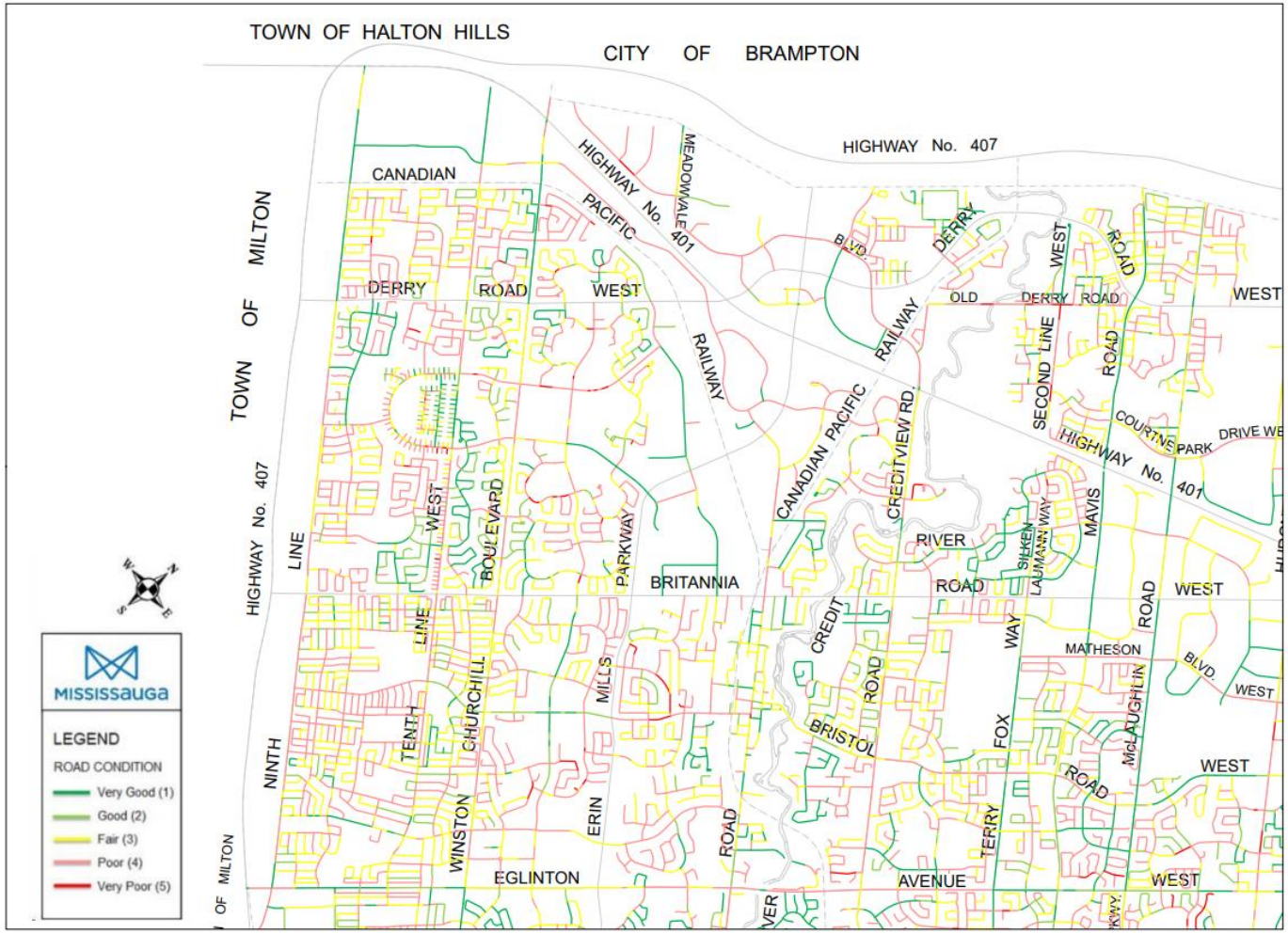


Figure 14: Mississauga's Current Road Pavement Conditions (Northwest Quadrant)

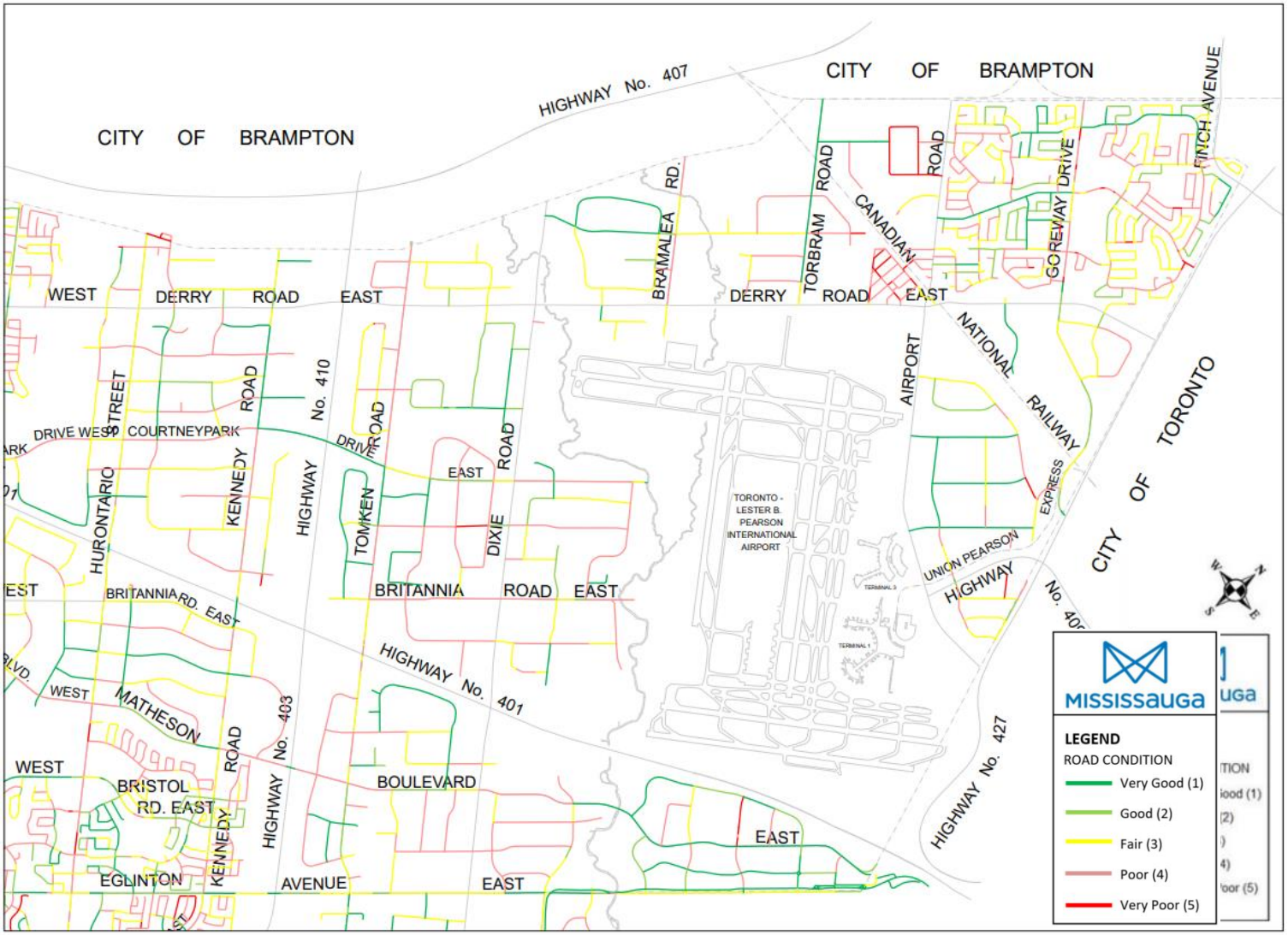


Figure 15: Mississauga's Current Road Pavement Conditions (Northeast Quadrant)

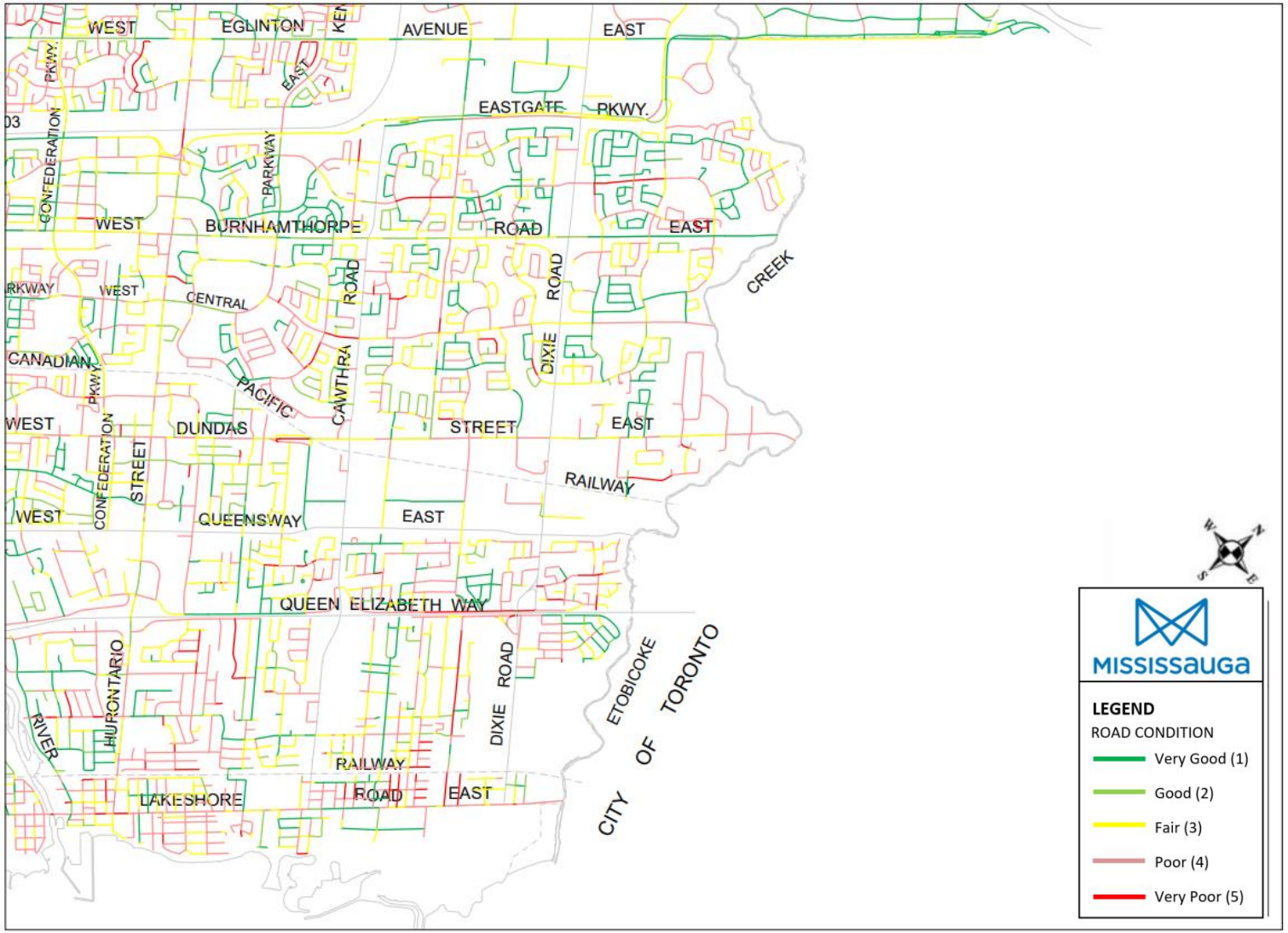


Figure 16: Mississauga's Current Road Pavement Conditions (Southeast Quadrant)

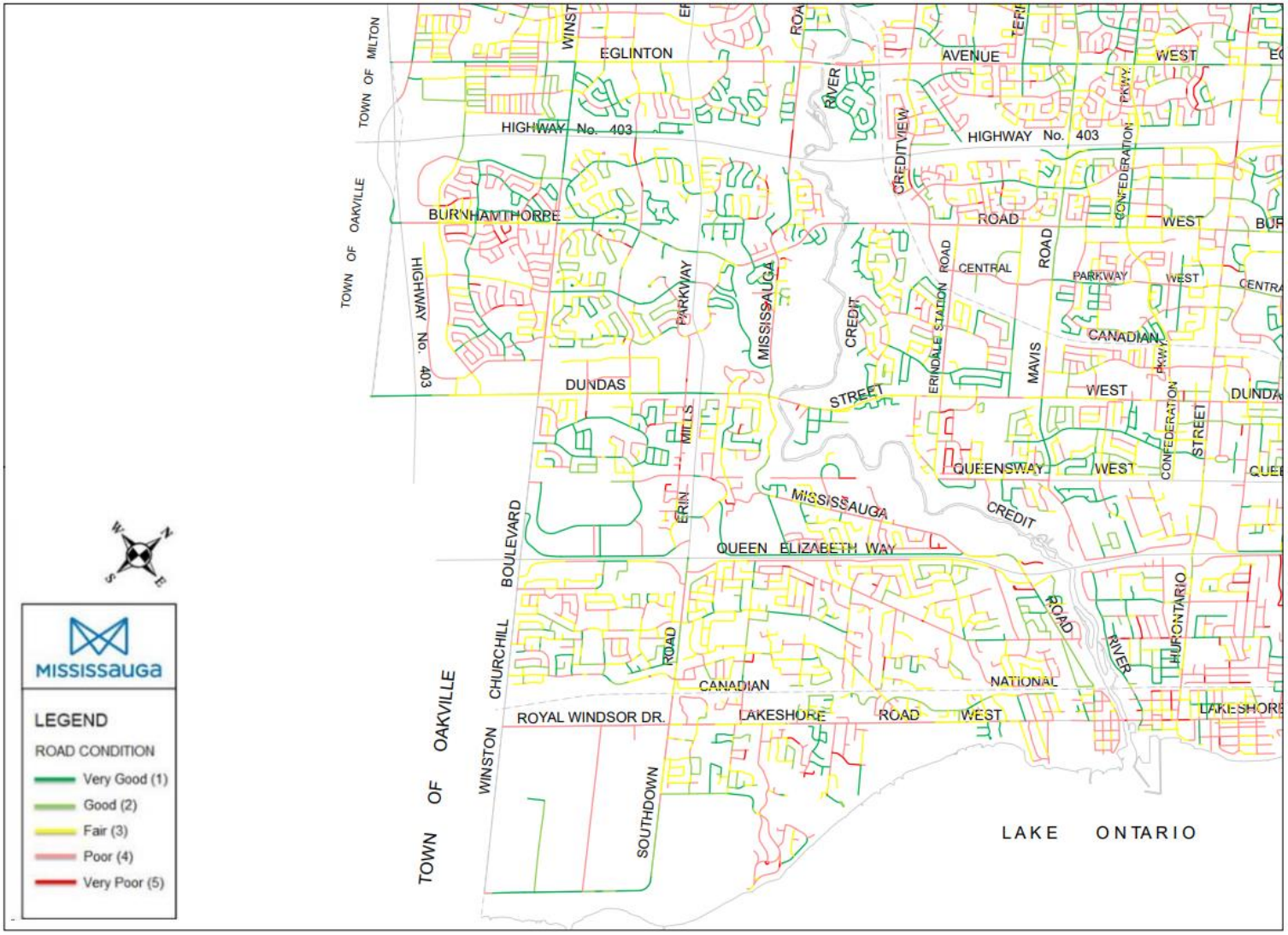


Figure 17: Mississauga's Current Road Pavement Conditions (Southwest Quadrant)

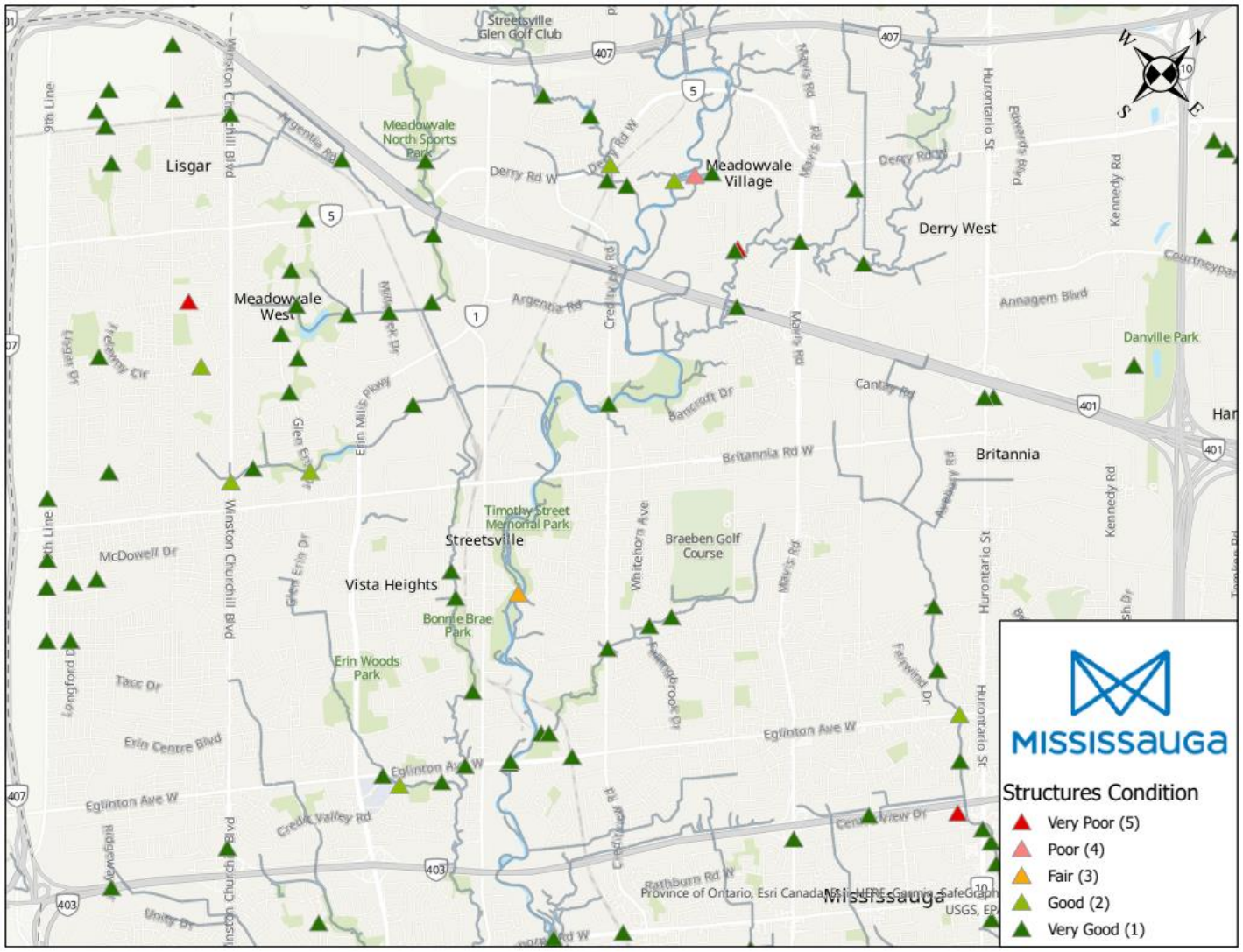


Figure 18: Mississauga's Current Bridges and Culverts Conditions (Northwest Quadrant)

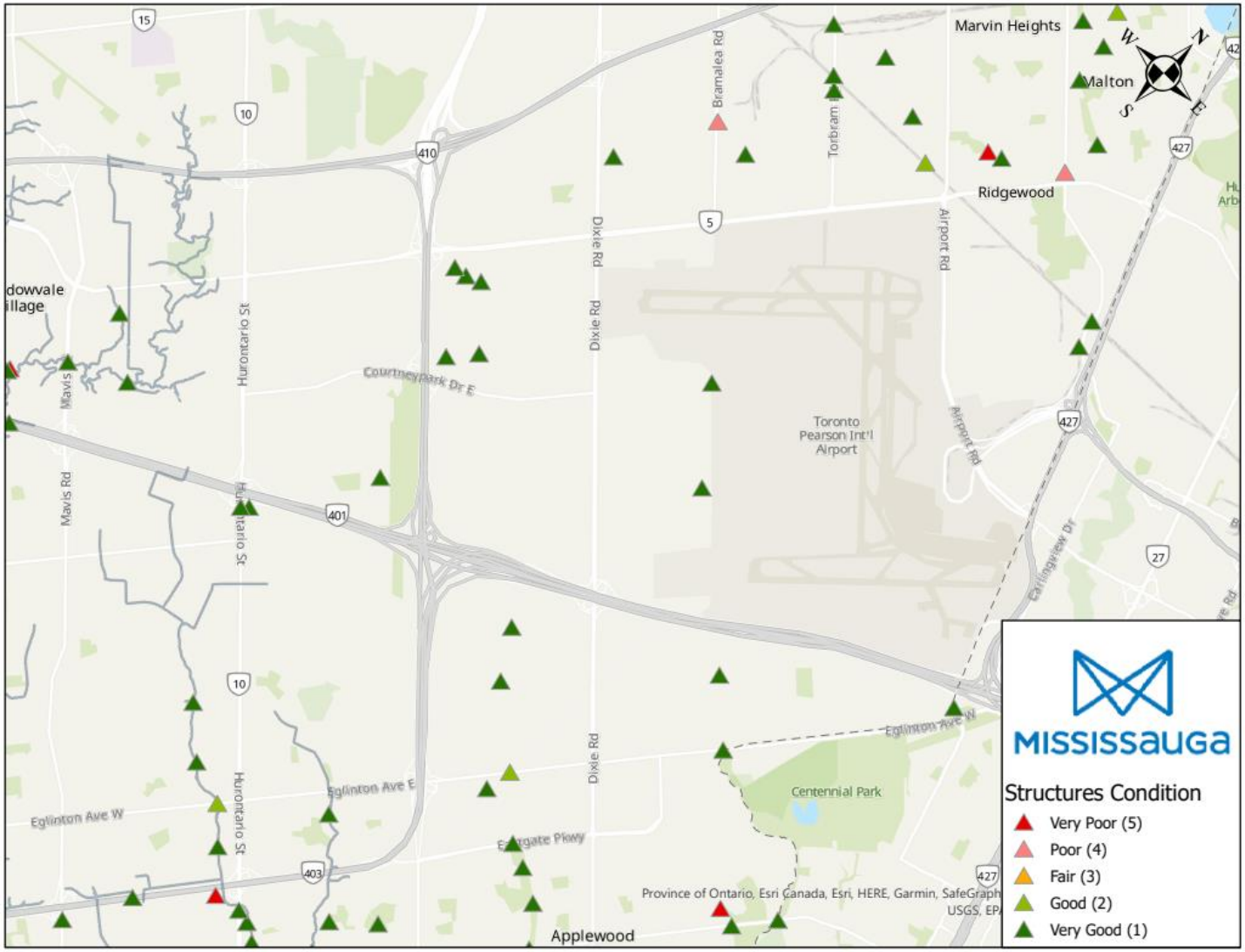


Figure 19: Mississauga's Current Bridges and Culverts Conditions (Northeast Quadrant)

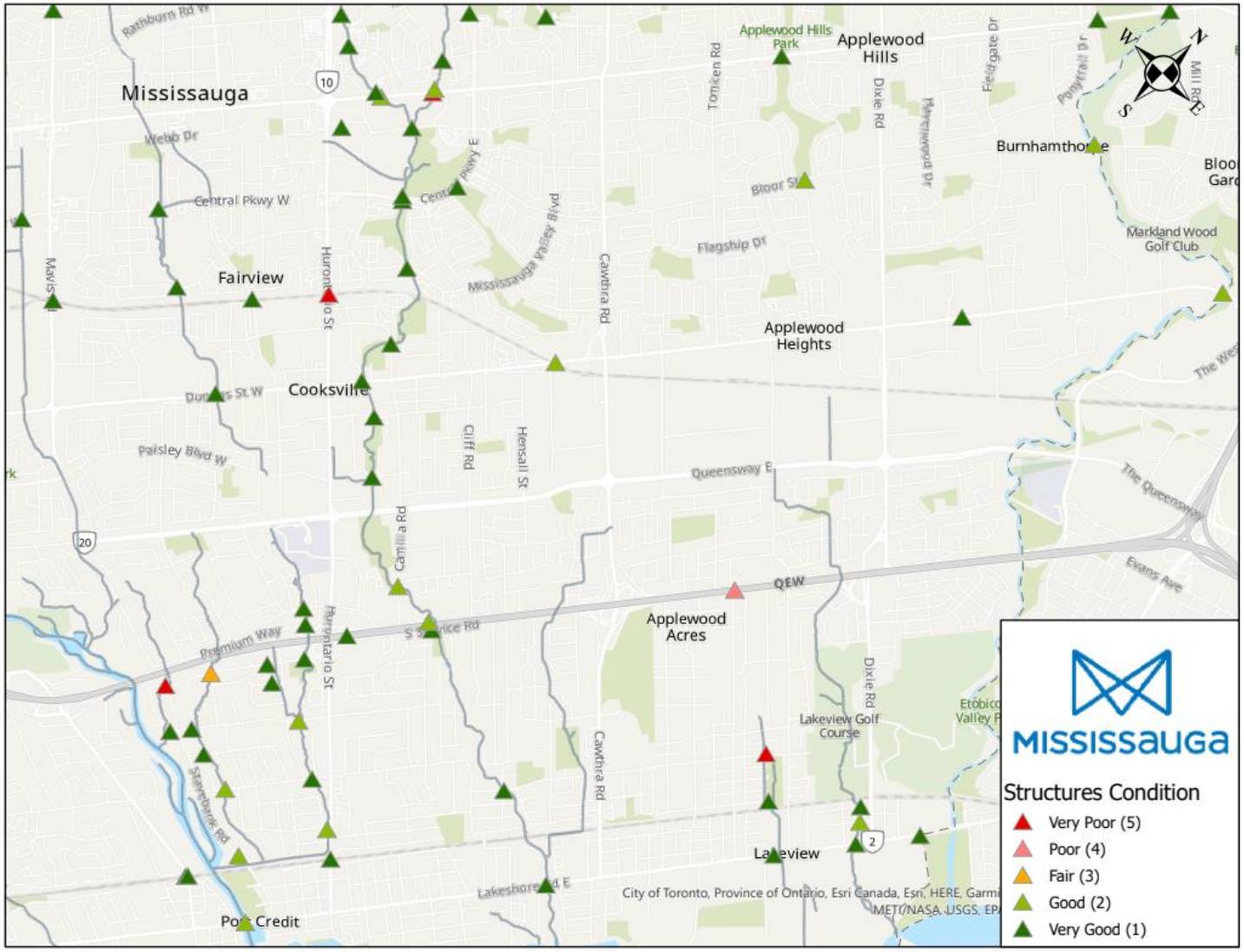


Figure 20: Mississauga's Current Bridges and Culverts Conditions (Southeast Quadrant)

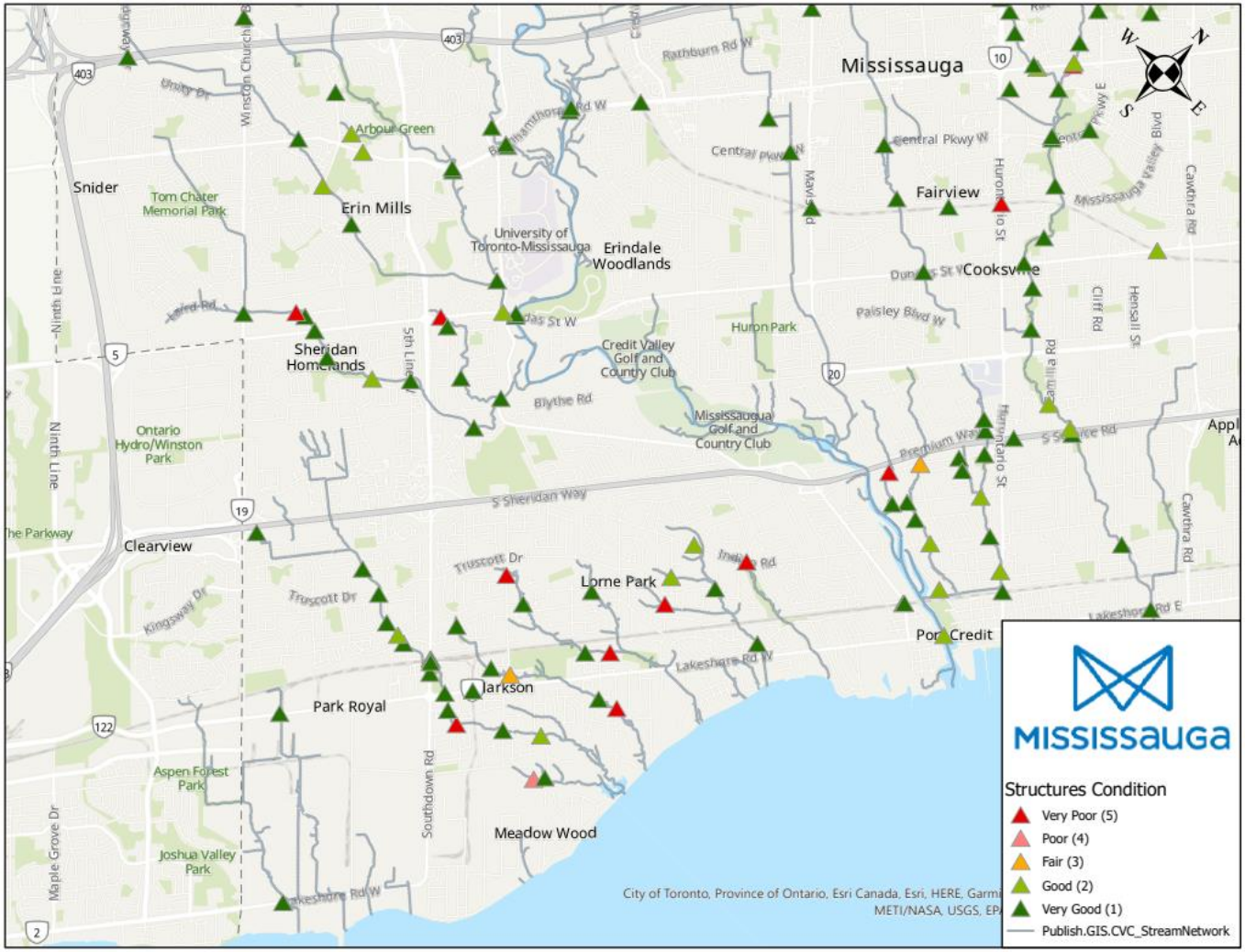


Figure 21: Mississauga's Current Bridges and Culverts Conditions (Southwest Quadrant)

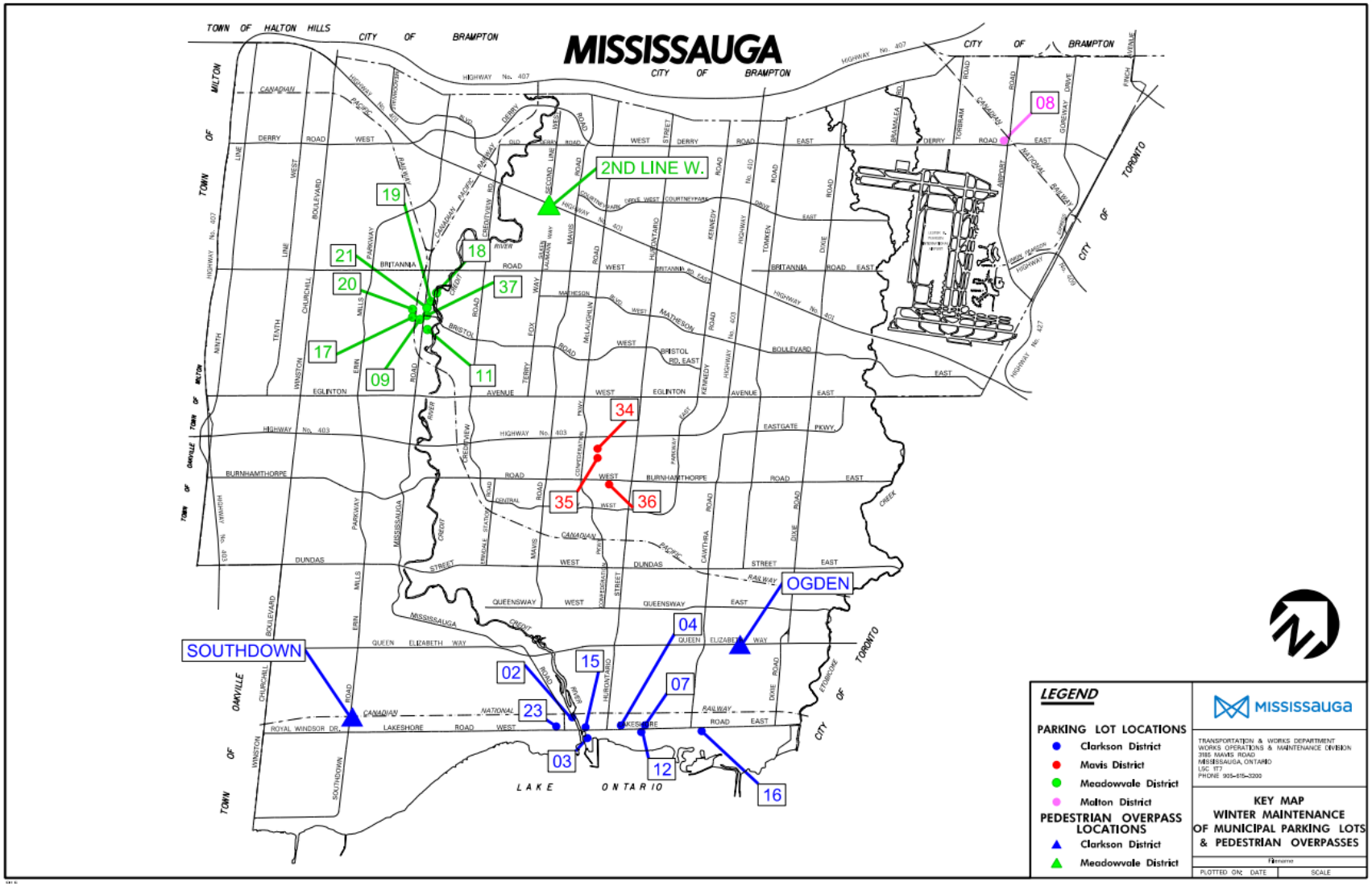
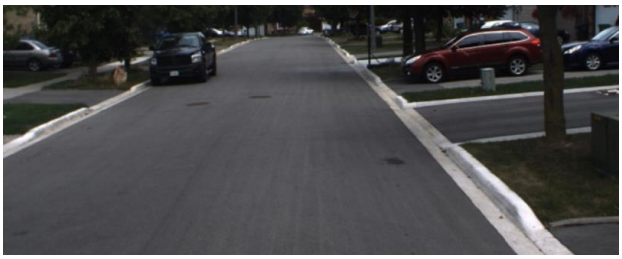


Figure 22: Mississauga's Municipal Parking Lot Locations

Appendix C - Level of Service Images and Descriptions

Road Pavements

The City retains a consultant to collect pavement surface distresses/defects and ride quality information every 4 years. The most recent pavement condition survey took place in 2021, with the next survey planned for 2025. Pavement surface distress such as cracks and distortions are computed as Surface Distress Index (SDI), and pavement ride quality, which is a measure of the roughness of the pavement, is measured as Ride Condition Index (RCI). The SDI and RCI are used to calculate the overall Pavement Quality Index (PQI) that represents the overall condition of the entire pavement section out of a score of 100. A PQI score of 100 would represent a perfectly constructed road section with no surface distress and excellent ride quality. A score of 20 would represent a road that has been severely compromised and is no longer providing its intended level of service. While the images below show typical condition scores, they do not take into account the RCI, which is generated based on the roughness of the pavement.

Condition Rating Scale		Rating Definition		PQI Rating
1	Very Good		Asset is in very good condition or better. It is new or recently rehabilitated. Asset is well maintained. Asset has a remaining service life (RSL) that exceeds 15 to 20 years. Asset is fit for future use.	80-100
2	Good		Asset is in good condition. Asset may have received repair or maintenance work. Asset is generally approaching mid-stage of expected service life. Asset has a remaining service life (RSL) of 10 to 15 years.	70-79
3	Fair		Asset is in fair or adequate condition. Asset shows signs of deterioration with some elements showing defects. Asset requires attention. Asset has a remaining service life (RSL) of 5 to 10 years.	55-69

4	Poor		Asset is in poor condition and is at risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life. Asset has a remaining service life (RSL) of 1 to 5 years. Asset is not fit for future use.	20-54
5	Very Poor		Asset is in very poor condition and is in major risk of affecting service. Large portion of the asset system exhibits significant deterioration, and the condition is below standard. Asset is approaching end of service life. Asset has a remaining service life (RSL) of 1 to 2 years. Asset is not fit for use.	0-19

Structures

Condition Rating		Rating Definition		NASVi
1	Very Good	 	The asset is typically new or recently rehabilitated.	100
2	Good	 	The asset is in good condition. Some elements show general signs of deterioration that may require attention. A few elements exhibit minor deficiencies.	80-99
3	Fair	 	The asset shows further signs of deterioration and requires attention. Some elements exhibit moderate deficiencies. Asset is in acceptable condition and components are generally functioning as intended.	40-79
4	Poor	 	The asset is approaching low standards. Many elements are approaching the end of their service life. A large portion of the elements exhibit significant deterioration.	20-39
5	Very Poor	 	The asset is in unacceptable condition with widespread signs of advanced deterioration.	0-19

Noise Walls

Condition Rating		Rating Definition		Condition Score	Remaining Useful Life
1	Very Good		The asset is typically new or recently rehabilitated. No visible defects or isolated mild defects	9-10	> 75%
2	Good		The asset is in good overall condition, with minimal/moderate isolated defects.	7-8	35% - 74%
3	Fair		The asset is in fair condition with moderate number of defects. Barrier may need some minor repairs or attention.	5-6	13% - 34%
4	Poor		The asset is in poor condition with noticeable amounts of defects. The barrier is below its operable state, with many elements approaching the end of their service life.	3-4	3% - 12%
5	Very Poor		The asset has an extensive number of defects or has sections that have failed. The barrier is in unacceptable condition and should be replaced or rehabilitated.	1-2	<3 %

Regulatory and Warning Signs

Condition Rating	Rating Definition		Condition Score
Good	 	The asset is in good overall condition, with no deficiencies.	**Pass**
Poor	     	The asset is in poor condition. The sign is damaged, missing, illegible, obscured, or worn	**Fail**

Appendix D - Maturity Assessment by Asset Class

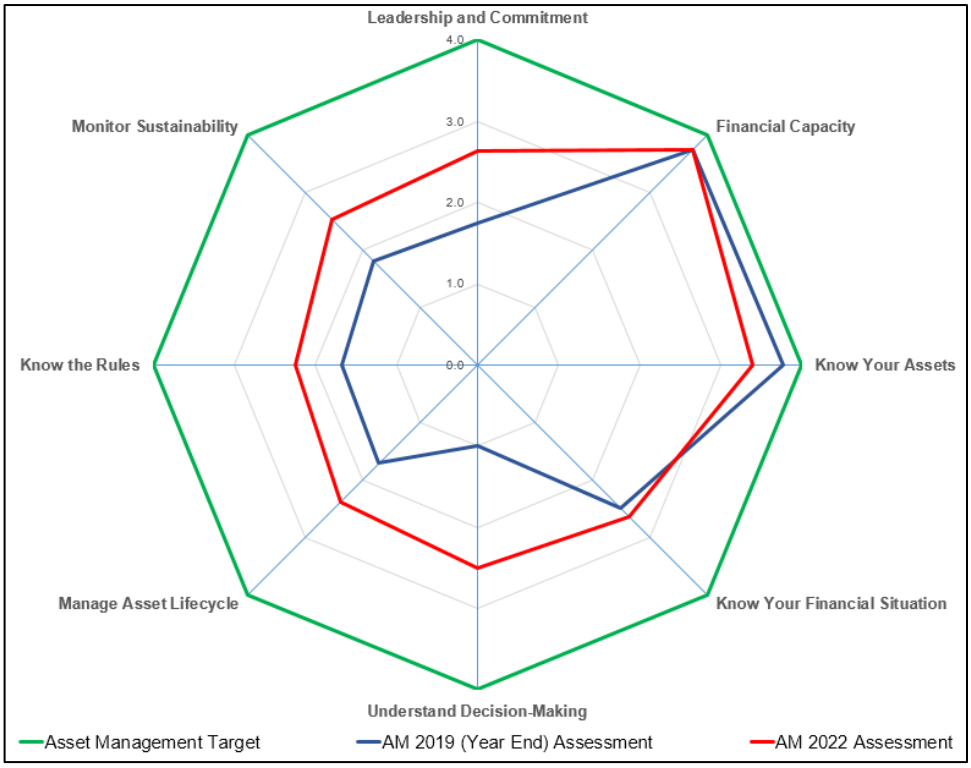


Figure 23: Road Pavements and Structures Maturity Assessment

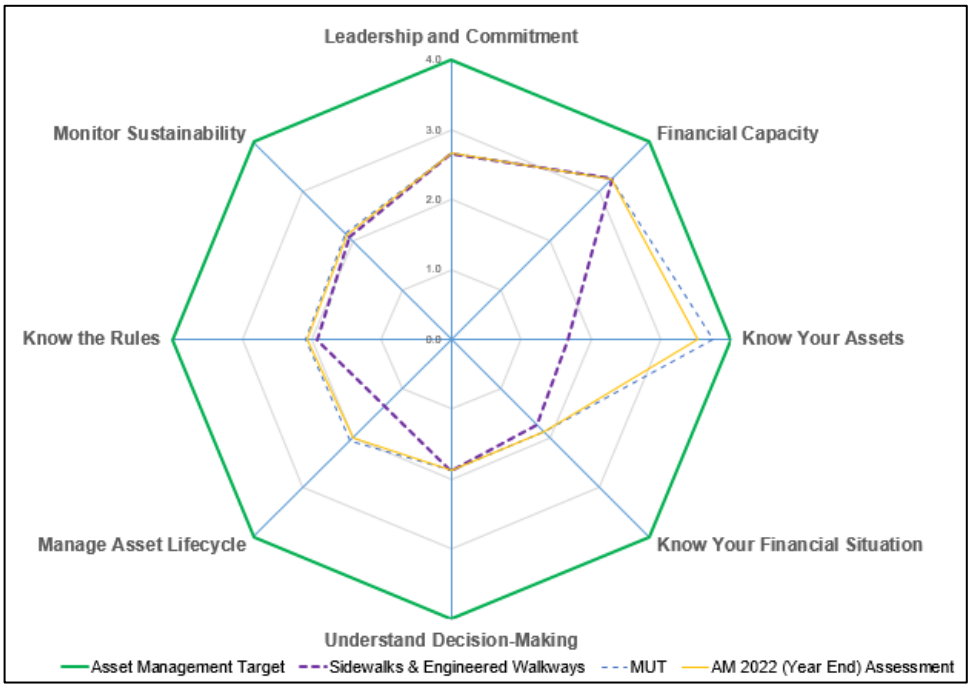


Figure 24: Roadside Trail Network Maturity Assessment

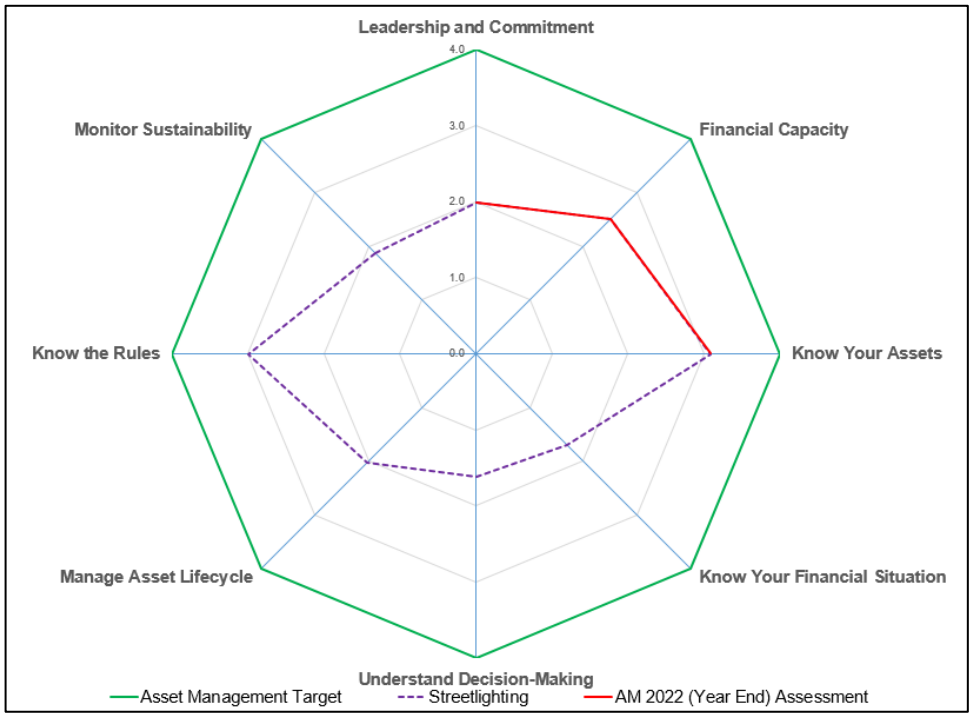


Figure 25: Street Lighting Maturity Assessment

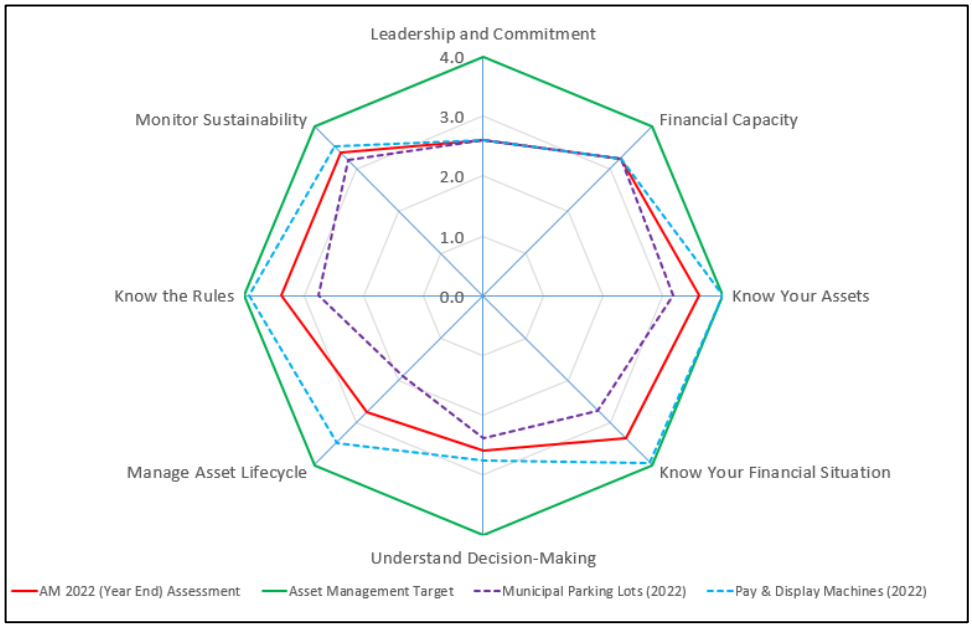


Figure 26: Municipal Parking Maturity Assessment

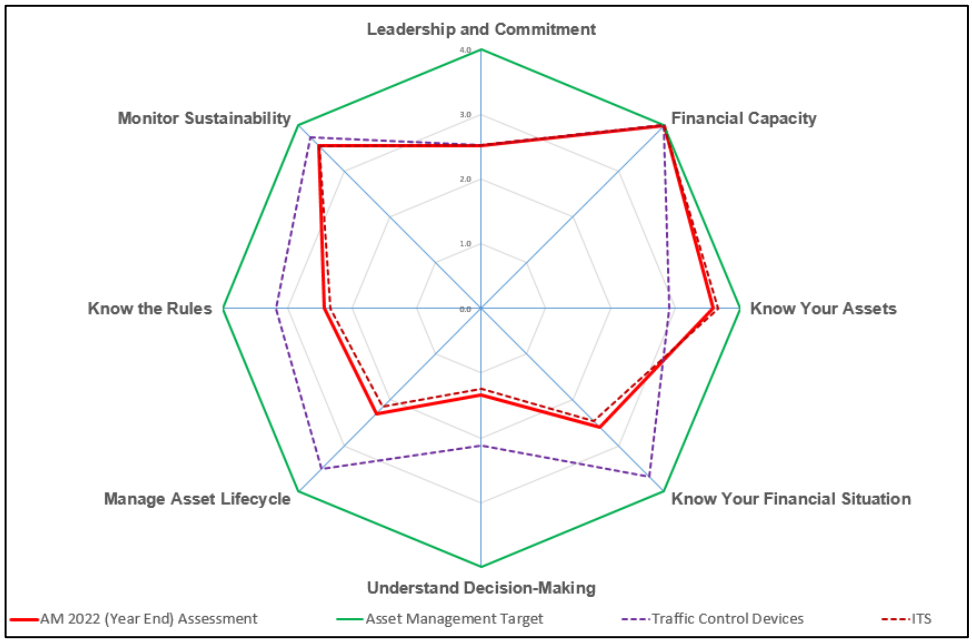


Figure 27: Traffic Signals and Related Electrical Devices and ITS Maturity Assessment

Corporate Asset
Management Plan **2024**

Facilities & Property Management

Table of Contents

Facilities & Property Management Overview

City facilities play an important role in a community and offer places where the public can gather for recreational, artistic, social or cultural activities. These facilities and the associated essential infrastructure are necessary for City departments to deliver services and programs to residents that significantly impact quality of life, prosperity and sustainability within the community. Valued at approximately $2.4 billion, Mississauga's Facilities & Property Management (FPM) detailed asset plan is comprised of a variety of asset types that include facilities, site infrastructure, park lighting and paved parking owned and operated by the City of Mississauga.

Smaller, non-conditioned structures such as sheds, canopies, domes, and shelters have been excluded from this iteration of the FPM detailed asset plan. In Mississauga, the FPM Service Area is responsible for maintaining the majority of the City's facilities and associated infrastructure, comprised of buildings of various sizes, age and complexity totaling close to 6 million square feet of space. The overall average condition of this portfolio is 'Good' as shown in the **Table 1** below. To see a breakdown by asset class, refer to **Table 2.**

The goals of Facilities & Property Management are to:

- Maintain City buildings and site infrastructure
- Ensure compliance with all applicable legislation
- Provide professional project management services
- Develop and maintain integrated capital plans and a long-term facility asset management strategy
- Ensure the secure, safe use and enjoyment of City facilities, parks and the transit system
- Ensure accessibility principles are incorporated into all business functions across City services
- Ensure the strategic configuration of office space to increase use of underutilized spaces

Table 1: Overview of FPM Service Area

Facilities & Property Management	
Replacement Value	$2.4 Billion
Overall Average Condition	Good (70%)
Average Annual Funding Gap	$16.3 Million

The FPM AM Plan includes the following sections:

- **State of the Infrastructure:** Outlines the current state of assets including what the City owns and the costs to replace them. This section also identifies the data limitations and assumptions made in this iteration
- **Levels of Service:** Identifies the service performance and outcomes the City currently provides
- **Future Demand:** Summarizes the expected future demands on services
- **Lifecycle Management Strategy:** Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy:** Describes the forecasted budgets, revenues, capital expenses and reserves and identifies any financial gap. 2022-2031 Capital Plan and 2022-2025 Operating Plan were utilized for this iteration
- **Continuous Improvement:** Documents the continuous improvements identified during the development of this plan

Table 2: Summary Asset Replacement Value, Condition, and Infrastructure Gaps

Asset Class	Replacement Value (Millions)	Average Condition	10-year Average Annual Funding Needs (Millions)	10-year Average Annual Infrastructure Funding Gap (Millions)
Corporate - Facilities and Site Infrastructure	$370.8		$8.3	(-$2.9)
Culture - Facilities and Site Infrastructure	$181.6		$5.1	$3.4
Fire - Facilities and Site Infrastructure	$124.7		$4.1	$0.4
Library - Facilities and Site Infrastructure	$174.7		$6	(-$0.4)
Parks - Facilities and Site Infrastructure (including lighting & paved parking)	$298.8		$14	$8.8
Recreation - Facilities and Site Infrastructure	$906.2		$29.2	$1.8
Transit - Facilities and Site Infrastructure	$308.6		$6.8	$3.7
Works - Facilities and Site Infrastructure	$54.6		$3.3	$1.5

State of the Infrastructure

The following section provides a snapshot of the state of the infrastructure for active, existing facilities and site infrastructure assets as of year-end 2022. The FPM service area is responsible for the oversight and management of eight distinct asset classes, each comprised of asset types as shown in **Figure 1** below. This section provides a summary of replacement value, age, condition and typical useful life of the assets. It also provides context for the methodologies employed to assess condition and risk, while also addressing the constraints resulting from data limitations.

Asset Hierarchy

The FPM Service Area is represented by eight asset classes as shown in **Figure 1** below.

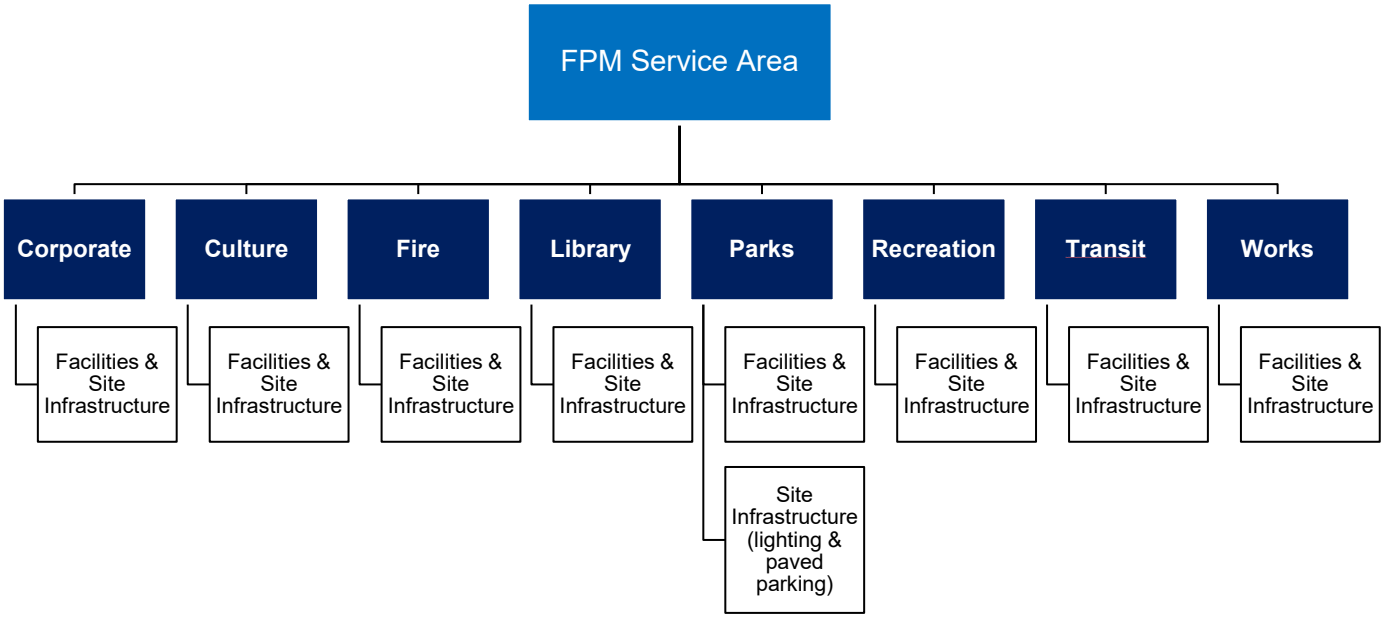


Figure 1: FPM Service Area Asset Hierarchy

Asset Inventory & Valuation

A summary of the FPM asset inventories for each of the asset classes is detailed in this plan in the form of dashboards. FPM manages their inventory of assets within a computerized asset management software known as Vanderweil Facility Advisors (VFA) software system. Each asset is tracked, regularly assessed and asset information updated within the software. The VFA software is used to support budget modeling, requirements forecasting and capital planning for the FPM portfolio. The inventory information contained in VFA has been used to support the development of this plan.

Inventory replacement values are based on industry valuation methods, utilizing VFA, RS Means and a comparison against the updated and appraised insured value of the asset.

A review of the current available data has been completed and a few gaps were identified from missing systems or requirement costing and outdated data and summarized the Asset Data Limitations section.

Asset Data Assumptions

The following assumptions were made in the development of this plan:

- **Replacement Cost** are calculated utilizing VFA and based on the sum of the replacement cost for each system. These costs are compared to the appraised insured replacement values and adjusted to align
- **Estimated Useful Life** is based on Building Owners and Managers Association (BOMA) standards and applied to each system and the average lifespan for a facility is 75 years to align with the City's Tangible Capital Asset Policy
- **Inventory** includes the facilities that are owned and operated by the City, and the responsibility of the FPM and are defined as conditioned occupied spaces. The smaller, non-conditioned structures such as sheds, canopies, domes, shelters, and assets that are slated for demolition, and leased assets, have been excluded from this iteration of the FPM detailed asset plan
- **Average Age** of the asset class is based on the year of construction for each asset
- **Asset Condition** is defined in terms of the Facility Condition Index (FCI). The FCI is an industry standard facility management benchmark that is used to objectively assess the current and projected condition of a facility. FCI is defined as the ratio of total cost of required renewal/repair to the current building replacement value. A summary of the FCI and condition rating scale can be found in **Table 3**

Table 3: Condition Rating Scale

Condition Rating	% of Remaining Useful life (RUL)	Facility Condition Index (FCI)	Description
Very Good: Fit for the Future	80%-100%	Less than 0.1	The infrastructure in the system or network has greater than or equal to 80% of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
Good: Adequate for Now	60%-79%	0.1 or less than 0.2	The infrastructure in the system or network has less than 80% (and greater than or equal to 60%) of its remaining service life. It is in good condition.
Fair: Requires Attention	40%-59%	0.2 or less than 0.3	The infrastructure in the system or network has less than 60% (and greater than or equal to 40%) of its remaining service life. It is in fair condition.
Poor: Approaching End of Life	20%-39%	0.3 or less than or equal to 0.5	The infrastructure in the system or network has less than 40% (and greater than or equal to 20%) of its remaining service life. It is in poor condition and mostly below operable state, with many elements approaching the end of their service life.
Very Poor: Requires Renewal	0%-19%	Greater than 0.5	The infrastructure in the system or network has less than 20% of its remaining service life. It is in very poor, unacceptable condition and should be replaced or rehabilitated.

Asset Data Limitations

A review of the current available data has been completed and some gaps were identified due to missing asset information from assets that have not yet been assessed and outdated information due frequency of assessments.

- **Assets Not Yet Assessed:** Once the City takes on a new asset (purchased, donation, new build), the facility is assessed, and the information is added to VFA. As summarized in **Table 4**, approximately six per cent of the building portfolio (based on facility area) has not yet been assessed and as a result there is minimal system or requirement costing information associated with these assets. This can impact the overall data quality
- **Frequency of Assessments**: FPM staff are performing annual building condition assessments to update data for all facilities. With the size of this portfolio, less than 20% of the portfolio can be assessed during the annual cycle. The frequency of the assessments takes about five years to complete the full portfolio which can impact data quality
- **Risk Management** is responsible for updating the insured replacement values for facilities annually. Due to the size of the facilities portfolio site evaluation and assessments cannot be part of the annual process and as an alternative the City performs up-to-date desktop appraisal reviews. Without on site verification some systems information can be missed and impact the quality of the replacement values
- **Inventory Data Updates and Process:** Shared responsibilities for the City's facilities includes multiple service areas involved in capital improvements and maintenance works. The process to advise on competed works is unfamiliar to some staff, or not included as an essential duty. If completed works are not shared, the inventory data cannot be updated. This creates a gap in the inventory data, which cannot be addressed until a building condition assessment is performed
- **Excluded Assets:** Some assets were excluded from this iteration of the plan due to limited information, asset managed by other service areas or ongoing responsibility discussions. This is summarized in **Table 5** includes a list of excluded assets planned for demolition

Table 4: Existing Records with Missing Attributes

Asset Class	Corporate	Culture	Fire	Library	Parks	Recreation	Transit	Works	Total
% of Inventory Not Yet Assessed (based on area)	0%	9%	11%	5%	4%	11%	9%	0%	**6%**

Table 5: List of Excluded Assets

Asset Class	Excluded Asset
All Asset Classes	• Smaller, non-conditioned structures such as sheds, canopies, domes, and shelters have been excluded from this iteration of the FPM detailed asset plan

Asset System Risk

Asset specific risks are determined by assessing the system's consequence of failure (CoF) and likelihood of failure (LoF). While the loss of some systems may have little impact on service delivery and negligible risk of damage or injury, the loss of other systems such roofs and life safety systems can severely impact public services and may lead to further damages or even fatalities.

For the purposes of this asset management plan, the remaining useful life of a system is used as a proxy to assign LoF, and criticality of a system is used as a proxy for CoF. Together these two factors help to calculate the risk rating for each asset system. In subsequent asset management plans, the CoF will also consider other aspects such as disruption, safety, financial, environmental impact, and reputation to the organization.

Asset risks are calculated by multiplying the asset CoF with the LoF as shown in **Figure 3**.

Figure 3 - Asset System Risk Calculation

Criticality criteria has been identified for each asset system group (such as structure, roof, interior finishes, plumbing etc.). CoF is defined by a numerical score assigned to each asset system based on the descriptions in **Table 6**. The likelihood of an asset system failure for each system/component is based on the remaining useful life as shown in **Table 7**. **Table 8** provides a matrix that summarizes the risk rating results.

Table 6 - Asset System Criticality Ranking

Criticality	Description	Score
Very Low	• Easy to replace • Can be non-operational for multiple months without significantly impacting core service delivery to many users	1
Low	• Somewhat difficult to replace • Can be non-operational for multiple weeks without significantly impacting core service delivery to many users • Asset does not perform a safety function or meet regulatory requirements	2
Medium	• Moderately difficult to replace • Outages of more than a couple of days may significantly impact core service delivery to many users • Asset performs a safety function or meet a regulatory requirement	3
High	• Highly mission-sensitive asset with no redundancy • Mission-critical asset with very limited redundancy • Significant community investment	4
Very High	• Mission-critical and unique asset • Significant service disruption from any outage • No redundancy • Significant community investment	5

Table 7 - Likelihood of Failure Ranking

Likelihood	Description	Score
Very Low	• Remaining useful life is >75% of the asset lifespan • Systems are generally in very good condition, typically new or recently rehabilitated	1
Low	• Remaining useful life is between 75% and 35% of the asset lifespan • Systems are in good condition	2
Medium	• Remaining useful life is between 35% and 13% of the asset lifespan • Systems are in fair condition and will be subject to mid-life interventions	3
High	• Remaining useful life is between 13% and 3% of the asset lifespan • Systems are in poor condition and mostly below standard, with many elements approaching the end of their service life	4
Very High	• Remaining useful life is less than 3% of the asset lifespan • Systems are in very poor, unacceptable condition and should be replaced or rehabilitated	5

Table 8: Risk Rating Matrix

Risk Rating		Consequence/Criticality				
		Very Low (1)	**Low (2)**	**Medium (3)**	**High (4)**	**Very High (5)**
Likelihood	**Rare (1)**	Very Low (1)	Very Low (2)	Very Low (3)	Very Low (4)	Very Low (5)
	Unlikely (2)	Very Low (2)	Low (4)	Low (6)	Medium (8)	Medium (10)
	Possible (3)	Very Low (3)	Low (6)	Medium (9)	High (12)	High (15)
	Likely (4)	Very Low (4)	Medium (8)	High (12)	High (16)	Very High (20)
	Almost Certain (5)	Very Low (5)	Medium (10)	High (15)	Very High (20)	Very High (25)

Dashboards

The following dashboards provide a summary of the current state of the infrastructure by each Asset Class. Each dashboard includes a breakdown of the number of active assets (inventory), their average age, estimated useful life, and replacement value by Asset Type. A summary of the assets' average condition is illustrated in each dashboard through graphs and a summary of the risk rating profile by replacement value.

A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete and accurate key asset information is as it relates to supporting asset management decision making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

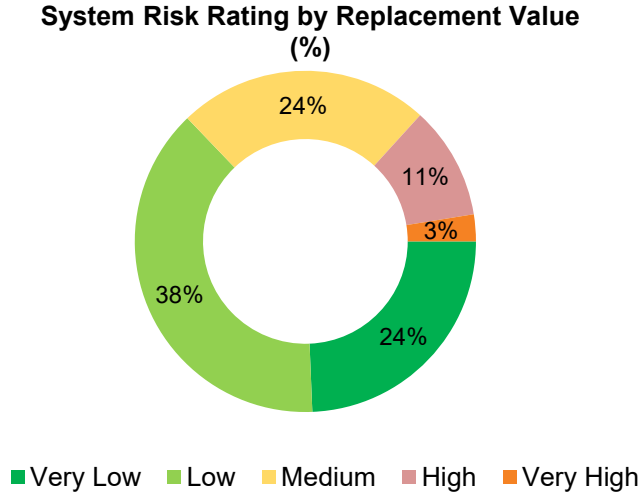
Asset Class:	Corporate	Replacement Value:	$370.8 Million

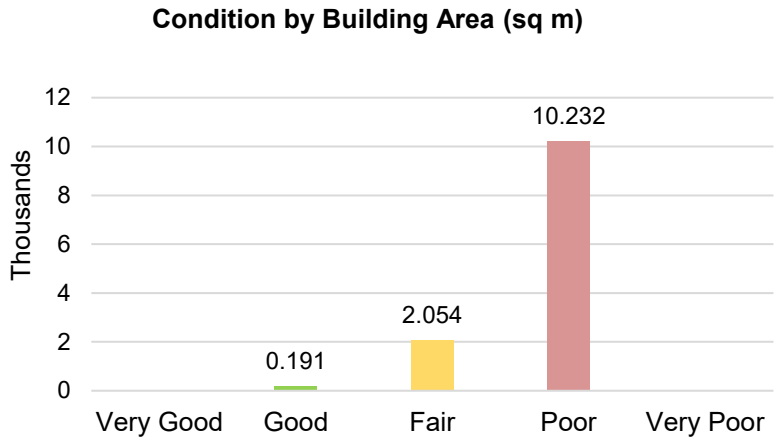
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

Mississauga City Hall (Civic Centre)

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Corporate - Facilities and Site Infrastructure	5	39	75	$370,800





Asset Class:	Culture	Replacement Value:	$181.6 Million

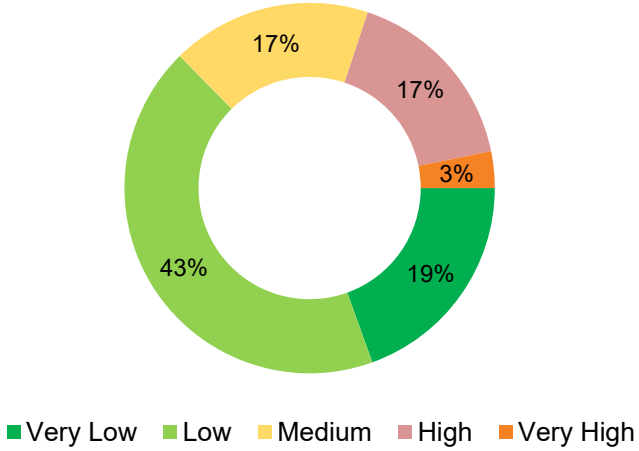
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

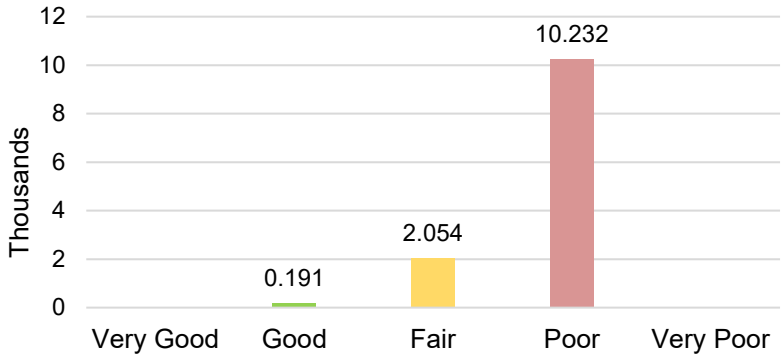
Living Arts Center

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Culture - Facilities and Site Infrastructure	21	99	75	$181,600

System Risk Rating by Replacement Value (%)



Condition by Building Area (sq m)



Asset Class:	Fire

Replacement Value:	$124.7 Million

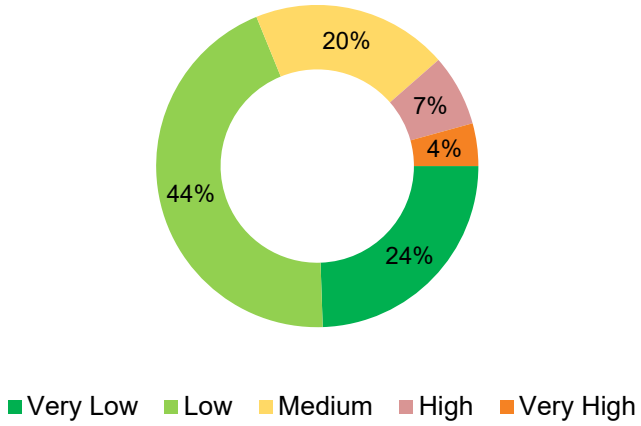
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

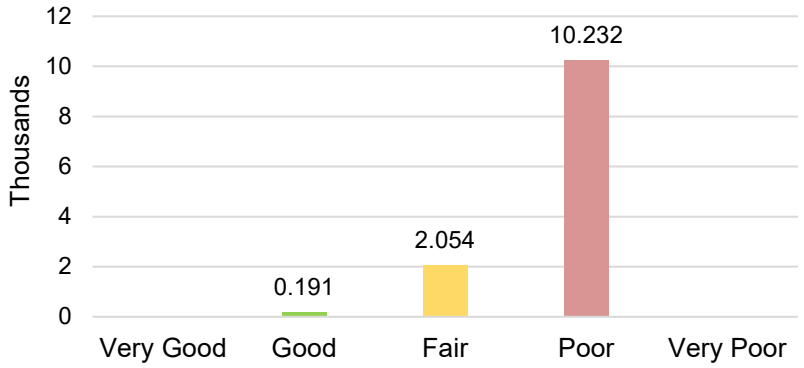
Garry W. Morden Fire Training Centre

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Fire - Facilities and Site Infrastructure	32	33	75	$124,700

System Risk Rating by Replacement Value (%)



Condition by Building Area (sq m)



Asset Class:	Library	Replacement Value:	$174.7 Million

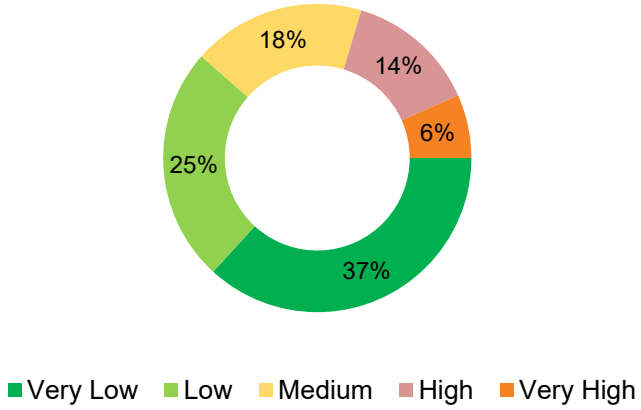
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

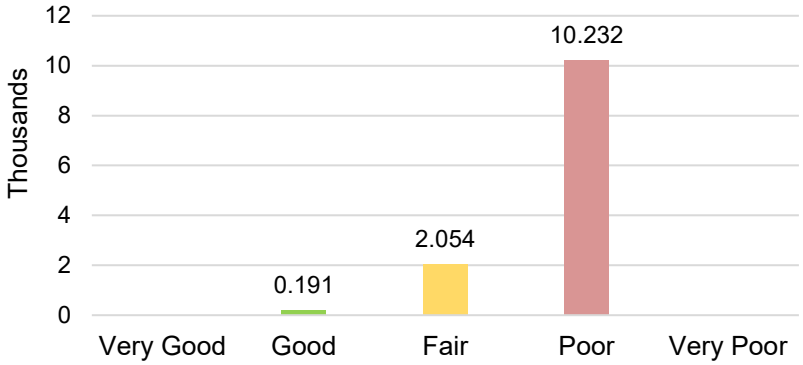
Hazel MacCallium Central Library

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Library - Facilities and Site Infrastructure	17	31	75	$174,700

System Risk by Replacement Value (%)



Condition by Building Area (sq m)



Asset Class:	Parks	Replacement Value:	$298.8 Million

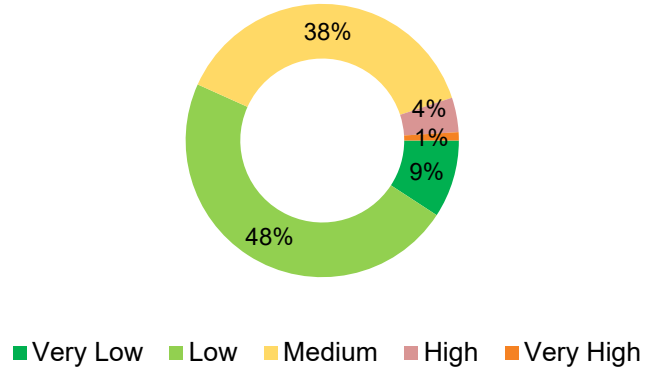
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

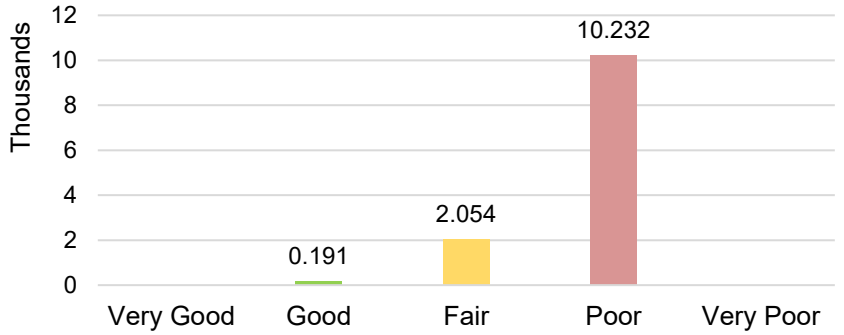
Community Common Comfort Station

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Parks - Facilities and Site Infrastructure	49 facilities	43	75	$65,700
Parks - Site Infrastructure (lighting & paved parking)	284 sites	44	75	$233,100

System Risk by Replacement Value (%)



Condition by Building Area (sq m)



Asset Class:	Recreation	Replacement Value:	$906.2 Million

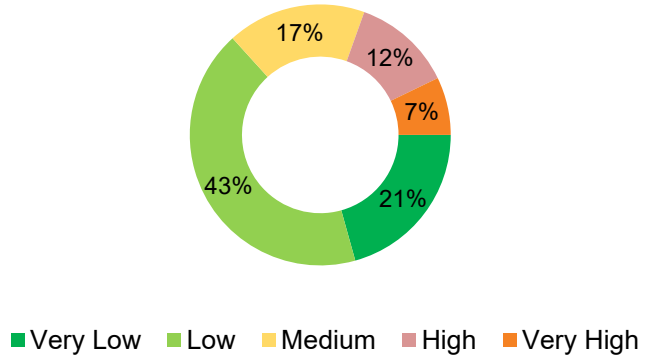
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

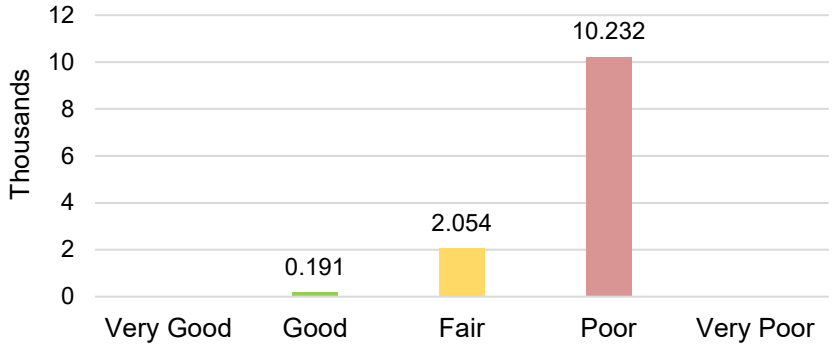
Meadowvale Community Centre

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Recreation - Facilities and Site Infrastructure	75	42	75	$906,200

System Risk by Replacement Value (%)



Condition by Building Area (sq m)



Asset Class:	Transit	Replacement Value:	$308.6Million

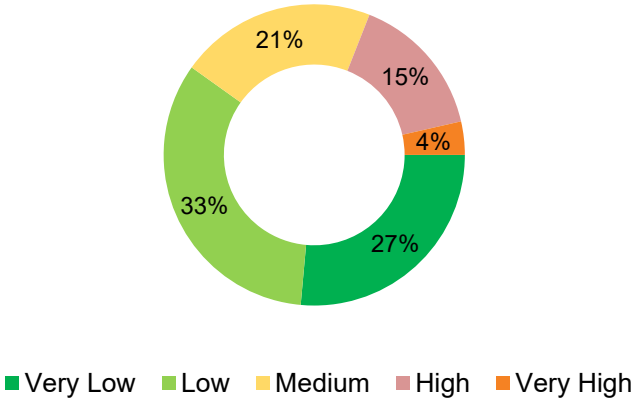
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

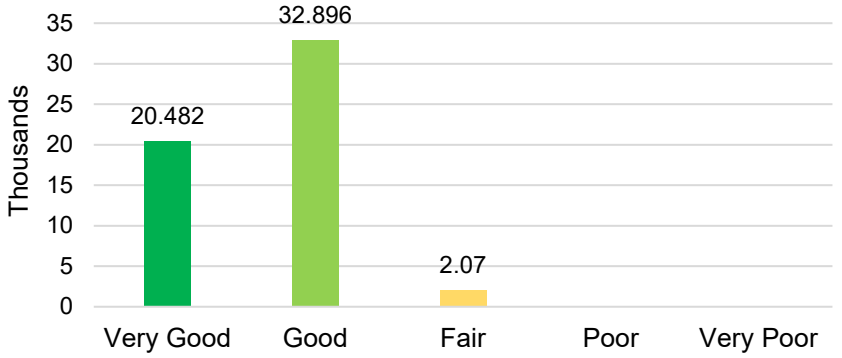
Mississauga Tahoe Bus Rapid Transitway Station

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Transit - Facilities and Site Infrastructure	75	14	75	$308,600

System Risk by Replacement Value (%)



Condition by Building Area (sq m)



Asset Class:	Works	Replacement Value:	$54.6Million

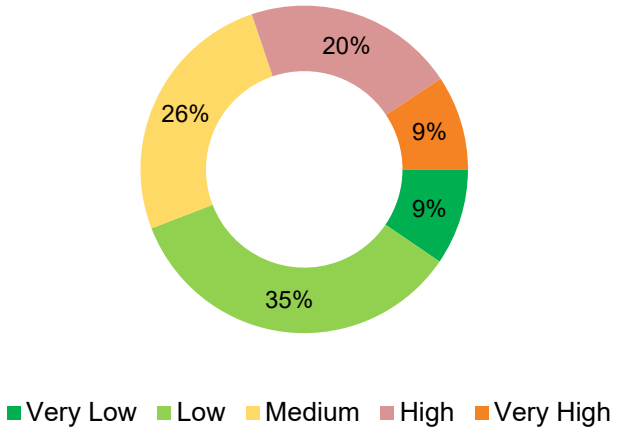
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	D	D

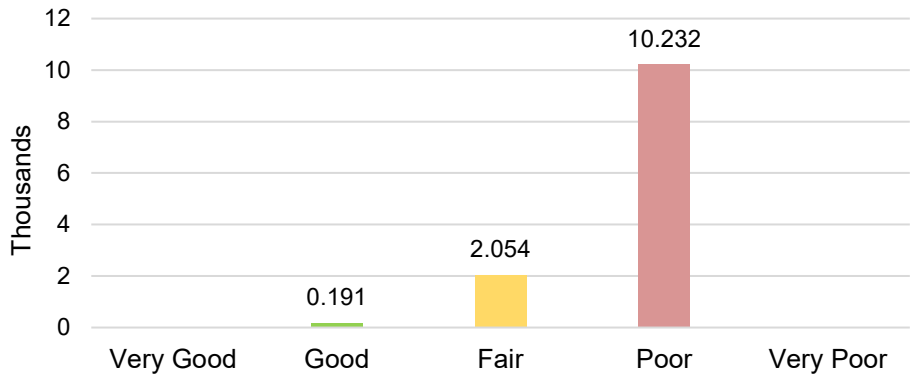
Mavis South Main Building

Asset Type	Inventory (count)	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Works - Facilities and Site Infrastructure	11	39	75	$54,600

System Risk by Replacement Value (%)



Condition Based on Building Area (sq m)



Levels of Service

The purpose of this section is to describe the levels of service (LOS) that City staff provide and aim to provide for the FPM service area.

LOS are the outcomes that an organization intends to deliver to its customers. They should also be utilized as key drivers for making decisions and future investment in infrastructure assets. As such, LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its ratepayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations. Performance measures indicate what the customers and stakeholders experience from the service that is delivered.

Legislative Requirements for Levels of Service

Table 8 identifies legislative acts that are critical or applicable to the FPM service area and project delivery. In addition to legislative requirements, there are several industry best-practice manuals and guidance documents that inform staff on how to effectively manage the City's buildings and associated site infrastructure.

Table 8: Governing Legislation

Legislation	Requirements
Accessibility for Ontarians with Disabilities Act, 2005	• Provides accessibility standards for Ontarians with physical and mental disabilities to all public establishments
Building Code Act, 1992	• Provides requirements to adhere to construction and safety practices
Conservation Authorities Act, 1990	• Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario
Development Charges Act, 1997	• Provides municipalities the ability to levy charges to fund growth-related municipal infrastructure, on the principle that growth pays for growth
Emergency Management and Civil Protection Act, 1990	• Provides requirements for emergency management
Environmental Protection Act, 1990	• Provides for the protection of the natural environment through regulations regarding discharge of contaminates into the natural environment
Municipal By-Laws	• Regulations approved by Council to safeguard and protect persons and properties
Municipal Government Act, 2001	• Practices and procedures • Accountability and transparency • Financial reporting
Occupational Health and Safety Act, 1990	• Rules governing health and safety in Ontario's workplaces
Ontario Heritage Act, 1990	• Provides guidance for the organization and delivery of programs and services that further the conservation, restoration, development and management of historical buildings and sites in Ontario
Planning Act, 1990	• Provides direction on municipal planning activities

Current Performance

Table 9 presents a summary of the technical LOS performance measures for the FPM service area portfolio as of 2022. The LOS measures provided are predominantly from an asset planning perspective. City staff have plans to review, formalize and update the operational and maintenance LOS and there is potential for additional LOS measures in future asset management plans to also include environmental, accessibility and preventative maintenance.

Table 9: LOS Framework

LOS Attribute	LOS Objective	Technical LOS Measure	Target Performance	Current Performance (2022)
Quality	To ensure efficient and well-maintained infrastructure that supports client groups' services and programs (maximize availability, reliability and safety of assets)	FCI average for asset class for each region (client group) – based on current 10-year target establish in 2009/2010 approved by Council	Corporate (0.15)	0.20 Good
			Culture (0.15)	0.08 Very Good
			Fire (0.20)	0.14 Good
			Library (0.15)	0.23 Fair
			Parks (0.25)	0.22 Fair
			Recreation (0.15)	0.15 Good
			Transit (0.20)	0.06 Very Good
			Works (0.25)	0.35 Poor
Reliability	To ensure efficient and well-maintained infrastructure that supports service objectives (maximize availability, reliability and safety of assets)	% of system assets with high-very high-risk rating (based on portfolio RV)	20%	23.7%
Quality		% of buildings in fair or better condition (FCI band)	Equal to or above 65%	69.5%
Affordability	To effectively manage lifecycle activities and ensure adequate funding for assets	Actual vs Target Reinvestment Rate (Capital)	2.5% - 5.0%	2.1%

Future Demand

A building typically begins to require higher investment in capital lifecycle renewals at approximately 20 years of age. Approximately 58 per cent of the FPM building portfolio is currently over 30 years old, which means that the pressure for lifecycle renewals in the facility portfolio is only going to increase every year. The aging infrastructure requires the systematic allocation of limited resources to maintain City-wide services, and the need to balance service levels with affordability pose significant pressures and challenges for the FPM service area.

Demand Drivers

Drivers affecting demand on the City's building infrastructure include aging building infrastructure, energy efficiency and climate change, and the gap between current and target FCI numbers.

- **Maintaining FCI targets** – Using the FCI numbers and comparing them against the desired 10-year target allows buildings to be compared analytically and highlights the buildings that are in the greatest need of renewals, repairs or lifecycle replacements. **Figure 4** shows the current state of the City's infrastructure and the FCI values compared to the targets set by Council. **Table 10** provides scenarios related to the 10-year forecast and how the FCI changes based on the funding provided. If the City wants to maintain the current FCI targets and maintain the condition of the City's facilities, additional funding will be required

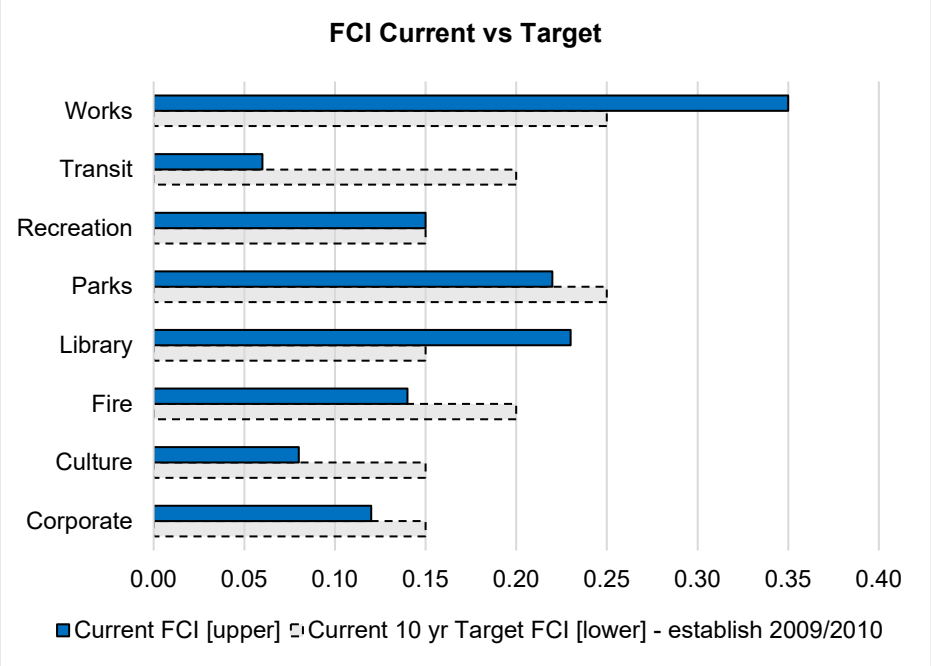


Figure 4 - Current vs Target FCI Performance by Asset Class

Table 10: FCI Scenarios Related to the 10-year Forecast

Scenarios	**Current FCI** (for facilities assets only)	**Total funding over 10 years** (based on scenario)	**FCI 10-year forecast** (based on scenario funding)	**Results of each scenario**
No change	0.15	$470M	0.17	FCI condition cannot be maintained, and will not continue to meet established targets
Additional funding to meet 2.28% Replacement Value	0.15	$530M	0.16	FCI can remain as status quo, does not meet future demands or growth to portfolio
Additional funding to meet 2.5% Replacement Value	0.15	$580M	0.14	FCI can be maintained and supports future demands and additional requirements from the 29 facilities added to portfolio

- **Growing portfolio** - With the FPM portfolio replacement value at approx. $2.4 billion, and as the City adds new buildings to this portfolio the current funding portfolio needs to include funding requirements for these added assets, especially for the ones assumed in the City's portfolio that were already in poor condition. There are 29 buildings in this list valued at $290M (not including Alectra Mavis West site) which do not have budgeted requirements associated with these buildings in the system. An example of these assets includes 15 Bus Rapid Transit terminals, Churchill Meadows Community Center, Mavis West (Alectra site), Woodlands Library, seven new comfort stations, Small Arms building, Dixie Chapel, etc. These assets on average would require approximately $6 million per year to maintain and are not currently in the budget forecast
- **Asset retirement obligations** – Forecasting budget pressures that are required to retire assets is a new legislative requirement and previously not included in the budget. There are future costs associated with asbestos abatement and decommissioning of underground fuel tanks. Minor in relation to the full budget, but still a pressure
- **Efficiencies and improvements** – not all new initiatives and improvements are funded through a separate budget request or funding source. Many code compliance and non-requirement renewals are absorbed into the state of good repair lifecycle budget. These have additional costs and impacts which do not address the risk rating or FCIs and could be related to energy, security and accessibility

Demand Forecasts

The current position and projections for demand drivers that may impact future service delivery and use of assets will be routinely assessed by the City staff through annual site validations, building condition assessments, system program analysis and various energy efficiency initiatives.

Demand Impact and Demand Management Plan

The impacts of demand drivers that may affect future service delivery and use of assets are described in **Table 11**. FPM service area is not responsible for defining the demand for new services, as these are managed through the responsible service area and based on program requirements.

The FPM service area is planning for the future by recognizing pressures and challenges associated with aging building infrastructure, climate change and meeting the targeted FCI building condition rating while addressing client requests and high to very high risk rated items.

Table 11: Demand Drivers

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Aging infrastructure	More than half (58%) of the building portfolio is 30 years and older, and approximately 20% of the portfolio's building area are currently in Poor and Very Poor condition	As the City's building and site infrastructure ages, the overall condition will decrease. The overall capital renewal costs are expected to increase as a result	Aging infrastructure without intervention can lead to more unplanned service disruptions, emergency repairs, and associated budget stresses which impact the services provided at these facilities	Develop and maintain a comprehensive asset management plan to formalize asset management plans at a system group level and conduct validation activities in order to maximize the useful service life of building assets. In turn this will inform the level of investment required in a more accurate and reliable source

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Grandfathered issues (e.g. code compliance for accessibility	Older buildings could benefit from accessibility improvements	Accessibility must be considered for all capital renewal projects to improve the accessibility and to meet updated standards. This results in added costs to the overall projects	Accessibility barriers can limit providing services, restrict working conditions and lead to unplanned interventions, which stresses budgets	Address these issues during proposed condition-driven capital renewal projects wherever practical and include in project scope
Buildings where designated substances are present require remediation	Many older buildings were constructed with materials that are now considered designated substances and require special consideration and attention for abatement	Legislation requires all projects perform a hazardous assessment related to designated substances prior to commencing redevelopment works. This requirement will continue to place cost and time pressures for future redevelopment projects	Where designated substances are found, project timelines and budgets are impacted and in some case a portion of full facility will need to be closed to complete the abatement	Address these issues during proposed condition-driven capital renewal projects wherever practical and include in project scope
Prioritizing energy efficiency and climate change actions to achieve set targets	The City has developed a 5-year Energy Conservation Plan with a goal of 1% energy reductions annually, declared a climate emergency, and developed a Climate	Plan and execute cost-intensive energy efficiency projects, facility renovations, and expand renewable energy generation assets. This requires investments in energy	If energy related initiatives are not incorporated into life cycle projects the City may not be able to meet the targets set out in the Climate Change Action Plan	Address these issues during proposed condition-driven capital renewal projects wherever practical and include prioritize decarbonisation during lifecycle renewals, facility renovations that maximize

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	Change Action Plan with a goal of 40% reductions by 2030 and 80% reductions by 2050 compared to 1990 levels	efficiency, greenhouse gas (GHG) emission reductions and building resiliency in the expanding building portfolio	and 5-year Energy Conservation Plan	greenhouse gas emission reductions
Maintain FCI targets	FPM uses Council approved FCI targets to highlight the buildings that are in the greatest need of system renewals, repairs or lifecycle replacements	Improve the quality of data for each program (at system group level), so the FCI analysis can be done at the system level and not just at the asset level. Decisions can be made based on rick rating at the systems level, and not just at the overall condition of the facility	If FCIs are not maintained for all systems groups, a facility may have an unexpected service interruption	Conduct validation activities to maximize the useful service life of building assets. In turn this will inform the level of investment required in a more accurate and reliable source and longer plan

Lifecycle Management Strategy

Assets of different types have different lifecycle durations, deteriorate at different rates and require different strategies for optimum performance and cost-efficiency over their service lives.

A lifecycle management strategy sets out the planned actions and intended methods of management for an asset throughout its life. The purpose of lifecycle strategies is to maintain the assets in an appropriate way that will deliver the required level of service for the least overall cost, while keeping risk within acceptable boundaries.

Lifecycle Activities

For the purposes of this asset management plan, the lifecycle actions are grouped into six activity types.

- **Non-Asset Solutions** are actions that consider how to influence and manage assets, services or customer/user demand. These actions can lower costs or extend asset life through better integration or coordination of planning activities, system use and process optimization activities. Examples include:
    - Annual in-house building condition assessment and capital validation
    - Process improvements on data inventory
    - Improvements to stakeholder consultation
- **Acquisitions - Expansion/Rebuild/New** activities are planned and required to extend services to previously un-serviced areas or expand services to accommodate asset enhancements. These activities provide a higher LOS or a new service that did not exist previously, or an upgrade or improvement to an asset beyond its existing capacity
- **Operations and Maintenance** include activities such as planned inspections, housekeeping activities and automated or manual system monitoring and generally occur throughout the asset's life. These activities are a collection of minor to moderate actions to ensure the longevity of an asset. They are typically identified as repairs and can be identified from an inspection, patrol, or by a notification from a user. The F&PM Service Area incorporates the operations and maintenance activities into its asset management strategies using the following:
    - In-house security services responsible for all City properties
    - 24-hour service delivery model to address unexpected concerns and ensure the safe and secure use of facilities and sites
    - In-house and outsource resources to provide preventative and demand maintenance related to structural, electrical and HVAC/mechanical systems including emergency response to major failures
    - Direct support to City departments that operate the facilitates day-to-day for technical expertise and guidance to support City program requirements
- **Renewal/Rehabilitation** activities are defined as larger-scale restorative activities designed to extend the service life of the asset and involve the repair of parts or components of an asset that have prematurely failed or are close to end of life. Renewal projects can occur at various points in the asset's life
- **Replacement** activities are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option. A replacement is typically intended to provide a new asset with the equivalent size or capacity
- **Disposal/Demolition** activities associated with the disposal of a decommissioned asset including sale, donation, demolition and abandonment

Most F&PM assets undergo regular operations and maintenance activities throughout their life cycle and are replaced at the end of their useful lives. The City's in-house annual building condition assessment verifies and updates the data accuracy and identifies renewal/rehabilitation repair items to extend the service life of the item.

Table 12 describes the lifecycle management activities documented for the building and associated site infrastructures managed by FPM.

Table 12: Lifecycle Management Activities

Life Cycle Activities	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Annual building condition assessments and studies (approximately 20% of portfolio per year) • Ongoing updates and quality control checks to computerized asset management system (VFA). • Ongoing client group consultation • Ongoing process mapping and developing standard operating procedures and standards. • Development of the annual FPM Business Plan	• Inability to identify and record asset condition to inform decision-making for maintenance and capital programs • Incorrect assumptions regarding expected useful life and other factors associated with undefined standards and practices • Strategic planning/budgeting, project prioritization and capital costing is not effective without building condition assessments, other studies and client consultation, of which inform long-term decision making
Acquisitions - Expansion/Rebuild/New	• Update inventory data with additional assets	• Non performed operating and maintenance activities can affect the life of the asset
Operations & Maintenance	• Complete demand maintenance on all equipment. Some practices include run to fail, the use of metrics to track how long different devices from different manufactures perform and on-site assessments by in-house staff or vendors • FM provides 24-hour service delivery model to address unexpected concerns and ensure the safe and secure use of facilities and sites	• Premature failure for equipment and not able to extend the life of underused equipment • Maintenance issues may persist longer if Security Services does not patrol • No response from Security Services could result in increased stress or even

Life Cycle Activities	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
	• In-house and outsource resources to provide preventative and demand maintenance related to structural, electrical and HVAC/mechanical systems including emergency response to major failures • Direct support to City departments that operate the facilitates day-to-day for technical expertise and guidance to support City program requirements • The City uses software to manage the maintenance requirements for the City's buildings, the software is used for tracking and scheduling routine maintenance along with preventive maintenance for the capital assets throughout the city	injury to facility staff, which could result in lost time • Failing to do so may result on noncompliance of regulatory requirements, property damage, and/or risk to the public • Deterioration of City property • Complaints from City employees and/or public
Renewal/ Rehabilitation	• Annual FPM capital budget process including validations and consultation to develop plans for lifecycle projects for the next one to three years • Replacement of systems and equipment based on recommendations form the annual budget process	• Emergency service request funding is required to respond to the failures that were not part of the planned lifecycle capital projects for the year • Facility closures and impacts to programs • Increase in daily operating and maintenance costs
Replacement	• The buildings and sites with the highest FCI values within the portfolio are analyzed for potential redevelopment. By replacing a building in Poor or Very Poor Condition, the newly constructed asset will provide a much greater LOS to users, and will result in a decrease in the overall portfolio wide FCI profile	• Increased operating and maintenance cost • Emergency breakage which can affect programing • Impact to services and customer experience provided at facility
Disposal/Demolition	• Decommission/demolish at end of life if asset is no longer required • Sell or donate assets	• Safety risk to public • Extra operating cost to maintain the asset

Lifecycle Needs vs Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations.
- The costs of any Non-Asset Solutions, Acquisition/Expansions/Rebuilds, and Operations & Maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of 2022-2025 operating budget and assuming Year 4 as annual budget for Years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Land acquisitions and related studies
    - Building controls and automation renewal and upgrades
    - Space planning related funding (i.e. Office Space Strategy, new hires, furniture, etc.)
    - Security related funding (i.e. Security Threat Risk Vulnerability Assessments)
    - Overhead costs

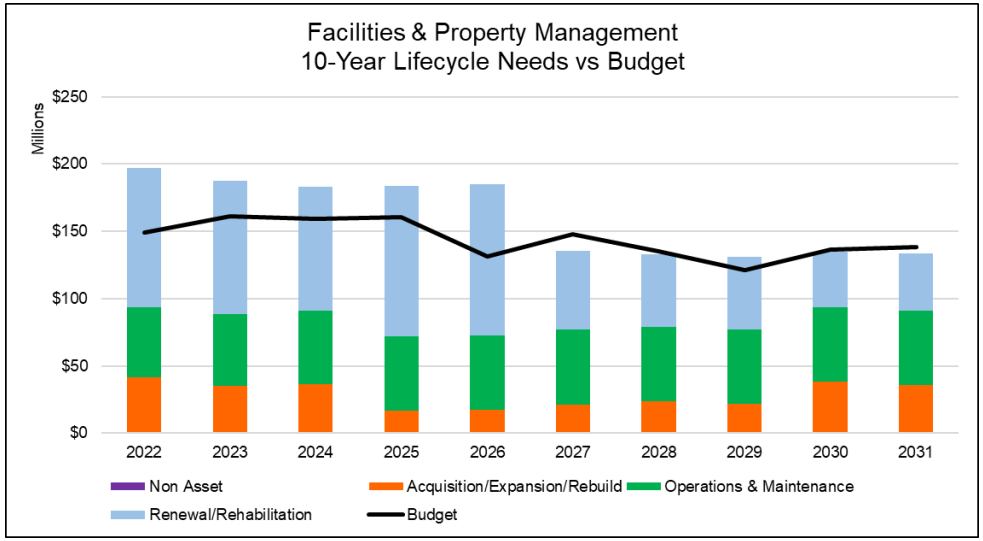
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

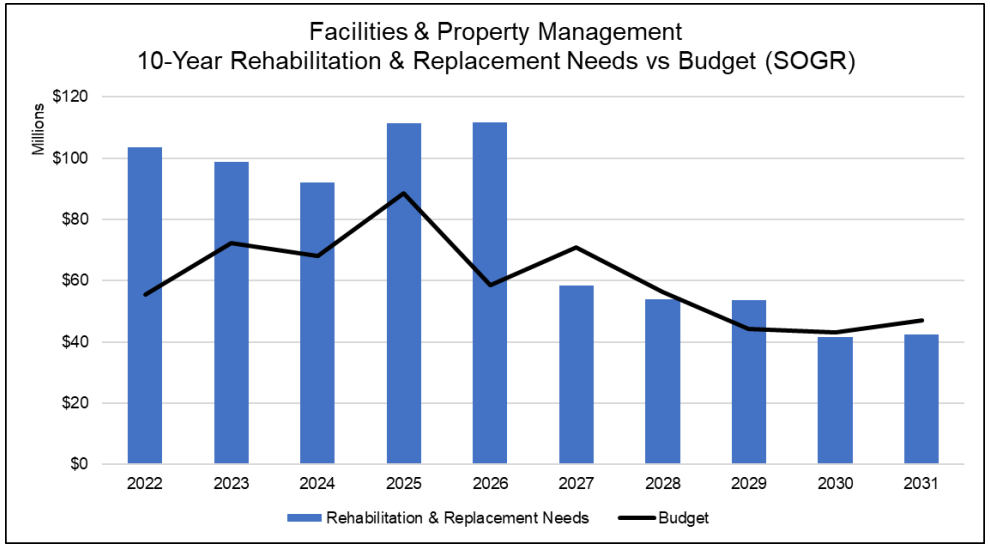
To illustrate the 10-year forecast, two graphs have been created by Service Area and by each Asset Class in this section:

- Total Lifecycle Needs vs Budget Graph
- Rehabilitation & Replacement Needs vs Budget (State of Good Repair[1]) Graph.

[1] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds

Overall - Facilities & Property Management



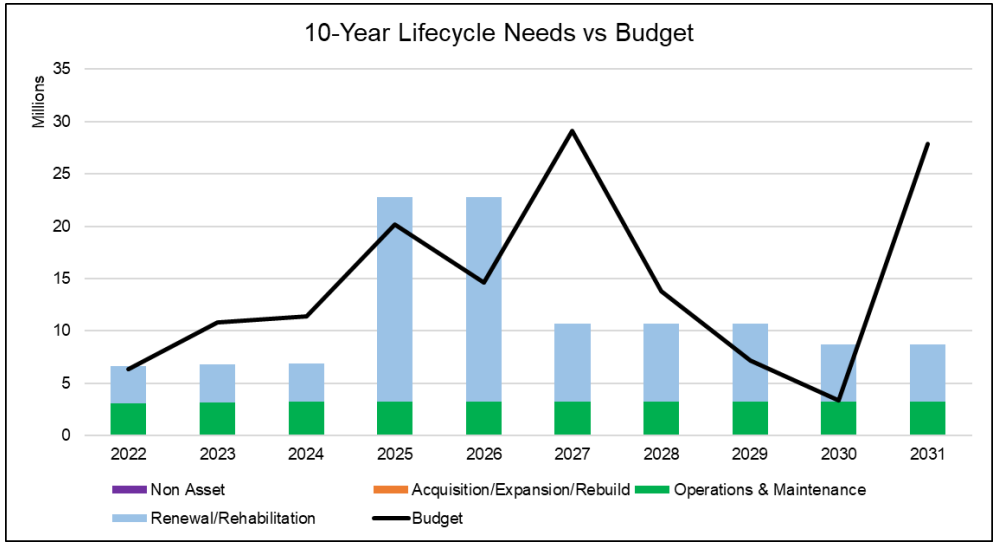


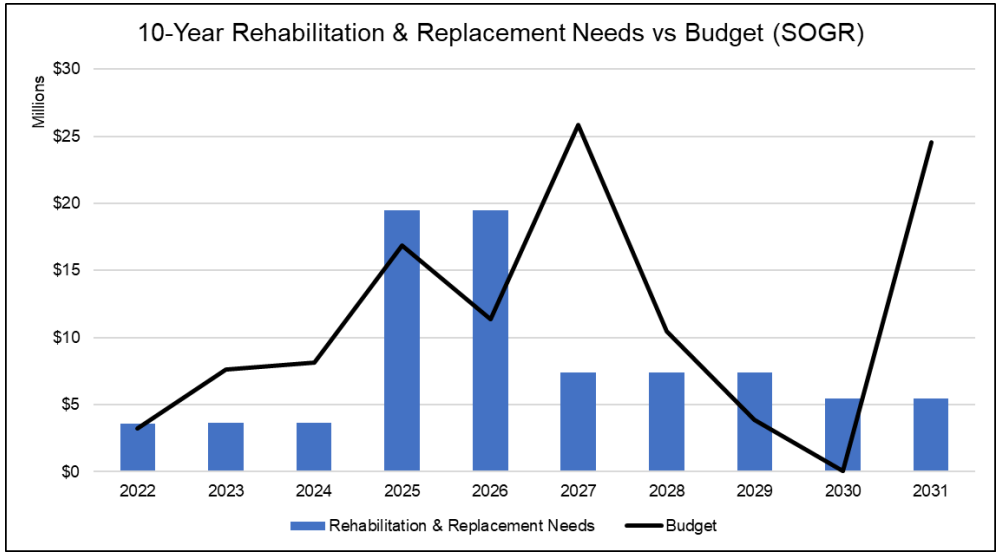
Lifecycle cost summaries are derived from the Operating and Capital budget and forecasts. It is prepared at the service area level and depicts the investment requirements by the lifecycle planned activities.

Acquisition refers to installation of new asset. Asset replacements are capital activities. Operations and Maintenance is primarily funded through the operating budget.

The graphs to the left provide an overview of all asset classes and service areas combined.

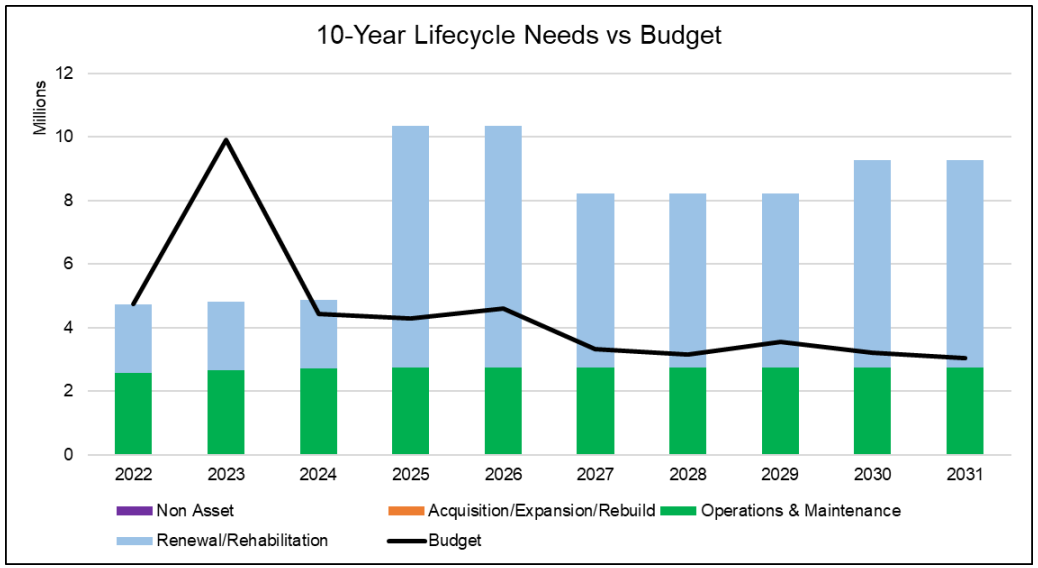
Corporate - Facilities and Site Infrastructure

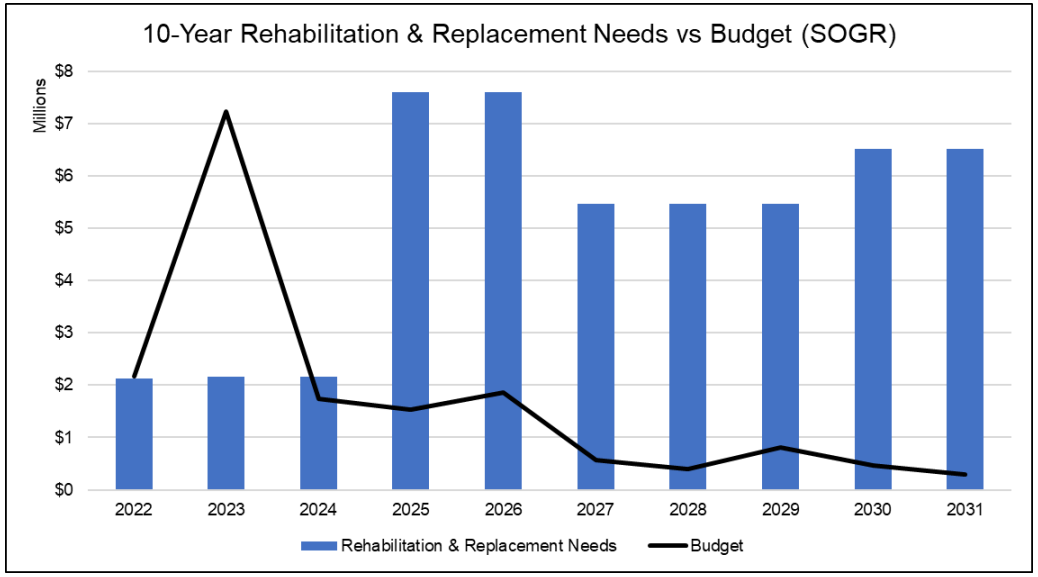




The graphs to the left provide the breakdown by the Corporate – Facilities & Site Infrastructure asset class.

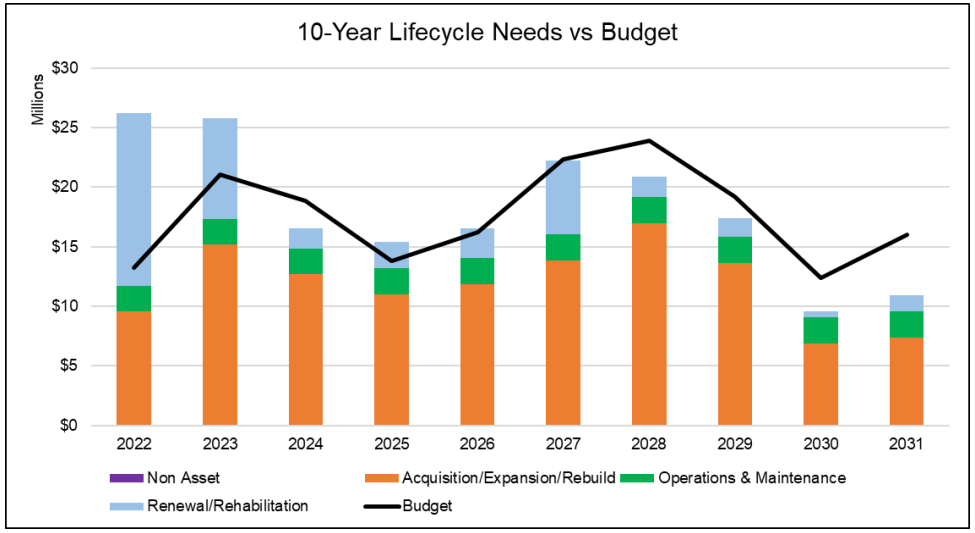
Culture - Facilities and Site Infrastructure

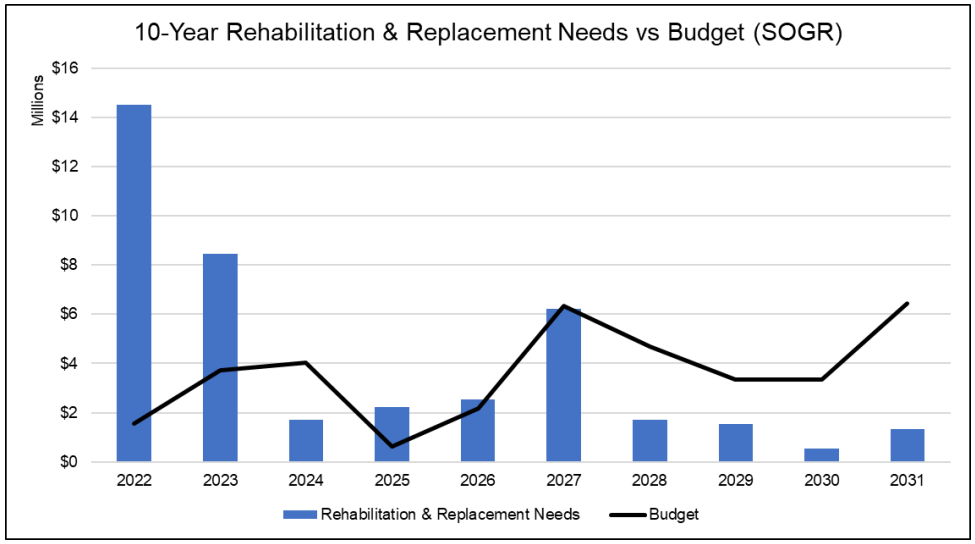




The graphs to the left provide the breakdown by the Culture – Facilities & Site Infrastructure asset class.

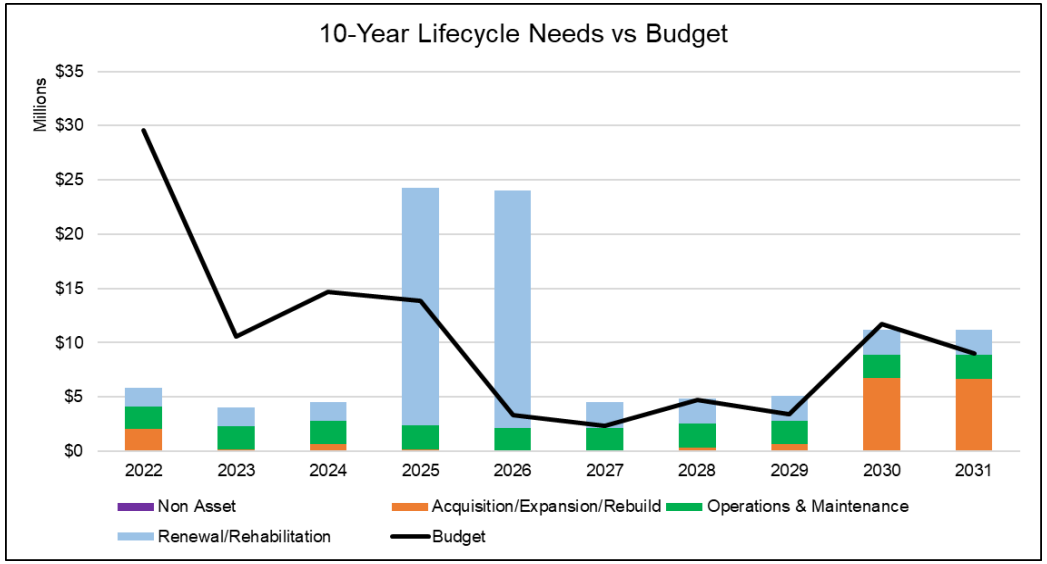
Fire - Facilities and Site Infrastructure

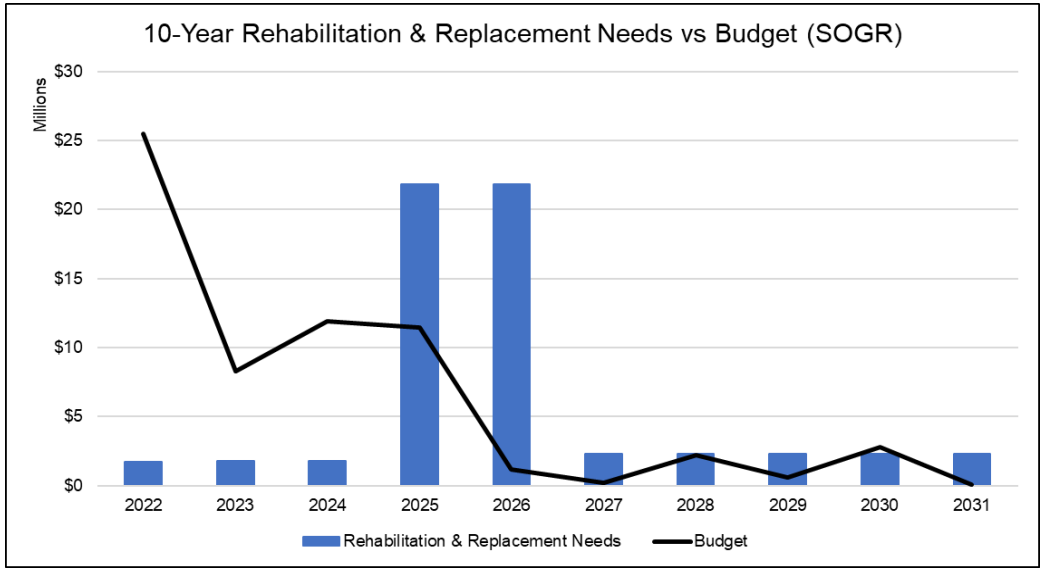




The graphs to the left provide the breakdown by the Fire – Facilities & Site Infrastructure asset class.

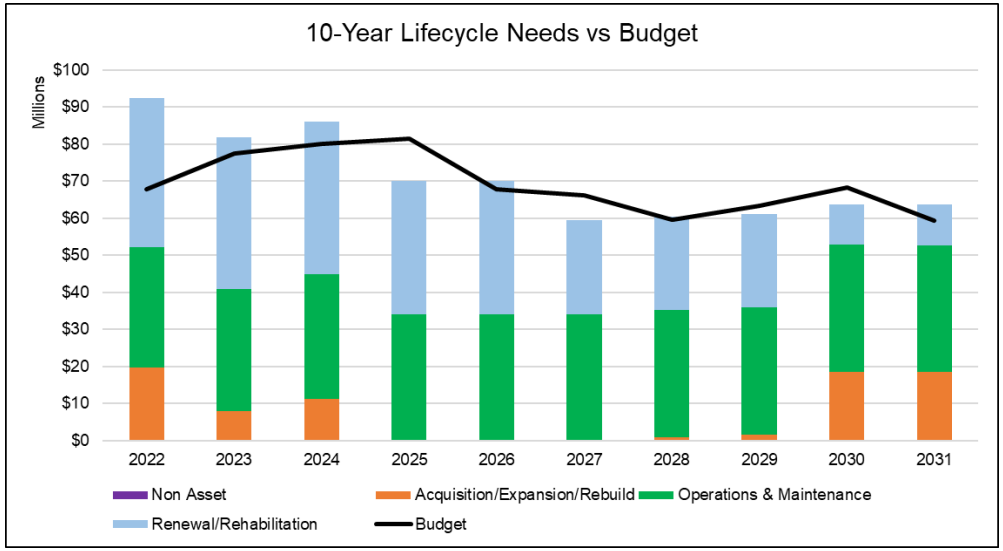
Library - Facilities and Site Infrastructure

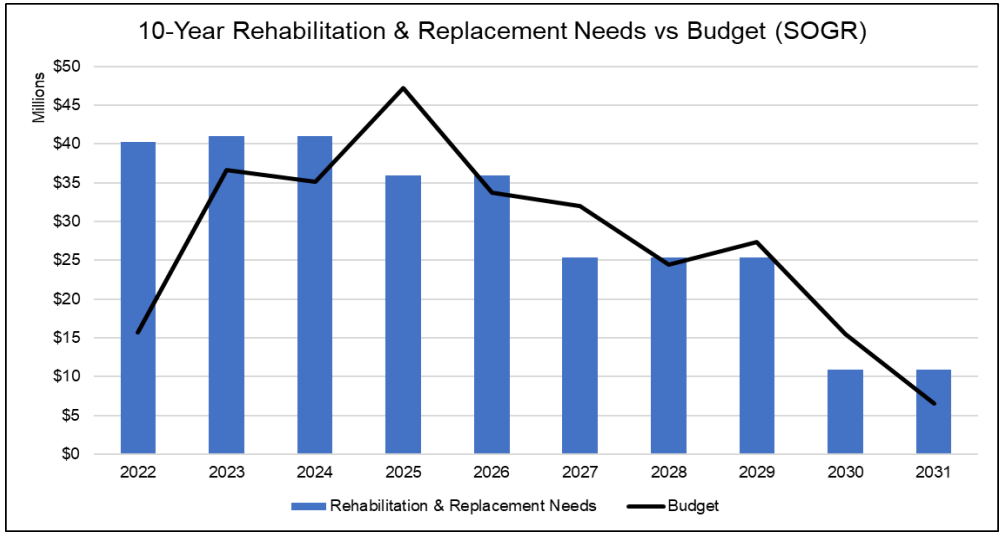




The graphs to the left provide the breakdown by the Library – Facilities & Site Infrastructure asset class.

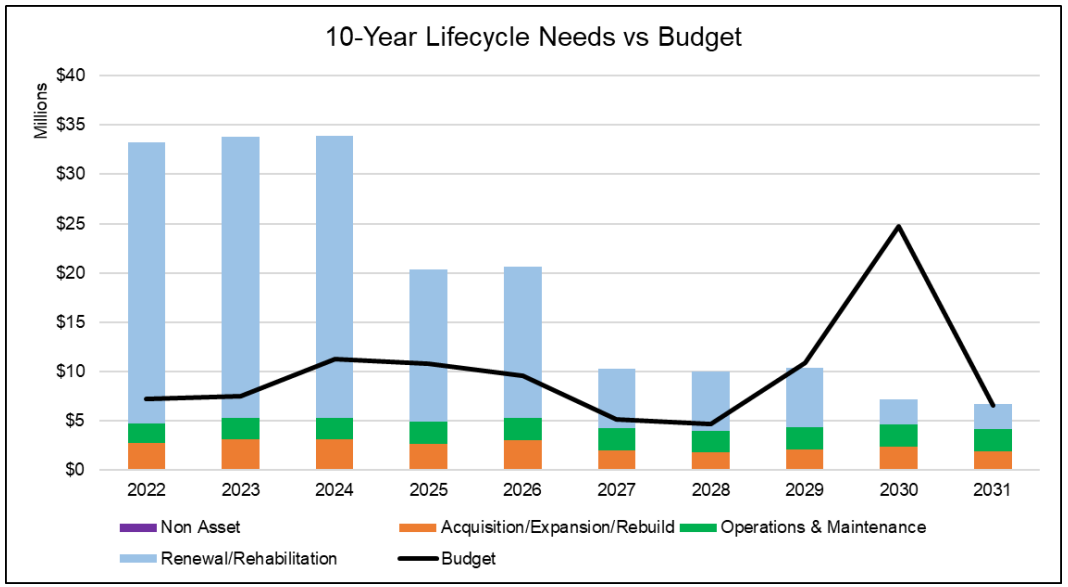
Recreation - Facilities and Site Infrastructure

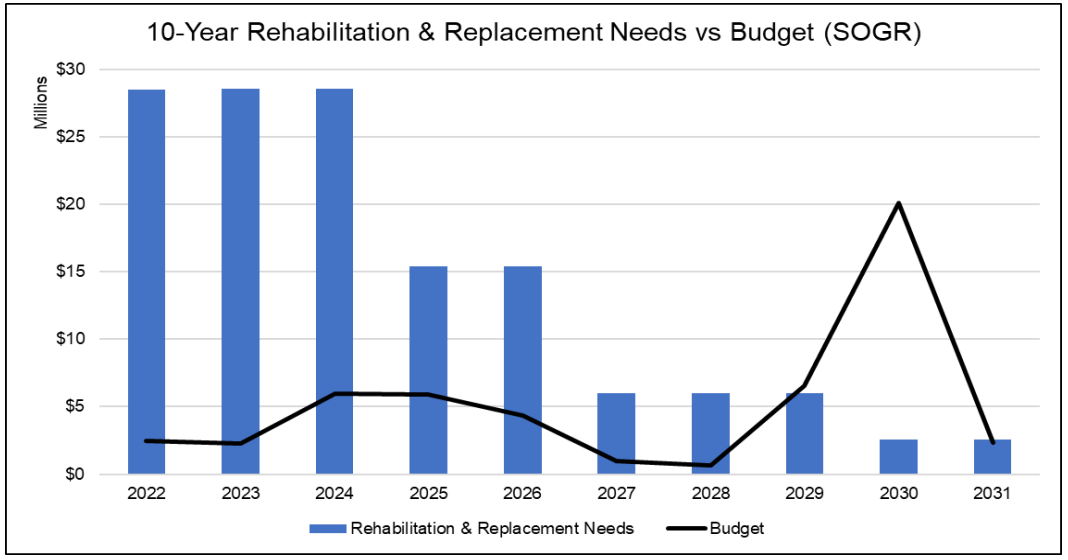




The graphs to the left provide the breakdown by the Recreation – Facilities & Site Infrastructure asset class.

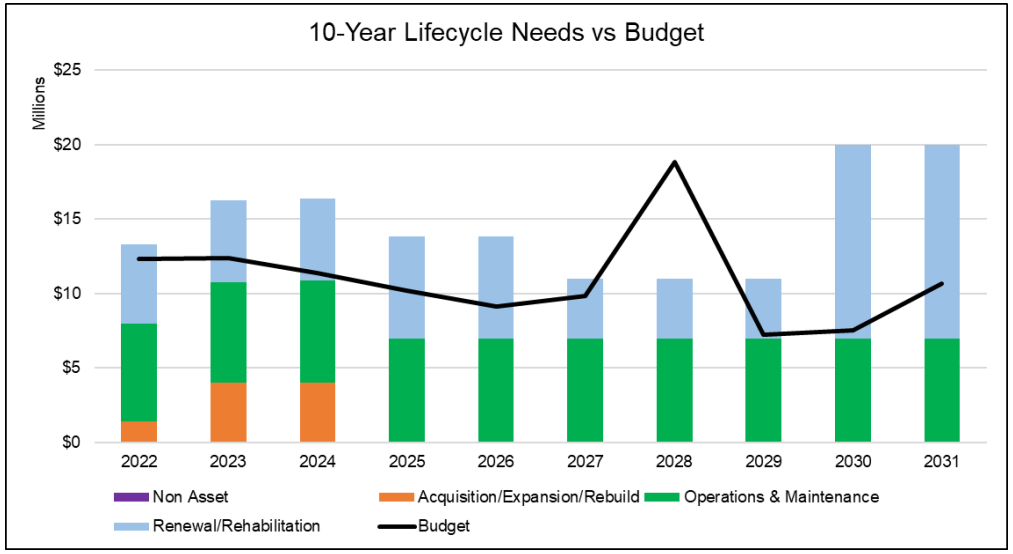
Parks - Facilities and Site Infrastructure

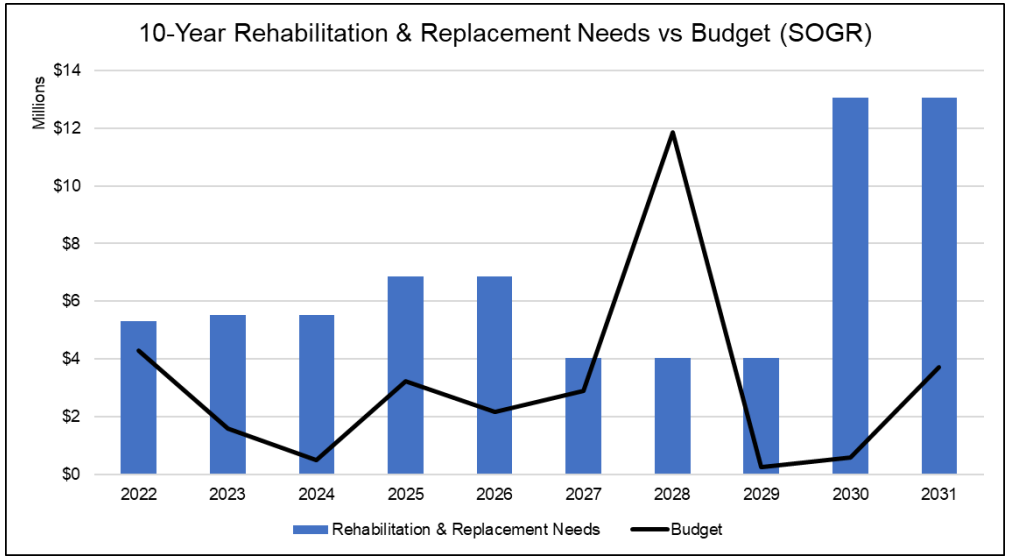




The graphs to the left provide the breakdown by the Parks – Facilities & Site Infrastructure asset class.

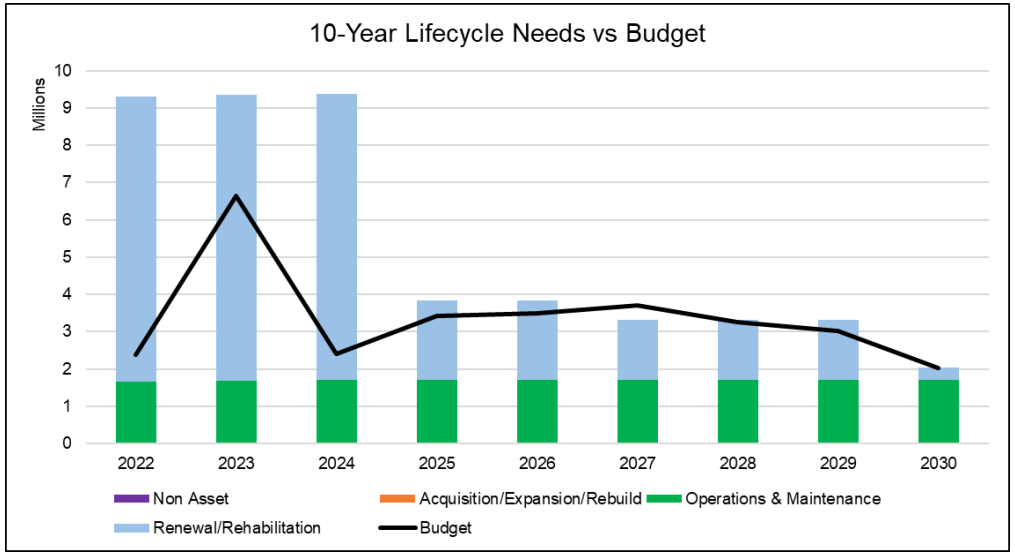
Transit - Facilities and Site Infrastructure

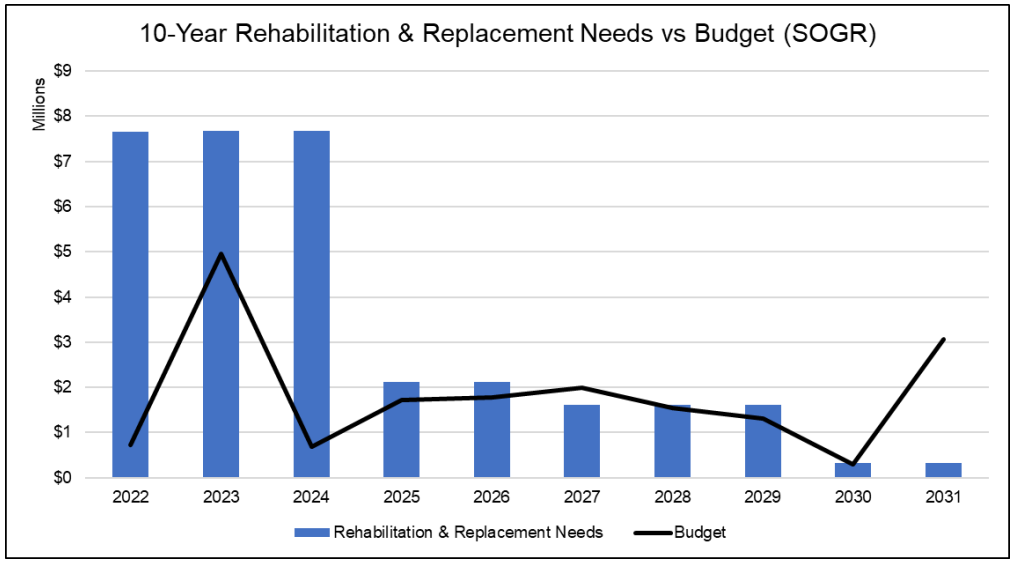




The graphs to the left provide the breakdown by the Transit – Facilities & Site Infrastructure asset class.

Works - Facilities and Site Infrastructure





The graphs to the left provide the breakdown by the Works – Facilities & Site Infrastructure asset class.

Over the next 10 years, the Facilities & Property Management average annual budget is $144.0M as shown in **Figure 5.**

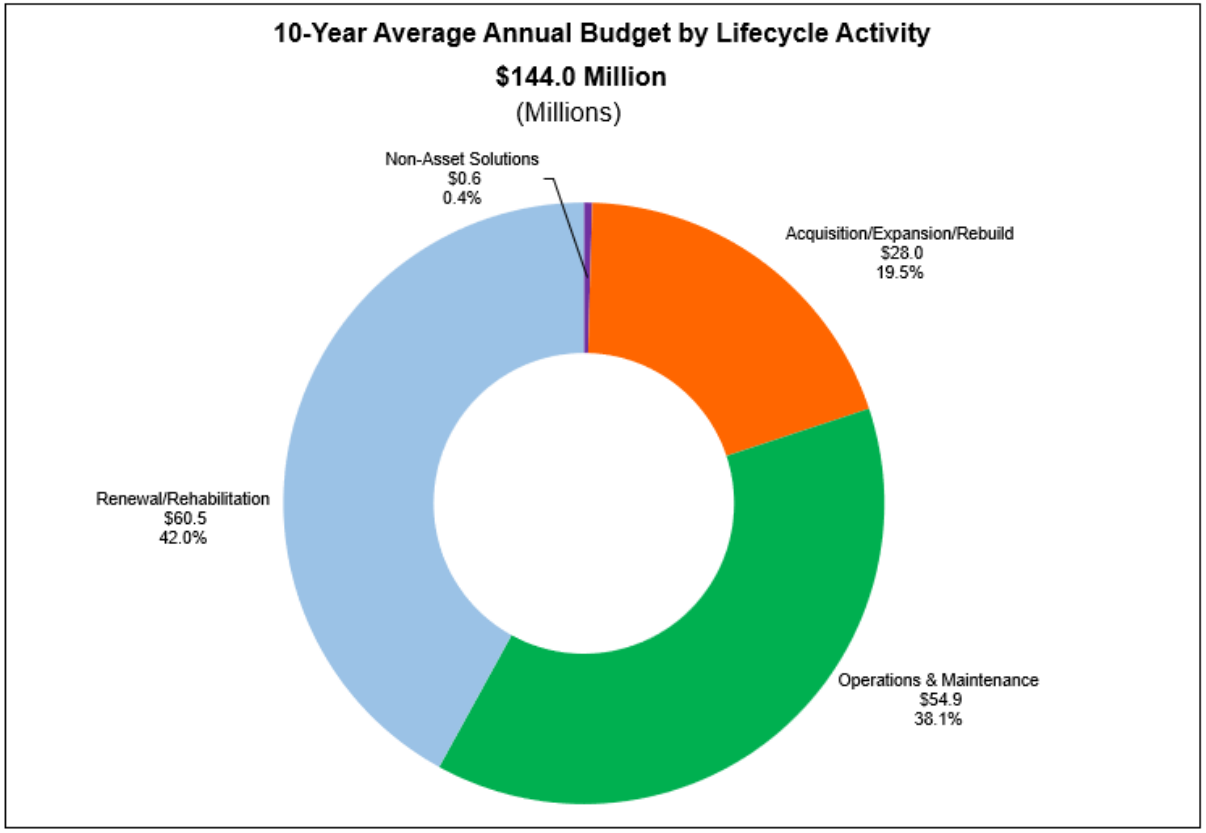


Figure 5: Budget breakdown by Lifecycle Activity

Table 13 shows 10-year annual average budget breakdown by Asset Class. The majority of the of the operating and capital budget is spent on State of Good Repair of FPM assets.

Table 13: Budget Breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Fire	2.2	10.0	12.2	5.5	17.7
Corporate	3.2	11.2	14.5	-	14.5
Culture	2.7	1.8	4.4	-	4.4
Library	2.2	6.6	8.8	1.5	10.3
Recreation	33.8	31.3	65.1	4.0	69.1
Parks	2.2	5.2	7.3	2.5	9.8
Transit	6.9	3.1	10.0	0.9	10.9
Works	1.7	1.8	3.5	-	3.5
Other[2]	-	0.4	0.4	3.2	3.7
Total	**54.8**	**71.5**	**126.3**	**17.7**	**144.0**

[2] The “Other” asset class denotes lifecycle activities that span over multiple asset classes within the Service Area such as energy enhancements, accessibility improvements, Solar PV installations and Climate Change Mitigation Studies.

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget – for example, utilities, building and sidewalk maintenance, etc. The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The Capital Budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment, including IT network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets – for example, sidewalk maintenance or licensing fees – are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 6**, the estimated available funding for the next 10-year period (2022-2031) for Facilities & Property Management is $1,439.9M The primary sources of funding are Tax Reserve Funds at 41.8 per cent which is primarily used to support capital infrastructure renewal needs, Operating Revenue sources at 38 per cent, Development Charges Reserve Funds at 6.7 per cent, Planning Act Reserve Funds at 5.9 per cent, Canada Community-Building Reserve Funds at 4.4 per cent.

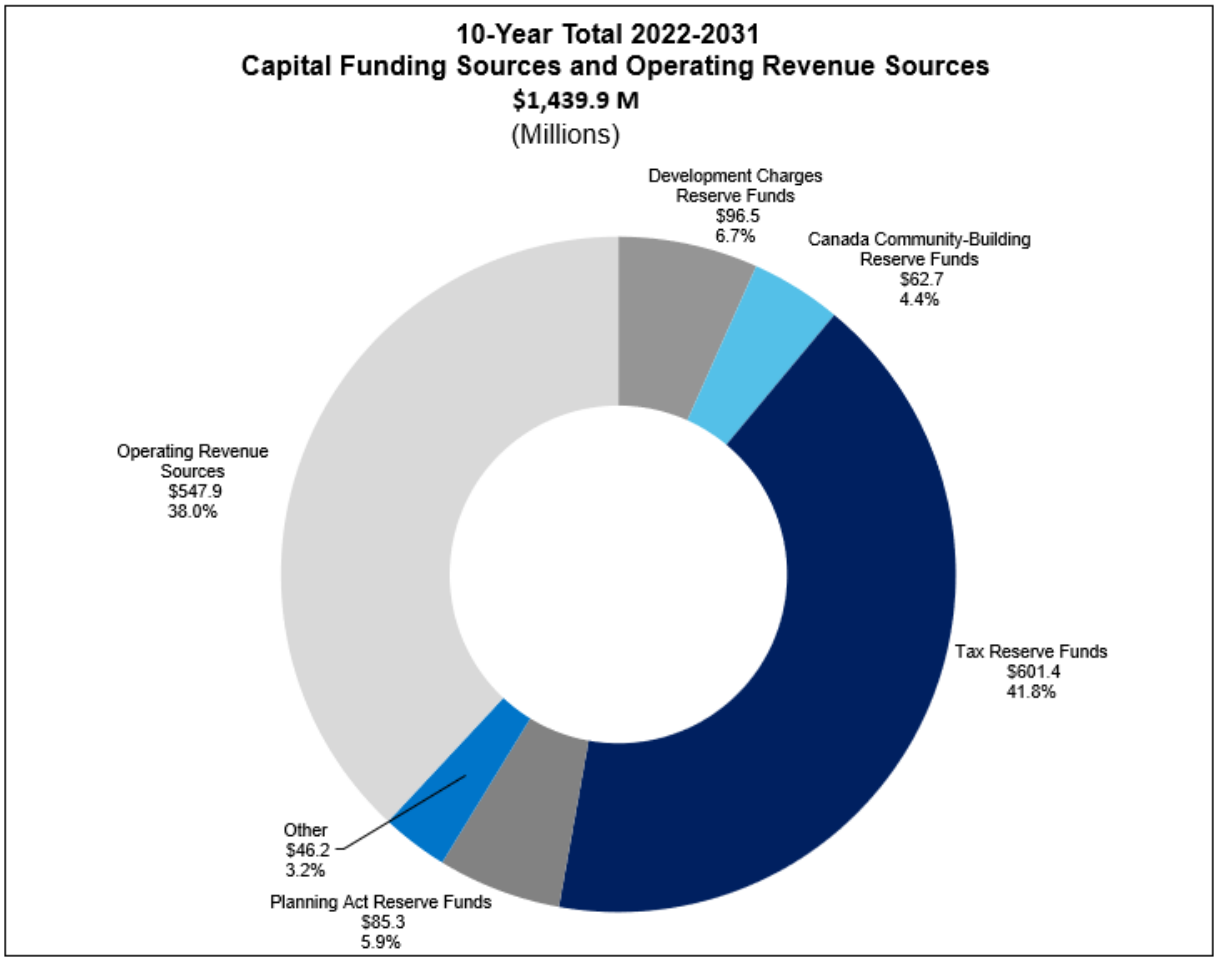


Figure 6: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure, and it will increase to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g. the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available.

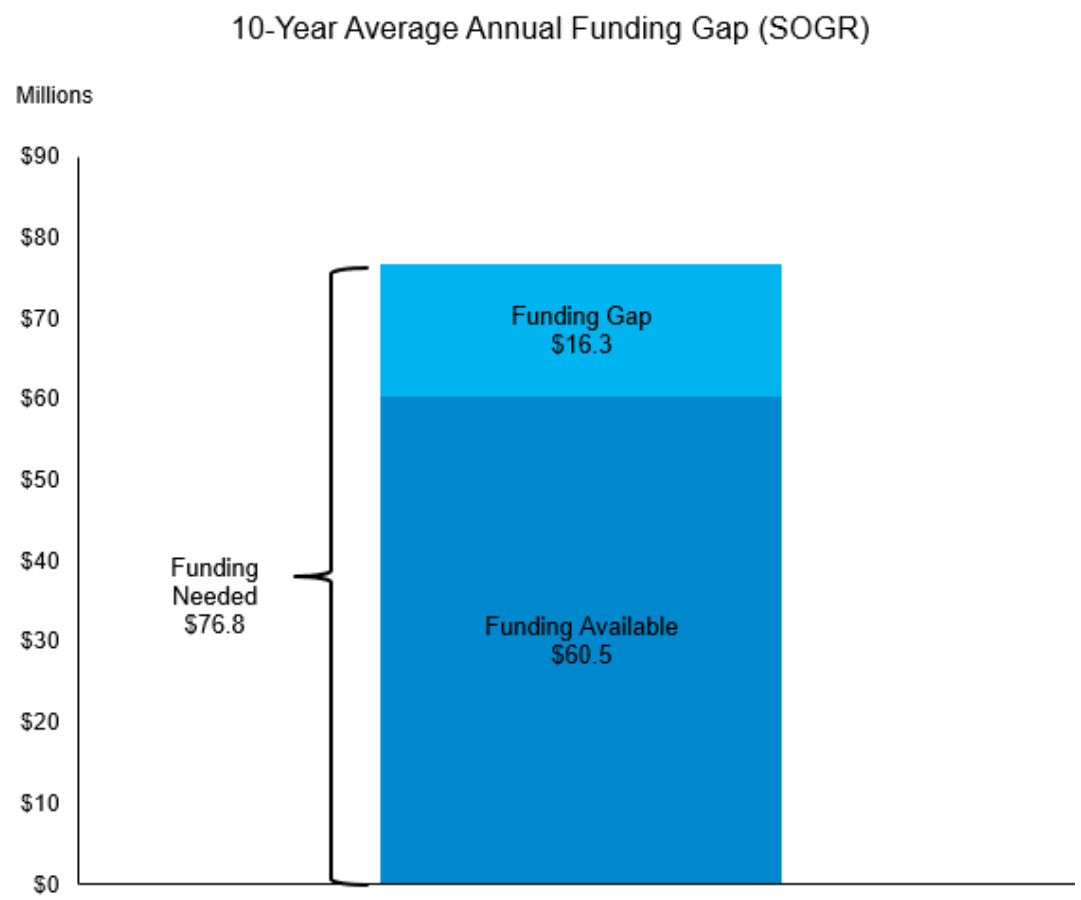
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to levels of customer satisfaction and the condition of City facilities
- Increased liability and claims related to safety concerns at City facilities
- Impacts to quality of life and services provided at City facilities
- Interruption in services and multiple closures both planned and unexpected

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (Funding Needed) and the annual average budget (Funding Available) for the next 10 years as is shown in the following graphs by Service Area and by each Asset Class. Continued implementation of asset management best practices as well as assistance from senior levels of government through continued infrastructure funding programs will provide opportunities to address some elements of the funding gap.

Overall - Facilities & Property Management



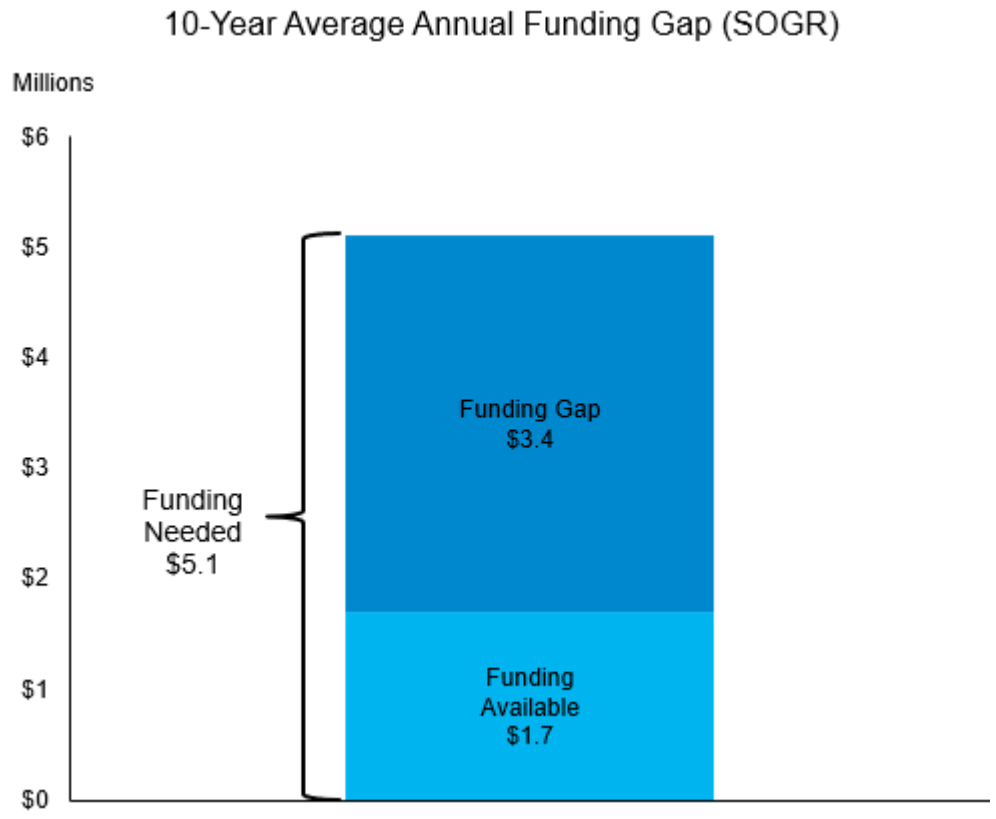
The overall 10-Year average annual infrastructure gap for Facilities & Property Management is $16.3 million.

Some of the drivers affecting demand on the City's building infrastructure include aging building infrastructure and the gap between current and target FCI numbers. Using the FCI numbers and comparing them against the desired 10-year target allows buildings to be compared analytically and highlights the buildings that are in the greatest need of renewals, repairs or lifecycle replacements.

Additional funding will allow the average FCI for all asset classes to be maintained at their target over the next 10 years.

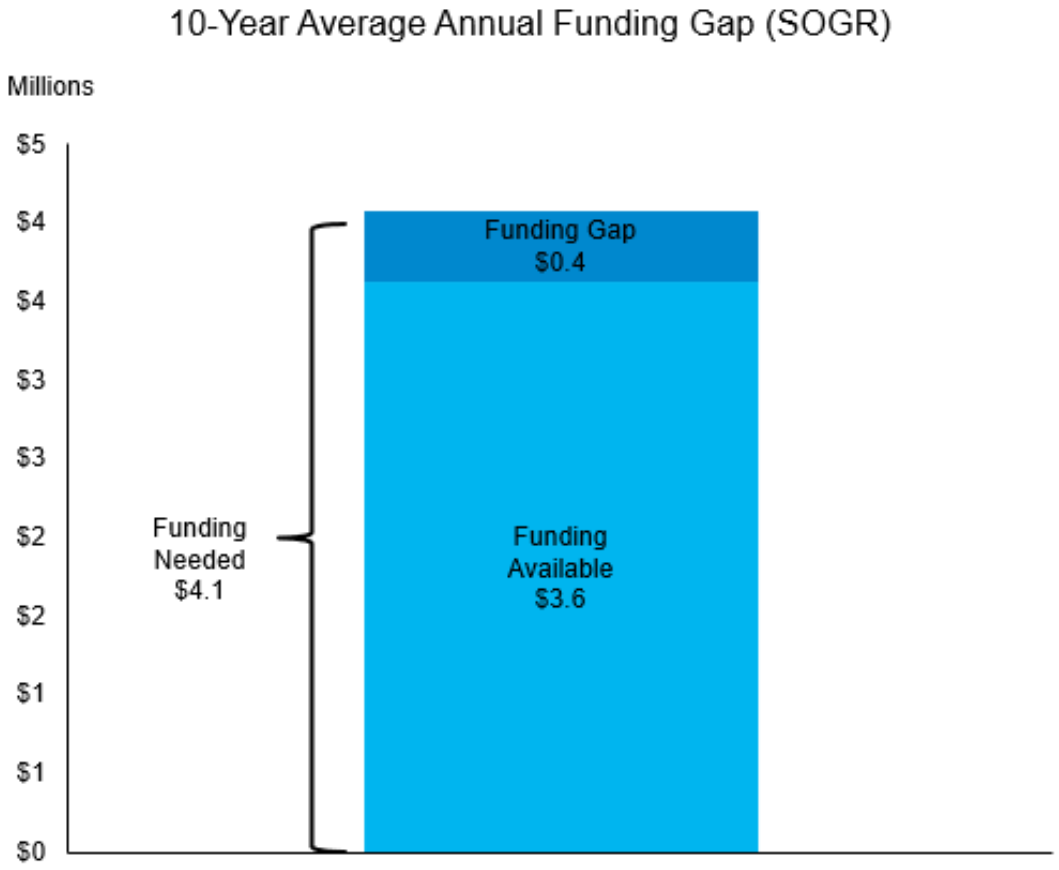
There are two asset classes that have a surplus of budget allocated which offset and reduces the overall funding gap. These two asset classes are the Corporate – Facilities & Site Infrastructure and Library - Facilities & Site Infrastructure.

Culture - Facilities and Site Infrastructure



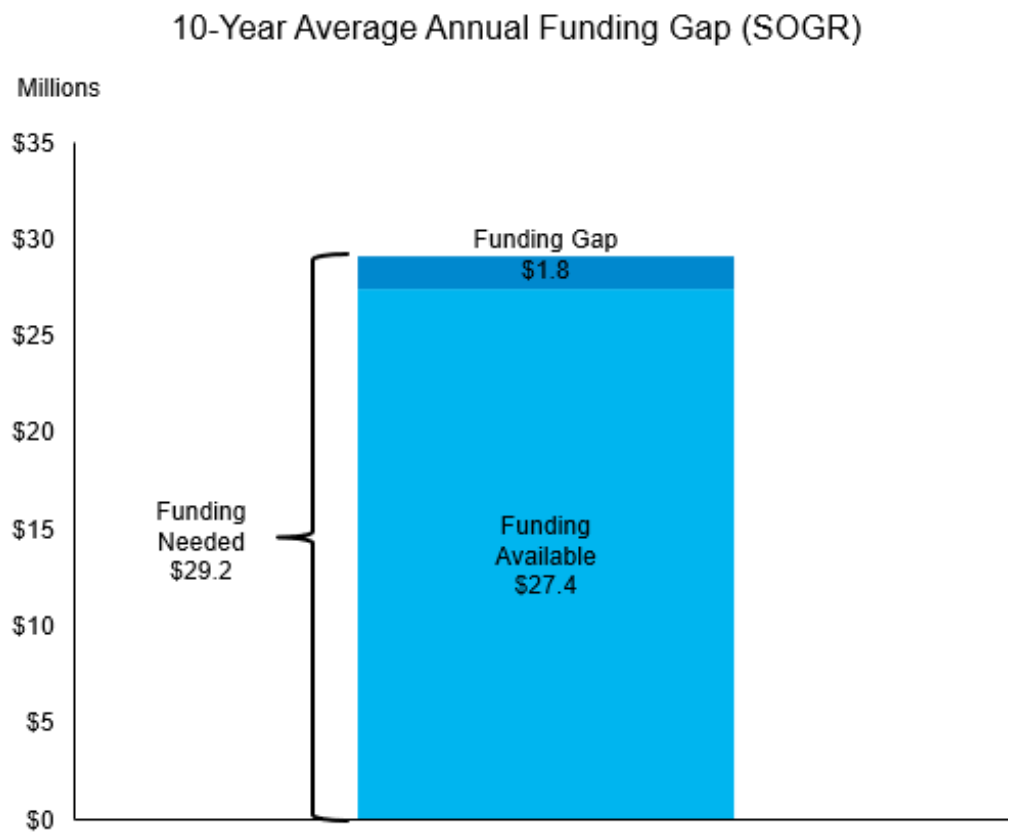
The overall 10-Year average annual infrastructure gap for Culture - Facilities and Site Infrastructure is $3.4 million.

Fire - Facilities and Site Infrastructure



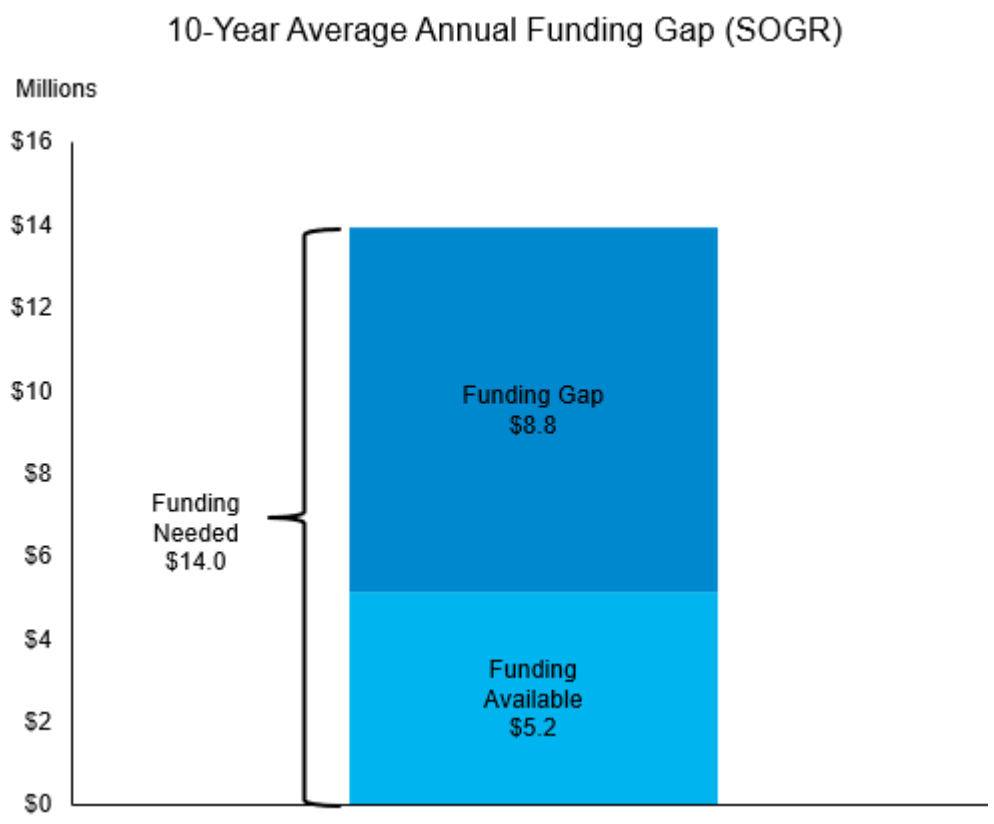
The overall 10-Year average annual infrastructure gap for Fire - Facilities and Site Infrastructure is $0.4 million.

Recreation - Facilities and Site Infrastructure



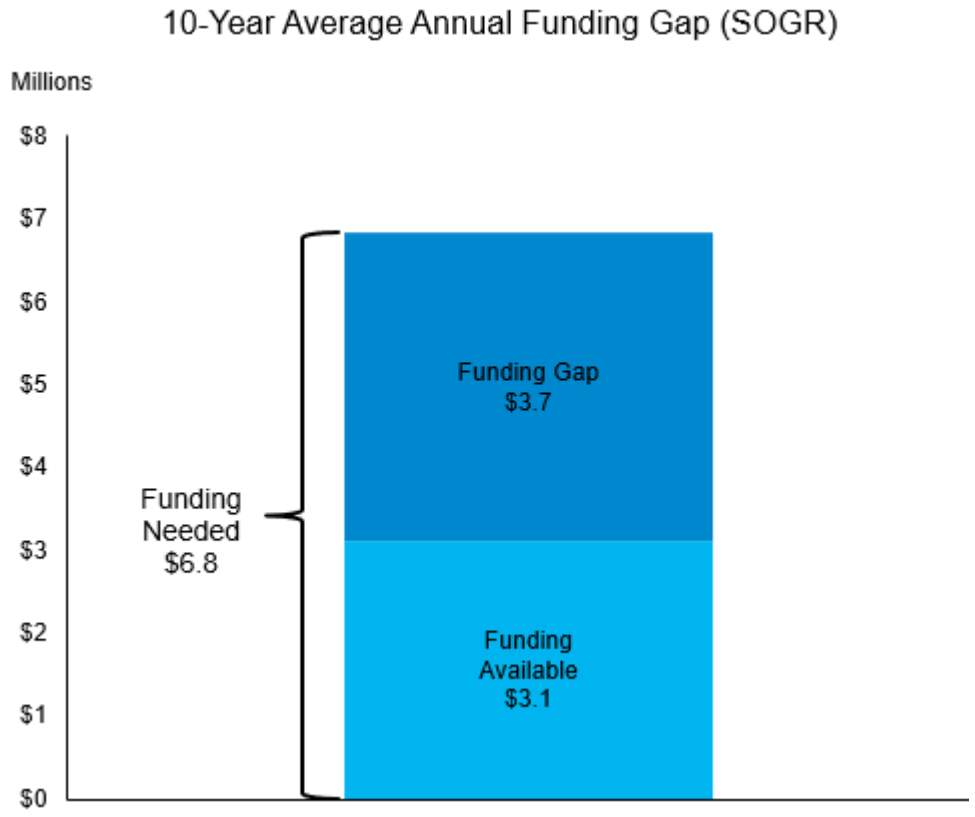
The overall 10-Year average annual infrastructure gap for Recreation - Facilities and Site Infrastructure is $1.8 million.

Parks - Facilities and Site Infrastructure



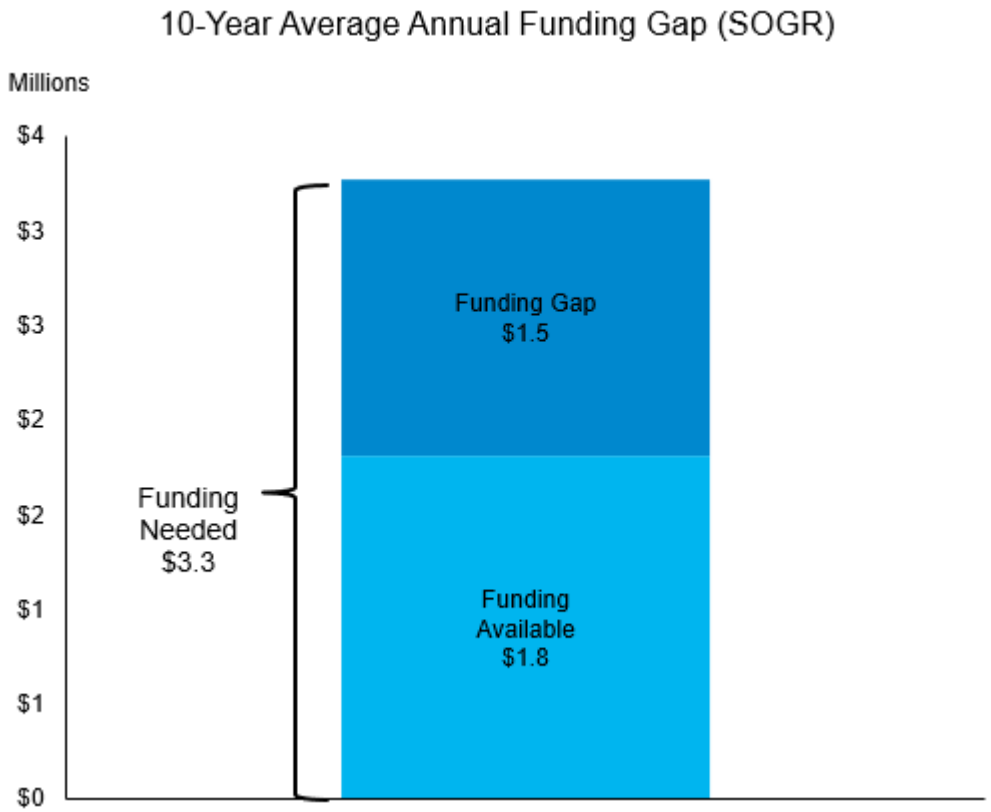
The overall 10-Year average annual infrastructure gap for Parks - Facilities and Site Infrastructure is $8.8 million.

Transit - Facilities and Site Infrastructure



The overall 10-Year average annual infrastructure gap for Transit - Facilities and Site Infrastructure is $3.7 million.

Works - Facilities and Site Infrastructure



The overall 10-Year average annual infrastructure gap for Works - Facilities and Site Infrastructure is $1.5 million.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through an overall maturity assessment which has been completed for the FPM service area. The results are scored from 0.0 to 4.0 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved. FPM will complete this assessment for the next cycle of asset management plan reporting.

Advancing Service Area Asset Management Capabilities

The proposed work plan in **Table 14** was developed in consultation with City staff through the development of the asset management plan. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks may differ from those in the maturity assessment improvement plan, as they are predominantly internal tasks to the FPM service are that provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories.

Through the maturity assessment and associated work plans provided, FPM aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service, to achieve both service area and corporate objectives.

Table 14: Work Plan for Continuous Improvements

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources
SOI - 1	Update data inventory by conducting annual condition assessments.	All	2023-2028	Ensures that database is up to date at the conclusion of each annual capital project planning process.	Internal
SOI - 2	Conduct building condition assessments for facilities that are not assessed yet.	All	2023-2026	Improved completeness and accuracy of the information within the database to improve tracking and management of assets and identifying funding requirements for capital renewal and asset management planning.	External
SOI - 3	Conduct desktop appraisals of the facilities and associated site infrastructure within the property lines.	All	2024-2026	Ensure that the appraised insurance value is up to date and inclusive of all building components within the property lines to improve the asset management planning.	External
SOI - 4	Continue to split up and assign the building facilities and systems to the corresponding service areas responsible for lease/ shared use facilities. Client consultation required.	All	2023-2026	Improved tracking/reporting of assets and responsibility to maintain/manage assets, and management of assets and identifying funding requirements.	Internal
SOI - 5	Culture region to be divided and assigned to either Recreation or Parks asset class accordingly.	Culture, Parks, Recreation	2023-2026	Improved tracking/reporting of assets and responsibility to maintain/manage assets, and management of assets and identifying funding requirements.	Internal
SOI - 6	Clearly define a process for all staff to provide inventory data updates when work has been completed at a City facility or site. Define a communication plan and reporting mechanism to ensure compliance.	All	2023-2026	Improved completeness and accuracy of the information within the database to improve tracking and management of assets and identifying funding requirements for capital renewal and asset management planning.	Internal

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources
FS - 1	Define an approach where the demand forecasts will be based on the weighted FCI and not on the facility average.	All	2023-2026	Support decision making and allocating funding for capital renewal and asset management planning based on the risk rating and system groups.	Internal
LMS - 1	Facilitate a discussion to understand the pros/cons of a centralized and decentralized model for capital funding for facilities and the asset portfolio. To be done in collaboration with the other service areas define an approach for moving forward.	All	2023-2026	Improved completeness and accuracy of the information within the database to improve tracking and management of assets and identifying funding requirements for capital renewal and asset management planning.	Internal
LMS - 2	Update the FPM and client group Service Level Agreements to address gaps and define the asset responsibility and asset list.	All	2023-2026	Improved completeness and accuracy of the information within the database to improve tracking and management of assets and identifying funding requirements for capital renewal and asset management planning.	Internal

Corporate Asset
Management Plan 2024

Parks, Forestry & Environment

Table of Contents

Parks, Forestry & Environment Overview

The Parks, Forestry & Environment (PFE) Division plans, develops, maintains, expands and renews the parks system and urban forest, boulevard landscapes and natural areas. The Parks, Forestry & Environment Asset Management Program includes park amenities, trails and bridges, trees, boulevard landscapes, natural areas and equipment. The total Parks, Forestry & Environment asset replacement value is $1.5 billion, with an overall average condition of Good as shown in **Table 1**. A further breakdown by asset class is provided in **Table 2**.

Table 1: Summary Overview of Parks, Forestry & Environment

Parks, Forestry & Environment	
Replacement Value	$1.5 Billion
Average Condition	68%
10-year Average Annual Funding Gap	$13.7 Million

The Parks, Forestry & Environment Asset Management (AM) Plan PFE plan includes the following information:

- **State of the Infrastructure:** Outlines the current state of the infrastructure assets including what the City owns, the condition of the assets and the costs to replace them. This section also identifies the data limitations and data assumptions required to develop these quantities. A risk distribution was also developed for each asset class where applicable
- **Levels of Service:** Describes and measures the service performance and outcomes the City currently provides
- **Future Demand:** Summarizes the expected future demand on the Parks, Forestry & Environment Service Areas. This includes those prescribed in O. Reg. 588/17 and additional advanced metrics to benchmark and monitor Parks, Forestry & Environment service area performance
- **Lifecycle Management Strategy:** Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy:** Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves, and identifies any financial gap
- **Continuous Improvement:** Documents the continuous improvements identified during the development of this Asset Management Plan and previous maturity assessments

Lakefront Promenade

Table 2: Summary of Parks, Forestry & Environment Replacement Value, Condition and Infrastructure Gaps

Service Area	Asset Class	Replacement Value (000s)	Condition	10-Year Annual Average Funding Needs (000s)	10-Year Annual Average Funding Gap (000s)
Parks	Amenities	$414,443		$16,100	$4,100
	Trails & Pedestrian Bridges	$178,349		$10,000	$3,500
	Park Equipment	$1,613		$479	$0
Forestry	Trees	$552,587		$7,500	$5,100
	Boulevard Landscapes	$110,791		$0	$0
	Natural Areas	$268,324		$1,200	$1,039
	Forestry Equipment	$569		(included with Parks Equipment)	$0

State of the Infrastructure

The following section provides a snapshot of the state of the infrastructure for active, existing assets as of year-end 2022 including replacement value, age, condition and typical useful life. The Parks, Forestry & Environment Division is responsible for the oversight and management of seven distinct asset classes, each comprised of various asset types as shown in **Table 3**. This section provides context for the methodologies employed to assess condition and risk, while also addressing the constraints resulting from data limitations.

Table 3: Parks, Forestry & Environment Hierarchy

Asset Class	Asset Types
Amenities	Sports Fields
	Green Space
	Park Structures
	Courts
	Play Facilities
Trails & Pedestrian Bridges	Off-Road Trails
	Pedestrian Bridges
	Docking Systems
Parks Hand-held Equipment	Small hand-held
	Medium hand-held
	Large hand-held
	Extra-large hand-held
Trees	Street Trees
	Park Trees
	Trees in Amended Boulevard Treatments
Boulevard Landscapes	Boulevard Grass
	Horticulture Features
	Seasonal Planters
	Amended Boulevard Treatment Areas
Natural Areas	Forested
	Non-Forested
Forestry Equipment	Power Equipment
	Tools and Specialized Equipment
	Machinery
	Information Technology

Asset Inventory & Valuation

A summary of the Parks, Forestry & Environment asset inventories, using the City's available data (2021), for each of the asset classes is detailed in this plan in the form of dashboards. Parks, Forestry & Environment has a robust inventory of assets, tracked and regularly assessed, to determine accurate budgetary needs.

Inventory replacement values are based on industry valuation methods and current tender prices. There is an ongoing effort to review these tenders to keep current with our asset costs. The replacement values for natural areas were developed by determining the cost to restore the natural area.

A review of the current available data has been completed and a few gaps were identified, either for missing attributes or missing assets, and summarized in Table **7** in the Asset Data Limitations section.

Asset Data Assumptions

The following assumptions were made in the development of this plan:

- **Replacement Cost**
  - Parks, Forestry & Environment subject matter experts provided estimates for rehabilitation and replacement based on expertise and latest tender prices. In adherence to integrated accessibility standards (O.Reg. 191/11) for the design of off-road trails, staff assumed a standard width of 3.5 metres in the replacement cost calculation
  - Trees and other green infrastructure are unique as they appreciate with time; their valuation is a function of condition, size and location. Industry best practices were applied to determine a value. Estimates for Boulevard Landscapes and Natural Areas are based on the cost to remove existing assets and replace to an equal standard using best estimates
- **Estimated Useful Life**
  - Forestry's green infrastructure appreciates with time and thus does not have a definitive useful life. A Safe Useful Life Expectancy (SULE) model was utilized to project the expected number of years that an asset can be expected to provide a desired level of service at an acceptable cost and level of risk. It is a conceptual tool for modeling highly variable and dynamic assets
  - Boulevard grass and natural areas do not have a defined useful life as they are in a state of perpetual maintenance and repair
- **In-Service Date**
  - Where in-service dates were not available, aerial photography was used to verify the age of various Park assets
  - Reliable in-service or plant dates for Forestry assets are not available prior to 2018. When there was no plant date, a growth factor was used to model asset age

Asset condition

Where physical condition information was unavailable or unreliable, staff utilized an age-based proxy based on age and remaining useful life[1] (RUL). Where both physical condition information and age were missing, staff assumed a relative condition of Fair. The age-based condition rating scale can be found in **Table 4**.

Condition Scales

Forestry staff regularly update the tree asset condition rating following the rubric identified in **Table 6A**. Boulevard grass features are assigned a condition rating based on their frequency of service as these assets require perpetual maintenance. Horticulture features are assessed based on age following the rubric found in **Table 6B**. In instances where conditions are not recorded, the level of service is used as a proxy for condition. The condition of Seasonal Planters, Amended Boulevard Treatments and Forestry Equipment utilize an age-based approach as described in **Table 5**.

Table 4: Age-based Condition Rating Scale

Condition Rating	% of Remaining Useful Life (RUL)	Description
Very Good	80% - 100%	The infrastructure in the system or network has greater than or equal to 80 per cent of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
Good	60% - 79%	The infrastructure in the system or network has less than 79 per cent (and greater than or equal to 60 per cent) of its remaining service life. It is in good condition and will not need rehabilitation for more than five years.
Fair	40% - 59%	The infrastructure in the system or network has less than 59 per cent (and greater than or equal to 40 per cent) of its remaining service life. It is in fair condition and will need to be replaced or rehabilitated within the next three to five years.
Poor	20% - 39%	The infrastructure in the system or network has less than 39 per cent (and greater than or equal to 20 per cent) of its remaining service life. It is in poor condition with many elements approaching the end of their service life. These assets will need to be replaced or rehabilitated within the next one to three years.
Very Poor	0% - 19%	The infrastructure in the system or network has less than 19 per cent of its remaining service life. It is in very poor condition and should be replaced or rehabilitated within the next budget cycle.

[1] Remaining useful life (RUL) was calculated by subtracting the asset's current age from its estimated useful life. The RUL is the expected time remaining before an asset will need to be replaced.

Table 5: Seasonal Planters and Amended Boulevard Treatments Condition Rating Scale

Condition Rating	% of Remaining Useful life (RUL)	Description
Very Good: Fit for the Future	75%-100%	The infrastructure in the system or network has greater than or equal to 75 per cent of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
Good: Adequate for Now	35%-74%	The infrastructure in the system or network has less than 75 per cent (and greater than or equal to 35 per cent) of its remaining service life. It is in good condition.
Fair: Requires Attention	13%-34%	The infrastructure in the system or network has less than 35 per cent (and greater than or equal to 13 per cent) of its remaining service life. It is in fair condition.
Poor: Approaching End of Life	3%-12%	The infrastructure in the system or network has less than 13 per cent (and greater than or equal to 3 per cent) of its remaining service life. It is in poor condition and mostly below operable state, with many elements approaching the end of their service life.
Very Poor: Requires Renewal	0%-2%	The infrastructure in the system or network has less than 3 per cent of its remaining service life. It is in very poor, unacceptable condition and should be replaced or rehabilitated.

Table 6A: Trees Condition Rating Scale

Condition Rating	Structural Condition Structural integrity of a tree	Health Condition Vigor, foliage size and colour, presence or absence of pest (i.e. insect, disease or parasites), twig growth rate, amount of twig or branch dieback and wound closure
Excellent (1) Exceptional life expectancy for the species	Nearly ideal and free of defects.	High vigour and nearly perfect health with little or no twig dieback, discoloration or defoliation.
Good (2) Typical life expectancy for the species	Well-developed structure, defects are minor and can be corrected.	Vigour is normal for the species. No significant damage due to diseases or pests. Any twig dieback, defoliation or discolouration is minor.
Fair (3) Below-average life expectancy for the species	A single defect of a significant nature or multiple moderate defects. Defects are not practical to correct or would require multiple treatments over several years.	Reduced vigour. Damage due to insects or diseases may be significant and associated with defoliation but is not likely to be fatal. Twig dieback, defoliation, discolouration and or dead branches may comprise up to 50 per cent of the crown area.
Poor (4) Low life expectancy for the species	A single serious defect or multiple significant defects. Recent change in tree orientation. Observed structural problems cannot be corrected. Failure may occur at any time.	Unhealthy and declining in appearance. Poor vigour. Low foliage density and poor foliage colour are present. Potentially fatal pest infestations. Extensive twig and/or branch dieback.
Dead or declining (5) Very low life expectancy for the species	Single or multiple severe defects. Failure is probable or imminent. Includes tree mortality.	Poor vigour. Appears to be dying and in the last stages of life. Little live foliage. Includes tree mortality.

Table 6B: Boulevard Grass & Horticulture Feature Condition Rating Scale

Condition Rating	Description
Very Good (1) Fit for the future	The asset is in very good condition, typically new, or recently rehabilitated.
Good (2) Adequate for now	Some asset elements show signs of deterioration that require attention in the long term.
Fair (3) Requires attention	The asset shows signs of deterioration that requires attention in the short term to prevent further decline.
Poor (4) Approaching end of life	The asset is in poor condition and is typically below established standards, with many elements approaching the end of their useful service life.
Very Poor (5) Requires renewal	The asset is below established standard conditions with widespread signs of advanced deterioration. Many components have surpassed the end of its useful service life and require urgent renewal.

Asset Data Limitations

Parks, Forestry & Environment utilize multiple software applications to store and track their assets; this can create inconsistencies in the type of information and attributes collected. For the most part, staff utilize a work management system (Infor Public Sector) as the main repository for assets; this system contains work orders, inspections and service request information. Staff also utilize Geospatial Solutions utilizing ArcGIS (Esri) to map out the assets geographically, extract meaningful insights and coordinate projects strategically. A review of the current available data and identified gaps in attributes or assets are summarized in **Table 7** and **Table 8** below.

Table 7: Parks, Forestry & Environment Existing Records with Missing/Incomplete Attributes

Asset Class	Number of Records	Asset Condition	In-Service Date	Replacement Cost	Estimated Useful Life
Amenities	1,079	0%	32%	0%	0%
Trails & Pedestrian Bridges	3,857	0%	0%	0%	0%
Parks Hand-Held Equipment	938	0%	100%	0%	0%
Trees	260,100	1%	90%	0%	0%
Boulevard Landscape	3763	20%	0%	20%	0%
Natural Areas	848 Ha	80%	N/A	60%	N/A
Forestry Equipment	258	20%	30%	10%	95%

Some parks in-service dates are missing and areal photography was used to determine install date.

The Trees Asset Class is well-established, with records that are largely comprehensive. A small subset of assets within this class lack essential information, such as condition ratings or species classification. Ninety per cent of the current tree records lack installation dates. The asset registry is updated on a seven-year rotation. As living assets, condition can be affected by biotic and abiotic factors such as extreme weather, invasive species and climate change.

Natural areas do not have a completed inventory, so the asset condition was determined through an extrapolation from the forest inventory for select woodlands. Natural areas are stratified as either Forested or Non-Forested dependant on the Ecological Land Classification (ELC) code assigned to them. Forested areas were assessed for the following attributes: age-class, predominant species distribution, and average basal area (indicator of density and for the purpose of asset management, age or progress towards maturity) among others.

For the remaining forested areas that do not have a completed inventory, an average value was generated using representative values from the existing forest inventory. The intent behind this was that this average would function as a representation of unknown values until such time that these remaining areas are inventoried. Non-Forested Areas, such as wetlands and grasslands, were not assessed in this plan as further study is required to develop an approach for their assessment.

Asset conditions were not available for all horticultural features within the inventory. A comprehensive outlook for the plant material at each horticultural bed would be required to provide a more accurate estimate for replacement cost methodology.

Further review is required for the Forestry Equipment to ensure that all asset types and subtypes are accounted for. This includes incorporating equipment into the asset registry that has not been done yet, removing those that are no longer serviceable (i.e., a chainsaw that is past service life but functioning as a parts saw) and updating important data attributes within the database such as in-service date, replacement cost, useful life and more.

Table 8 below, provides a summary of assets excluded from this iteration of the plan due to limited information or assets managed by other service areas. For example, infrastructure assets such as retaining walls or fencing are excluded due to ongoing ownership issues; similarly, assets with incomplete inventories are excluded to maintain quality and reliability of the collected data. These assets will be considered and integrated into future plans when their data quality is deemed sufficient.

Table 8: Assets Excluded from this Asset Management Plan

Asset Class	Excluded Assets
Amenities	• Natural Ice Rinks • Toboggan Hills • Amenities owned by other entities (i.e. school boards, Region of Peel, etc.) • Seasonal Planters
Trails & Pedestrian Bridges	• Trails and Bridges owned and managed by Transportation & Works. Only those that are adjacent to, or part of a park, are included in this plan
Parks Equipment	• Major fleet and equipment that are owned and managed by Corporate Fleet • Assets with limited and unreliable attribute information

Infrastructure	• Assets with limited information and/or ownership issues:
	  ○ Retaining Walls
	  ○ Perimeter Fencing
	  ○ Stormwater Features
	  ○ Shoreline Treatments
	  ○ Gravel Parking Lots

Trees	• Assets in which ownership was not conclusive • Assets that are under warranty including developer installations
Boulevard Landscapes	• Boulevard Grass that is not owned by the City (e.g., tractor-cut areas) as they are managed under maintenance agreements with other external parties • Amended Boulevard Treatments that have not transitioned ownership to the City from developers • Bike Parking/Rings within Amended Boulevard Treatments
Natural Areas	• Non-Forested natural areas (e.g., Wetlands and Grassland)
Forestry Equipment	• Major fleet and equipment that are owned and managed by Corporate Fleet • Assets with limited and unreliable attribute information

Asset Risk

Park staff has identified risk management as a continuous improvement as they will begin to formalize and develop a framework in 2024. Staff prioritize assets by considering many factors such as the age, condition, location, usage and consequence of failure of the assets. Parks, Forestry & Environment staff will be working with the Corporate Asset Management (CAM) Office to develop comprehensive and reliable risk models so they can prioritize within, and across, various asset classes.
A qualitative risk rating was used for the Tree Asset Class following the methodology outlined in the ANSI A300 (Part 9)-2011 Tree Risk Assessment. The two-part matrix first shows the likelihood of failure with the likelihood of impacting targets as shown in **Table 9**. The second matrix assesses the likelihood of failure and impact derived from the first matrix against the perceived consequences, to determine a qualitative risk rating as shown in **Table**

Table 9: Matrix One - Likelihood of Failure & Impacting Service Level

Likelihood of Failure	Likelihood of Impacting Service Level			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Table 10: Matrix Two - Likelihood of Failure & Consequence

Likelihood of Failure and Impact	Consequences			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Very Low	Moderate	High	High
Somewhat Likely	Very Low	Low	Moderate	Moderate
Unlikely	Very Low	Very Low	Low	Low

Dashboards

The following dashboards provide a summary of the current state of the infrastructure by each Asset Class. Each dashboard includes a breakdown of the number of active assets, their age, estimated useful life, and replacement value by Asset Type. A summary of the assets' average condition is illustrated in each dashboard through graphs.

A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete and accurate key asset information is as it relates to supporting asset management decision making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

Asset Class: **Amenities**

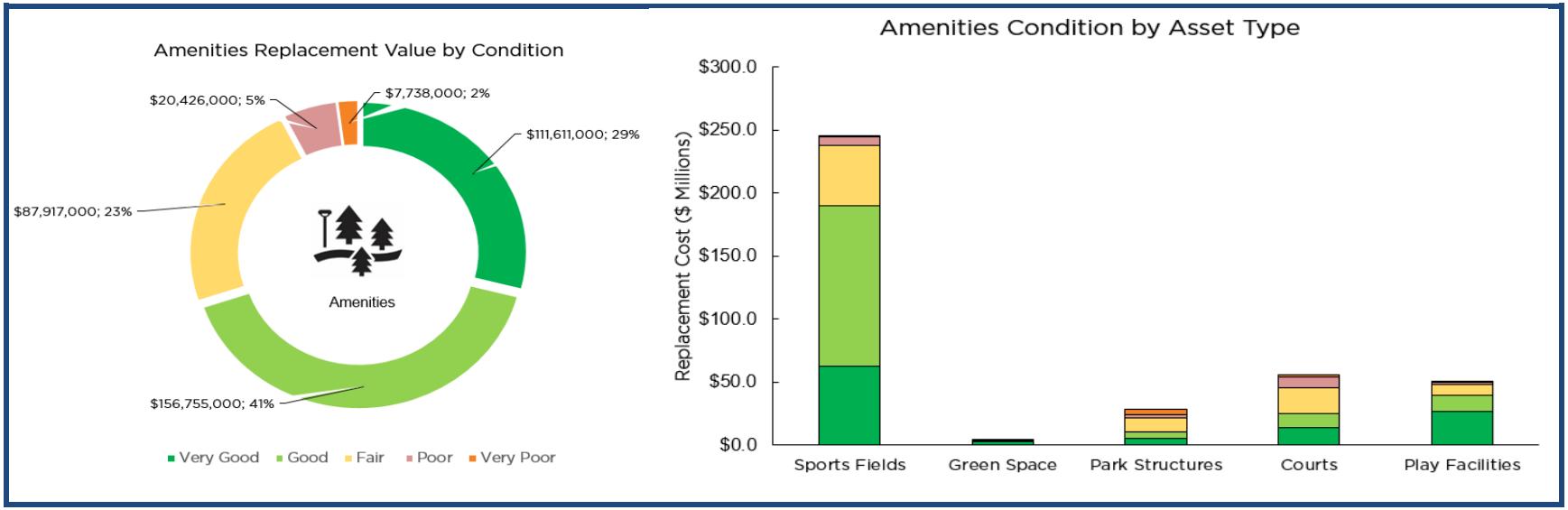
Replacement Value **$414.4 Million**

DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	A

Mississauga-Meadowvale Rotary Park

Asset Type	Assets Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Sports Fields	Baseball/Softball	126	Ea.	29	25	$118,024
	Cricket	9	Ea.	13	25	$10,790
	Football	3	Ea.	28	25	$6,069
	Soccer	210	Ea.	24	25	$105,532
	Track & Field	4	Ea.	25	25	$5,055
Green Space	Outdoor Fitness	32	Ea.	4	25	$3,040
	Leash Free Zone	8	Ea.	12	25	$640
Park Structures	Park Structures	123	Ea.	20	25	$28,712
Courts	Basketball/Multi-Pad	110	Ea.	19	25	$13,336
	Bocce	19	Ea.	19	25	$1,764
	BMX	4	Ea.	18	25	$2,163
	Lacrosse	2	Ea.	32	25	$850
	Lawn Bowling	4	Ea.	4	25	$670
	Multi-Ramp	9	Ea.	14	25	$3,418
	Tennis	148	Ea.	16	20	$32,278
	Volleyball	8	Ea.	9	25	$1,244
Play Facilities	Playground - Community	258	Ea.	14	25	$55,470
	Playground - All Inclusive	5	Ea.	11	25	$4,725
	Spray Pads	29	Ea.	13	20	$20,663


Amenities Replacement Value by Condition
$20,426,000; 5%
$7,738,000; 2%
$111,611,000; 29%
$87,917,000; 23%
Amenities
$156,755,000; 41%
Very Good
Good
Fair
Poor
Very Poor
Amenities Condition by Asset Type
Replacement Cost ($ Millions)
$300.0
$250.0
$200.0
$150.0
$100.0
$50.0
$0.0
Sports Fields
Green Space
Park Structures
Courts
Play Facilities

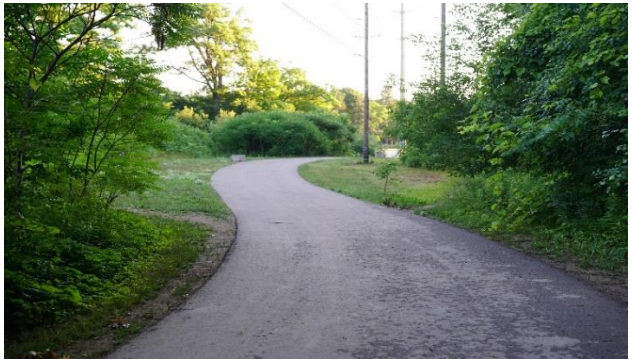
Asset Information

- Playground facilities are inspected on a monthly basis, in accordance with Canadian standard association (CSA) standards, regardless of the size or complexity of the assets; any major deficiencies that affect functionality, use or the safety of users are addressed immediately. Regardless of the condition of the playground facility, once it reaches its estimated useful life of 25 years, it is replaced. Staff will consider new technologies and accessibility requirements at the time of replacement
- An overall condition inspection is conducted annually for playground facilities to determine future capital needs
- Spray pads are inspected on a regular basis. Spray pad water does not need to be tested regularly as the water is not recirculated and goes to waste
- Sports fields, courts, and green spaces undergo comprehensive condition assessments every two to three years
- Staff perform regular visual checks on the park structures; with more formal condition assessments being conducted every three years. The next formal condition inspection is scheduled for 2024 for all park structures

Asset Class:	Trails & Pedestrian Bridges	Replacement Value	$178.3 Million

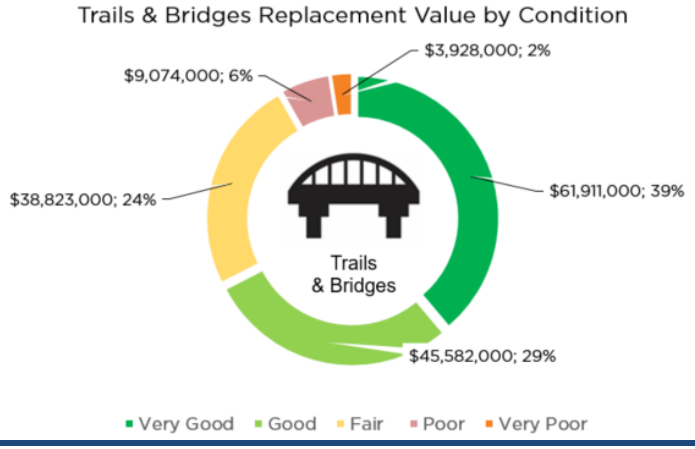
DATA QUALITY

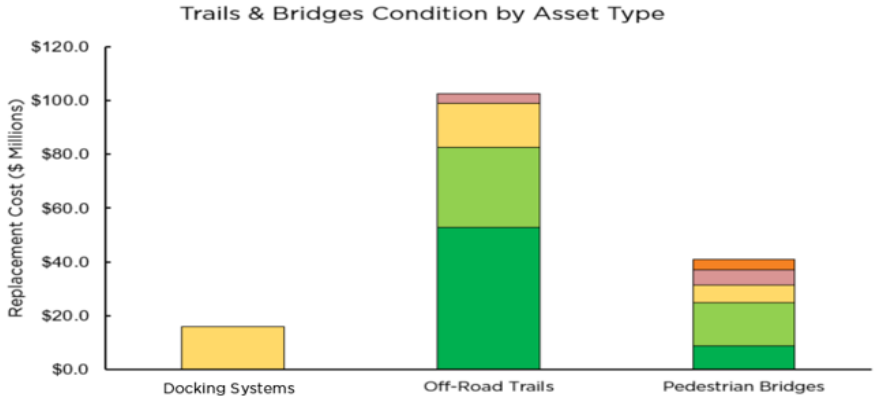
Asset Inventory	Condition	Replacement Value
A	B	A



Nine Creeks Trail

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Off-Road Trails	278	km	N/A	15	$121,529
Pedestrian Bridges	131	Ea.	18	30	$40,895
Docking Systems	10	Ea.	28	20	$15,925





Asset Information

- Park trails are assessed formally every three years, with the last assessment having been conducted in October 2020. Staff exclude certain trails from the condition assessment if they are under or around major construction at the time of the inspection. Trails receive a pavement quality index (PQI) that is in line with how road pavement is assessed
- Gravel or dirt trails are visually inspected by staff, on an ad-hoc basis. These assets are in a perpetual cycle of maintenance
- Pedestrian bridges are inspected every two years through the Ontario Structural Inspection Manual (OSIMs) studies and receive a condition rating. Park staff also regularly inspect the bridges to ensure that they are safe, accessible and reliable
- Docking systems are informally inspected on an ad-hoc basis, and mostly rely on an age-based condition to determine lifecycle intervention

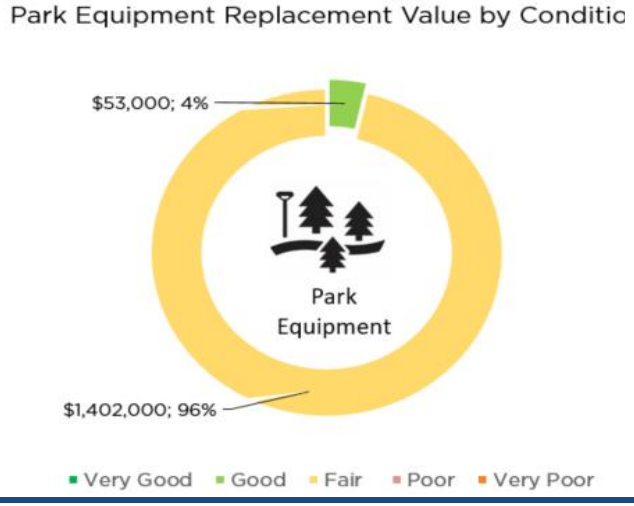
Asset Class:	Parks Equipment	Replacement Value	$1.6 Million

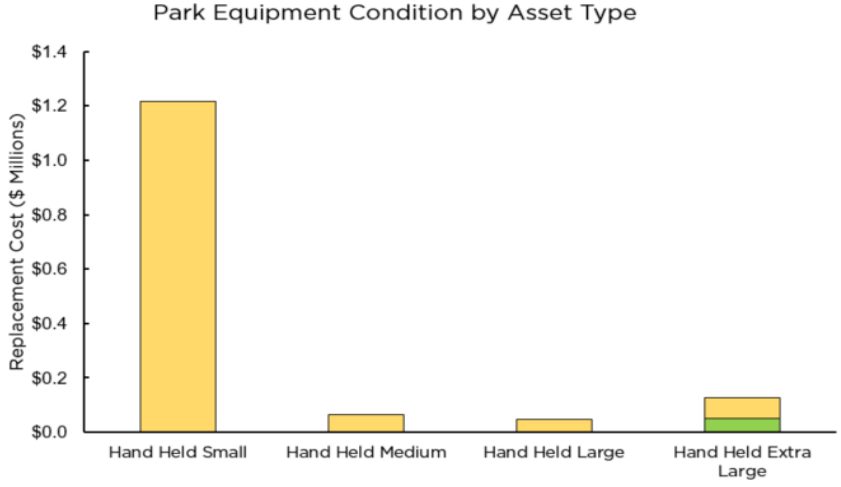
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	B

Maintenance at Mississauga Parks

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Small Hand-Held	774	Ea.	N/A	10	$1,374
Medium Hand-Held	54	Ea.	N/A	10	$63
Large Hand-Held	7	Ea.	N/A	10	$49
Extra Large Hand-Held	6	Ea.	N/A	10	$127





Asset Information

- Staff primarily utilize age-based condition assessments for the Parks equipment. Some considerations for asset usage, functionality and obsolescence are taken into account when staff are prioritizing replacements, but they are not reflected in the above condition ratings for the assets
- Where in-service date and age are missing, staff made educated estimates on the condition, with most assets being labelled as Fair

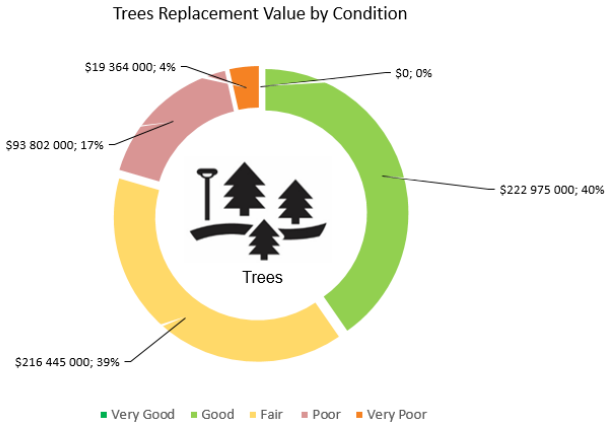
Asset Class:	Trees	Replacement Value	$552.6 Million

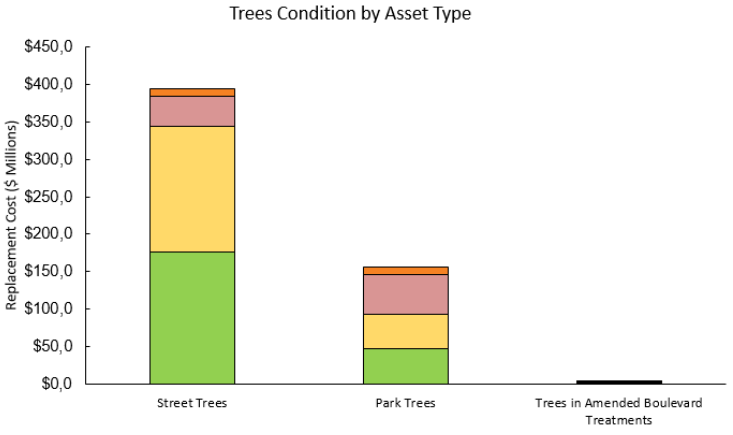
DATA QUALITY

Asset Inventory	Condition	Replacement Value
A	A	A

Street tree corridor on Prince of Wales Drive

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Street Trees	190,174	Ea.	33.6	30	$394,845
Park Trees	69,435	Ea.	29.7	60	$155,166
Trees in Amended Boulevard Treatments	491	Ea.	11.1	30	$2,576





Asset Information

- The tree inventory is updated on a seven-year rotation, and by Forestry staff on an as-needed basis. The tree inventory condition assessment was completed on a four-point scale, however, to remain consistent with Corporate Asset Management guidelines, it was converted into a five-point scale. Future iterations of the inventory will utilize a five-point scale to better reflect this practice
- Age data is largely incomplete as documented installation dates were only reliably available after 2018. A model was developed to approximate age of trees which factored species growth factors using their diameter as a proxy for age
- A Safe Useful Life Expectancy (SULE) model was developed to project the expected number of years that an asset can be expected to provide a desired level of service at an acceptable cost and level of risk
- Monetary replacement cost for living assets is a complex task. To determine an appropriate replacement cost, the Guide for Plant Appraisal (Ninth ed.) by the Council for Tree & Landscape Appraisers (CTLA) was used. Appraisal valuations considered the basic tree cost derived from the cost of the tree and the unit tree cost multiplied by the appraised trunk increase. This value was then multiplied by variables depreciating for species rating, location rating, and condition rating. When the appraised value was below the replacement cost, the value was adjusted to replacement cost to install a new tree

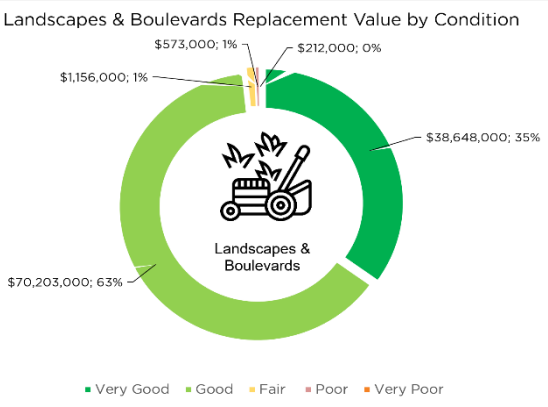
Asset Class:	Boulevard Landscapes	Replacement Value	$110.8 Million

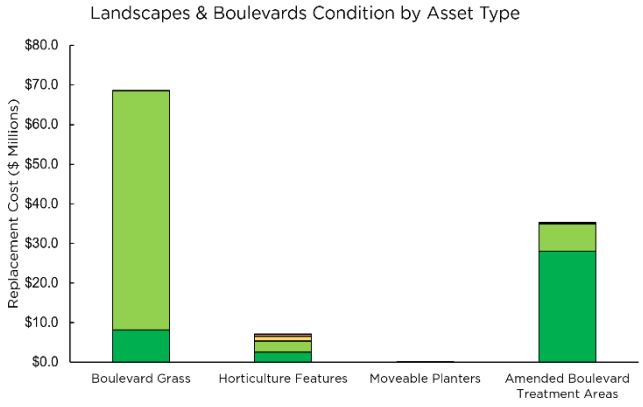
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	A

Horticultural Feature on Burnhamthorpe Rd W

Asset Type	Asset Sub-Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Boulevard Grass	N/A	244.9	Ha	N/A	N/A	$68,566
Horticulture Features	N/A	4.0	Ha	N/A	N/A	$7,019
Moveable Planters	N/A	28	Ea.	4	15	$26
Amended Boulevard Treatments	Soil Cells & Engineered Growing media	2.4	Ha	10.1	30-50	$31,840
	Civil Assets	1,832	Ea.	10.5	50	$3,340





Asset Information

- **Boulevard Grass**
  - Staff oversee the maintenance of approximately 244 hectares of grass cutting throughout the City. Areas are added or removed as required based on an established eligibility criteria. These assets are in a perpetual state of maintenance and undergo regular visual inspections aligned with the frequency of service
  - To estimate replacement value, staff calculate the costs associated with the removal of the existing grass, introducing new soil, laying the sod, applying initial fertilization, and maintaining consistent watering for a duration of 14 days to establish a healthy turf
- **Horticulture Features**
  - Visual inspections are conducted regularly by staff. Similar to Boulevard Grass, these assets have an annual maintenance requirement. If left unmaintained, these features degrade quickly as weeds and weather elements break down the horticultural display
  - Horticulture feature replacement costs are based on obtained quotations and consultation for services. Actual costs are highly variable depending on location constraints and plant material that is being installed
  - As the infrastructure that holds the horticulture features, such as concrete containers, is not owned or managed by Forestry, assessment is limited to the soil, plants, and trees
- **Seasonal Planters**
  - Staff maintain several seasonal planters used for horticultural displays. These seasonal planters can be transported across various locations City-wide. A majority of them are found along the Bus Rapid Transit (BRT) station network and at various transit facilities
  - Staff rely on age-based condition in the absence of physical condition assessments
- **Amended Boulevard Treatment Areas**
  - Staff rely on age-based condition in the absence of physical condition assessments. Planning & Building staff provided a detailed price matrix to reflect costs for the installation of amended boulevard treatments
  - Amended Boulevard Treatments are upgraded boulevard infrastructure throughout the City. Generally, amended boulevards are installed by developers as part of development there are numerous examples in which Park Development or Transportation & Works (T&W) have installed certain features. They are relatively costly to install and thus require a higher degree of attention. These asset types are typically unencumbered lands, free of utilities or other infrastructure, and typically feature soil cells, and engineered growing media. Although there may be multiple combinations, the primary installations include:
    - Soil Cells: in which an engineered infrastructure is installed into the boulevard and filled with soil. This infrastructure prevents soil compaction, which is common in dense urban areas, however it is the most expensive form of amended boulevard
    - Structural Soil: in which an engineered growing mixture, primarily mixed granular, is used which is more resistant to the impacts of compaction. However, without frequent soil amendments, it is the lowest quality for tree growth

- Amended soils: existing soils (often compacted or poor quality, i.e., shale) are replaced with a soil growing media suitable for tree growth. Often these environments (although not always) are associated with curbed planters to prevent compaction. This is the optimal environment for tree growth but most susceptible to impacts of tree compaction
- Streetscape installations associated with amended boulevard treatments fall in the purview of Forestry, these include:
    - Tree Guards
    - Tree Grates
    - Benches
    - Garbage Receptacles

Asset Class:	Natural Areas	Replacement Value	$268.3 Million

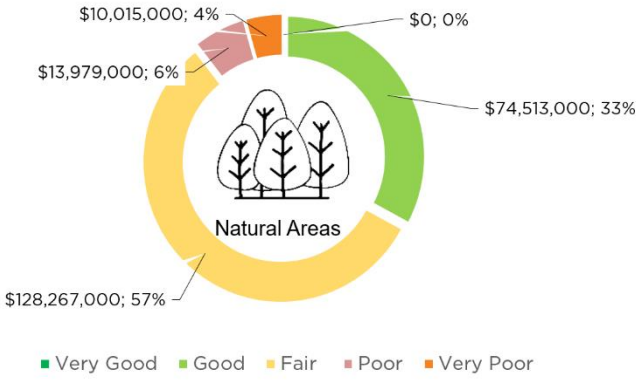
DATA QUALITY

Asset Inventory	Condition	Replacement Value
D	D	C

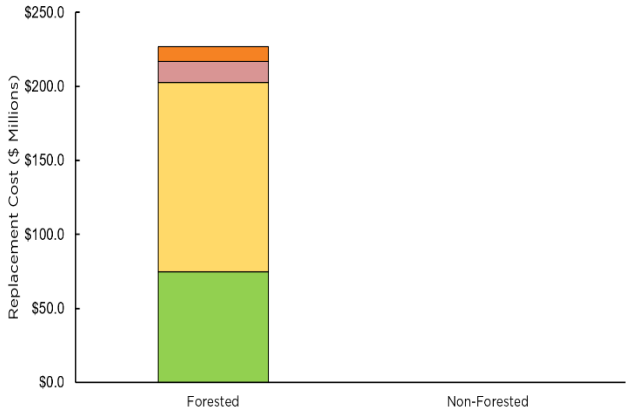
Britannia Woods

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Forested	848	Ha	80-120	N/A	$268,324
Non-Forested	N/A	Ea.	N/A	N/A	N/A

Natural Areas Replacement Value by Condition



Natural Areas Condition by Asset Type



Asset Information

- **Forested Area**
  - Forested areas include those lands that have a predominant land cover vegetated with trees. The underlying data source for this asset management plan is the 2022 forest inventory. Each forest area is provided an age-class, predominant species distribution, average basal area (indicator of density and for the purpose of asset management progress towards maturity). The amount of land area included in this analysis is 207.3 hectares of forested land. For the remaining forested areas an average value is generated using the representative samples from the forest inventory. A limitation of this analysis is that some of these other forested areas have diverse conditions unique from assessed woodlands including often small, limited access, steep slopes, ravine locations, and limited operational abilities. There is no industry standard approach to assess and calculate an overall condition rating, rather the CSA W218:23 Specification for Natural Asset Inventories provide guiding principles by defining minimum requirements for the development and reporting of a natural asset inventory. To get an accurate picture of the health of a woodland, five key criteria are assessed: overstory quality, dead tree abundance, overstory diversity, abundance of desirable tree regeneration and abundance of invasive plant species. Each criterion is rated on a five-point scale. The overall health of the forest is determined by calculating the average of the criteria scores
  - The replacement valuation method is based on the cost to restore each asset including natural/semi-natural forest, and plantation which constitute the forested asset type. The replacement value method estimates the cost of restoring a forest and adjusts it by a factor that reflects the time needed to recover the service levels of older forested areas. The restoration cost for each area is obtained by multiplying its area by the restoration cost per unit area. The adjustment factor is calculated by dividing the basal area of the inventory compartment by 5 m^2/ha. The basal area is a measured attribute from Mississauga's forest inventory. The adjustment factor increases the value of older compartments compared to younger ones
- **Non-Forested Area**
  - Non-forested areas are ecosystems that are not predominantly treed. They have a diverse array of functions and will be further assessed in future iterations of this plan. These non-forested areas can include, but are not limited to, grasslands and wetlands

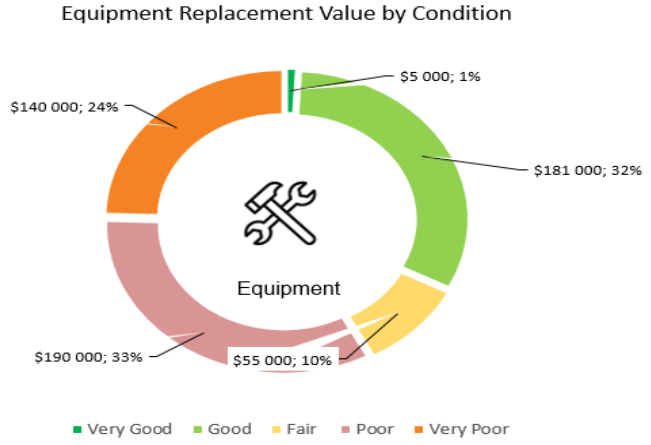
Asset Class:	Forestry Equipment	Replacement Value	$0.6 Million

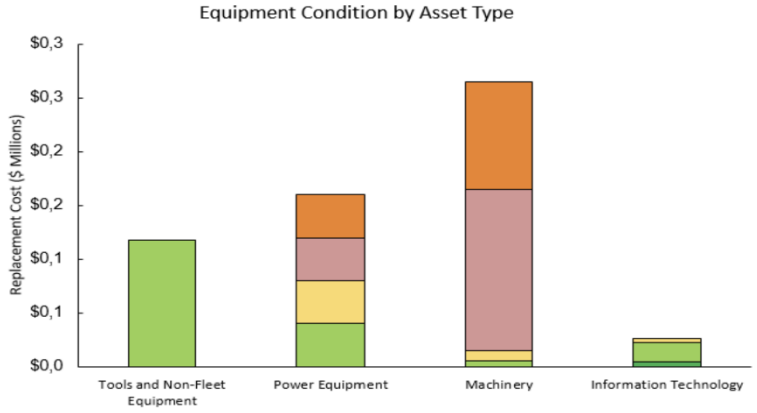
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	A

Forestry Arborist staff utilizing specialized tool

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value
Tools and Specialized Equipment	125	Ea.	7	1-10	$118,000
Power Equipment	100	Ea.	4	3-5	$160,000
Machinery	7	Ea.	12	10	$265,000
Information Technology	26	Ea.	3	4	$26,000





Asset Information

- **Tools and Specialized Equipment**
  - Forestry acquires highly specialized equipment important for completing tree work. Staff are provided with the equipment needed to operate safely in trees and aerial devices. There are manual tools and personal protective equipment (specialized) which are on a frequent replacement cycle due to their safety implications, frequency of use or other factors. These include:
    - Arborist Specialized Tools and Equipment
    - Manual Tools - Pole Pruners
    - Manual Tools - Hand Saws
    - Manual Tools - Ladder
    - Arborist Personal Protective Equipment (Chain saw pants, Chainsaw boots, gloves, eye protection)
  - Age-based condition is utilized for these assets
- **Power Equipment**
  - These assets include climbing chainsaws, speciality chainsaws, power pole saws, power blowers, string trimmers, and more
  - Age-based condition is utilized for these assets
- **Machinery**
  - Forestry owns several specialized machines outside of Corporate Fleet that enable specific tasks to be completed. These include:
    - Mini-skidsteer (S800TX)
    - Kubota Loader (B2320HSD w Auger & Tiller attachment)
    - Stumper (SC60TX & SG13)
    - Brush Mower
    - Good Rig Control System
  - Age-based condition is utilized for these assets
- **Information Technology**
  - Forestry owns tablets that are not owned or managed by Information Technology (IT) as they are considered secondary devices. IT provides an asset identification for the tablets, but the purchase, maintenance and replacement fall within the responsibility of Forestry
  - Age-based condition is utilized for these assets

Levels of Service

Levels of Service (LOS) is the intended target of service delivery provided to City of Mississauga residents. They should also be utilized as key drivers for making decisions and future investment in infrastructure assets. As such, LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its ratepayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations. Performance measures indicate what the customers and stakeholders experience from the service that is delivered.

The purpose of this section is to describe the LOS that are currently provided for the Parks, Forestry & Environment Service Area.

Table 11presents a summary of the approach to describe levels of service and performance measures. This is based on the International Infrastructure Management Manual (IIMM) which was written by a consortium of asset management professionals and is widely accepted as the guiding document to implement the ISO 55000 standard for infrastructure asset management.

Table 11: Level of Service Criteria

Concept	Definition
Levels of Service (LOS)	Specific objectives of the service the organization intends to deliver, from the customer point of view. LOS provide the link between higher level corporate and asset management objectives with more detailed technical and operational objectives.
LOS Attributes	LOS attributes of the overall service that are relevant and meaningful to stakeholders.
Performance Measures	Criteria that can be measured and provide an indication of how the organization is doing in delivering the intended LOS form performance measures. They can be defined as: Customer performance measures - measures describing how the customer receives or experiences the service. Technical performance measures - technical criteria the organization can measure to indicate how the service is being achieved.

Level of Service Methodology

City staff followed the approach described below to identify key LOS objectives and appropriate performance measures.

Identify Groups with Interest

Identify the groups with interest who are affected by the delivery of Parks, Forestry & Environment services. The groups with interest may use the service, rely on the service to provide their own service, regulate the service, depend on the service as part of their community service provision mandates, or connect to the service. Review recently completed studies feedback received for plans affecting the delivery of park services and amenities, such as Future Directions.

LOS Objectives and Attributes

Key expectations (LOS objective) are determined by city staff for each group with interest. One or more service attribute is identified for each expectation statement. It is important to note that it is reasonable that the same attribute would apply to more than one expectation.

LOS Measures

LOS measures identify appropriate measurement for an attribute and describe how well the City is delivering that service attribute (e.g., how safe/reliable/affordable the service is). A useful LOS measure is quantitative and facilitates the development of "SMART" performance targets (that is, performance targets that are Specific, Measurable, Achievable, Relevant, and Time-bound).

LOS measures can be grouped into the following categories:

- **Technical LOS measures: Specific and quantifiable** technical criteria the organization can measure to indicate how the service is being achieved
- **Customer LOS measures: Non-technical** measures define how the customer receives or experiences the service

Current Performance

The LOS measures provided are predominantly from an asset planning and an operational perspective. After review from City staff, there is potential for additional LOS measures in future Asset Management plans.

Forestry has a distinct set of LOS measures for the range of services provided that align with the Strategic Plan, the Natural Heritage & Urban Forest Strategy, and the Urban Forest Management Plan.

Parks & Forestry LOS

Ontario Regulation 588/17 provides customer and technical measures for core services. The Parks, Forestry & Environment Service Area has established its own measures for its assets as shown in **Table** and **Table** This is not a comprehensive list, but some of the primary LOS measures are identified below.

Table 12: Community Levels of Service Framework

LOS Attribute	LOS Objective	Performance Measure	Current Performance
Scope	To ensure assets support the delivery of Parks services.	Pedestrian Bridges –Description of the traffic that is supported by the structures.	Park bridges support pedestrians, cyclists and other users.
		Park Facilities – Description of their distribution throughout the city. Following the Future Directions.	Example – Walkability to Parks Playsites (See Figure 4).
	To ensure assets support the delivery of Forestry services and health of the natural environment and the community.	Forestry Assets – Description of the location and quantity of Forestry assets.	Example – Boulevard Landscapes and Tree Asset Network (See Figures 5 & 6).
Quality	To ensure efficient and well-maintained infrastructure that supports the wellbeing of the community.	Pedestrian Bridges – Description of the condition of structures and impact on use.	Bridges undergo biennial condition assessments and receive an overall Bridge Condition Index (BCI) that ranges from 0-100.
		Park Facilities – Description of the inspection process and lifecycle activities conducted to ensure state of good repair (SOGR).	Assets undergo inspection on a regular basis, with more critical assets having a greater frequency. Staff strive to maintain, rehabilitate and replace assets proactively, depending on the criticality, age and condition.
	To ensure well-maintained green infrastructure that supports the health of the natural environment and the community.	Forestry Assets – Description of the condition of assets.	Example – Tree Quality Map (See Figure 6).
Affordability	Parks services are maintained cost-effectively and are affordable to users.	Park Facilities – Description of Service Level Agreements and standard operating procedures.	Parks staff adhere to established service level agreements and operating procedures.

LOS Attribute	LOS Objective	Performance Measure	Current Performance
	Forestry services are delivered in a cost-effective manner.	Forestry Assets – Description of Service Level Agreements and standard operating procedures.	Forestry has service level agreements with many groups including the public that specifies the timing of various life cycle activities. Example – Forestry Inspections has 30 business days to complete inspections for non-emergency requests.
Reliability	Forestry services are reliable and available when required.	Forestry Assets – Description of the lifecycle maintenance activities to ensure assets are in a state of good repair.	Assets are maintained on a scheduled maintenance cycle that adheres to best practices.

Table 13: Technical Levels of Service Framework

LOS Attribute	LOS Objective	Performance Measure	Current Performance
Scope	To ensure assets support the delivery of Parks services.	Pedestrian Bridges – Per cent of structures with loading or dimensional restrictions.	0%
	To ensure assets support the delivery of Forestry services and health of the natural environment and the community.	Forestry Assets – Number of trees as a percentage of total plantable area of municipality.	Future Metric
		Forestry Assets – Number of hectares of boulevard landscapes as a percentage of total hectares of road allowance in Mississauga.	Boulevard Landscapes: 2.1%
		Forestry Assets – Number of hectares of natural areas as a percentage of available parkland in Mississauga.	Future Metric
Quality	To ensure efficient and well-maintained infrastructure that supports the wellbeing of the community and the health of the natural environment.	Pedestrian Bridges – Average bridge condition index (BCI).	71%
		Park and Forestry Assets – Per cent of assets in fair or better condition.	Amenities: 95% Trails & Bridges: 91% Trees: 76% Boulevard Landscapes: 99% Natural Areas: N/A
Affordability	Parks & Forestry services are delivered cost-effectively and are affordable to users.	Park and Forestry Assets – Operating & Maintenance costs spent.	Amenities: $29 per capita Trails & Bridges: $0.3 per capita Trees: $24 per tree Boulevard Landscapes: $11,000 per hectare Natural Areas: $1,300 per hectare

LOS Attribute	LOS Objective	Performance Measure	Current Performance
		Park and Forestry Assets – Actual vs. Target Reinvestment Rate.	Amenities: 2.9% vs 3.9% Trails & Bridges: 3.7% vs 5.6% Trees: 0.4% vs 1.4% Natural Areas 0.1% vs 0.4%
Reliability	Parks services are reliable and available at all necessary times.	Park Facilities – Per cent of assets with risk rating of high/very high.	Future Metric
		Park Facilities – Per cent compliance with scheduled preventative maintenance within established SLA timelines.	Future Metric
		Park Facilities – Per cent of Environics survey results with satisfied/very satisfied with park services.	84%
	Forestry services are reliable and available when required.	Forestry Assets – Per cent of emergency maintenance completed within established SLA timelines.	84%
		Forestry Assets – Per cent of routine maintenance completed within established SLA timelines.	67%
		Forestry Assets – Per cent compliance within established SLA timelines.	Urban Forestry 76% within SLA
		Forestry Assets – Number of participants as a percentage of total participant spaces available.	Future Metric

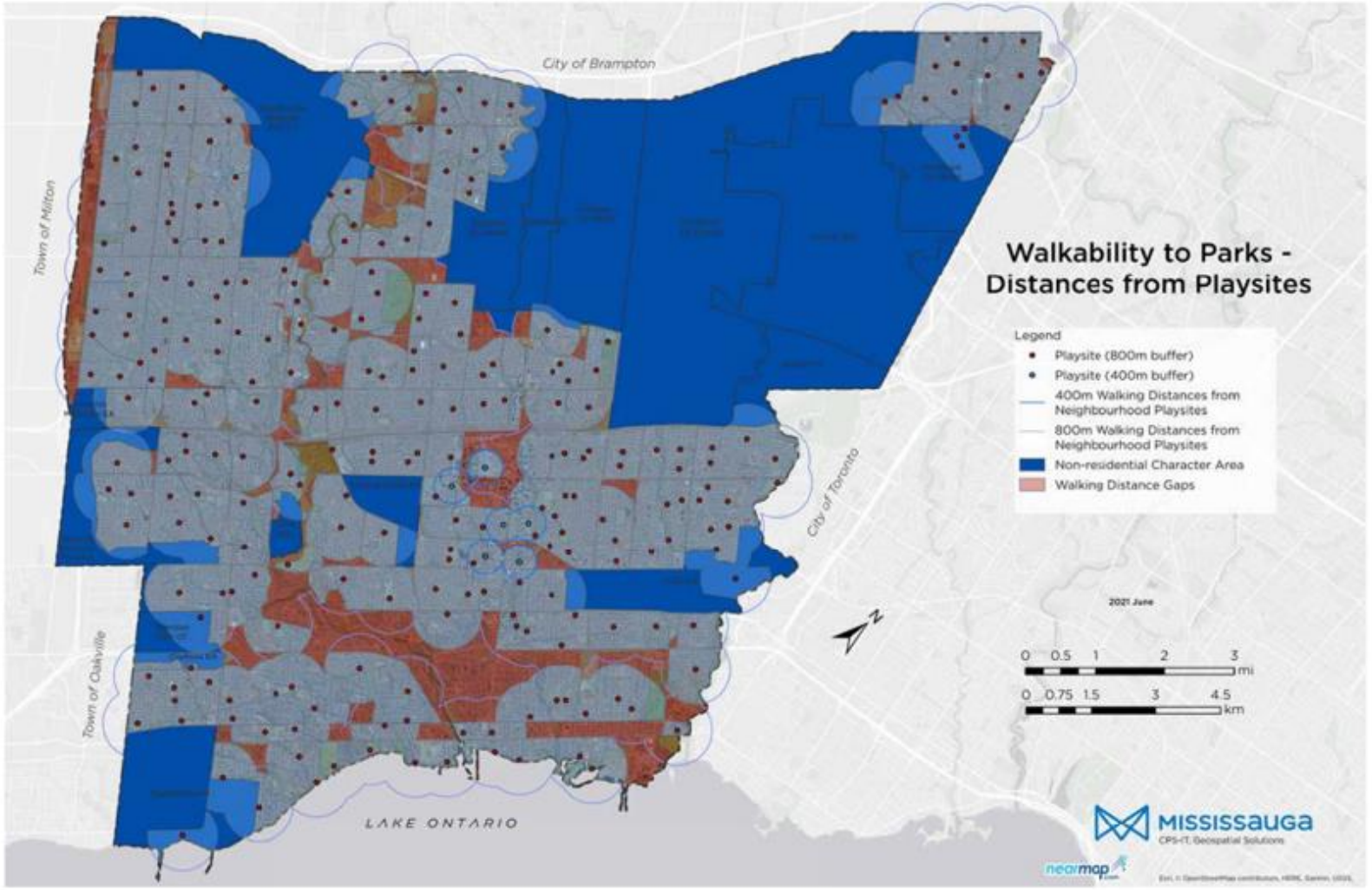


Figure 3: Walkability to Parks – Playsite Distance Map (Future Directions)

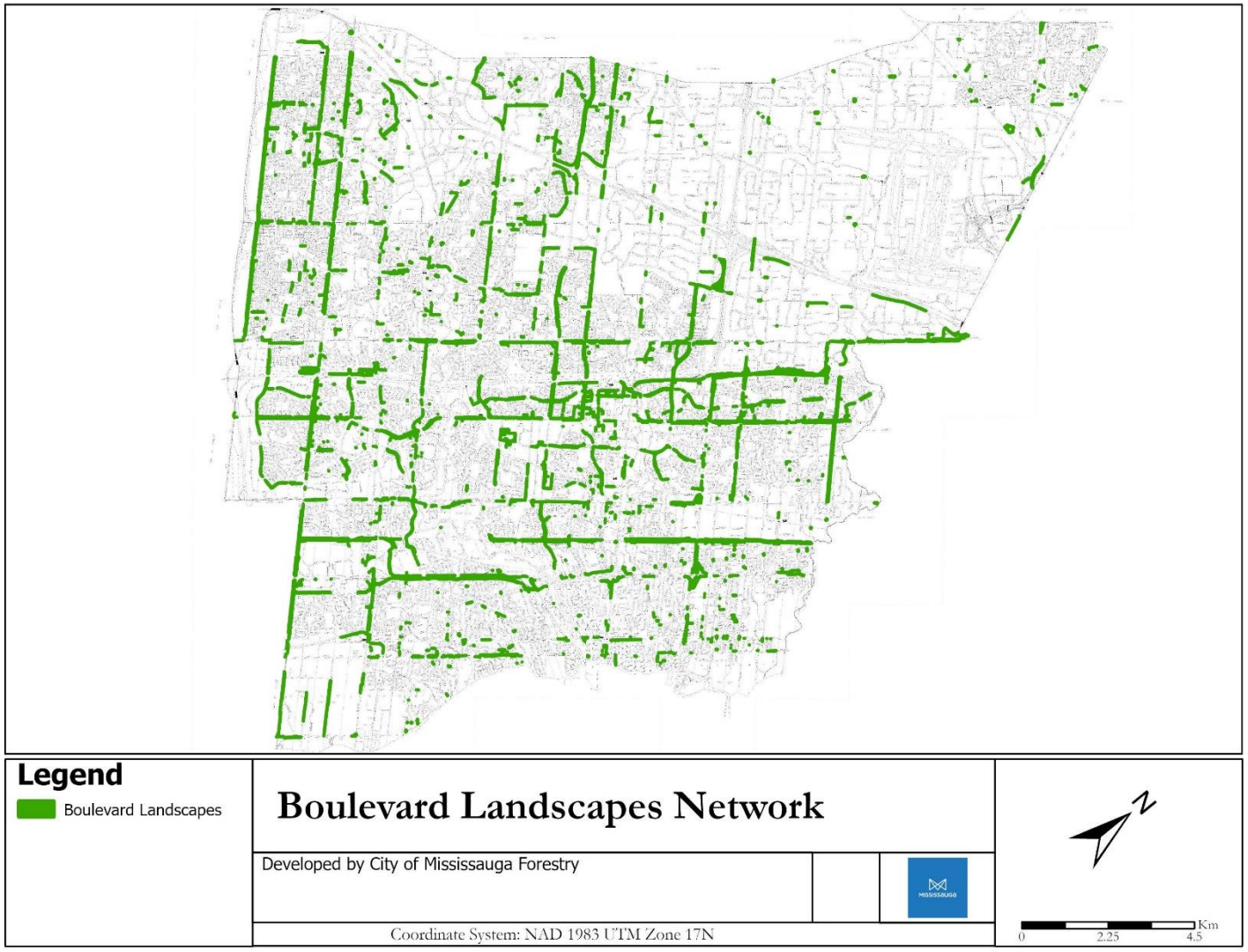


Figure 4: Boulevard Landscapes Network

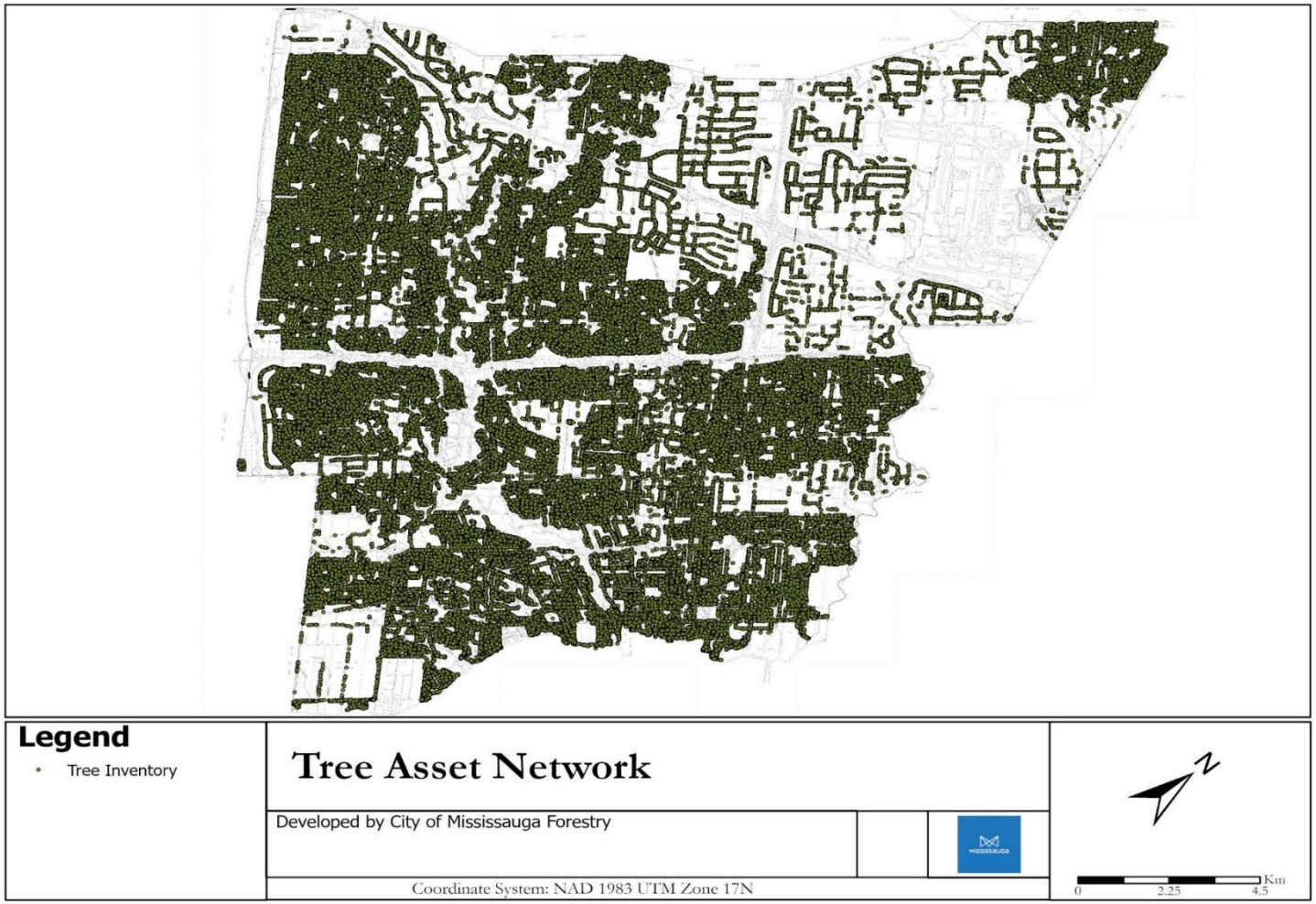


Figure 5: Tree Asset Network

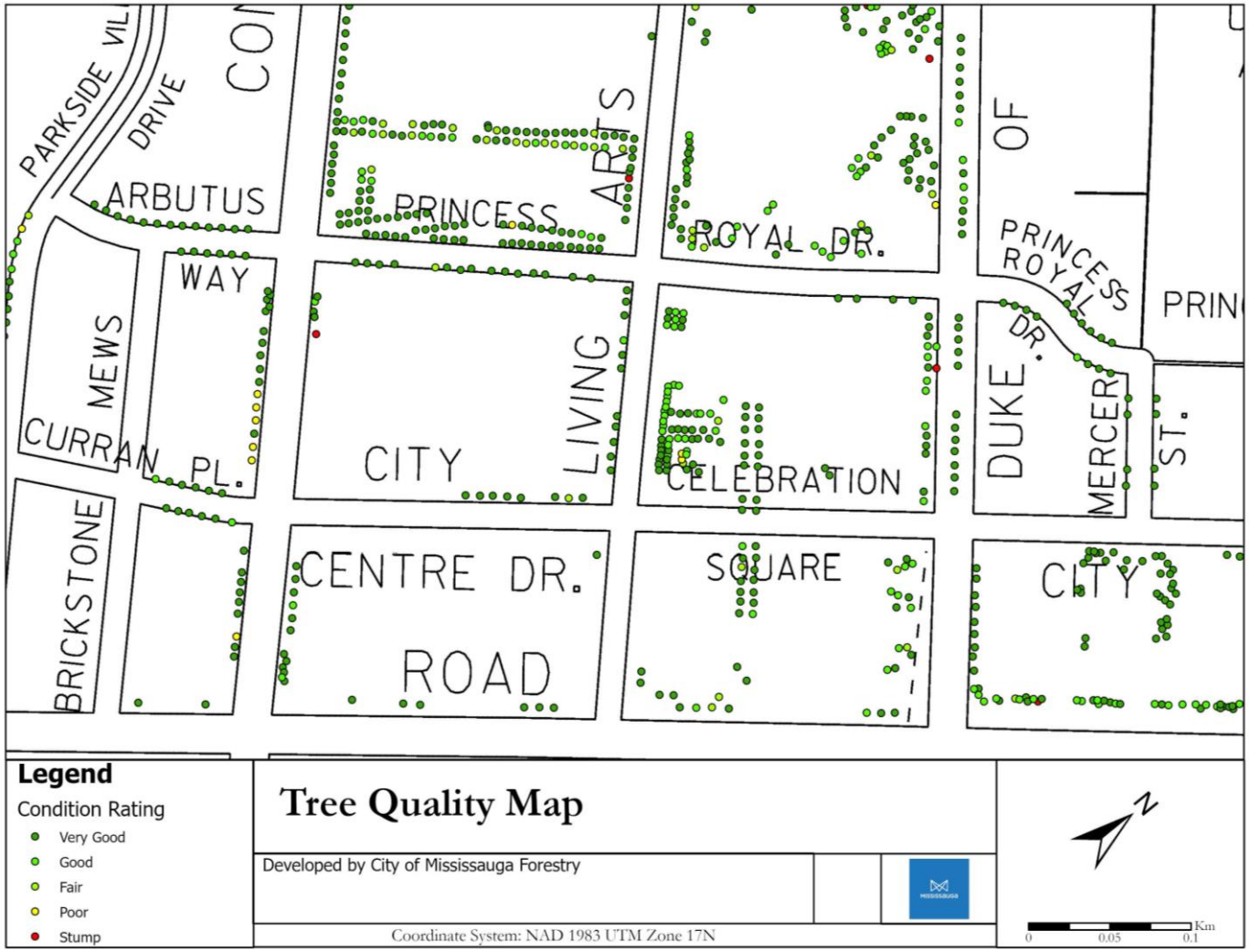


Figure 6: Tree Quality Map

Future Demand

The City places significant emphasis on assessing the present and future needs of its Park System, Urban Forest & Natural Heritage System, all of which are crucial elements in the City's overall health. They facilitate a wide range of recreational, cultural and leisure activities while embracing vibrant urban spaces, multi-use trail systems and significant natural habitats. The City's Parks, Forestry & Environment Division envisions that these spaces function as integral components that enrich the quality of life for its residents.

To ensure a sustainable future for the City's Parks Systems, Urban Forest & Natural Heritage System, proactive planning for potential challenges posed by a suite of demand drivers expected to impact these areas are outlined in **Table** These include abiotic forces such as increased stress and damage from extreme weather events, biotic forces such as the spread of invasive non-native species, changes in technology and increased development and population growth.

This section outlines the current position in light of these demand drivers, projected changes, impacts on services and how to best plan for the demand.

Demand Drivers

Drivers affecting demand include things such as changes to development form and density, regulations and legislation, technological changes, economic factors, environmental awareness and the direct impact of climate change on forestry assets and infrastructure. A summary of the primary internal and external drivers that affect demand for Parks, Forestry & Environment services are summarized in **Table** below. Note this list is not exhaustive.

Urban Canopy over Dr. Martin L. Dobkin Community Park

Paul Coffey Park

Table 14: Demand Drivers for Parks, Forestry & Environment Services

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Asset Management Planning	Asset Management is a relatively new concept for Ontario Municipalities. Ontario Municipalities are required to develop an asset management plan for non-core infrastructure by 2024.	Effective asset management planning is expected to become standard practice at the City within the next few years.	Effective asset management planning should allow the City to make effective, risk-based decisions. The asset management plan includes inspection programs and maintenance strategies to identify problems and intervene at the right times to fund rehabilitation and replacement works. This will result in cost-effective spending on the right assets at the right time to maximize an asset's useful service life.	Continue to implement asset management principles and procedures and identify/ document continuous improvements through updated maturity assessments. Other initiatives for the Parks, Forestry & Environment section include improvements to data, software, training, and asset condition assessments to support effective programs, services and the development of better asset management plans and strategies.
Demographic & Population Changes	With the population and demography of the City of Mississauga constantly evolving, so do the demands and service level needs of the public. For example, demand for outdoor sports fields, courts, cricket pitches, and un-programmed spaces is	Staff evaluate service level provisions through regular public engagements, service requests, the Parks Plan, and by conducting a Parks, Forestry and Environment Future Directions plan review every four years. Considerations are made for the size, location and usage rate of park amenities when	To meet the demands or needs of the public with regards to appropriate and sustainable service level provisions, puts pressure on the City from an operational, economic and regulatory perspective. This is especially the case for growing requests such as maintaining parks and trails during the winter as that will require increased capital and/or operating budget to achieve.	Staff quantify the costs and risks associated with enhancing or modifying the types of services they maintain through their asset management plans, master plans and capital projects. Staff acquire or construct new assets to meet demands; expand the hours of sports courts and other park amenities to accommodate demand; Increase winter maintenance budget to

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	increasing. Demand for the winter use of park amenities and trails is also increasing.	determining the feasibility of service improvements (e.g., installing lighting at appropriate venues, expanding the scale of spray pads at destination-type or waterfront park developments, maintaining trails and pedestrian bridges in the winter).		account for off-road trails and pedestrian bridges that remain open in the winter.
Technological Advancements	New technologies and techniques are constantly being developed, and staff evaluate and take advantage of these advancements when feasible.	Newer technologies provide more opportunities and competition, thereby allowing staff to diversify their lifecycle interventions.	The ever-changing technological landscape puts pressure on Parks & Forestry's limited budget and staff resources. Staff try to adapt and utilize best industry practice, tools, and techniques in order to manage their assets effectively and sustain desired service levels.	Conduct regular cost benefit analyses of new technology and potential service enhancements. Monitor changes to available renewal technologies and communicate with other municipalities to discuss changes in industry best practice.
Climate Change & Extreme	With the frequency and intensity of extreme weather changes increasing year after year, staff are challenged to maintain their levels of service and assets adequately.	There are numerous changes predicted by mid-century, including, but not limited to, increases in temperature by approximately 3.4°C. The frequency of 1 in 100-year extreme	An increase in extreme heat can lead to dry-out of the park fields. It can also lead to quicker disintegration of asphalt and/or rubber court surfaces. An increase in extreme heat leads to increased stress on trees	Staff evaluate different mitigation and adaptation strategies and conduct cost-benefit analyses to determine the best lifecycle interventions during the acquisition, maintenance, rehabilitation, replacement, or even disposal of assets.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Weather Changes[2]	Extreme heat or drought events affect the usage of play facilities and outdoor sports fields, further exacerbated by the urban heat island (UHI) effect[3]. They can also lead to the premature expiration of natural assets. Increased rainfall events can lead to more flooding and shutdown of amenities. Extreme wind events create a health and safety risk for operational staff as well as the Public.	rainfall and overland flooding events is expected to be three times more likely. The frequency of freezing rain events for the typically coldest months could increase in southwestern and south-central Ontario by the 2050s. High wind events can cause tree limbs and woody debris to fall, which can accumulate in watercourses, damage infrastructure, property, or people and can reduce vitality of tree.	leading to reduced growth and vulnerability to pests and disease. Road salt is applied to roadways to mitigate freezing rain events, and as a result, impacts urban trees through salt spray on bark and foliage as well as infiltrating urban boulevards. This affects salinity, ultimately reducing the expected useful life of urban trees. Decline in overall tree health and vigour impacts the ability of the urban forest to provide essential ecosystem services.	Staff conduct climate change vulnerability assessments to better understand climate change hazards and their risks to Parks & Forestry services. Forestry staff select more resilient species of hardy trees to plant, that are better able to withstand the stressors of growing in urban environments. Strengthen tree maintenance and pruning schedules to ensure health and safety of the urban forest. Increased importance of tree establishment and protection practices to ensure that trees can become self resilient, structurally developed and protected from damage so that they are best prepared to withstand the impacts of a changing climate.

[2] Climate Risk Institute (CRI), Emmons & Olivier Resources Inc. (EOR), Nodelcorp, and Climalogik. 2023. Climate Change Risk and Adaptation Assessment for Asset Management. Prepared for the City of Mississauga, Ontario.
[3] Urban heat island (UHI) is a phenomenon characterized by higher temperatures in urban areas compared to their surrounding areas. This temperature difference is primarily attributed to human activities, such as the extensive use of impervious surfaces, buildings, and heat-generating infrastructure, which absorb and re-radiate solar energy, leading to elevated urban temperatures.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
City Growth & Development	With continued population growth and intensification in Mississauga, the city will require additional outdoor recreation facilities to meet demand and service levels. Majority of areas within the city limits have been developed. Continued growth will result in pressures on the Urban Forest & Natural Heritage System.	Park redevelopments and additional parkland will be required to meet the demand created by new growth and additional population. New legislation and changes to the *Planning Act* further limit the City's ability to provide additional parkland. Future growth will result in more pressures on the Urban Forest & Natural Heritage System. Due to space constraints and overlapping development pressures, more soil cells and engineered growing media are expected to be installed.	New parkland and facilities will require additional staffing, operating resources and future capital rehabilitation and replacement requirements. Forestry assets will require additional staffing, operating resources and future capital rehabilitation and replacement requirements.	New assets will need to be added to the inventory registry and included in condition assessment programs for monitoring and future replacement needs. Targeted expansion of the Urban Forest & Natural Heritage System in high priority areas. The maintenance of trees and the restoration of natural areas will need to be strengthened.
Limited supply of available contractors	The City relies on a limited supply of available contractors to complete its work on the Urban Forest & Natural Heritage System.	The City will continue to be reliant on contractors to complete services pertaining to the management of the Urban Forest & Natural Heritage System.	Additional staffing, operating and capital resources will be required to maintain the Urban Forest & Natural Heritage System as costs increase overtime.	The need for, and importance of, the development of strong asset management and lifecycle management strategies to ensure funding and capacity is available when needed.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions – Expansion/Rebuild/New
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)
Operations & Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Renewal & Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Error! Not a valid bookmark self-reference. provides a summary of the different strategies and actions that staff employ for their applicable lifecycle activities along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 15: Current Lifecycle Management Activities for Parks, Forestry & Environment

LifecycleActivity	Lifecycle Strategies	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Parks, Forestry & Environment Standard Operating Procedures are updated annually • Natural Heritage & Urban Forest Strategy • Urban Forestry Management Plan • Invasive Species Management Plan • Training courses are facilitated to foster cultural change • Parks, Forestry & Environment Service Level Agreements (SLAs) are established and reviewed when needed • City staff are available to respond and attend to customer requests (24/7 on call coverage for emergency forestry requests)	• Asset life is not extended or cost of managing an asset increases rather than decreases • Facility closures • Loss of revenue • Not adhering to established service level agreements may results in shorter asset life, worsening quality, public distrust in business unit, exposure to claims, injury/lawsuit

LifecycleActivity	Lifecycle Strategies	Risks Associated with Lifecycle Activities
Operations & Maintenance	• Playgrounds are inspected monthly in alignment with CSA standards • Park assets undergo staff visual inspections on a regular basis • Annual playground capital inspections are performed by playground practitioners for condition assessments and replacement timing • Trail condition inspections are done by an external consultant/engineer every three years • Bridges condition inspections are done by an external consultant/engineer every two years • All other play facilities, sports fields, courts have a condition assessment every three years • Litter pickup once a week • In soccer fields, cricket fields and baseball diamonds, grass is cut three times a week • Over seeding, top dressing and sodding is done once a year or as required for soccer fields, cricket fields and baseball diamonds • Annual maintenance filling of potholes and grading of gravel trails • Paved trails are repaved every 15 years • Scheduled tree inspection every seven years • Scheduled preventative tree pruning every seven years • Seasonal cleanup, aeration, fertilization, mulching, and filling in displays • Annual inspection of streetscape features and maintenance as required	• Insufficient resources available to complete a series of unplanned, urgent work requests that are submitted in close succession • Unable to complete planned maintenance activities while managing reactive maintenance activities • Premature asset failure due to incorrectly planned maintenance activities • Emergency or unscheduled closures result in much higher replacement costs • Loss of reputation/public perception • Facility closures • Loss of revenues • Injury/lawsuits • If there are no monthly inspection there could be a risk to health and safety

LifecycleActivity	Lifecycle Strategies	Risks Associated with Lifecycle Activities
Renewal/Rehabilitation	• Replacing or rehabilitating components of an asset instead of complete replacement • Grinding and capping of an asphalt trail as needed • Replacing carpet on artificial turf fields as needed based on condition assessments • Structural reinforcement and decking replacement on a bridge • Natural areas are typically renewed through capital projects particularly for invasive species management • Repairing of defective forestry equipment to maintain equipment life	• Incorrect assumptions regarding expected useful life after rehabilitation • Deferral cost of not rehabilitating items on schedule • Degradation of natural asset • Facility closures • Loss of revenue • Injury/lawsuits

Replacement	• Asset condition and age are monitored through the course of its' life, but in general, asset are replaced as follows:
	  ○ Replace playgrounds every 25 years
	  ○ Replace full park shelters every 20 years
	  ○ Replace the entire bridge structure every 30-50 years
	  ○ Artificial turf fields are replaced every 10-12 years
	  ○ Synthetic track surface is replaced every seven years
	• Forestry assets are replaced at scheduled end of service life
		• Facility closures
		• Loss of service
		• Loss of reputation
		• Loss of revenue
		• Injury/lawsuits

Expansion/Rebuild/New	• New and expanded assets are reviewed and prioritized within master plans and are funded through development charges • New assets are reviewed and selected to best suit the location to achieve success. This can include new trees, boulevard landscapes, natural areas, equipment etc.	• Asset failure as a reflection of incorrect asset size, environmental tolerance, cultural tolerance etc. • Service is prematurely expanded • The ability to afford, operate and maintain any future assets

Lifecycle Needs vs. Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations
- The costs of any non-asset solutions, acquisition/expansions/rebuilds, and operations & maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of 2022-2025 Operating Budget and assuming year four as annual budget for years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Land acquisitions and related studies
    - Overhead costs

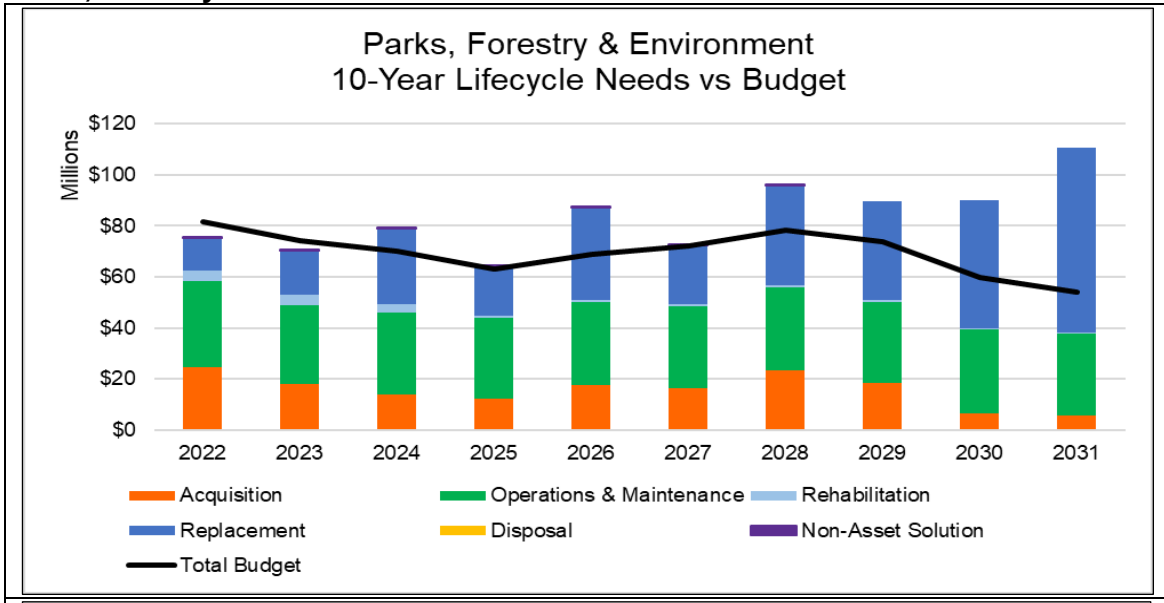
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

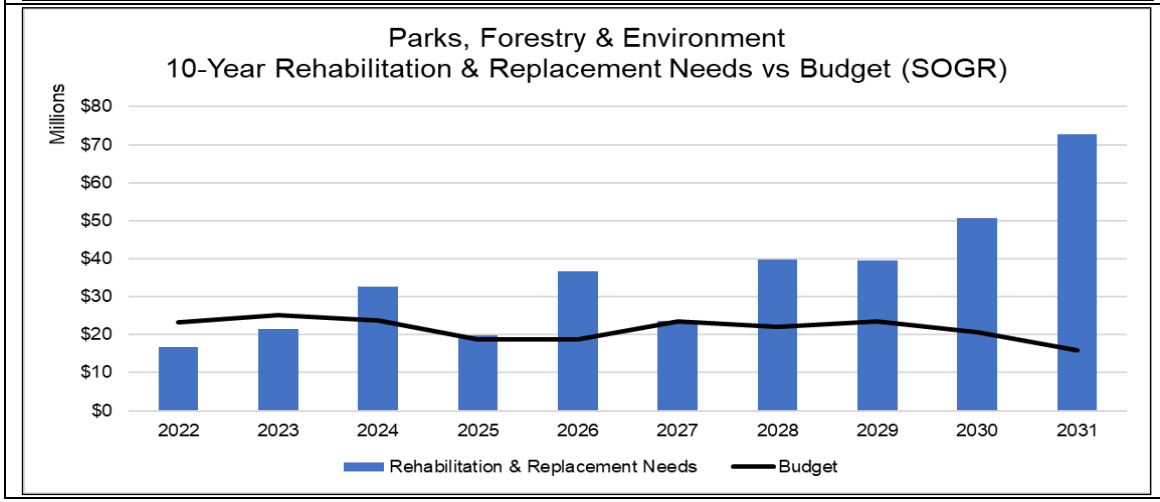
To illustrate the 10-year forecast, two graphs have been created by the Parks, Forestry & Environment Service Area and by each asset class in this section:

- Lifecycle Needs vs. Budget Graph
- Rehabilitation & Replacement Needs vs. Budget (State of Good Repair[4]) Graph

[4] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.

Parks, Forestry & Environment

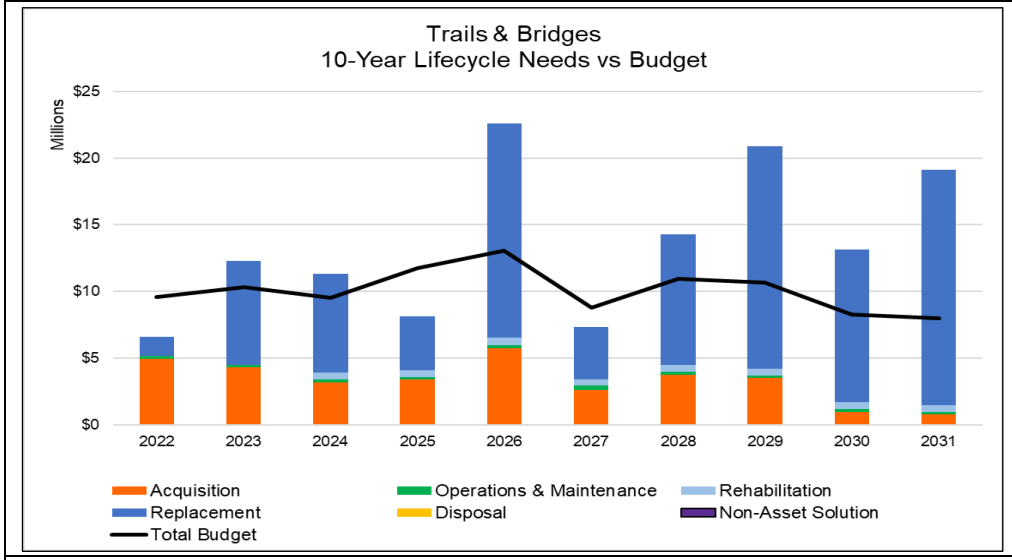


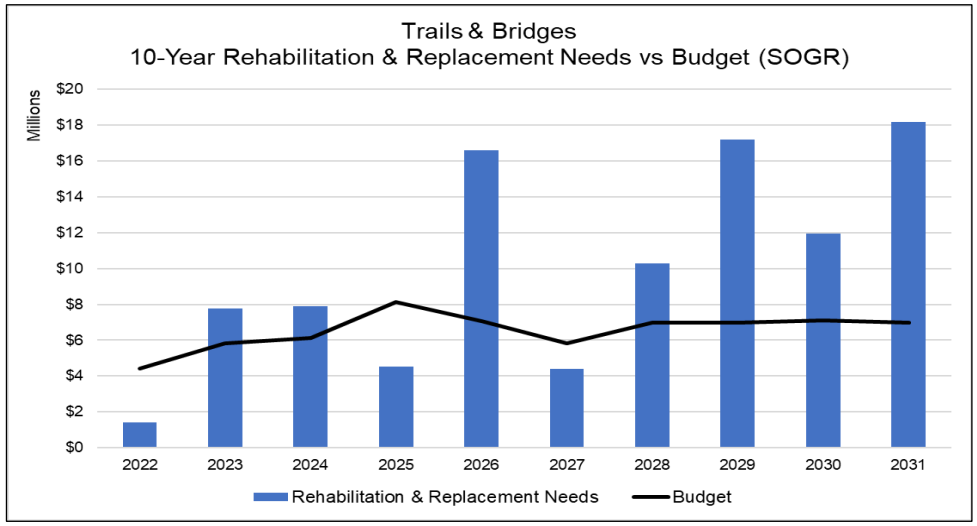


Lifecycle Cost Summaries are derived from the operating and capital budget and forecasts. It is prepared at the service area level and depicts the investment requirements by the lifecycle-planned activities (e.g.,. non-asset solutions) for the service area.

Operations and Maintenance is primarily funded through the operating budget.

Trails & Bridges



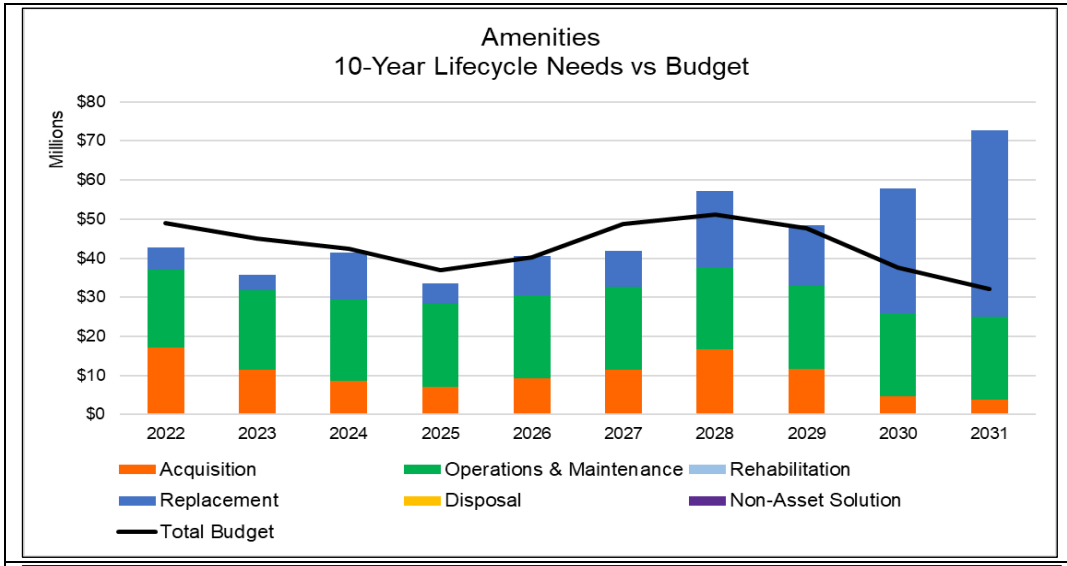


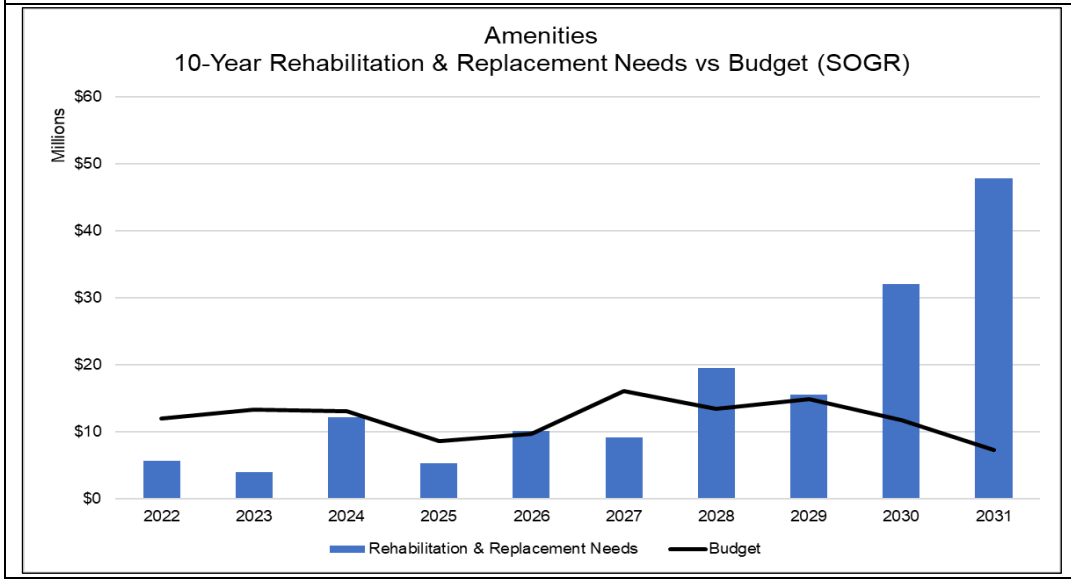
The graph shows peaks in 2026 and 2029 which indicates major rehabilitation and replacements that will need to be done to bridges (an example would be the bridges in Applewood Hills) and in trails around the city.

The majority of trails will require major renewals at the end of this 10-year cycle, with many needing replacements in 2026, 2029 and 2031.

It is important to note that costs have grown significantly since 2022 and budgets have remained static. These figures are in 2022 dollars.

Amenities



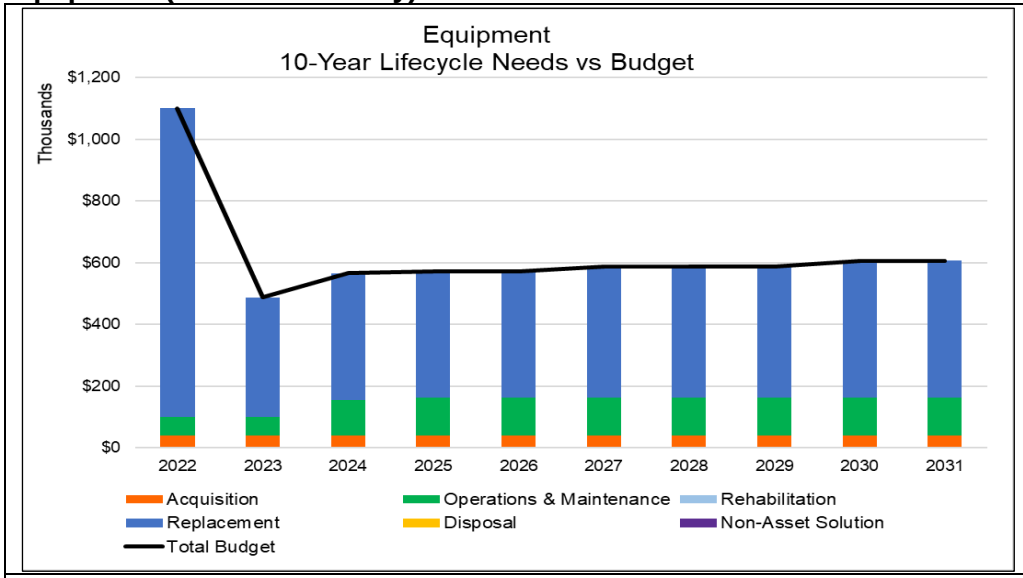


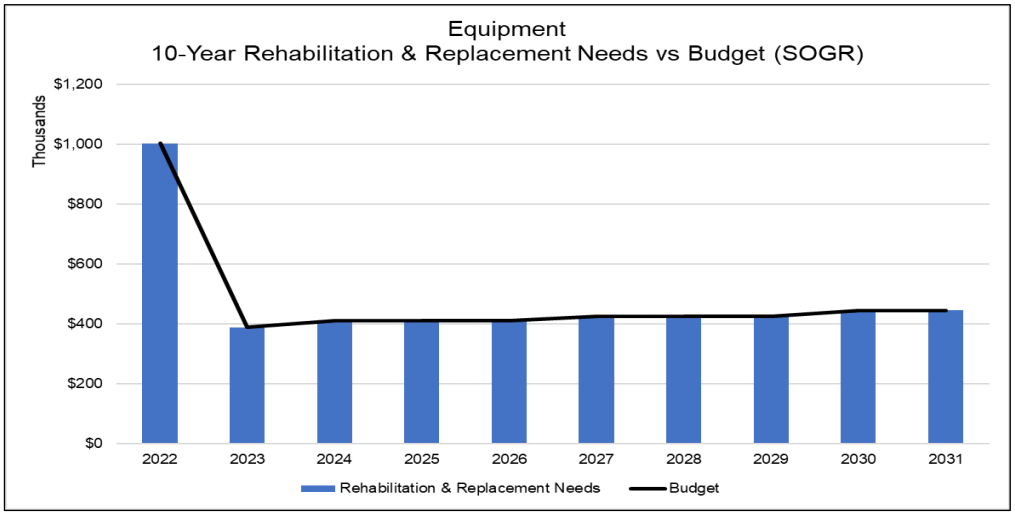
Park amenity replacement needs grow near the end of the 10-year plan.
Projects are coordinated with the timing of other asset replacements and interdepartmental initiatives. In some instances, asset replacements are advanced to minimize the disturbance of a park and maximize efficiency/economies of scale (e.g., Elmcreek Park redevelopment, Lakefront Promenade Marina Dock maintenance).

Play facilities are maintained in a Good or Very Good condition throughout their lifespan and are replaced at the 20-25 year mark to meet current standards and functionality, despite condition rating.

It is important to note that costs have grown significantly since 2022 and budgets have remained static. These figures are in 2022 dollars.

Equipment (Parks & Forestry)



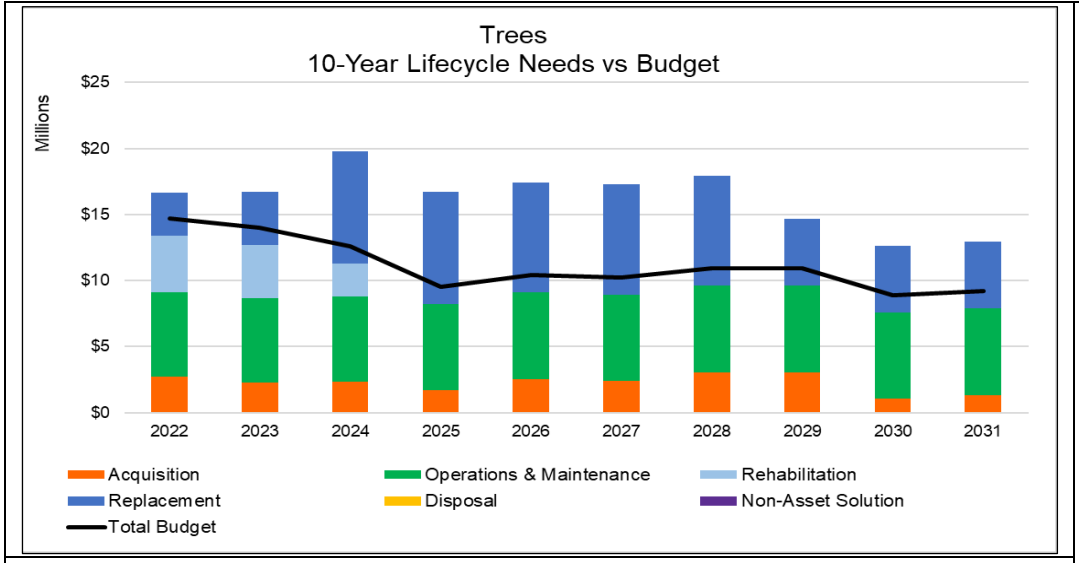


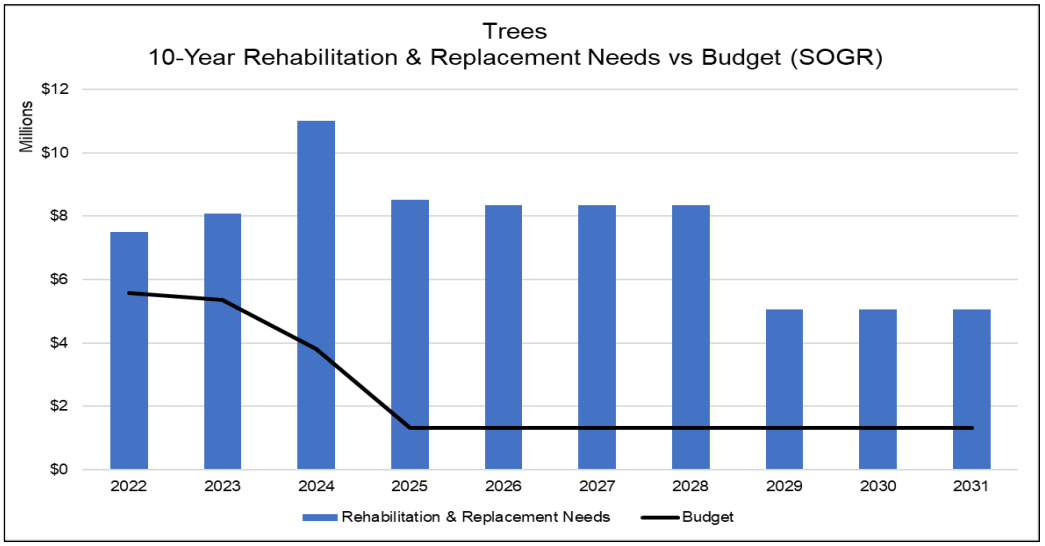
The peak in 2022 shows all of the backlog assets or assets that have reached their end of life in 2022.

The budget line shows that Parks has adequate funding for park equipment. The staff meet the needs of this asset class.

The reliability of parks equipment inventory is still being developed and staff will be investigating the true needs of the asset class in future iterations of the Parks, Forestry & Environment Asset Management Plan.

Trees



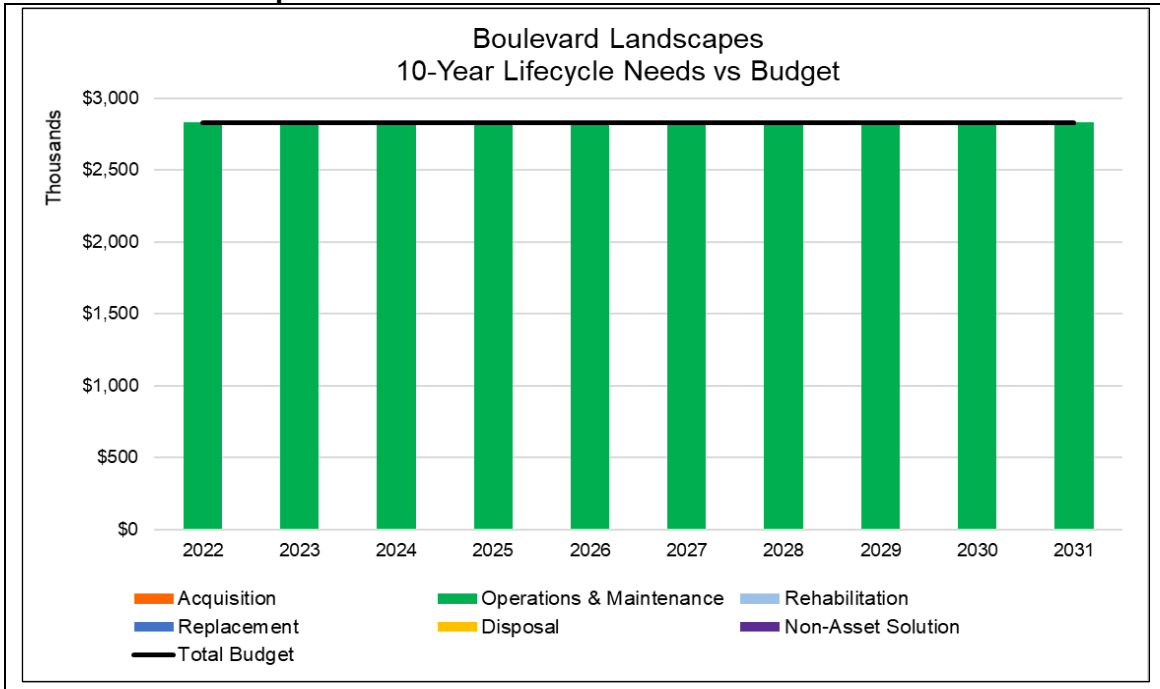


To forecast the rehabilitation and replacement needs of trees, staff applied the following criteria over the next 10 years:

Based on average planting rates, staff forecasted over 10 years, taking into consideration annual mortality rate of two per cent. Annual mortality is highly variable and subject to many factors such as climate change, pests, or diseases that can affect the rate at which they decline.

There exists a considerable backlog of planting sites reflective of the funding gap for this service. Dead trees and stumps that need to be managed and replaced are also part of the forecast.

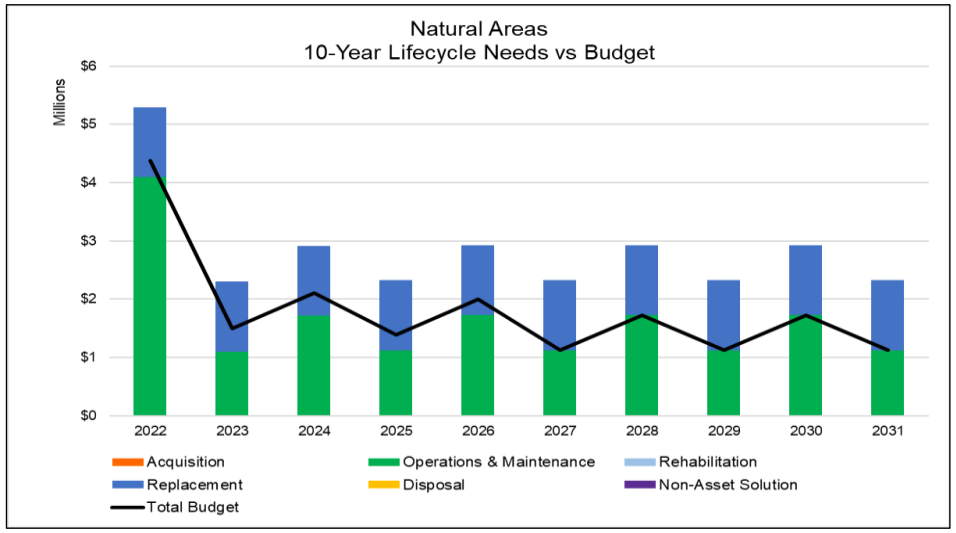
Boulevard Landscapes

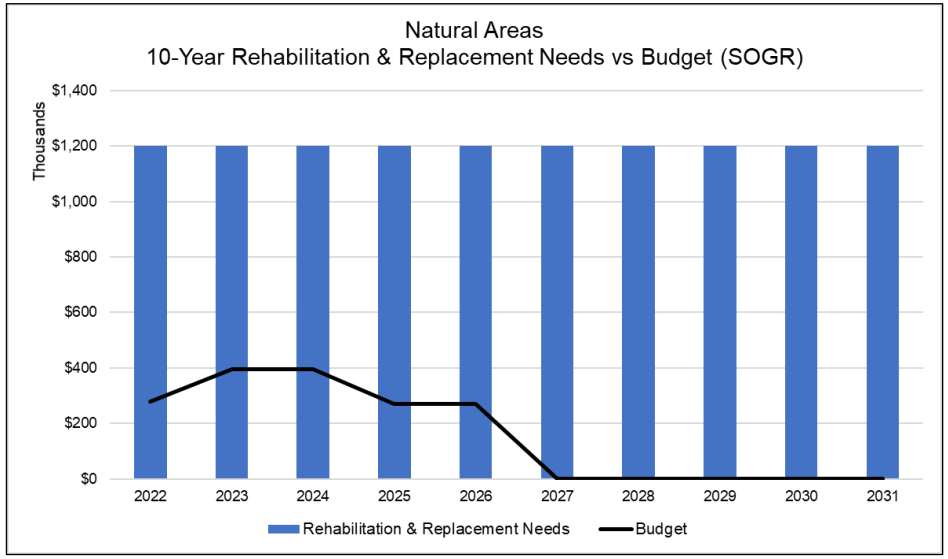


Boulevard grass and horticulture features are under perpetual maintenance and funded adequately.

Amended boulevard treatments contain fairly new assets that are not due for renewal or replacement until 2034. However, these assets may be up for replacement much earlier due to damage from various third parties such as utilities, soil shifting/settling etc. The associated streetscape features to amended boulevard treatment areas can experience early renewal needs as well, despite the fact that the earliest end-of-life replacement is not until 2054.

Natural Areas





Staff estimated the lifecycle needs to improve asset condition from Poor/Very Poor to Fair or Better. Roughly 10 per cent of the Natural Areas (Forested) are in Poor/Very Poor condition.

Natural Areas are heavily impacted by invasive species management and understory planting which contribute to 40 per cent of the overall woodland condition, and are thus a reasonably large proportion of influence to alter the condition from Poor/Very poor to at least Fair or better.

Staff forecasted the costs of those activities based on a reliable average; however, it should be noted that pricing can vary significantly depending on topography, drainage, vegetation on site, etc.

Over the next 10 years, the Parks, Forestry & Environment average annual budget is $70.1M as shown in **Figure 7**.

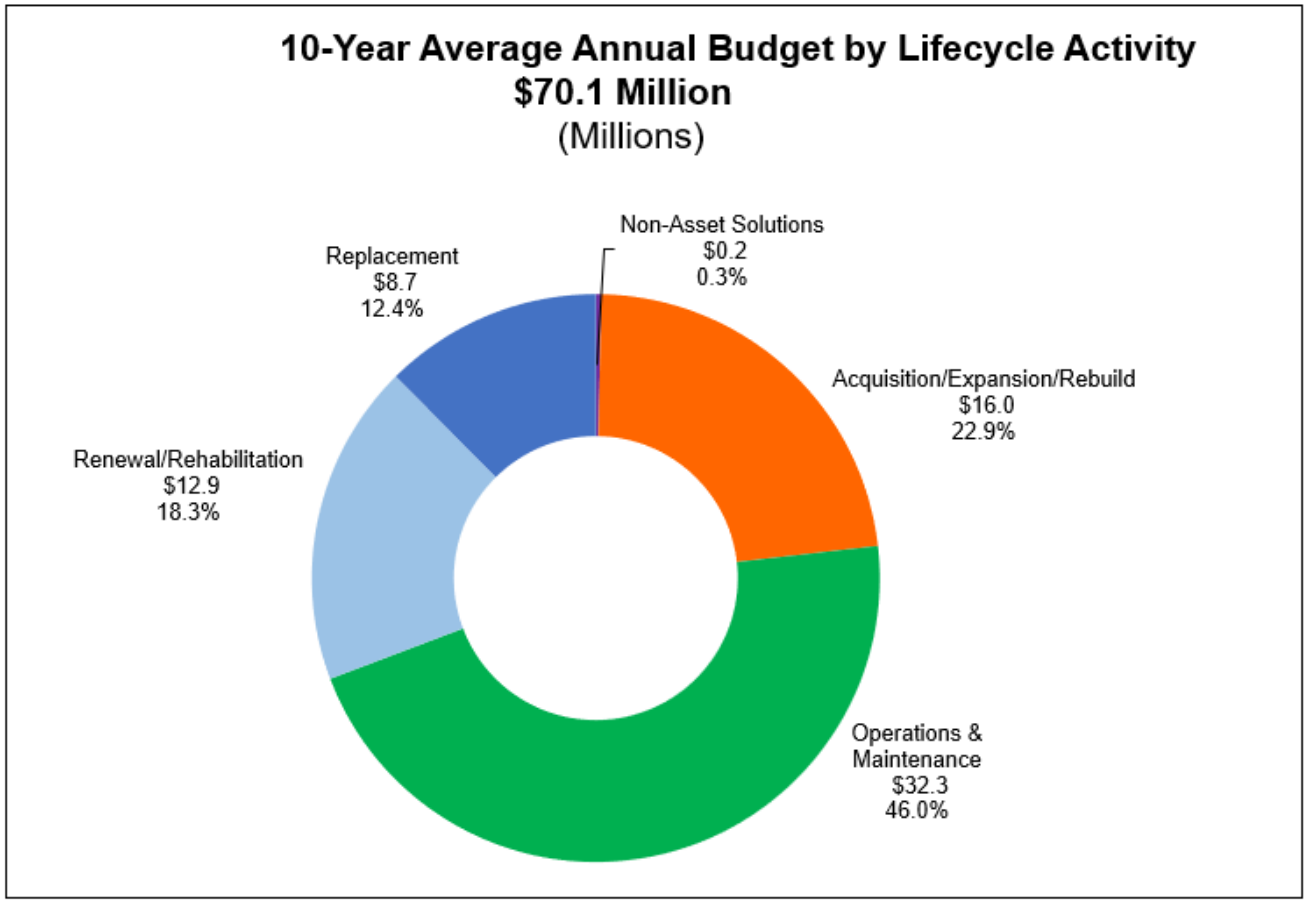


Figure 7: Breakdown of Budget by Lifecycle Activity

Table shows the 10-year annual average budget breakdown by asset class. The majority of the operating and capital budget is spent on State of Good Repair of Parks and Forestry assets.

Table 16: Budget breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Amenities	20.9	12.0	32.9	10.2	43.1
Trails and Bridges	0.2	6.6	6.8	3.3	10.1
Trees	6.1	2.8	8.9	2.3	11.1
Natural Areas	1.1	0.8	1.8		1.8
Boulevard Landscapes	2.8	-	2.8	-	2.8
Equipment	0.1	0.5	0.6	0.0	0.6
Other[5]	-	0.1	0.1	0.4	0.5
Total	**31.2**	**22.8**	**54.0**	**16.2**	**70.1**

[5] The "Other" asset class denotes lifecycle activities that span over multiple asset classes within the service area such as plans, studies, and other non-asset solutions.

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management-related lifecycle activities based on the 2022-2025 Operating and the 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget – for example, utilities, building and sidewalk maintenance, etc.

The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The Capital Budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment, including IT network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets (e.g., sidewalk maintenance or licensing fees) are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds, development charges (DCs) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 8,** the estimated available funding for the next 10-year period (2022-2031) for Parks, Forestry & Environment is $701,125,035. The primary sources of funding are Operating Revenue sources at 44.5 per cent and Tax Reserve Funds at 25.3 per cent, which is primarily used to support capital infrastructure renewal needs.

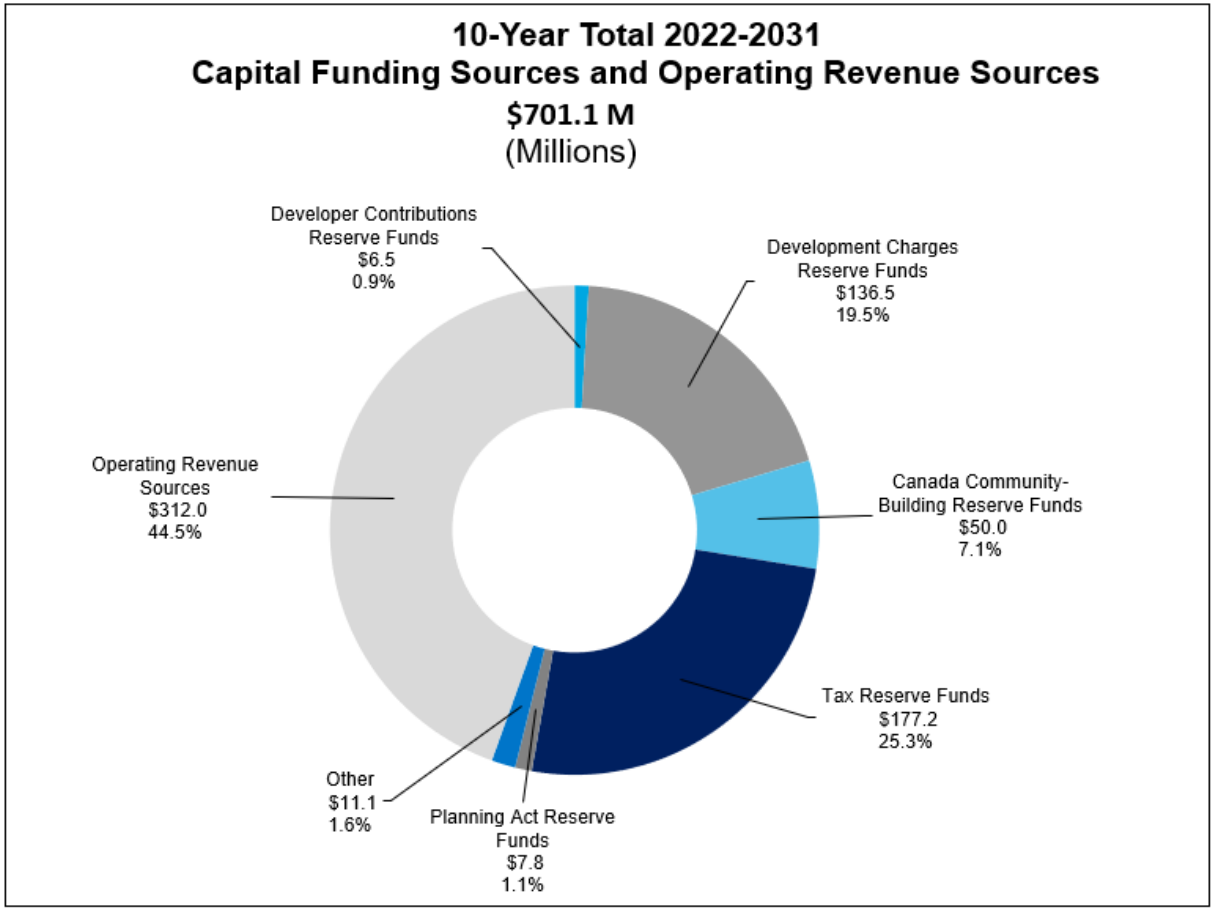


Figure 8: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure and increased to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g. the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available.

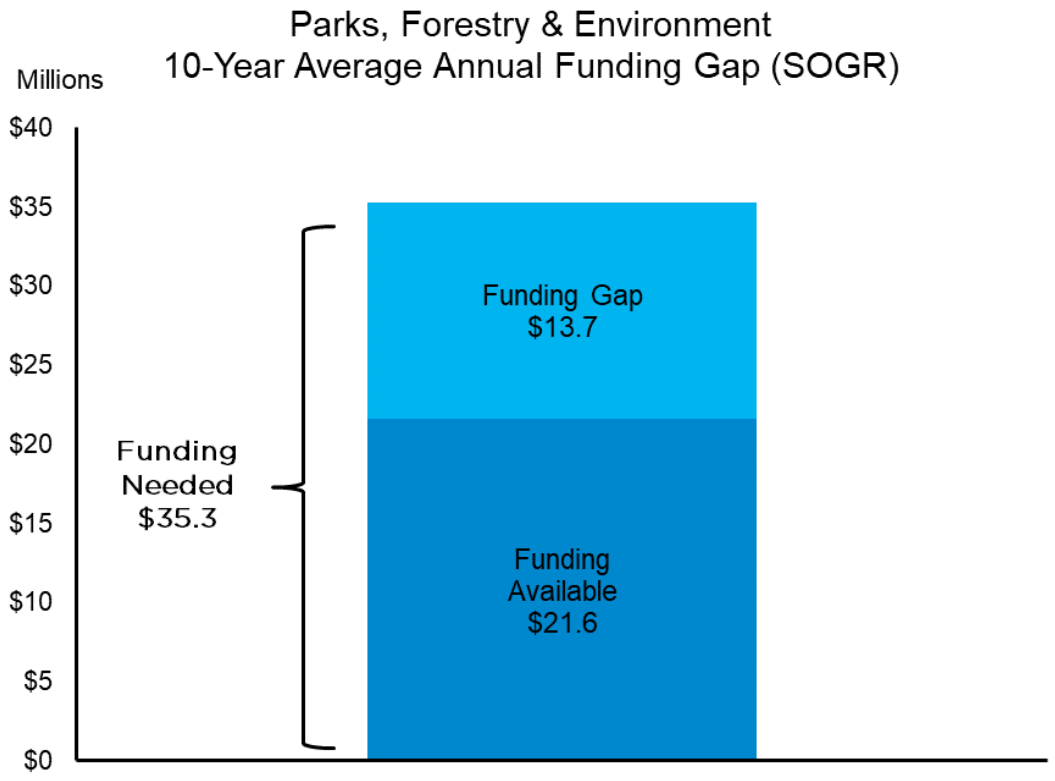
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to levels of customer satisfaction
- Increased liability and claims
- Impacts to quality of life

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (funding needed) and the annual average budget (funding available) for the next 10 years, as is shown in the following graphs by Service Area and by each asset class. Continued implementation of asset management best practices, as well as assistance from senior levels of government through continued infrastructure funding programs, will provide opportunities to address some elements of the funding gap.

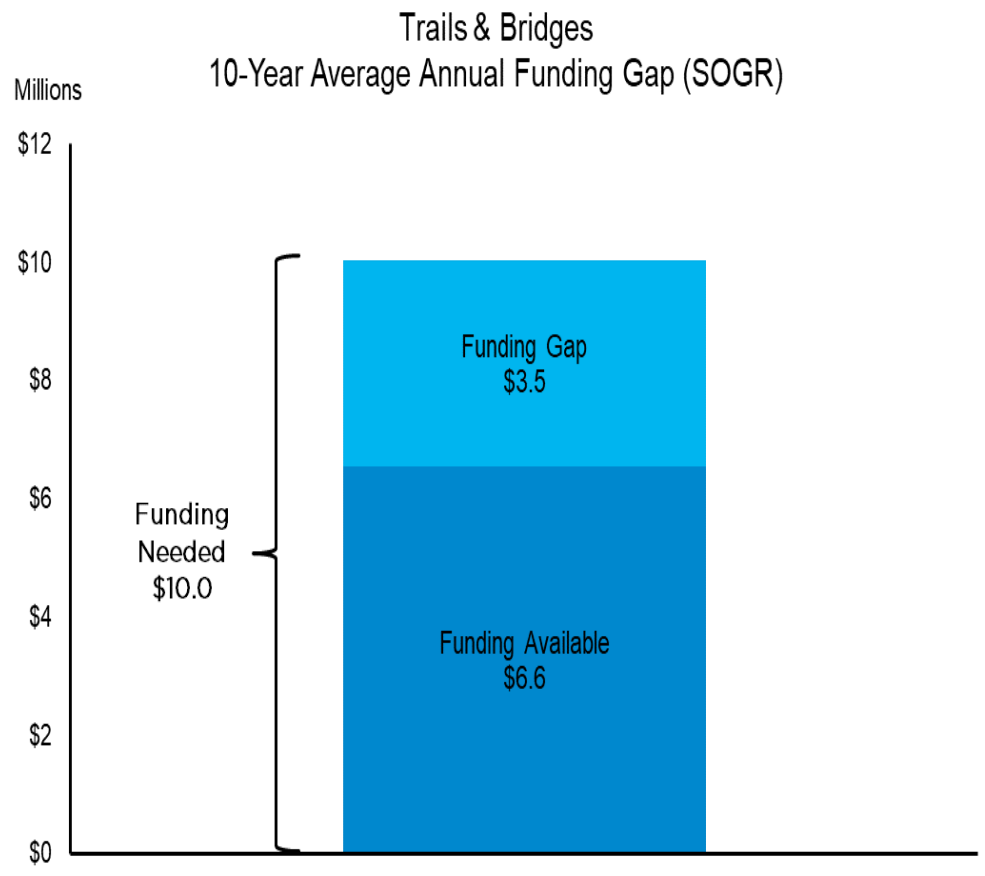
Parks, Forestry & Environment



The overall infrastructure gap for Parks, Forestry & Environment is $13.7 million. Note that at this time, Boulevard Landscapes and Equipment Asset Classes have been deemed to have no funding gap and that funding is adequate to meet lifecycle needs for the next 10 years.

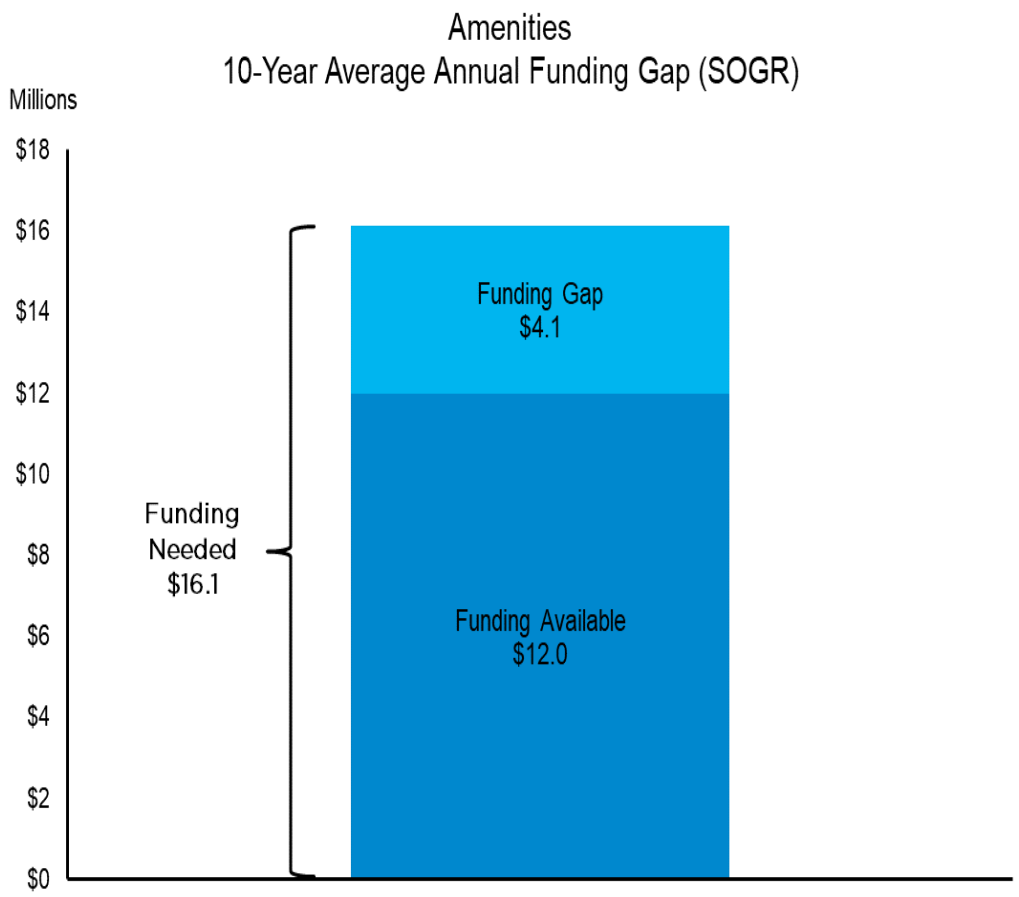
However, beyond the next 10 years, it was estimated that Boulevard Landscapes will require $50,000 to renew aging or damaged streetscape features.

Trails & Bridges



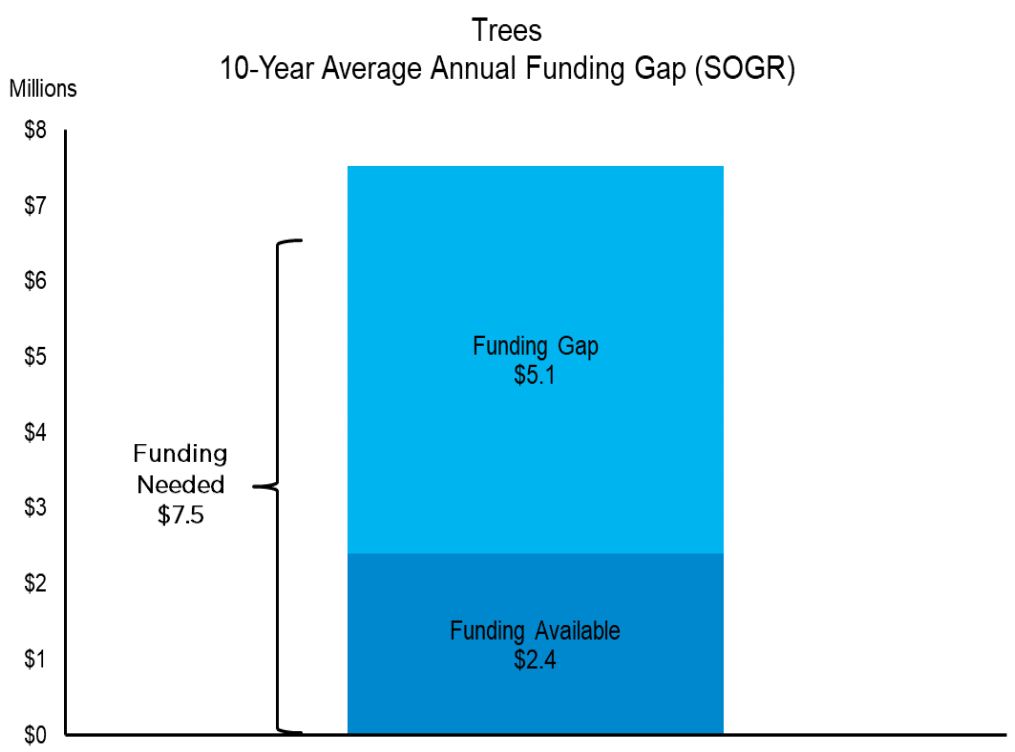
Trails & Bridges have a $3.5 million gap at this time. This is due to upcoming major replacements that have not yet been conducted on the assets.

Amenities



There are a substantial number of assets that are reaching their end of life that make up part of this backlog in order to provide the desired level of service staff need to fund these projects.

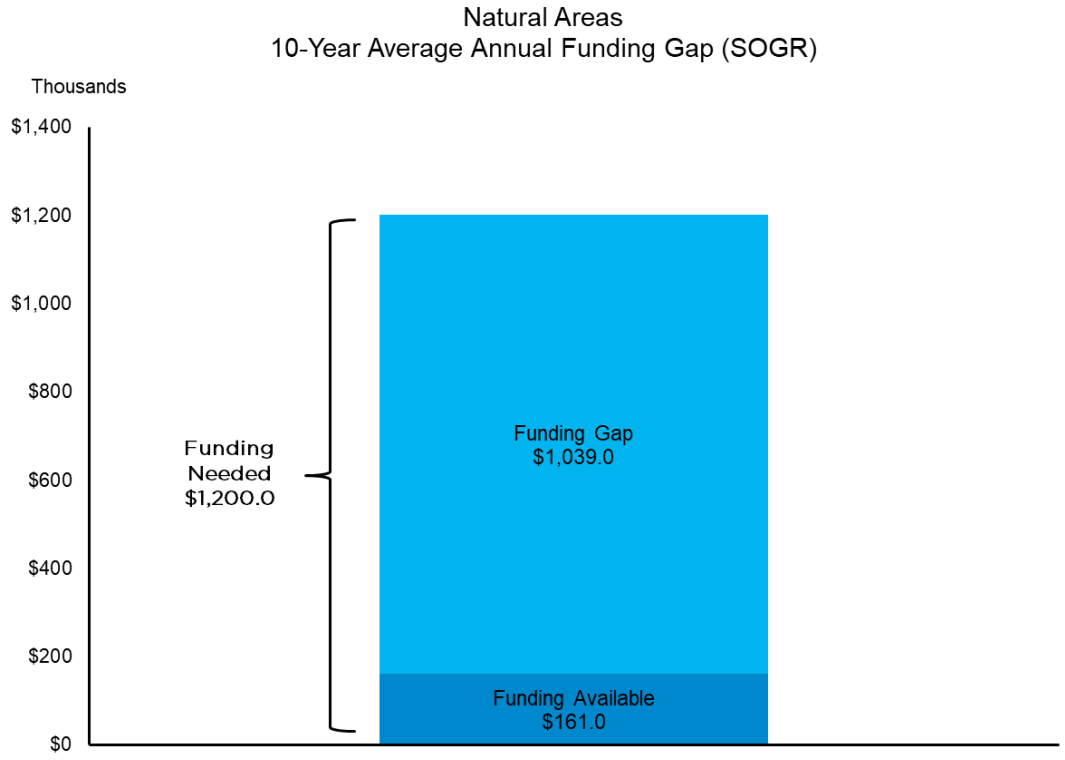
Trees



Replacement of trees is an underfunded service. The rate of mortality exceeds the replacement of new trees annually creating a substantial backlog. Further, the Emerald Ash Borer (EAB) resulted in significant loss to the city's tree population which are, and will continue to be, replaced through funding sources available into 2025.

To deal with the existing backlog which can be scoped out over a five-year period, a funding gap has been identified and required to renew these sites. Failure to do so will result in an increased backlog which will further delay and increase replacement tree timelines.

Natural Areas



The renewal gap for natural areas captures the need to restore natural areas that are in Poor or Very Poor condition to at least Fair condition. Of the 848 hectares of forested areas, approximately 10 per cent are in Poor or Very Poor condition.

Invasive species management and understory planting are two actions that can reasonably contribute to the restoration of a woodland and influence the overall condition score.

The funding required to renew the 84.8 hectares of natural areas in Poor or Very Poor condition to at least Fair conditions would be $11,872,000. These projects are typically scoped out on a 10-year planning horizon (to account for the time required to conduct the project) and thus their budgeted allocation can be amortized over 10 years, amounting to a funding requirement of $1,187,200 per year.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for Parks, Forestry & Environment Asset Classes. The results for each asset class and an overall result for the Parks, Forestry & Environment Service Area are scored from 0 to 4, based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved. The radar graphs below display the maturity of the Parks and Forestry Asset Classes. As the service areas mature in each of the eight categories, they will expand outwards towards the outmost ring (score of 4.0).

The overall maturity scores are derived from a detailed assessment survey that tracks progress of high-level tasks. As a result, the assessment can be reviewed and updated to reflect progress in Parks, Forestry & Environment Asset Management overall, and ultimately demonstrate the service area's maturity at a corporate level.

Advancing Service Area Asset Management Capabilities

The proposed work plan in Table **17**was developed in consultation with City staff through the development of the Parks, Forestry & Environment Asset Management Plan. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks may differ from those in the maturity assessment improvement plan, as they are predominantly internal tasks to the Parks, Forestry & Environment Service Area that provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories.

Through the maturity assessment and associated work plans, the Parks, Forestry & Environment Service Area aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service, to achieve both service area and corporate objectives.

Table 17: Work Plan – Parks & Forestry

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
State of the Infrastructure (SOI)						
SOI - 1	Develop a Risk Assessment Framework for Parks & Forestry Assets.	All	2023-2024	Medium	Enable the Parks, Forestry & Environment service area to better prioritize funding availability across asset classes.	Internal/External
SOI - 2	Compile a Parks & Forestry Equipment Inventory.	Equipment	2023-2024	Medium	Compile a comprehensive database of parks non-fleet, powered equipment and handheld tools inventory across all parks areas, complete with critical attribute information. Improve on our standard methodology to add new equipment and remove old equipment that will also speak to INFOR and not require a third party conversation.	Internal
SOI - 3	Condition assessments on newly acquired, and old park structures.	Amenities	End of 2024	Medium	Assess all park structures and provide condition rating and replacement timeline.	Internal/External
SOI - 4	Include Infrastructure Assets in AM Plans.	Infrastructure	2024-2026	Medium	Compile comprehensive inventory of retaining walls, fencing, irrigation systems, stormwater and shoreline treatments within city parks.	Internal

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
SOI - 5	Implement INFOR for work order management.	All	2024-2025	Medium	Enhanced and expanded work order management for parks service requests.	Internal
SOI - 6	Update the Maturity Assessment and Continuous Improvement Plan and report back to Leadership Team.	All	2023-2025	High	Providing Leadership Team and Council with regular updates on the progress made towards asset management planning will ensure that we continue to mature in our asset management practices.	Internal
SOI - 7	Consolidate Forestry Assets into Asset Management Software and formalize inventory to assign unique IDs populating missing attribute information.	Boulevard Landscapes, Natural Areas	2024	High	Integrate all forestry assets into Asset Management System to allow for better management of assets centralized in one source for information.	Internal/External
SOI - 8	Expand condition scoring system to a five-point scale.	All	2024-2030	Medium	Allows for asset condition to be consistent with corporate asset management best practices.	Internal
SOI – 9	Replacement Cost Update and development.	All	2023-2024	Medium	Enables precise budgeting required for lifecycle costing and sustainability of the forestry resource. This knowledge aids in making decisions regarding optimal timing for asset replacement, thereby maximizing operation efficiency.	Internal

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
SOI - 10	Estimated Useful life: review and update.	Trees	2023-2024	Medium	Allows for better Lifecycle Management planning.	Internal
Financial Strategy (FI)						
FS - 1	Centralize all assets in one asset management system to run asset management scenarios.	All	2025-2026	Medium	Develop a predictive performance model to forecast the future condition of assets, based on budget, levels of service and/or lifecycle strategies changes.	Internal/External
FS - 2	Work with Corporate Finance to formalize performance targets and sustainable funding.	All	2023-2025	High	Develop more proactive and reliable short-term and long-term capital planning.	Internal
Levels of Service (LOS)						
LOS - 1	Ongoing review of LOS metrics and establishment of targets.	All	2023-2025	High	Level of service targets enable the service area to track progress against established targets.	Internal

Corporate Asset
Management Plan **2024**

Transit (MiWay)

Table of Contents

Transit (MiWay) Overview

As the City of Mississauga continues to develop as a transit-oriented and dynamic urban centre, the City and MiWay strive to ensure that transit service levels support our customer growth through increasing service frequencies and improvement of infrastructure to enhance the safety, reliability, and efficiency of the transit system. As the ridership increases significantly, the need to add service and infrastructure grows thereby increasing the cost of delivering that service.

The City's Strategic Plan provides direction for growth and evolution through the identification of five pillars: focus on the customer, move people, support employee success, harness technology and innovation and build business and environmental sustainability. The Transit asset management plan is being developed to ensure that transit assets meet the fast-evolving needs of MiWay's customers and stakeholders while aligning with both the City's and MiWay's strategic directions. To this end, Transit's assets will be managed based on the following guiding principles:

- **Resilient and customer focussed** with the ability to anticipate and meet customer requirements leading to MiWay being the customer's preferred transportation choice
- **Sustainable today and in the future** through the ever-evolving levels of service to ensure the long-term health of its infrastructure
- **Evidence-informed, transparent and collaborative** decision making that will be documented for both internal and external service delivery groups
- **Optimized and aligned** decisions to meet service delivery requirements and outcomes in alignment with corporate reporting requirements
- **Safety driven** for its customers and employees and all others who interact with the service

MiWay currently supports a network of 65 routes servicing approximately 3,300 stops and multiple terminals and stations. MiWay owns, operates and maintains the majority of the transit assets required to provide Mississauga with a shared travel choice that is friendly, reliable and respects the environment. MiWay's asset portfolio is comprised of five Asset Classes: Vehicles (revenue generating), Facilities (terminals, stations, and garages), Right-of-Way (ROW) Infrastructure, Stormwater Infrastructure, and Equipment & Systems (includes non-revenue generating vehicle). While transit facilities support the delivery of transit services within the City of Mississauga, these assets are reported on in detail under the City's Facilities Asset Management Plan and are not included in MiWay's Asset Management Plan; MiWay does perform some operations and maintenance duties and undertakes minor facility upgrade projects.

Table 2 summarizes the key outcomes of the asset management plan, including replacement value, average condition, and the 10-year average annual funding gap for Transit.

Table 1: Summary Overview of Transit (MiWay)

Transit (MiWay)	
Replacement Value	$588 Million
Average Condition	45%
Average Annual Funding Gap	$4.4 Million

Table 2: Summary of Transit Asset Information by Asset Class (excluding Facilities)

Asset Class	Condition	Replacement Value (000s)	10-Year Annual Average Funding Needs (000s)	10-Year Annual Average Funding Gap (000s)
Vehicles (Revenue Generating)		$313,420	$52,454	$0.0[1]
Equipment & Systems		$18,043	$3,263	$493
Right of Way (ROW) Infrastructure		$231,746	$4,160	$3,866
Stormwater Infrastructure		$24,784	$0.0	$0.0[1]

[1] As detailed in the **Financing Strategy**, Vehicles (Revenue Generating) and Stormwater Infrastructure asset classes have sufficient budget to meet state of good repair (SOGR) lifecycle needs for the next 10 years (2022-2031).

Further to the guiding principles noted above, the Transit Asset Management Plan has been developed in accordance with the requirements of Ontario Regulation 588/17-Asset Management Planning for Municipal Infrastructure and includes the following sections to provide an overview of MiWay's current asset management maturity.

- **State of Infrastructure**: Outlines the current state of the assets including what the City owns under Transit services, the condition of the assets and the costs to replace them
- **Levels of Service**: Describes and measures the service performance and outcomes the City currently provides
- **Future Demand**: Summarizes the expected future demand on Transit services. This includes those prescribed in O.Reg. 588/17 (Asset Management Planning for Municipal Infrastructure regulation) and additional advanced metrics to benchmark and monitor Transit performance
- **Lifecycle Management Strategy**: Documents the strategies used throughout the assets' lifecycle to maximize the life of the asset while ensuring service delivery targets are maintained
- **Financing Strategy**: Describes the current and forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves, and identifies any financial gaps
- **Continuous Improvement**: Documents the recommendations for continuous improvements identified during the development of this Asset Management Plan and maturity assessments

MiWay will continue to improve on the existing asset management practices for the next iteration of the Transit Asset Management Plan.

State of Infrastructure

An understanding of the State of Infrastructure (SOI) is foundational in ensuring the effective management of MiWay's assets. Key questions that need to be answered through the compilation and consolidation of existing databases, and the collection of new data include the following:

- What assets are owned by MiWay (asset inventory)?
- What are the assets worth (asset valuation)?
- What is the condition of the assets (asset condition)?

This information lays the groundwork for continual evaluation, reporting, and benchmarking of MiWay's assets. It also facilitates transparent communication of the state of assets to the public. This section summarizes the current state of MiWay's asset portfolio in response to the questions noted above. MiWay's asset portfolio is divided into five asset classes consisting of Vehicles (i.e., revenue generating vehicles), Facilities (terminals, stations, garages, etc.), Equipment & Systems (i.e., fixed technology equipment, fare related equipment, on-vehicle IT equipment and non-revenue generating vehicles), Right-of-Way (ROW) Infrastructure (i.e., roadway assets including transit appurtenances), and Stormwater Infrastructure (i.e., stormwater management facilities, drainage network, etc.) as shown in **Figure 1.** MiWay's extended asset hierarchy can be found in **Appendix A- MiWay Asset Hierarchy**.

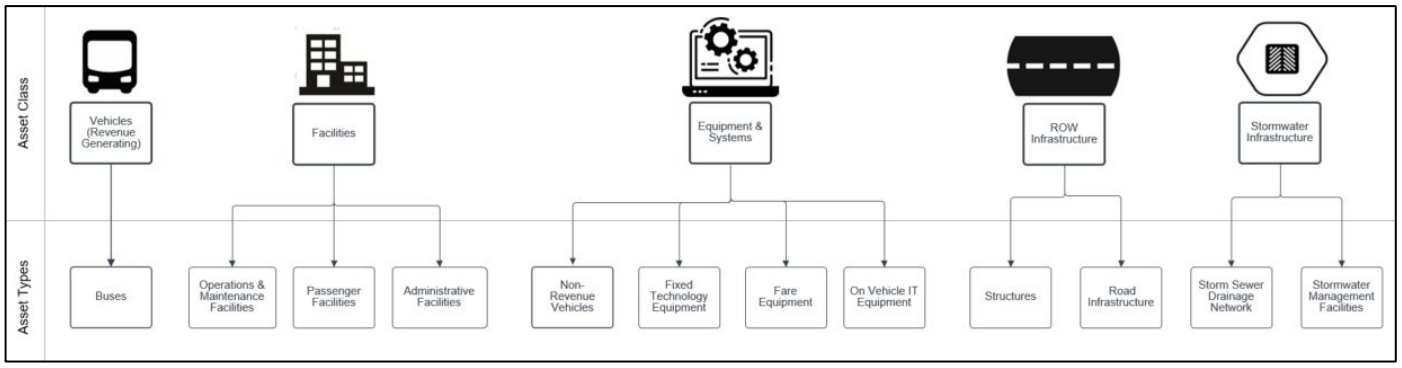


Figure 1: Transit – MiWay Asset Hierarchy

MiWay's asset hierarchy consists of assets that are owned by MiWay, as well as assets that impact MiWay's Level of Service. Due to the wide range of assets owned by MiWay, some asset class lifecycle activities may be managed by different sections within the City. As a result, the asset information is housed in different software and systems, and the format by which the asset information is collected and stored for each asset class differs. While transit facilities support the delivery of transit services within the City of Mississauga, these assets are reported on in detail under the City's Facilities Asset Management Plan and are not included in MiWay's Asset Management Plan as facilities are primarily operated and maintained by Facilities and Property Management. MiWay does perform some operations and maintenance duties and undertakes minor facility upgrade projects which is captured in the following sections. As MiWay is directly customer-facing, the condition of the facilities contribute to MiWay's customer levels of service. **Table 3** below summarizes MiWay's asset portfolio (excluding facilities) as of 2021/2022 as well as where the data is stored.

Table 3: Summary of Transit Information (2021/2022)

Asset Class	Asset Type	Asset Sub-Types	Inventory	Data Management Systems
Vehicles (Revenue Generating)	Buses	Conventional (Diesel) Buses (Standard 40')	382	Trapeze EAM
		Conventional (Diesel) Buses (Articulated 60')	61	Trapeze EAM
		Hybrid Buses (Standard 40')	25	Trapeze EAM
		Hybrid Buses (Articulated 60')	16	Trapeze EAM
Equipment & Systems	Non- Revenue vehicles	Administrative Vehicles	63	Trapeze EAM
	On-Vehicle IT Equipment	Radios	531	Trapeze EAM
		Geolocation Technology (IBUS)	484	Trapeze EAM
		Passenger Count System (APC)	484	Trapeze EAM
		Cameras and DVRs	484	Trapeze EAM
	Fare Equipment	Fare boxes	484	Trapeze EAM
Right of Way (ROW) Infrastructure	Structures	Bridges	28	BridgeTMS
		Culverts	1	BridgeTMS
		Noise Walls	8 (1.53 km)	BridgeTMS
		Retaining Walls	10 (1.22 km)	BridgeTMS
		Living Walls	19 (2.14 km)	BridgeTMS
	Road Infrastructure	Pavement (Transitway)	136,373 m^2	RoadMatrix
		Stops[2]	3,289	Esri
		Cell	6	Esri
		Channel	4	Esri
		Sewer (inlet and outlet)	32	Esri
		Junction	8	Esri
		Inlet (outlet)	5	Esri
		Outlet (inlet)	5	Esri
		Oil and Grit Separator (OGS)	14	Esri
		Structures	1	Esri
	Storm Sewer Drainage Network	Catchbasins	244	Esri
		Manhole	86	Esri
		Gravity Pipe	336	Esri
		Outfall	4	Esri
		Pipe Culvert	2	Esri
		Pipe Inlet	5	Esri

[2] Stops are comprised of Shelters (916 units), Bus Bays (180 units), Pedestrian Landing Pads (2072 units) and Stop Markers (3,289 units)

Detailed AM Plan
Transit (MiWay)

There are additional assets within the Transit portfolio; however, due to limitations in data availability or low data confidence, these assets have not been included into this version of the Transit Asset Management Plan. This information excluded from the Transit Asset Management Plan us summarized below in **Table 4**.

Table 4: Assets Excluded from the Transit Asset Management Plan

Excluded Information

• Data and asset management activities for:
  ○ Facilities (in Facilities and Property Management Asset Management Plan)
  ○ Service Equipment, Electronic signage, Presto (on-vehicle and at terminals and stations) under Equipment & Systems
  ○ Assets owned and managed by Metrolinx (including Transitway sections)
  ○ Assets owned and managed by other agencies
• Lifecycle Management for Bridges, Structures, and Stormwater infrastructure (see relevant section in City's Asset Management Plan as lifecycle activities are undertaken by SMEs from other service areas but paid for by MiWay)

As part of MiWay's continuous improvement plan, MiWay will improve on data quality for the asset inventory in order to report at a more granular level.

Asset Valuation

In asset management, replacement value is a financial metric that reflects the current cost to replace assets at the asset's existing functionality and performance level. MiWay's asset portfolio has a replacement value of $588 million. **Figure 2** below provides an overview of the total replacement value of MiWay assets by asset class, whereby the largest share of the portfolio relates to Vehicles (Revenue Generating), representing 53 per cent ($313.4 million) of the total value. Replacement values are based on current market value, historical inflation, unit costing and staff expertise.

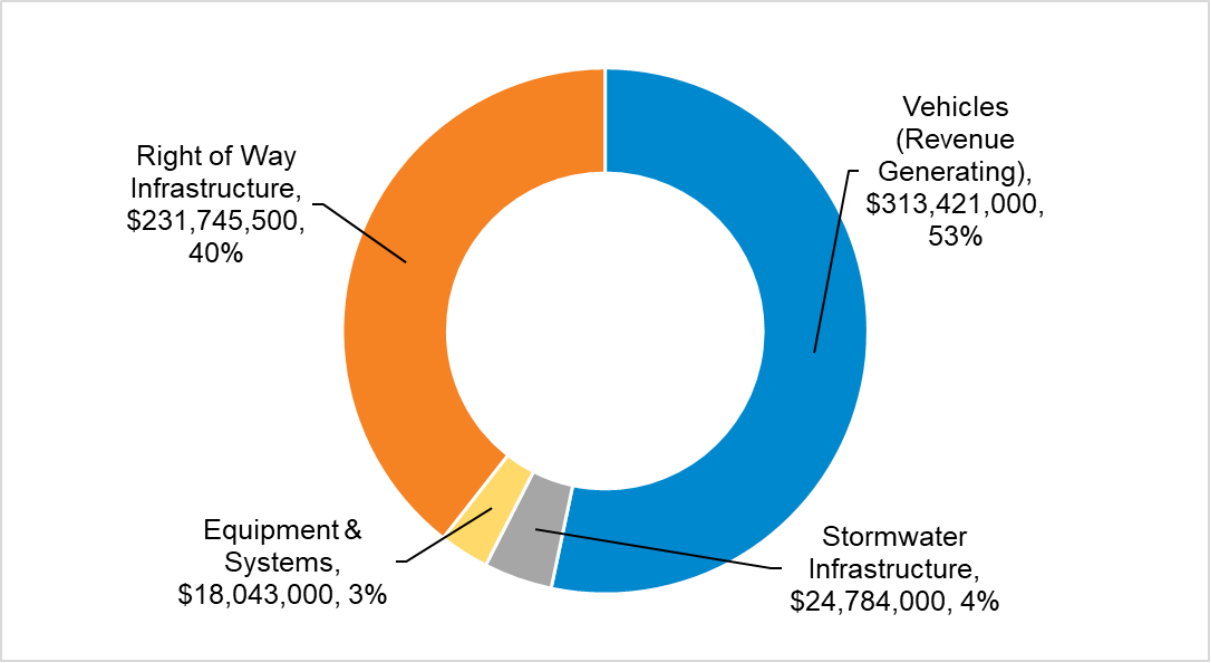


Figure 2: Replacement Value Breakdown by Asset Class

Asset Condition

The asset condition defines the physical state of the asset at this moment in time and helps inform useful life remaining, maintenance interventions, replacements, and other asset decisions. For the majority of MiWay's assets, the condition of the assets was calculated based on an age-based evaluation method. This approach is commonly used in the absence of formal condition assessments and considers the asset's condition in relation to its remaining useful life (RUL). Key assets that were assessed with the RUL approach included vehicles, right-of-way infrastructure (excluding pavement and structures), stormwater infrastructure, and equipment and systems. **Table 5** provides a breakdown of the condition scoring by remaining useful life methodology.

Table 5: Asset Condition Rating based on Remaining Useful Life

Score	Condition Rating	Methodology	Definition
1	Very Good	80-100% remaining useful life	The asset is fit for the future. It is well maintained, in good condition, new or recently rehabilitated.
2	Good	60-79% remaining useful life	The asset is adequate. It is acceptable and generally within the mid-stage of its expected service life.
3	Fair	40-59% remaining useful life	The asset requires attention. The asset shows signs of deterioration, and some elements exhibit deficiencies.
4	Poor	20-39% remaining useful life	There is an increasing potential for its condition to affect the service it provides. The asset is approaching the end of its service life, the condition is below the standard and a large portion of the system exhibits significant deterioration.
5	Very Poor	0-19% remaining useful life	The asset is unfit for sustained service. It is near or beyond its expected service life and shows widespread signs of advanced deterioration. Some assets may be unusable.

Under ROW infrastructure, the condition rating for MiWay's dedicated roadways, such as the Transitway, is based on a Pavement Quality Index (PQI) that is collected during pavement condition surveys undertaken every four years by the Transportation Asset Management Team. The PQI score is comprised of a calculation that takes into consideration a Surface Distress Index (SDI) and a Ride Condition Index (RCI). A PQI score of 100 would represent a perfectly constructed road with no surface distress and an excellent ride quality. Structures are assessed every two years based on the Ontario Structural Inspection Manuals (OSIMs) and are given a score out of 100. **Table 6** provides a breakdown of the condition scale used for both road pavement and structures.

Table 6: Asset Condition Rating Scale for ROW Assets

Condition Rating			Very Good	Good	Fair	Poor	Very Poor
Physical Condition Definitions			**Fit for the Future -** The asset is generally in very good condition, typically new, or recently rehabilitated	**Adequate for Now** -– The asset is in good condition and performing as intended. Some elements show minimal signs of deterioration.	**Requires Attention -** The asset shows general signs of deterioration and requires attention with some elements exhibiting significant deficiencies	**Approaching End of Life** - The asset is in poor condition and typically below established standards, with many elements approaching the end of their life	**Requires Renewal -** The asset is below established standard conditions with widespread signs of advanced deterioration. Many components have surpassed the end of their life
Asset Class	**Asset Type**	**Condition Rating Scale**					
Right of Way (ROW)	**Road Infrastructure (Pavement Only)**	PQI (Pavement Quality Index)	80 - 100	70 - 79	55 - 69	20 - 54	0 - 19
	Structures (Bridges and Culverts)	NASVi (Net Asset Salvage Value Index)	100	80 - 99.9	40 - 79.9	20 - 39.9	0 – 19
	Structures (Retaining Walls)	10 point scale	9 - 10	7 - 8	5 - 6	3 - 4	1 – 2

Dashboards

The following dashboards provide a summary of the current state of the infrastructure by each Asset Class. Each dashboard includes a breakdown of the number of active assets, their age, estimated useful life, and replacement value by Asset Sub-Type.

A summary of the assets' average condition is illustrated in each dashboard through graphs. A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete, and accurate key asset information is as it relates to supporting asset management decision making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

The information in this plan was prepared using 2021/2022 data.

Detailed AM Plan
Transit (MiWay)

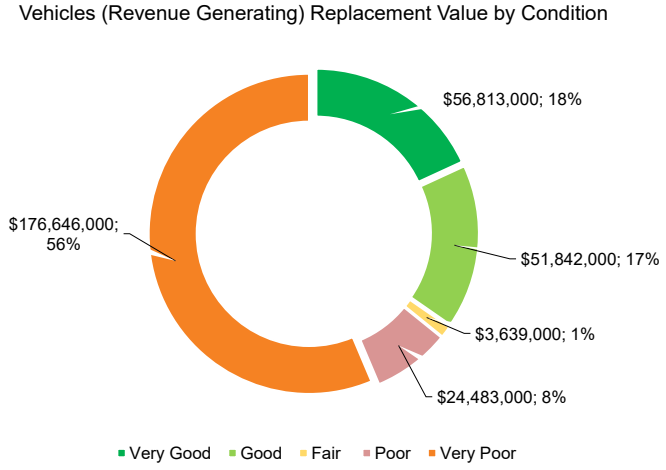
Asset Class:	Vehicles (Revenue Generating)	Current Replacement Value (CRV)	$313.3 Million

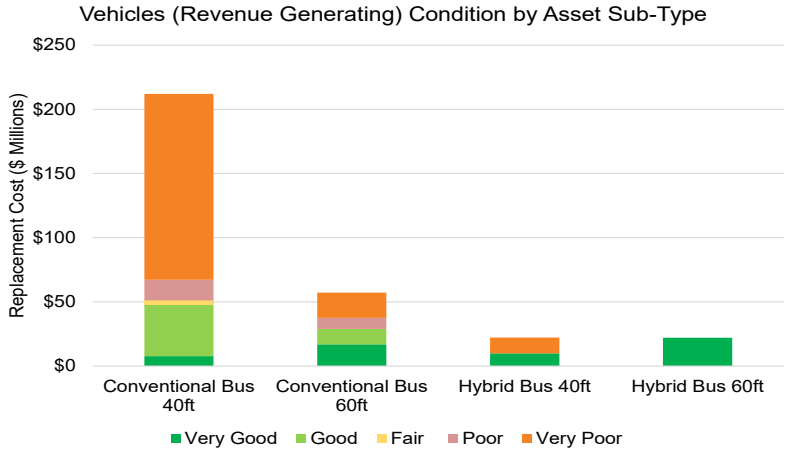
Data Quality

Asset Inventory	Condition	Replacement Value
A	B	A

Example: Hybrid Bus (Standard 40')

Asset Type	Asset Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Buses	Conventional (Diesel) Buses (Standard 40')	382	Ea.	13	15	$211,950
	Conventional (Diesel) Buses (Articulated 60')	61	Ea.	9	12	$57,146
	Hybrid Buses (Standard 40')	25	Ea.	9	15	$22,263
	Hybrid Buses (Articulated 60')	16	Ea.	3	12	$22,061





Asset Information Summary: Vehicles (Revenue Generating)

MiWay's revenue generating vehicles consists of a fleet of 484 buses with a replacement value of $313.4 million as of December 31, 2022. These are made up of 382 Conventional (Diesel) Buses (Standard 40'), 61 Conventional (Diesel) Buses (Articulated 60'), 25 Hybrid Buses (Standard 40') and 16 Hybrid Buses (Articulated 60'). The weighted average age of the vehicles is 12 years, with the estimated useful life of 12 years for 60' buses to 15 years for 40' buses. The overall condition of the asset class is Very Poor, with 265 of 484 (>55 per cent) buses falling within that condition rating due to Remaining Useful Life (RUL). This makes up approx. $244.9 million of the overall replacement value. Due to funding challenges, many of the Very Poor buses were not able to be replaced before reaching this condition. The Investing in Canada Infrastructure Program (ICIP) provided funding to the City that enabled MiWay to renew almost 40 per cent its fleet within one year. It is anticipated that the 2023 data will show significant improvements to the overall condition and projected trending towards an overall Good to Very Good state.

The condition of assets has been calculated on an age-based assessment. This approach is commonly used when no formal condition assessment is available, whereby the age of the asset and its Expected Useful Life (EUL) are used to estimate the current condition. Additionally, staff considered other factors alongside age to determine the condition/performance of assets (i.e., capacity, functionality, compliance, etc.). MiWay has plans to work towards a continuous improvement "risk-based" approach in the future, which will also drastically improve the overall data confidence and accuracy scoring.

Detailed AM Plan
Transit (MiWay)

Asset Class:	Equipment & Systems	Current Replacement Value (CRV)	$18.0 Million

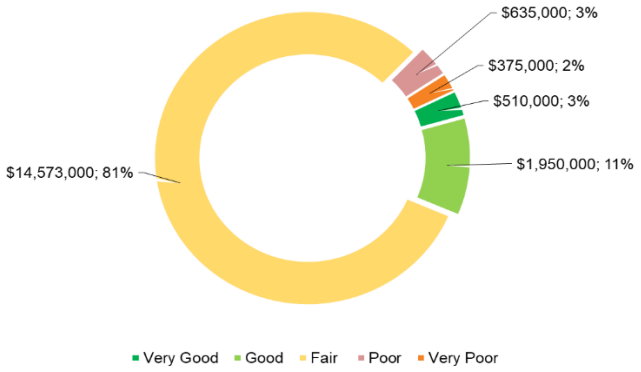
Data Quality

C — Asset Inventory
C — Condition
B — Replacement Value

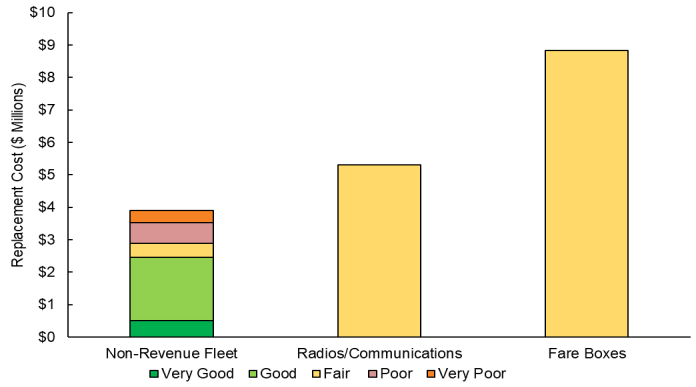
MiWay Fare Equipment – On-vehicle Presto

Asset Type	Assets Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Non-Revenue Vehicles	Administrative Vehicles	63	Ea.	6	10	$3,900
On-Vehicle IT Equipment[3]	Radios	531	Ea.	1	10	$5,310
Fare Equipment	Fare boxes	484	Ea.	12	12-15	$8,833

Equipment & Systems Replacement Value by Condition



Equipment & Systems Condition by Asset Sub-Type



[3] Equipment for Geolocation Technology (IBUS), Passenger Counts (APC), and Security (cameras and DVRs) are assumed to be included in the revenue vehicle (bus) replacement costs. Condition is assumed to be fair or better as no condition data was available.

Asset Information Summary: Equipment & Systems

The MiWay Equipment & Systems asset class is made up of Non-Revenue Vehicles, On-Vehicle IT Equipment and Fare Equipment, with an overall replacement value of $18.0 million.

The condition for the majority of assets under this asset class is Fair. The condition of assets has been calculated on an age-based assessment or assumed to be Fair or better whereas no formal condition assessment data is available. As part of the continuous improvement plan, MiWay will be developing asset-specific condition assessments to improve the data accuracy and reliability considering other factors alongside age to determine the condition/performance of assets (i.e., capacity, functionality, compliance etc.).

Asset Class:	Right-of-Way (ROW) Infrastructure	Current Replacement Value (CRV)	$231.7 Million

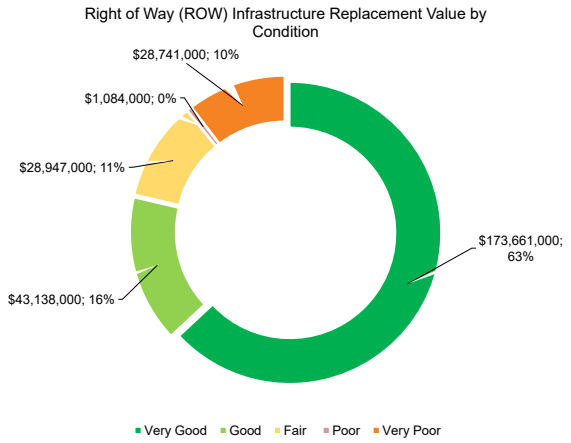
Data Quality

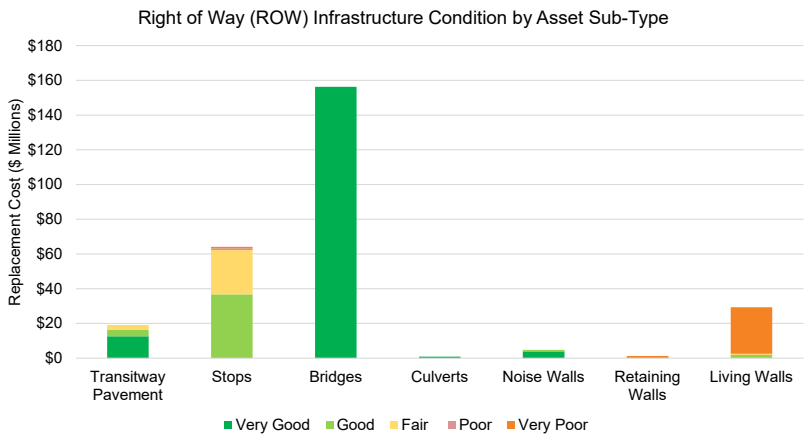
Asset Inventory	Condition	Replacement Value
C	C	B

Example: Dedicated Roads- Transitway

Asset Type	Assets Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Road Infrastructure	Pavement (Transitway)	136,373	m²	8	50	$19,038
	Stops*	3,289	ea.	8	20-50	$64,081
Structures	Bridges	28	ea.	7	75-100	$112,410
	Culverts	1	ea.	8	60-70	$831
	Noise Walls	1.53	km	5	30-50	$4,824
	Retaining Walls	1.22	km	7	60	$1,273
	Living Walls	2.14	km	10	30-50	$29,289

*Stops are comprised of Shelters (916 units), Bus Bays (180 units), Pedestrian Landing Pads (2072 units) and Stop Markers (3,289 units) which have varying useful lives.





Asset Information Summary: Right of Way (ROW) Infrastructure

The Right of Way (ROW) Infrastructure asset class is comprised of many asset sub-types including dedicated roads, bridges, culverts, noise walls, and bus stops with a total current replacement value of $231.7 million. In accordance with **Table 6**, the overall condition of the asset class is Very Good, consisting of $129.8 million of the overall replacement value. The bridge assets make up the largest overall value ($112.4 million) of the asset class. The condition has been assumed to be fair or better where no age data was available. An average height for retaining walls was used for the unit costing for replacement values due to limited data.Table 6

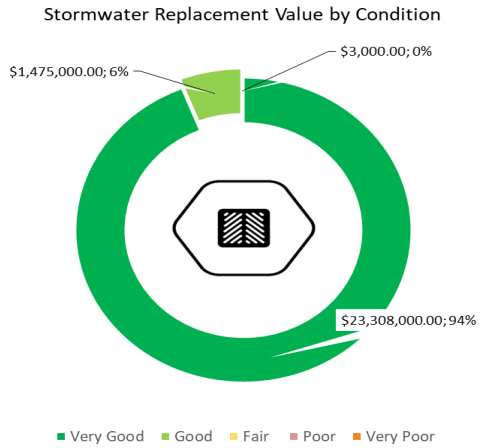
Asset Class:	Stormwater Infrastructure	Current Replacement Value (CRV)	$24.8 Million

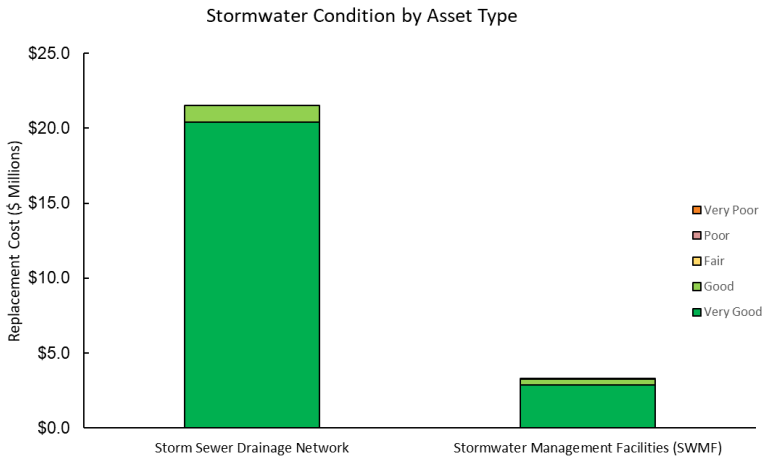
Data Quality

Asset Inventory	Condition	Replacement Value
B	C	B

Example: MiWay Stormwater - Outfall

Asset Type	Assets Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Storm Sewer Drainage Network	Catchbasins	244	Ea.	14	100	$2,226
	Gravity Pipe	336	Ea.	13	55	$16,154
	Manhole	86	Ea.	13	100	$2,814
	Outfall	4	Ea.	22	100	$216
	Pipe Culvert/Inlet	7	Ea.	13	100	$113
Stormwater Management Facilities (SWMF)	Cell	6	Ea.	10	100	$378
	Channel	4	Ea.	10	50	$63
	Sewer (+Inlets & Outlets)	32	Ea.	18	85-100	$924
	Junction (SWMF Inlets & Outlets)	8	Ea.	15	90-100	$702
	Inlets & Outlets	10	Ea.	14	85-100	$260
	Oil Grit Separators	14	Ea.	10	100	$900
	Structure	1	Ea.	10	50	$34





Asset Information Summary: Stormwater Infrastructure

The Stormwater Infrastructure asset class is comprised of the stormwater drainage network which consists of catch basins, manholes, piping, culverts, inlets etc. and stormwater management facilities (SWMF) which consists of cells, channels, sewers, outlets, inlets etc. The Stormwater Infrastructure asset class has a current replacement value of $24.8 million. Replacement costs have been provided by the City's Stormwater Assets & Programming team and are calculated using a unit cost basis.

The overall condition of the asset class is Very Good indicating that the assets are relatively new. The condition of assets has been calculated on an age-based assessment. This approach is commonly used when no formal condition assessment is available, whereby the age of the asset and its Expected Useful Life (EUL) are used to estimate the current condition. At this time, it is assumed that the stormwater assets will not require major funding for the next 10 years.

As part of continuous improvement, a condition-based approach of CCTV inspections for the stormwater drainage network is tentatively scheduled for 2025+ (based on current asset priorities). Additionally, some assets have yet to be spatially mapped and have note been included in this plan.

Asset Risk Framework

Understanding an asset's risk allows for the effective management of life cycle activities. The risk analysis involves identifying an asset's criticality and risk scores which is calculated as a product of consequence scores and likelihood scores. The likelihood of a risk event identifies the frequency and/or probability of its occurrence that would compromise the delivery of MiWay's strategic objectives and levels of service. Consequence denotes an outcome of an event affecting MiWay's overall objectives. Consequences can be stated qualitatively or quantitatively.

One of the purposes of the Transit Asset Management Plan is to manage potential risks that may compromise service delivery and strategic objectives. The goal is to understand the asset portfolio's criticality and prioritize lifecycle interventions proactively. Treatment plans may involve asset replacement, rehabilitation, upgrading, and continuous monitoring, with the goal of managing risks at acceptable levels. Furthermore, it involves communication and consultation with stakeholders to ensure understanding and effective management of risks. For this iteration of the Transit Asset Management Plan, risk scores were calculated to obtain an understanding of key risk areas and identifying the areas to focus on as part of the continuous improvement plan. Further details to the assumptions behind the calculation of the risk scores are described below.

Risk Impact Matrix

The Risk Impact Matrix is used to determine the significance of a perceived transit risk. The Risk Impact Matrix is a graphic representation of the risk ratings, expressed in terms of the product of the consequence and likelihood of the risk. The risk is calculated by multiplying the consequence and likelihood of failure. To illustrate the risk methodology, consider the City's revenue-generating vehicles (buses)-one of the major risks that can impact this asset class and the services it provides is the aging or deteriorating condition of the vehicles with time; the impacts include financial loss, operational and service delays, environmental concerns and other. On the likelihood of failure scale, staff rated this risk at a four due to the overall condition of the fleet, and on the consequence of failure scale, a five due to the adverse consequences/threats. When multiplied, the risk impact is 20 (Extreme) as shown in Table 0-5. The Risk Impact Matrix for threats and opportunities is shown in **Table 7** and

Table 8 below. **Table 9** provides treatment options and recommended strategies based on the severity of the risk scores.

Table 7: Risk Impact Matrix for Threats

Likelihood	5	Medium	Medium	High	Extreme	Extreme
	4	Low	Medium	High	High	Extreme
	3	Low	Medium	Medium	High	High
	2	Low	Low	Medium	Medium	Medium
	1	Low	Low	Low	Low	Medium
		1	2	3	4	5
	(Threat) Consequence					

Table 8: Risk Impact matrix for Opportunities

Likelihood	5	Medium	Medium	High	Extreme	Extreme
	4	Low	Medium	High	High	Extreme
	3	Low	Medium	Medium	High	High
	2	Low	Low	Medium	Medium	Medium
	1	Low	Low	Low	Low	Medium
		1	2	3	4	5
	(Opportunity) Consequence					

Table 9: Treatment Options and Strategies for Risks

Assessment	Low Threat	Medium Threat	High Threat	Extreme Threat
	Low Opportunity	Medium Opportunity	High Opportunity	Extreme Opportunity
Score	1-4	5-10	11-16	17-25
Risk Acceptance	Within risk tolerance	Slightly within risk tolerance	Outside risk tolerance	Significantly outside of risk tolerance
Actions (risk response)	No active management required	Active monitoring required	Proactive management required	Urgent and immediate attention required
Escalation	No escalation	No escalation	No escalation	Requires escalation and higher-level attention
Management	Minimal oversight and control needed	Moderate oversight and control needed	Substantial oversight and control needed	Intensive oversight and control needed
Frequency of Review	Review every 2 years	Review every year	Review every 6 months	Review every 3 months
Reporting	No reporting needed unless score changes	No reporting needed unless score changes	Include in operational reports only	Report frequently in high visibility operational and strategic reports

Risk Register Summary

Based on the methodologies noted above, a preliminary risk register was completed for the four Transit asset classes and a summary is provided in **Figure 3** denoting the distribution of current risks by asset class.

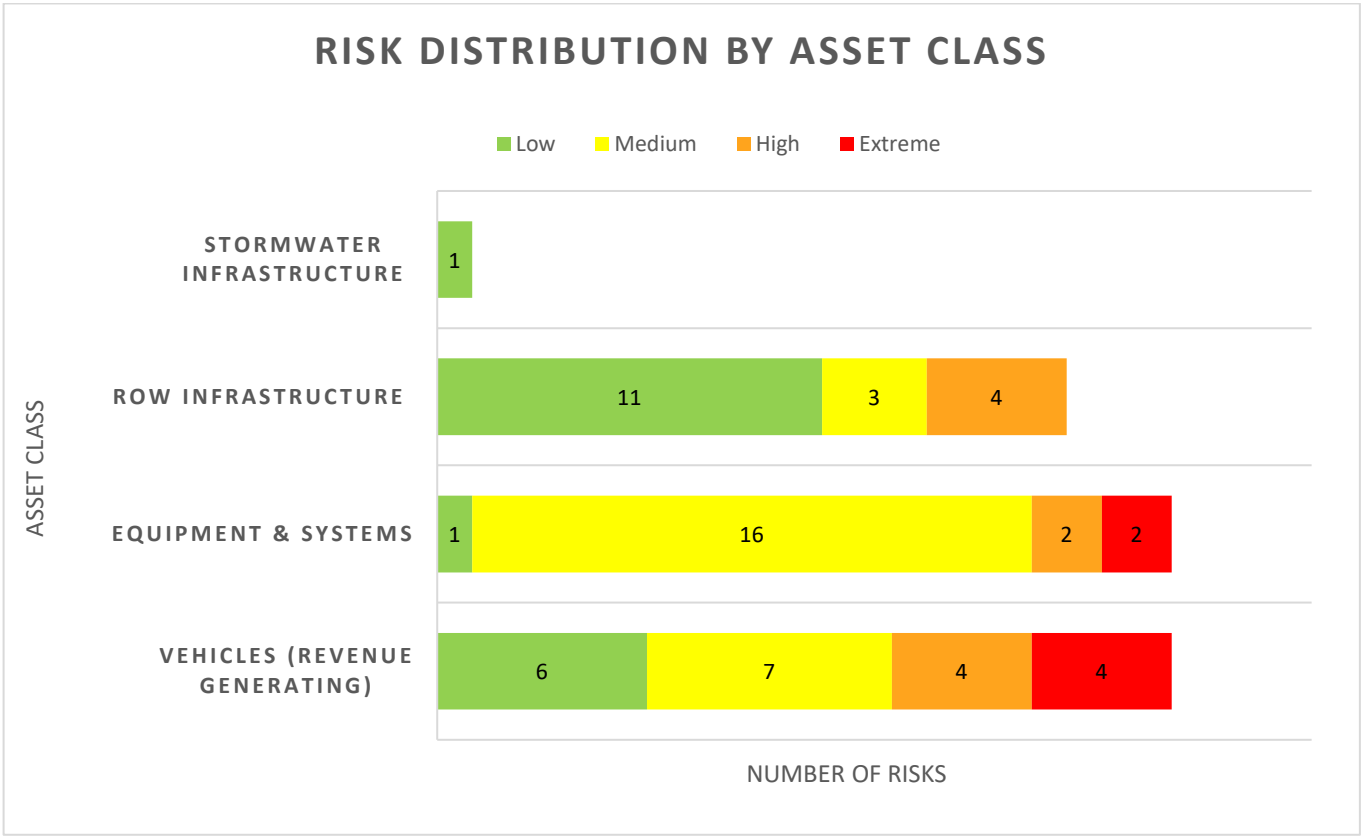


Figure 3: Distribution of Risk Scores by Asset Class

As part of the continuous improvement plan, MiWay will expand on the risk register to identify additional risks that may have not been captured in this iteration. The goal is to decrease the probability and/or severity of threats or, in the case of opportunities, to maximize their probability and/or potential benefits. There are many different methods by which to address these risks and the intent is to address the highest risks possible whether through asset replacement, rehabilitation, upgrading, continuous monitoring of risks and creation of contingency plans to mitigate the consequences of potential risk events. The action plan will identify the requirements to reduce risks.

Levels of Service

Levels of Service (LOS) describes the outputs or objectives MiWay intends to deliver to its customers and includes measures from both the customer/community perspective as well as technical metrics. LOS provides a description of a particular activity or asset metric where performance may be measured in order to benchmark the current state and set targets to ensure business needs are met. A cohesive suite of LOS measures, set at the appropriate levels within the organization, integrates the corporate performance vision with the day-to-day asset management decisions. Correctly defined LOS are critical in the further development of key asset management system elements including:

- Asset Management Plans
- Risk Management policies and associated tools
- Business Case Evaluations
- Capital Investment Prioritization and Planning tools
- Resource allocation including budgets and organizational adjustments (e.g., staffing levels to meet LOS)
- Short- and long-term Capital Maintenance funding requirements.

LOS measure how well MiWay is meeting business needs and will be utilized as key drivers for making decisions and future investment in various assets. Having well-defined service levels will allow MiWay to be transparent with its stakeholders to find the appropriate balance between affordability and service expectations. MiWay's LOS approach considers the customer experience by understanding and quantifying the value that customers place on transit services. Using this LOS framework, MiWay will be able to:

- Seek Leadership Team and Council endorsement of the corporate and customer LOS enabling the organization to clearly communicate service impacts associated with available operating and capital budgets
- Document the LOS at the corporate, customer and asset levels to provide a clear line-of-sight between corporate objectives and asset-focused objectives
- Consult customers and stakeholders on an ongoing basis to understand their needs and appropriately update LOS
- Ensure that investment and operational decisions are evaluated against their impact on our customers, the community, and the environment

MiWay's Level of Service Goals

The LOS Framework helps support and achieve key asset management goals, such as the following:

- Recommend future asset related endorsement of the corporate, customer and technical level of service framework and vision guiding principles, which enables the organization to clearly communicate service level impacts associated with available operating and capital budgets into future years
- Develop and continuously improve the documentation to provide evidence-based level of service linkages between the corporate, customer and technical levels with integration

directly into service-based activities as it relates to both the operational and capital expenditures
- Allow stakeholders, on an ongoing basis, to understand their needs and appropriately update the desired levels of service while balancing all facets of risks
- Ensure that investment and operational decisions are evaluated against their service delivery impacts on the customers and provide a standardized framework to undertake documented service level agreements throughout MiWay and along with the partners
- Understand the “willingness to pay” and provide data to appreciate the affordability of undertaking the various levels of service as future continuous improvement requirements for MiWay

Excessive investment is likely to result in assets being replaced unnecessarily, leading to higher costs and little benefit for customers. If assets are being replaced/rehabilitated more often, the customer may potentially perceive the benefits immediately, but the costs would outweigh the benefits. Too little investment is likely to mean a gradual decline in the asset’s performance with an associated impact on customer service. From the perspective of best practices, the LOS approach needs to involve agreeing on and then monitoring a set of defined customer and technical service performance indicators (LOS measures). If these indicators are broadly constant, or marginally improving, then it is assumed that the level of capital maintenance spent is of the right order.

The LOS measures indicators can therefore be used to monitor the effectiveness of MiWay’s asset management and maintenance programs from year to year, and to support the development of longer-term strategic plans for asset management. In addition, a comprehensive suite of levels of service measures can also be used, over a period, to give an indication of MiWay’s overall performance as a service.

Levels of Service (LOS) Framework

Asset management endeavors to harmonize performance, risk, and cost. This approach involves discerning customer expectations and it is impacted by asset performance. Defining and quantifying LOS within each Service Area becomes pivotal, steering asset requirements identification and investment determinations. **Figure 4** illustrates the relationship between corporate objectives and the Customer and Technical Levels of Service. These tiers need to be established in a manner that clearly illustrates how corporate objectives are linked to asset objectives and that the assets provide LOS needed to meet customer needs. This will ensure a clear relationship is identified between corporate and asset objectives. Likewise, comprehending the interaction between Asset LOS and Customer LOS will facilitate integrated and comprehensive asset management decision-making.

Across different service sectors in the City of Mississauga—Roads, Bridges, Stormwater, and Facilities—several Asset LOS measures are in place. In line with agreements within these sectors, MiWay's assets falling under these categories will conform to the established LOS measures. Additional performance measures and targets are proposed for MiWay's integrated performance planning. Moreover, typical transit agencies commonly utilize several LOS measures, like On-Time Performance (OTP), ensuring alignment with broader Canadian Transit industry standards. Using this methodology, MiWay can develop appropriate plans, processes, resources, and funding to deliver the specified LOS to the customer and achieve the overall MiWay goals to meet ridership demands and effectively manage transit assets to ensure the safety, reliability and efficiency of the transit system.

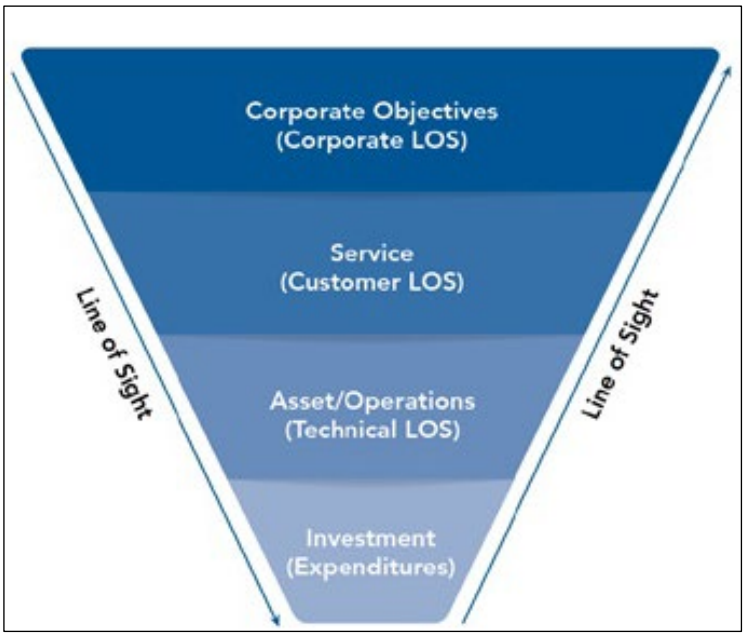


Figure 4: ISO55000 Line of Sight

LOS Attribute

A phrase that describes attributes of the service being provided (i.e., cost efficient, safe, reliable, etc.). These descriptions cover all aspects of the service and are easy for the customer/resident to understand.

Customer Levels of Service (CLOS)

Customer Levels of Service are specific parameters that describe the extent and quality of services that the municipality provides to users from the user perspective. CLOS is comprised of qualitative metrics such as asset appearance, response times, and quality of interactions. CLOS can be evaluated by measures such as customer complaints per certain number of people, customer surveys, community outreach, or discussions with staff familiar with service operations.

Technical Levels of Service (TLOS)

Technical Levels of Service are specific parameters that measure asset performance. TLOS is comprised of quantitative metrics such as asset age/condition, availability, and downtime. Part of the Technical LOS is to consider both the individual asset capability and how the assets are scheduled to be utilized as part of a system of service delivery.

MiWay Levels of Service

MiWay's Levels of Service provide a measure of how well transit assets are meeting the fast-evolving needs of MiWay's customers and stakeholders in alignment with the City's strategic direction for a transit-oriented city. MiWay's levels of service will be ever evolving through the incorporation of adaptive

measures and new technologies, demonstrating agility in response to and in anticipation of external factors of influence (e.g., Climate change, social, economic, and political changes), to ensure the long-term health of its assets. This section of MiWay's asset management plan will provide a summary of the current levels of service metrics as shown in **Table 10**. Currently, only key current LOS with higher data confidence and reliability within this asset management plan are being presented (high data confidence with three to five years of repeatable data analysis, performance reporting and benchmarking).

Table 10: Levels of Service Framework

LOS Attribute	Customer Levels of Service (CLOS)	Technical Levels of Service (TLOS)
Scope	Provide accessible and frequent transit service	Regular Service Passengers/Capita (2022): 29.5
Performance	Provide reliable transit service	On-Time Performance[4] Average (2022): 70%
		% of Vehicles (Revenue Generating) that exceed their estimated useful life (EUL) (2021): • Non-Revenue Vehicles: 35% • Conventional 40' Bus: 43% • Conventional 60' Bus: 4.6% • Hybrid 40' Bus: 0% • Hybrid 60' Bus: 0%
		Labour hours attributed to CM as a % of total labour hours (2022): 52%
		Labour hours attributed to PM as a % of total labour hours (2022): 48%
		% of assets in Fair or Better Condition by Asset Class (2021): • Vehicles (Revenue Generating): 36% • Equipment & Systems: 95% • Right-of-Way (ROW) Infrastructure: 89% • Stormwater Infrastructure: 100%
Quality	Provide clean buses	Bus Cleaning Schedule (2022): • Daily clean (mop floor and pick up garbage) • 28 day cycle for basic clean • 180 day cycle for major clean (including roof, ceiling and lighting
	Provide clean customer amenities	Inspections Schedule (2022): • Annual stop inspections • Weekly Transitway Station Inspection
Affordability	Provide affordable transit service	Actual vs Target Reinvestment Rate[5] by Asset Class (2022): • Vehicles (Revenue Generating): 16.7% vs 16.7% • Right of Way: 0.1% vs 1.0% • Equipment & Systems: 15% vs 18% • Stormwater: N/A
		Revenue/Cost Ratio (2022): 0.36

[4] On-Time Performance (OTP) is a measure of transit service reliability. MiWay's OTP range to consider a bus on time is between 1 minute early and 5 minutes late.
[5] Actual vs Target Reinvestment Rate is a measure of the how much funding is available (Actual) to meet lifecycle needs versus how much funding is required (Target) as a percentage of the total replacement value.

Future Demand

Asset management helps the organization manage change and business transformation challenges. These challenges are recognized in the form of demand drivers. Services are delivered to the customers of MiWay based on the requirements and defined capacities, available funding, and allocated resources. The levels of service (LOS) provided are intended to meet the service demands. Therefore, understanding changes in demand placed on services is advantageous in planning for affordable, sustainable, and desirable community/customer services. Demand drivers can create positive or negative service needs and enable or constrain the LOS, which MiWay can effectively and affordably deliver to its communities.

The Transit Service Area is planning for the future by recognizing the pressures and challenges ahead resulting from aging transit assets, extreme weather events, climate change and new legislation/regulations among other factors. There is an increasing need to plan and deliver effective and timely transit services and establish sustainable service levels. **Table 11** provides a summary of the key demand drivers for transit services.

Growth Analysis & Transit Ridership

As a part of the ongoing development of a departmental Asset Management Plan for Transit in the City of Mississauga, an analysis of current and future growth in the City is required to properly plan for future asset management related needs in the most efficient and cost-effective manner. This section aims to provide an overview of historical, current and projected growth in the City, Transit ridership (and the key planning and demographic elements influencing it), and anticipated expansion-related activities planned for as outlined in the most recent Development Charges Background Study.

Historical Population, Household & Employment Growth in the City

A key component to asset management planning is to understand how future changes in a municipality's population and employment base will impact the demand for municipal services. Moreover, consideration must be made for how changes in population and employment can impact ridership for transit systems. This section aims to identify the factors that can influence the demand for the City of Mississauga's Transit-related asset portfolio and their associated levels of service.

The population of the City of Mississauga was approximately 742,600 in 2021, making it the third largest City in Ontario and seventh largest in Canada. For planning purposes, total population, as opposed to Census population, is used as it accounts for the Census net under coverage (i.e. those who were missed or double-counted by the Census). Since 2006, the City's population has increased by nearly 45,000 residents and approximately 62,000 employees. This growth has propelled the acquisition of several new assets and the expansion of City services. These activities ensure that service levels are maintained and the needs of residents, both existing and new, are met. This is particularly relevant for Transit services as the City has continued to acquire new fleet, expand services and improve ridership. **Figure 5** below tracks population, households and employment in the City since 1996. As a point of context, as the City's 2021 population figures were lower than those projected in the approved Region of Peel Official Plan for 2021 (795,000 people), the growth which was not achieved (approximately 52,000 people) has been assumed to occur over the remaining planning period to 2051.

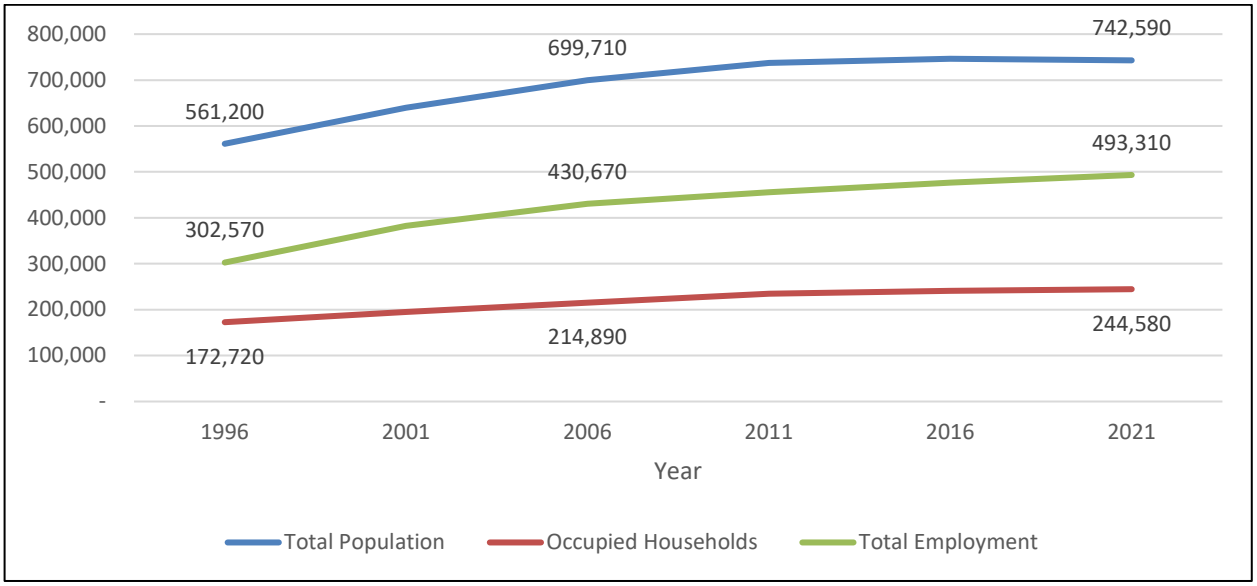


Figure 5: Historical Population, Occupied Households and Employment (1996 – 2021) Statistics Canada Data. The 2021 population and household figures are based on 2021 Census while employment is based on Peel Region forecast for Mississauga

While there was a slight decline in population over the last Census period from 2016 to 2021, the City is expected to return to steady population and employment growth, and associated development, over the long-term to meet the provincially approved 2051 targets. This level of growth will place demand for additional services, including improved access for all modes of transportation to ensure that quality of life is maintained for the new and existing residents.

Overall, the demand pressures identified will require the City to review and manage existing levels of service. An ongoing evaluation of the need for new services is required to identify works required to expand servicing capacity or address asset-related needs in the City's Transit asset portfolio.

Key Demographic & Planning Elements

Growth

The total population of the City of Mississauga is estimated at approximately 742,600 (2021 Census - adjusted to account for the under-coverage) with a strong residential and non-residential growth forecast over the long-term.

It is projected that the City's population will reach 995,000 and approximately 590,000 employees by 2051 based on the provincially approved Region of Peel Official Plan and the draft City of Mississauga Official Plan (see **Figure 6** below). The projected increase in residential growth, supplemented by continued economic development, will further create increased demand for municipal infrastructure. These additional infrastructure needs must be planned for to meet the needs of residents.

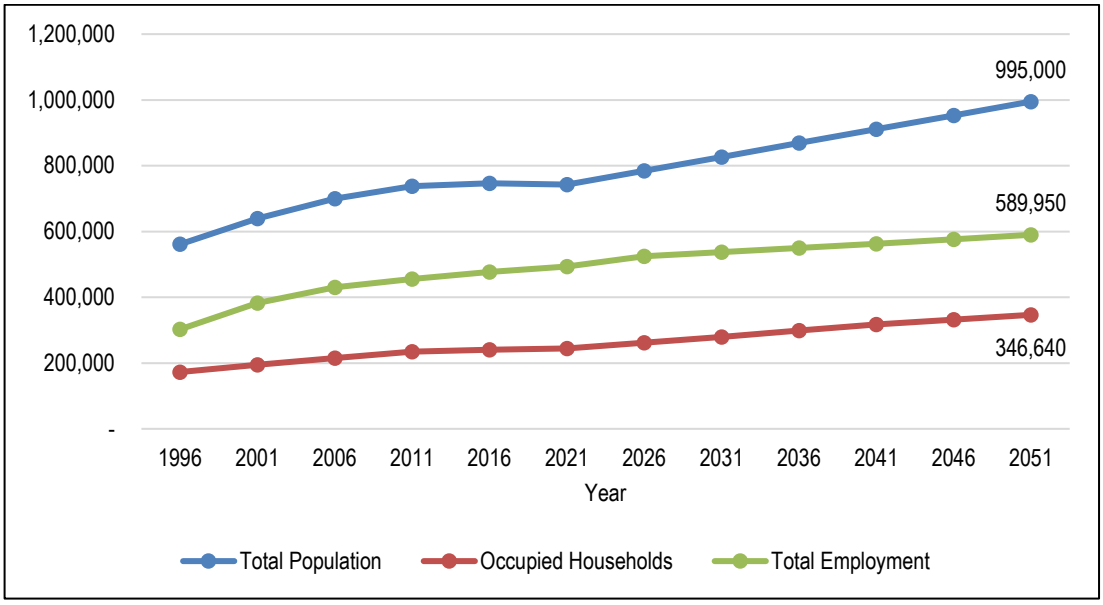


Figure 6: Historical and Forecast Population, Occupied Households and Employment (1996 – 2051)[6] , Statistics Canada and based on the Region of Peel Official Plan

Age Structure

Mississauga's age structure is slightly younger than the Province but notably older than the neighbouring municipality of Brampton. While the City will remain attractive to younger households, Mississauga's age structure is anticipated to shift increasingly towards senior population age groups as shown in **Figure 7**. As the population ages, the need for a variety of different services will change from the current standards. Of particular importance to Transit services, these demographic patterns can potentially lead to a change in transit use and commuting patterns impacting revenue ridership. Typically, municipalities with a younger age profile would be more akin to utilize transit services.

[6] The 2051 targets remain consistent with the Region of Peel approved targets, but the inter-year figures have been adjusted to reflect the 2021 census results.

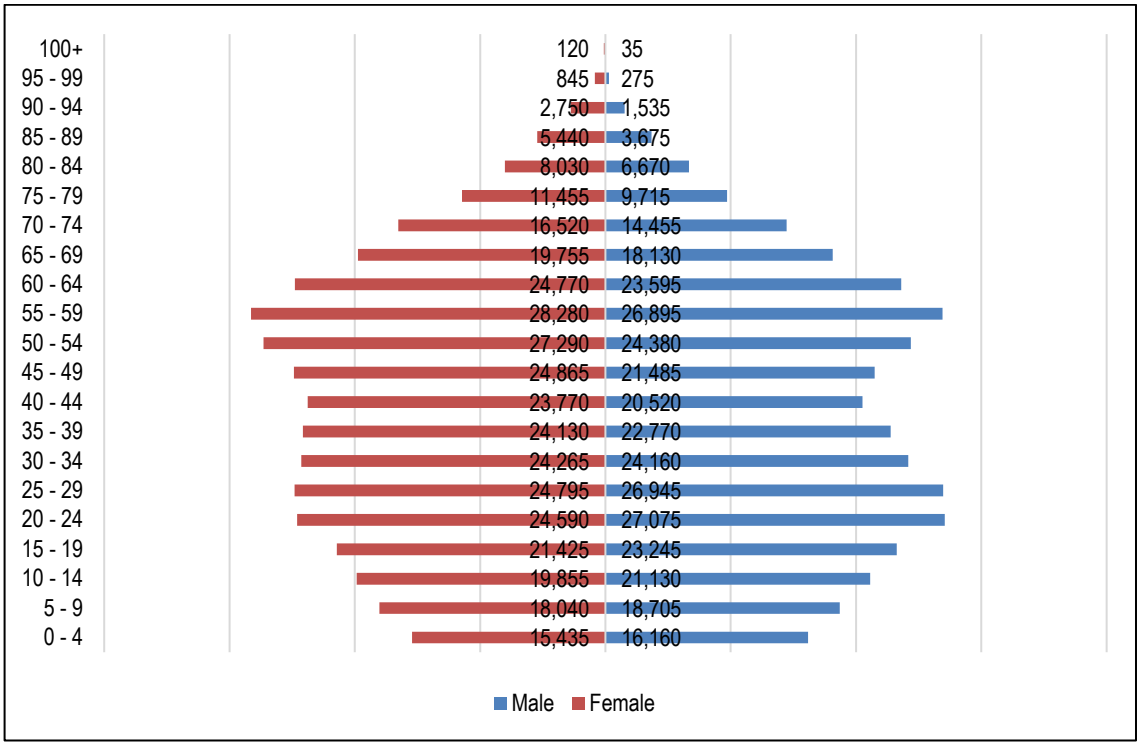


Figure 7: City of Mississauga – 2021 Population Age Structure, Statistics Canada, 2021 Census

Transit Ridership (Revenue Rides)

An assessment of the ridership forecast for the purposes of this Asset Management Plan was completed using the City's business plan and population projections outlined in this memorandum. As a point of reference, the City of Mississauga has targeted a short-term goal of 54 revenue rides per capita with that amount increasing to 79 rides per capita by 2049. For the purposes of this analysis, the transit ridership forecast maintains the City's methodology to measure *annual revenue ridership*, which is the sum of all linked trips on the transit system for which a fare has been received. **Figure 8** below outlines the change in ridership from 2015 through to 2031. The City's transit system has experienced fairly steady growth in ridership in the pre-pandemic era from 2015 to 2019. That said, similar to many transit agencies across the country, the COVID-19 pandemic impacted the use of the transit system as a primary mode of transportation ultimately impacting revenue ridership.

It also illustrates a reduction in revenue rides of about 50 per cent in 2020 and 2021 with a fairly strong rebound in ridership in 2022 which is beginning to mirror a return to pre-pandemic levels. Following this period, continued growth in ridership is expected which revenue rides will reach about 50 million by 2031 which equates to about 60 rides per capita on an estimated population of 826,000.

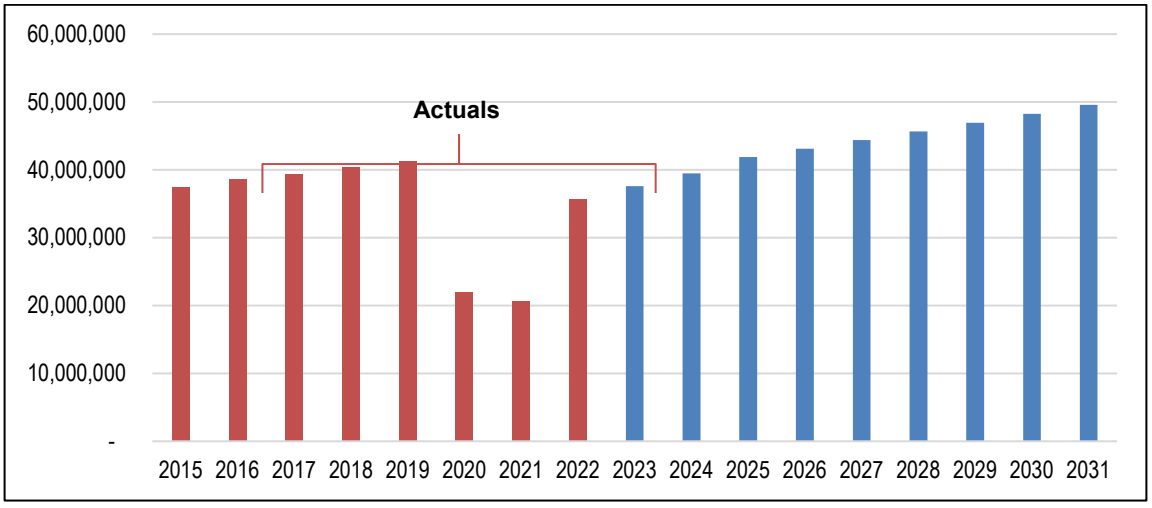


Figure 8: City of Mississauga Transit Revenue Ride Projections, City of Mississauga 2022 MiWay Business Plan, Canadian Urban Transit Association (CUTA) data for 2015-2022 and projections

Expansion Activities

As a result of increased population and employment, which is an attributing factor in the ridership projections outlined, new capital assets would be required to accommodate this growth. The City historically has used development charges, to the fullest extent allowed for, under the provisions of the *Development Charges Act* (DCA) to ensure that growth pays for growth. The City's DC Background Study illustrates a capital requirement of $455 million for new transit infrastructure over the 2022-2031 period, of which, $262 million is growth related and can be recovered from development charges (DCs) over this period. The remaining amount would be recovered from grants and subsidies ($91 million), and $102 million to be funded through taxes.

From a technical perspective, not all net new assets can be recovered from DCs as there are limitations to what can be considered growth-related. For the purposes of the 2022 DC Background Study, the City's travel demand model was used to forecast future transit ridership as an indicator of the planned levels of service based on future land use (population and employment) and future network[7]. This methodology helped determine the share of net new assets which could be funded from DCs, while the remaining share of costs would have to be funded from non-DC sources (i.e. taxes). In addition, the DC Study, the analysis below includes consideration for budgeted acquisitions over the 10-year period.

Of particular importance from an asset management perspective, although a significant share of this infrastructure will attract funding from development charges, the assets will become the responsibility of the City to operate, maintain, repair and ultimately replace in the future. This requires careful asset management planning to ensure levels of service can be maintained. A proper understanding of the

[7] Note, the ridership model used for the purposes of the DC study is different than the revenue rides projected in **Figure 8**. The DC Study projects AM (morning) peak period transit demand for 2016 (2016 network), 2016 (2031 network) and 2041 (2031 network). By applying the proposed 2031 transit network to the anticipated population and employment in 2041, the total AM peak period trips are projected.

relationship between the assets required to support the demand identified and the long-term asset management implications is critical.

Demand Drivers

Drivers affecting demand include things such as changes to development form and density, regulations and legislation, technological changes, economic factors, environmental awareness, and the direct impact of climate change on transit assets. A summary of the internal and external drivers that affect demand for transit services is shown in **Table 11**

Table 11: Demand Drivers for Transit Services

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Knowledge Retention (Staff Attrition)	MiWay, like many other similar organizations, will inevitably be experiencing both an aging workforce and staff attrition due to many uncontrollable factors. This potential knowledge management risk may result in either inefficient working as staff will take additional time to conduct tasks initially or this can result in lower LOS, as asset failures may not be prevented or the response to an asset failure may not be dealt with as promptly as it had previously.	Many organizations similar to MiWay struggle to compete with industry regarding retaining existing staff and attracting new staff. As a trend, this may become more difficult to attract and retain talented staff which has the potential to impact on MiWay's ability to continue to deliver its LOS.	Delays to processes due to learning curve. Delays to implementing improvements due to learning curve. Workforce has limited experience and therefore delivers lower quality work.	Develop, review and update Standard Operating Procedures. Review and update training curriculum. Formalized succession planning.
Demographic Changes & Diversity	Demographic shifts impact MiWay's customer demands for enhanced asset-related information transparency and a broader spectrum of communication methods, including social media. The diversity that exists in Mississauga in terms of persons from different social, cultural, economic, and religious backgrounds, and persons with disabilities should be important trends to consider, when identifying priorities and building new infrastructure. For reference, according to 2021 census, the City had the 5th largest visible	As the demographics continue to adjust, the change may put additional pressure on the City to ensure the transit services meet the demands of an evolving user base. Addressing these changes involves developing innovative strategies to cater to diverse customer needs amid rapid demographic modification.	Low customer satisfaction. Low employee satisfaction.	Equity, diversity and inclusion training for all City staff. Updates to the City's Facility Accessibility Design Standards. Improved coordination between City teams for projects and decisions that involve various members of the public including transit users.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	minority population in Ontario with nearly 62% of the population reported as being a visible minority.			
Technology Changes	Embracing new technology within MiWay is crucial for improved service delivery and reduced dependence on hard infrastructure assets.	As technology advances, MiWay will need to be able to adapt to change and endorse new technologies to improve LOS.	Obsolete technology and/or parts. Unreliable data. Lack of training for new technology.	Implementing comprehensive Data Governance Strategies to ensure uninterrupted service delivery. Stay up to date with changing technologies. Review and update training curriculum.
Environmental Changes and Greenhouse Gases (GHGs) Targets	Understanding and formalizing climate change impacts on transit asset performance is imperative. MiWay's response to the Greenhouse Gases (GHG) strategy and reduction targets are part of the City's Climate Change Action Plan. It is evident that there is a clear declaration from the leadership team acknowledging the changing climate, which is expected to lead to significant risks, pressures, and changes in demand in the future.	As climate change remains a global concern with observable changes in weather patterns, sea levels, and the frequency and intensity of extreme events, the City must continue its efforts to reduce its contribution to climate change as well as mitigate and adapt to its impacts. Advancements in technology and policy can influence the trajectory of climate change.	A greater number of hot days (over 30 degrees Celsius), which have the potential to impact the performance of assets, particularly those aging assets that were likely never designed with such conditions being a possibility. Increases in the number of days of heavy precipitation. This may manifest in higher short term snow management needs and increased importance or capacity of stormwater supporting assets (bridge and culverts). A greater number of freeze/thaws cycles, which have the potential to adversely affect asset durability and performance.	Assessing climate change scenarios to develop a robust Risk Management Strategy and continue to update detailed Service Asset Management Plan. Develop a comprehensive assessment of service and infrastructure demand changes in alignment with the City of Mississauga's Climate Change Adaptation Plan.
Regulatory Pressure	Transit services are typically regulated at different levels of government, including municipal, provincial, and federal authorities. Municipalities in Ontario are responsible for local transit services, while provincial and federal authorities may be	MiWay strives to be in compliance with applicable regulations. As regulations continue to evolve, MiWay must have a forward-thinking approach to sourcing managing, and commissioning assets in order to minimize	Existing assets not meet updated codes and standards. MiWay is not the asset owner (or is partial owner) and therefore the asset performance is subject to different LOS and lifecycle practices.	Continuous monitoring of impending legislation is necessary to future-proof assets and ensure compliance. Continue to benchmark best practices and consult with other agencies for alignment.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	involved in broader transportation policies and regulations. Involvement by the various tiers and current legislation may impact MiWay's ability to meet desired levels of service.	throwaway costs of replacing assets. Furthermore, as MiWay works collaboratively to implement higher-order transit projects, the regulations and standards per project may differ depending on the asset owner.	Lag time between new legislation implementation project completion may result is inability to comply with up-to-date regulations. Contracts for on-going projects would reference relevant regulations and standards at the time the project was tendered.	

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Employment Trends	Employment trends can be influenced by various factors, including economic conditions, industry growth, and regional development, among others. As with most communities in Ontario, the COVID-19 pandemic resulted in a disruption to the local economy, the effects of which are still being felt. At the time of the 2021 Census business closures and stay-at-home orders were still in effect. As such, a large portion of the labour force was unemployed and many others were working from home on a full-time basis, and often outside the City.	Employees continue to gradually return to their usual place of work, either full-time or under hybrid arrangements, it is evident that some shifts in work-at-home patterns will be long-lasting. Therefore impacting both MiWay staff and MiWay's ridership demand. As MiWay continues to develop the asset management program, identification of gaps in resources to effectively managing assets. Additional staff support will be required to improve asset management maturity, meet growing ridership demands and effectively assets.	Potential to impact future ridership and infrastructure demands. Need for additional resources to improve asset management maturity, meet growing ridership demands and effectively manage assets.	Continue to seek grant funding for growth, replacement and rehabilitation of assets. Submit budget requests for additional staff.
Population Density & Urbanization	Intensification is development that allows for more people to connect, work, and play within the existing urban boundary by re-developing, expanding and/or re-purposing existing areas, buildings or vacant lands. The City needs to ensure development in these built-up areas and planned intensification occurs in a sustainable and coordinated fashion. Developments needs to consider provisions for transit infrastructure that will support demand generated from the intensified areas.	Mississauga will continue to grow through intensification as its greenfield lands are nearly entirely built out. Mississauga is planning for growth through intensification based on a City structure and urban hierarchy with the highest intensity of development in the Downtown Urban Grow Centre, followed by Major Transit Station Areas, Major Nodes, Community Nodes and Neighbourhoods.	Increased transit service demand in intensified areas. Need for upgraded on-street infrastructure such as shelters to support service growth. Need for property for additional terminals and garages to support service growth.	Prioritize transit service and infrastructure in the City's master plans and strategic studies. Provision for transit infrastructure though development applications. Partner with provincial and federal authorities for opportunities for new and upgraded transit terminals/infrastructure including high-order transit projects. Continue to seek grant funding for growth, replacement and rehabilitation of assets.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services, but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions/Expansion/Rebuild
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)
Operations & Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Renewal/Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Through a series of workshops with stakeholders, an integrated asset lifecycle management strategic approach was undertaken, and current service delivery and potential future gaps were identified. This information was used to inform the timing and determine the number of needed investments in various assets. MiWay aims to provide sufficient service capacity to meet demand and manage asset upgrade, operation, maintenance, and renewal to sustain defined service levels, including meeting legislated and other corporate requirements. This section of the AM Plan outlines MiWay's asset management strategies for expansion and upgrade strategies to support capacity and functionality service levels and the operations, maintenance, and renewal activities to support reliability service levels.

All assets physically deteriorate at different rates to eventual failure and loss of ability to deliver the required LOS. **Figure 9** illustrates this typical deterioration curve, which shows the relationship between the condition and effective life (typically measured in age). Asset condition measures an asset's current position or place on the asset "decay" or deterioration curve. Many assets deteriorate slowly at first to a fair condition; after that, there is more rapid degradation.

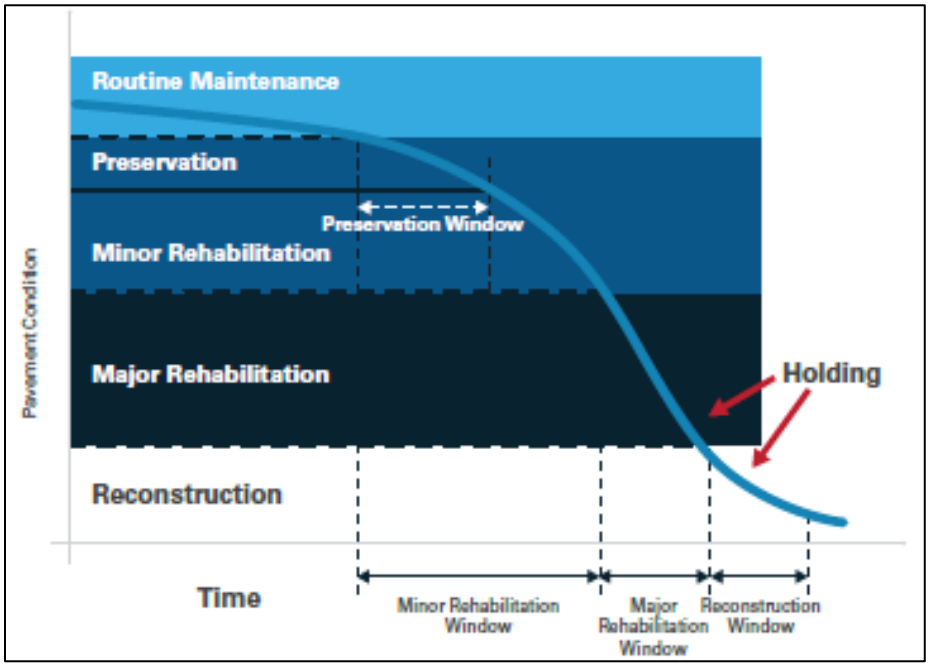


Figure 9: Typical Pavement Performance Curve, MTO Workshop- AMONTario

Asset Lifecycle Strategies

Table 12-15 provides a summary of the different strategies and actions that MiWay employs for its various asset classes. These tables are not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff. As some MiWay assets are maintained by other groups within the City, the lifecycle activities for ROW assets, such as roads, bridges, culverts, noise walls, retaining walls, and Stormwater Infrastructure can be found in the Road and Stormwater asset management plans. For Equipment & Systems, there are no lifecycle activities noted as only end-of-life replacement is currently being conducted.

Table 12: Lifecycle Strategies for Vehicles (Revenue Generating)

Asset Category	Activities	Current Activities
Vehicles (Revenue Generating)	**Non-Asset Solutions**	• Updates to training program/curriculum as needed for new bus technologies for Maintenance and Operations staff
	Operations & Maintenance	• Semi-annual inspection process as prescribed by Ministry of Transportation Ontario (MTO) • Visual inspections are conducted to make sure asset components are functioning as required (ex: Look for missing body parts, damaged or cracked frame etc.) • Check for cleanliness regularly • Maintenance based on Original Equipment Manufacturer (OEM) recommendations
	Renewal/ Rehabilitation	• N/A
	Replacement	• Full replacement of vehicles at the end of their useful life
	Disposal/Demolition	• Selling or scrapping vehicles at the end of their useful life
	Expansion/Rebuild/New	• Purchasing growth buses to increase service hours, while also introducing zero-emission vehicles to MiWay fleet

Table 13 Lifecycle Activities for Right of Way

Asset Category	Activities	Current Activities
Right of Way (ROW)[8]	**Non-Asset Solutions**	• Develop MiWay 5 Services Plan and MiWay Infrastructure Growth Plan every five years • Participate in the development of Transportation Master Plans (TMP) and strategic studies • Implement road network improvement priorities within Development Charges Transportation Background Studies • Conduct Roadway feasibility studies, Environmental Assessments, and design works
	Operations & Maintenance	• Minimum Maintenance Standards Inspections including routine patrols, winter weather monitoring, sidewalk inspection and sign testing • Winter Operations including anti-icing, salting, plowing and snow removal • Crack sealing • Pothole or asphalt patching • Road signage repairs • Pavement marking re-application
	Expansion/Rebuild/New	• New road construction • Roadway realignment • Road widening (may be done in conjunction with a renewal activity) • Installation of a new bridge or culvert where none previously existed • Bridge and culvert widening associated with a road widening or flood mitigation project

[8] There are lifecycle activities undertaken by the Transportation Asset Management team for ROW infrastructure that are not noted in the Table 13. Refer to the Roads Asset Management Plan for other lifecycle activities.

Table 14 Lifecycle Activities for Stormwater Infrastructure

Asset Category	Activities	Current Activities
Stormwater Infrastructure[9]	**Expansion/Rebuild/New**	• Manage projects related to expansion and rehabilitation as recommended by the Stormwater Assets & Programming team • Manage projects related to new construction

Table 15: Lifecycle Activities for Facilities

Asset Category	Activities	Current Activities
Facilities[10]	**Operations & Maintenance**	• Manage projects related to minor repairs, replacements, and upgrades of transit facilities • Fire drills and monthly Joint Health and Safety Inspections • Miscellaneous stocking of supplies • Daily walk-around by each Maintenance Shift Supervisor to identify safety concerns and ensure proper storage of tools and materials
	Expansion/Rebuild/New	• New construction of transit terminals, stations, and garages with support from Facilities & Property Management

[9] There are lifecycle activities undertaken by the Stormwater Assets & Programming team for Stormwater infrastructure that are not noted in the Table 14. Refer to the Stormwater Asset Management Plan for other lifecycle activities.
[10] Note that all lifecycle activities except for Operations & Maintenance are budgeted for and undertaken by Facilities & Property Management

Table 16 summarizes the risks associated with performing these lifecycle activities to maintain current levels of service.

Table 16: Risks associated with Lifecycle Activities Undertaken

Activity Type	Risks Associated with Lifecycle Activities
Non-Asset Solutions	• Inability to identify and record asset condition to inform decision-making for maintenance and capital programs • Strategic planning/budgeting, project prioritization and capital costing is not effective without Master Plans and other studies to inform long-term decision making • Without DC studies the City cannot collect funding for growth-related projects and satisfy legislated requirements • Inability to mitigate climate change impacts and other demand factors
Operations & Maintenance	• Premature asset failure due to incorrectly planned maintenance activities • Emergency or Unscheduled closure result in much higher replacement costs • Facility closures • Loss of revenues • Injury/lawsuits
Renewal/Rehabilitation	• Deferral cost of not rehabilitating items on schedule • Facility closures • Loss of revenues • Injury/lawsuits
Replacement	• Inadequate planning and implementation of infrastructure to manage existing and potential growth pressures
Disposal/Demolition	• N/A
Expansion/Rebuild/New	• Service is prematurely expanded • The ability to fund, operate and maintain any future assets

Lifecycle Needs vs Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class. Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations
- The costs of any Non-Asset Solutions, Acquisition/Expansions/Rebuilds, and Operations & Maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of 2022-2025 operating budget and assuming Year 4 as annual budget for Years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Land acquisitions and related studies
    - Overhead costs

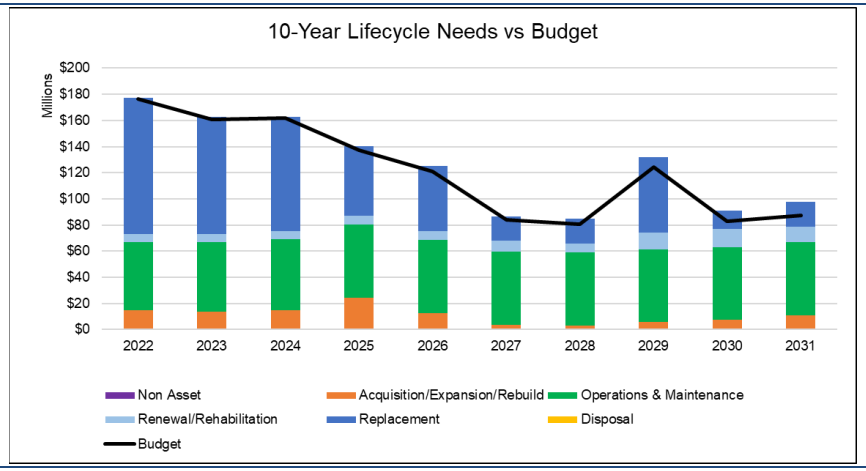
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation, and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

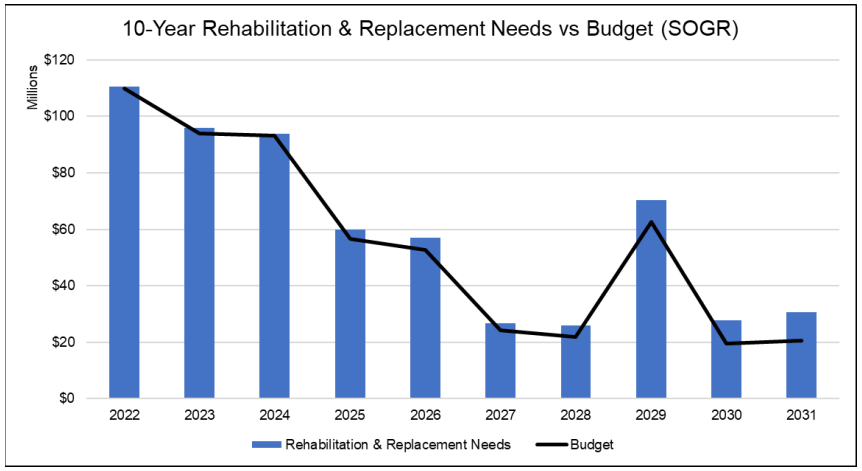
To illustrate the 10-year forecast, two graphs have been created by Service Area and by each Asset Class in this section:

- Total Lifecycle Needs vs Budget Graph
- Rehabilitation & Replacement Needs vs Budget (State of Good Repair[11]) Graph.

[11] State of Good Repair (SOGR) denotes projects that ensure existing assets are maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision making process for allocating limited capital funds

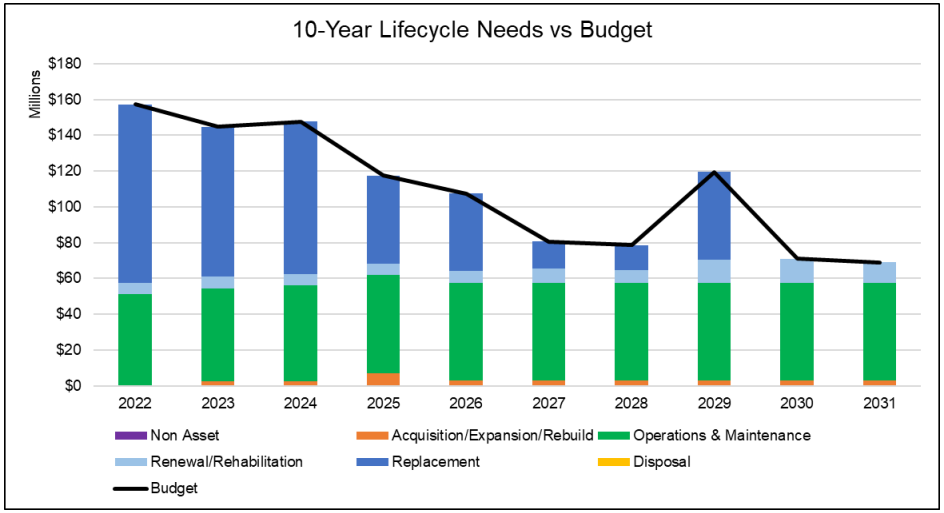
Transit- MiWay[12]

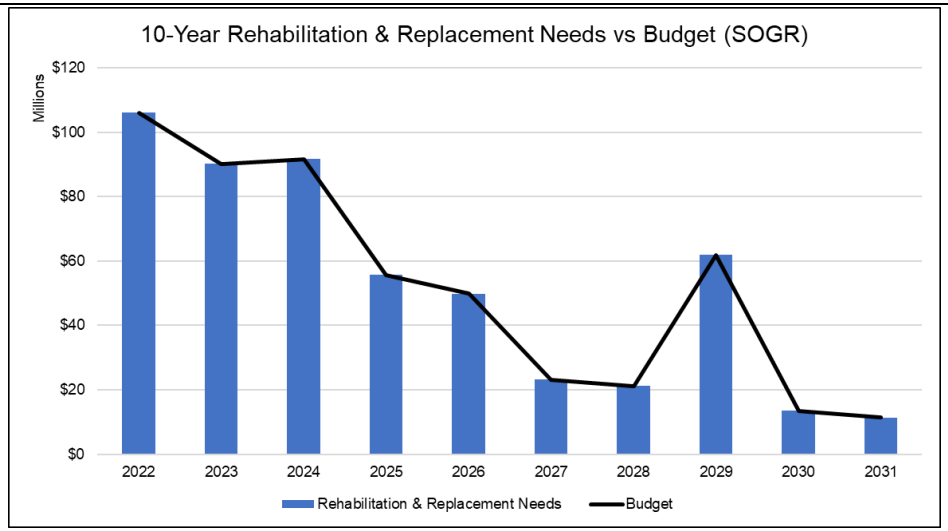




[12] As Stormwater Infrastructure assets are in Good to Very Good condition with an estimated useful life of 50-100 years, it is assumed to be no lifecycle activities planned for the next 10 years. Therefore no graphs have been provided.

Vehicles (Revenue Generating)

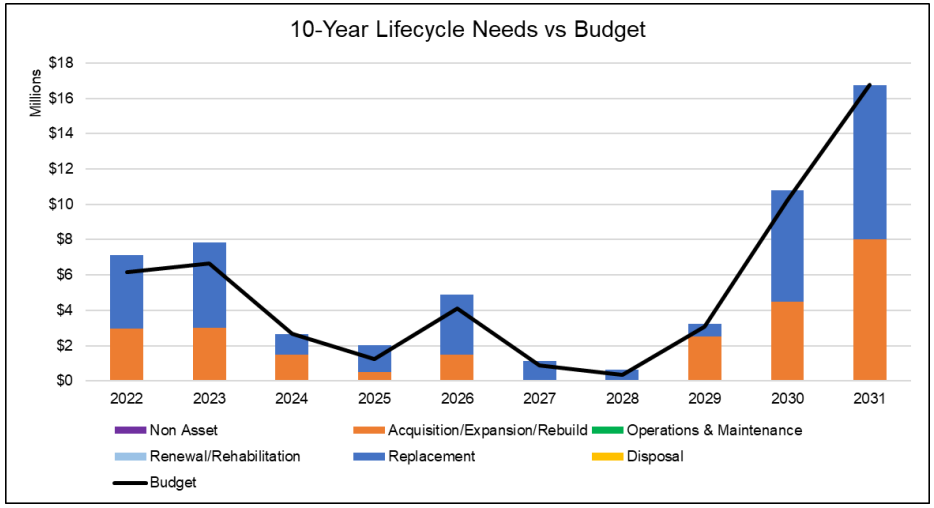


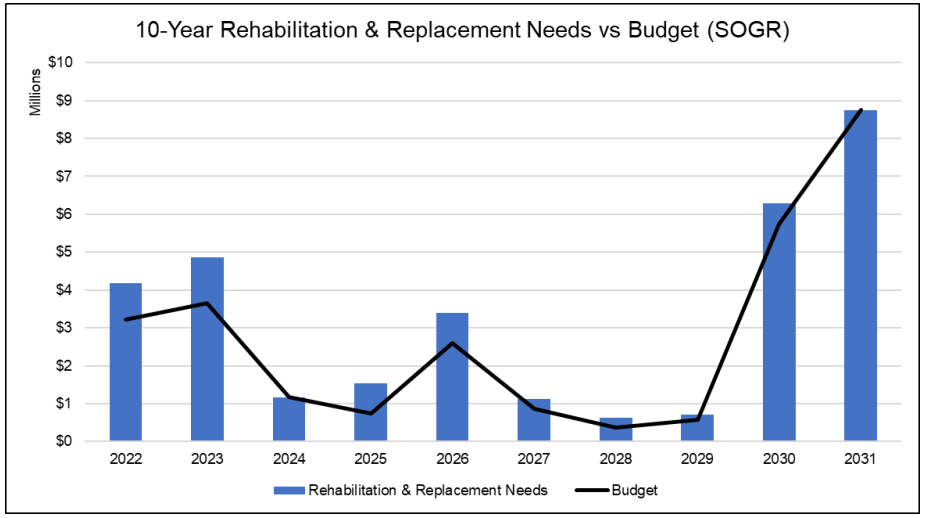


Approximately 64% of the revenue generating vehicle inventory is in poor to very poor condition meaning their replacement is imminent within the next few years as shown on the lifecycle forecast from 2022-2024. As vehicles age and their condition deteriorates, the safety and reliability risks increase. Fleet in poor condition is more prone to breakdowns and disruptions which could compromise passenger safety, leading to accidents or breakdowns which further lead to service delays, cancellations, and inconvenience for passengers. This could result in decreased ridership, loss of revenue, and damage to the reputation of the transit service provider.

Maintaining an aging fleet can be more expensive due to increased repair and maintenance costs. Operating outdated vehicles may also to be less fuel-efficient, further increasing operational expenses over time.
For the current 2022-2031 forecast, the budget is deemed sufficient to meet lifecycle demands for revenue-generating vehicles. The procurement of new vehicles incrementally increase starting in 2023, and will affect future lifecycle forecasts.

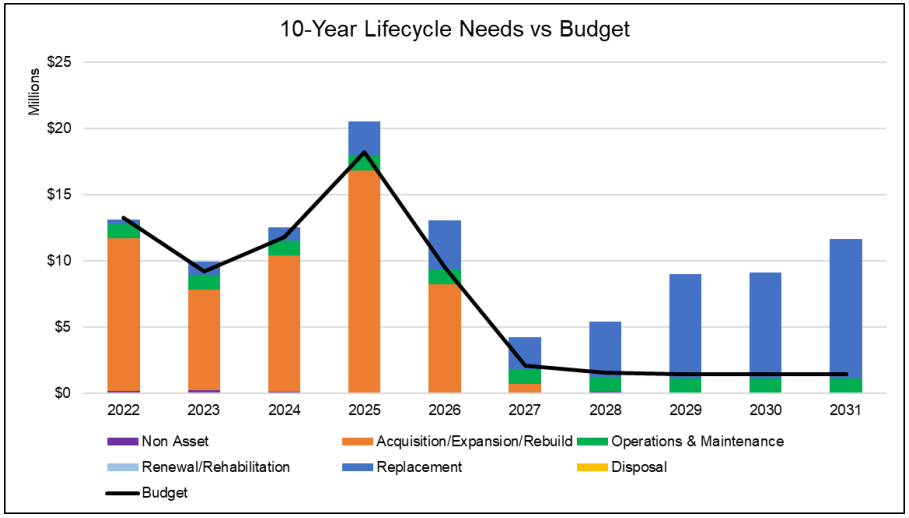
Equipment & Systems

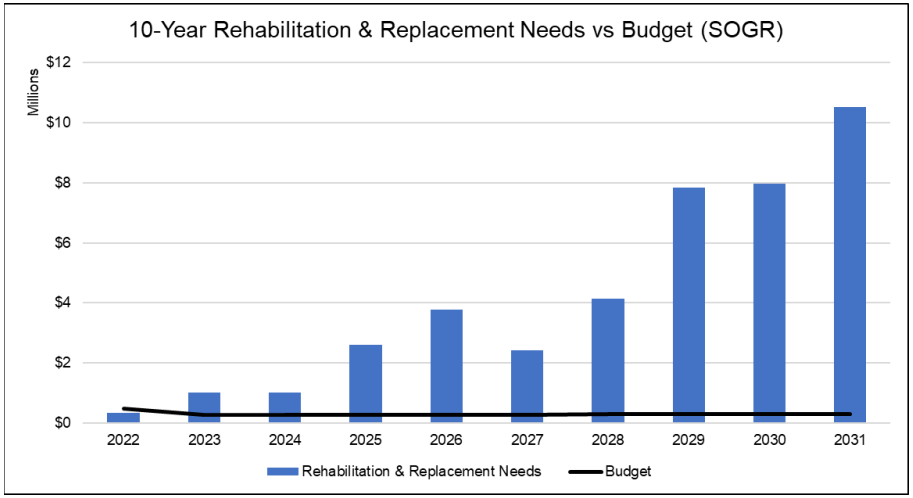




Around 95% of the Equipment & Systems assets are in fair or better condition. Depending on RUL of the asset sub-type, lifecycle replacement may be expected within the next 10 years. The assets in poor or very poor condition are estimated to reach their end-of-life replacement within the next 3 years. The planned budget is mostly sufficient to meet the lifecycle needs of these assets as shown by the Budget line; however, for the fare equipment asset type, there is a moderate infrastructure gap.
As some Equipment & Systems assets sub-types are considered a part of bus replacement costs, these assets will be replaced with the procurement of new buses.

Right of Way (ROW) Infrastructure





Approximately 10% of the Right of Way assets are in Poor to Very Poor condition, meaning many of them will require major rehabilitation or replacement in the next 10 years (includes stops, retaining walls and living wall).

Staff continue to validate and assess asset condition and performance in order to more accurately and reliably inform their lifecycle forecasts and planned budgets.

Over the next 10 years, MiWay's average annual budget is $1.2 billion as shown in **Figure 10**.

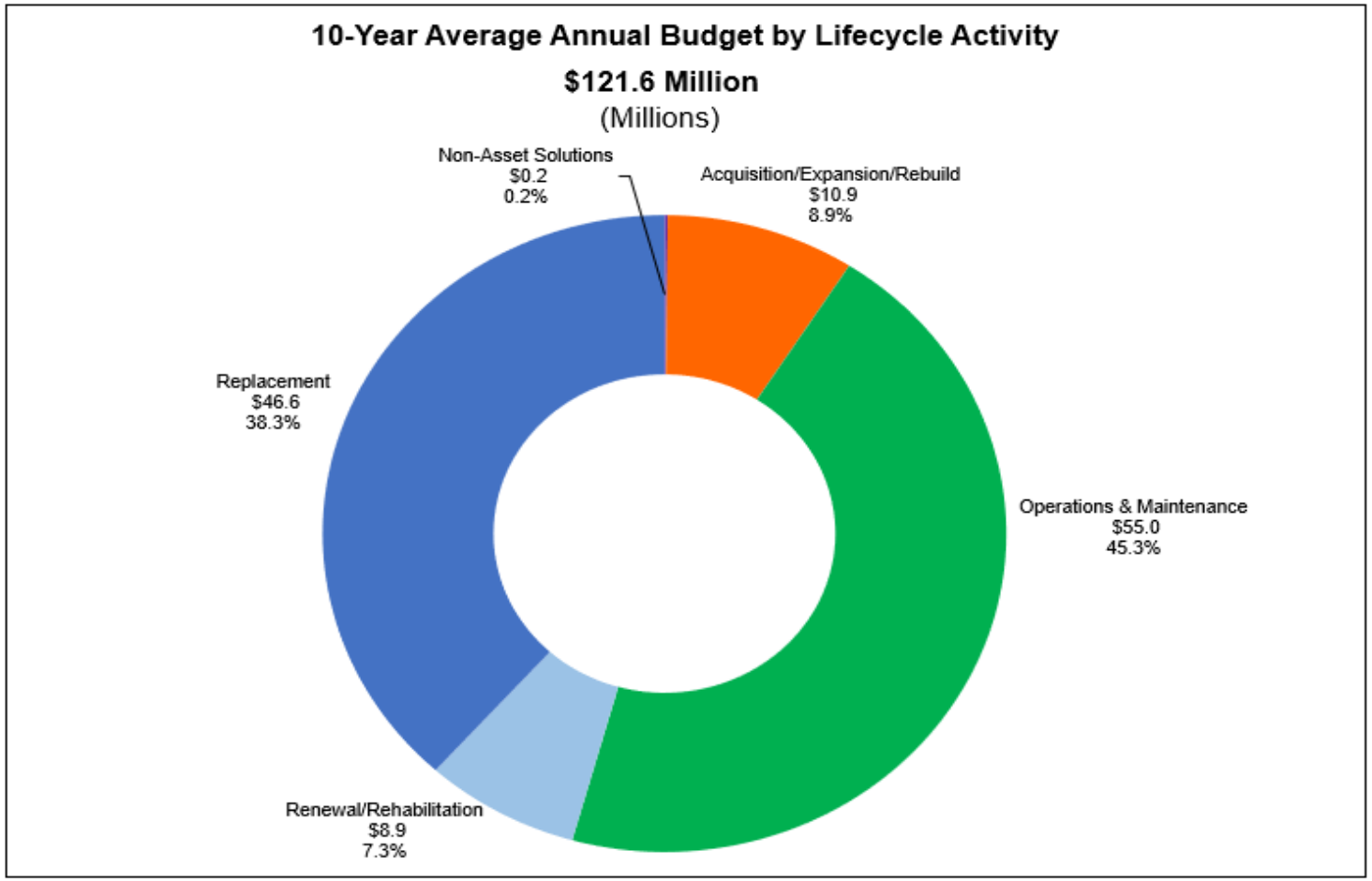


Figure 10: Breakdown of Budget by Lifecycle Activity

Table 17 shows 10-year annual average budget breakdown by Asset Class. The majority of the operating and capital budget is spent on State of Good Repair of Transit assets.

Table 17: Budget breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Vehicles (Revenue Generating)	53.9	52.5	106.4	2.9	109.3
Equipment & Systems	-	4.7	4.7	0.5	5.2
Right of Way (ROW) Infrastructure	1.1	0.3	1.4	5.6	7.0
Other[13]	-	0.1	0.1	-	0.1
Total	**55.0**	**57.6**	**112.7**	**9.0**	**121.6**

[13] The “Other” asset class denotes lifecycle activities that span over multiple asset classes within the Service Area such as plans, studies, and other non-asset solutions.

Financing Strategy

Effective implementation, maintenance and management of assets aligns with the City of Mississauga's Strategic Plan goals and are achieved by applying sound asset management practices, inventorying assets, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

MiWay is an asset-intensive organization. To accurately capture the financial commitment, it is important to recognize the consumption of an asset, categorize expenditure by lifecycle activity, allocate costs to assets, prepare long term forecasts, consider available revenue sources, and report financial performance. As articulated in the Strategic Priorities, is to "move" the city, and hence this Transit Asset Management Plan directly links to this strategic goal by actively managing transit assets and supports inter-generational equity by apportioning the investment needs over the long term.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget – for example, utilities, building and sidewalk maintenance, etc. The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The Capital Budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment, including IT network infrastructure, used in providing municipal services. Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets – for example, sidewalk maintenance or licensing fees – are included in the operating budget. The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserve and Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue, and are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget. Reserves contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle. Municipalities use reserves and reserve funds to set aside funds for future spending. This practice can help to stabilize any annual fluctuations in funding requirements, plan for any major long-term asset investments, and prevent sudden spikes in property taxes, rates, and debt levels.

As illustrated in **Figure 11,** the estimated available funding for the next 10-year period (2022-2031) for MiWay is $1.2 Billion. The primary sources of funding are Operating Revenue sources at 45.3 per cent and Subsidies, Grants, Recoveries and Other at 28 per cent.

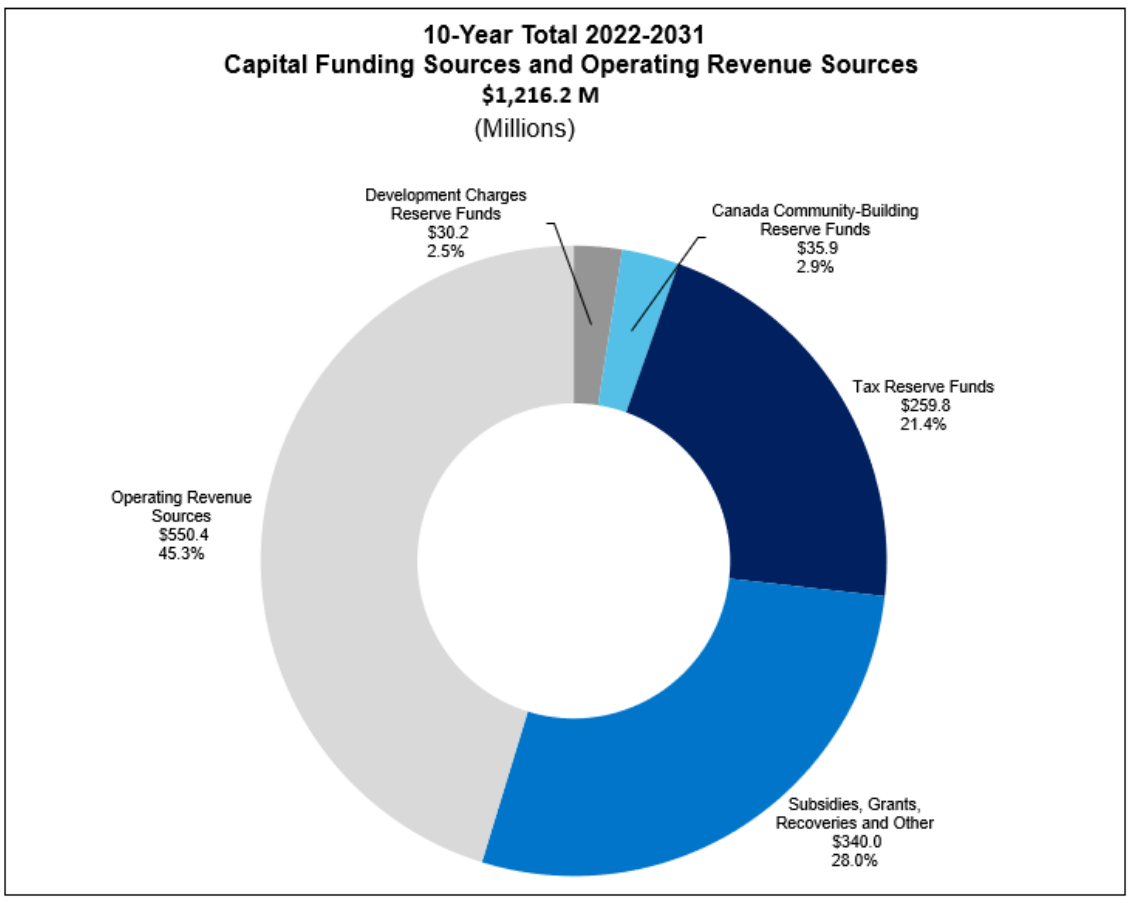


Figure 11: Capital Funding Sources & Operating Revenue Sources

Overview of Revenues

MiWay uses a wide range of funding and financing tools to address the identified capital requirements while the MiWay operating costs are funded through a combination of user fees and taxes.

From a capital funding perspective, the type of capital project typically aligns to its funding source. In this regard, growth-related projects receive funding through development charges; replacement projects are predominantly funded through tax-based contributions. Provincial and Federal subsidies are also commonly used to fund transit services and Investing in Canada Infrastructure Program (ICIP) will be used to facilitate the replacement and renewal of the City's fleet in addition to funding on-street transit appurtenances and transit amenities (e.g. shelters, queue jump lanes, glass partitions, etc.).

Federal and Provincial Grants

The Federal and Provincial governments provide grants to municipalities to assist in funding necessary capital infrastructure. Senior grants are generally separated into two categories: ongoing and one-time.

The Federal Gas Tax Fund provides stable funding to municipalities across Canada on an annual basis. It is a major source of capital funding for the City of Mississauga, with $41.9 million in these funds received in 2022 (as per the 2022-2025 Business Plan & 2022 Budget). These contributions, which are distributed to municipalities based on population, are now indexed annually for inflation. Unlike Provincial Gas Tax funds, Federal Gas Tax funds may be applied to most services. The City of Mississauga has typically used Federal Gas Tax funds for transit, facilities, roads and bridges.

According to the 2022 Budget, the City also received $19.0 million in transit-focused Provincial Gas Tax funding - the City primarily uses these funds for transit operating expenditures. Provincial Gas Tax funds are distributed to municipalities across Ontario based on a formula considering population and ridership.

The City has secured funding from 2022 to 2027 for the construction, rehabilitation and replacement of MiWay assets, through the Investing in Canada Infrastructure Program (ICIP), of approximately $472.4 million. The amount is comprised of Federal funding, Provincial Funding and a portion funded by the City of Mississauga.

User Fee Supported Funding Tools

User fees are representative of the principle of economic efficiency, as the consumer of the service has direct control over the extent to which the service is used. In Mississauga, user fees related to transit are significant sources of operating budget revenue.

Using the data obtained from the 2022 Canadian Urban Transit Association (CUTA) factbook, the City of Mississauga collected about $78 million in transit user fees, which accounts for approximately 36% of the total operating expenses associated with providing the service. This cost recovery ratio is slightly higher than the cost recovery average (31%) compared to other GTA municipalities with transit services (**Figure 12**). Considering size and density, Mississauga's transit service cost recovery is lower than the City of Toronto's TTC operation and the City of Brampton's transit service. It is recognized that the TTC operation is quite different as the level of intensification along transit routes is much higher and the service delivery model which is highly dependent on a network of subways and streetcars which influenced the ridership per transit vehicle. Also, GTA municipalities are often required to provide transit on routes before adjacent subdivisions are fully built-out which could impact the timing of revenue collections relative to the costs incurred.

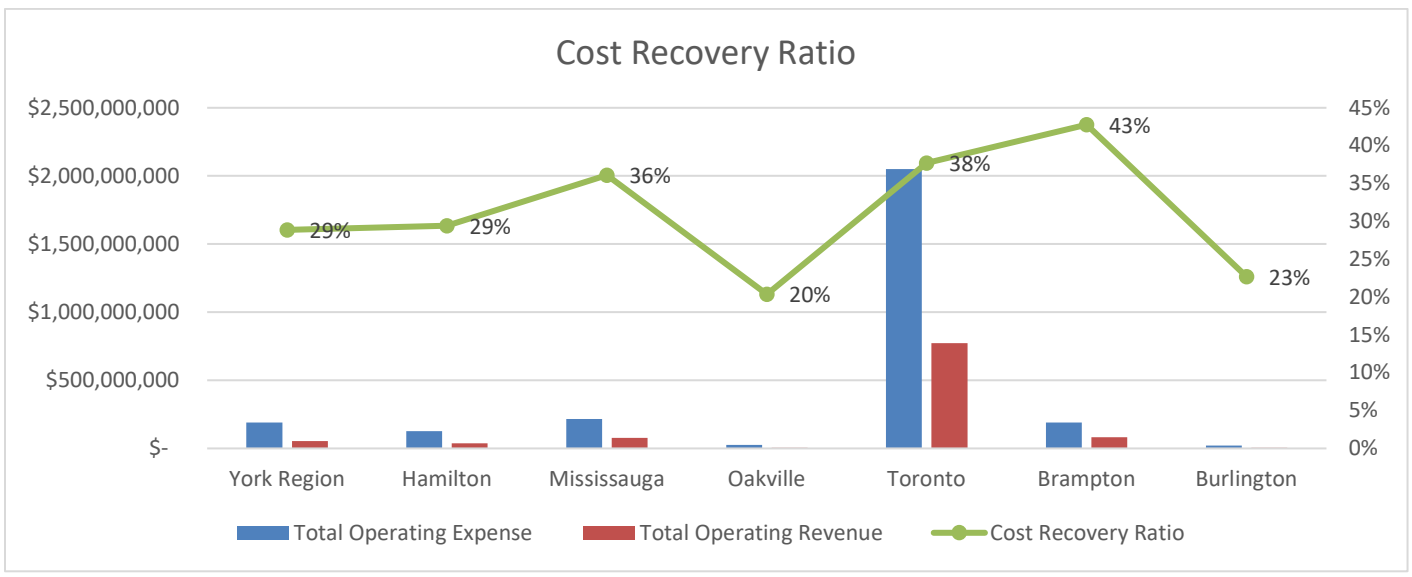


Figure 12: Transit Services Cost Recovery Comparison for Select GTA Municipalities, 2022 CUTA factbook

Development Supported Funding Tools

Developer-funded mechanisms are available to municipalities to cover the costs of transit capital infrastructure that is associated with growth and development. Most municipalities in Ontario impose development charges to pay for off-site, development-related infrastructure. The Development Charges Act (DCA) provides the authority to impose these charges, and provides strict limitations on their calculation. Development charges are generally based on the benefits principle, as increases in need for services necessitated by development are estimated and all or a portion of the net capital cost (gross cost less other contributions such as grants or subsidies) of providing the services are recovered through the levy paid by the benefiting development.

The City of Mississauga currently collects development charges on a City-wide basis to cover growth-related costs associated with transit operations. Development charges cannot be used for replacement projects; however, they can pay for the expansion share of certain projects. Amongst the 2016 amendments to the DCA, the legislation requires municipalities to complete an asset management plan for the growth-related assets considered in the background study. Furthermore, the changes to the Act allow for the calculation of the transit development charge to be based on the use of the "planned level of service" rather than the more restrictive "10-year historical average level of service". These changes formed an integral component to how the DC rate was calculated during the 2022 DC Study update.

Revenue History

As shown in **Figure 13** below, over the past number of years, Provincial and Federal grants and subsidies continually represent the largest share of capital funding sources for transit services. It should be noted that growth-related projects are generally funded through the City's development charge reserve funds (or development charge supported internal debt financing) as well as grants and subsidies available.

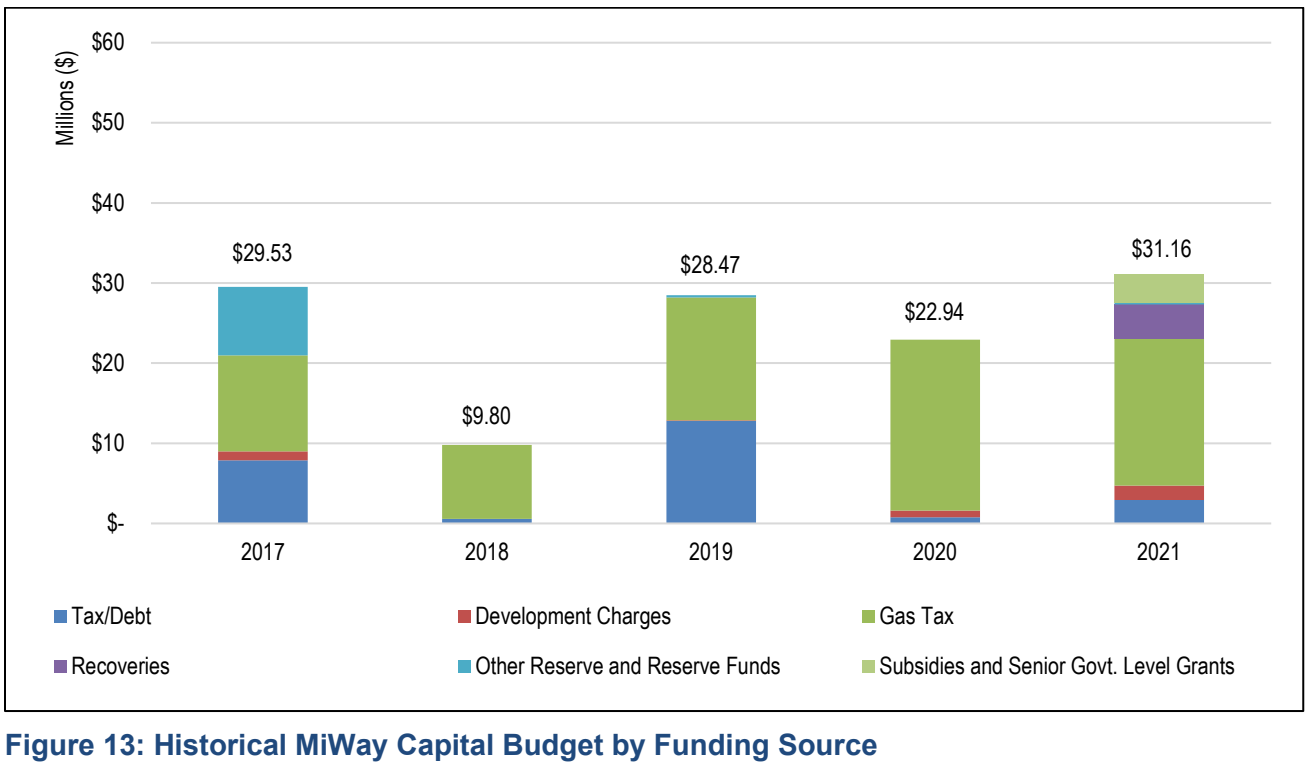


Figure 13: Historical MiWay Capital Budget by Funding Source

The following provides a snapshot of the most prominent capital funding sources for MiWay based on the 2017-2021 period.

- Federal Gas Tax represents the largest share of total transit funding, representing approximately 63 per cent of the total funding over the 2017-2021 period. These funds are typically prioritized to help fund the Transit capital program. Other subsidies and senior government level grants represent an additional three per cent of the total funding. MiWay is different from other City services as federal and provincial funding has historically been more readily available to fund asset repair and replacement activities than other City services. Overall, this allocation of funds would need to be considered and incorporated into the funding plan moving forward.
- About three per cent of the funding is from development charges, used as a source of funds for growth-related projects outlined in the City's DC Study.
- The tax and debt capital contributions represented roughly 20 per cent of the City's capital funding sources for Transit Services. These funds are used to address the annual deterioration of existing Transit assets.
- Recoveries and Other Reserve and Reserve Funds accounted for 11 per cent of the total funding over the period.

On average from 2017-2021, about $23.6 million (unadjusted for inflation) per annum has been spent on transit infrastructure for non-DC related infrastructure.

Cost Analysis: Overview of the Full Lifecycle Model Approach

As part of this analysis, the total full lifecycle costs of an asset that correspond to the requirements of the regulation. This would entail a cost estimation throughout the asset's life including planning, design, construction, acquisition, operation, maintenance, renewal (and disposal). In addition, the analysis also takes into consideration the inclusion of expansion-related infrastructure into the lifecycle management strategy. This approach ensures that the additional lifecycle costs associated with newly constructed/acquired assets are accounted for in the long-term forecast. The initial first-round capital to acquire the asset is not considered in the asset management provision.

While this Plan looks to address the various cost elements, it is important to recognize that as the maturity level increases, the costs associated with each lifecycle activity will strengthen and improve the expenditure outlook. **Table 18** below provides the specific approach used to forecast expenditures in this Transit Asset Management Plan.

It is important to recognize that there are some limitations with the cost analysis, and primarily, the contributions for asset replacement includes the replacement of assets of a similar function and style. This limitation is particularly relevant for transit services as the infrastructure that supports these services are very dynamic and the capital lifecycle requirements of these assets are continuing to evolve. Therefore, this expenditure analysis does not include for the consideration of electrification of the City's fleet (or supporting infrastructure) to upgrade existing technologies. In this context, achieving greenhouse gas (GHG) reductions and targets may require additional funding beyond what has been identified herein.

The cost analysis is intended to be used for information purposes outlining a level of optimal investment to support the existing asset base and future lifecycle needs of the City.

Table 18: Overview of the Full Lifecycle Cost Activities and the Approach Employed

Category	Approach
Non-Asset Solutions	• Based on a review of the 2022 MiWay Business plan and budget documents, certain solutions have been documented. A minor provision of $185,600 per annum has been included in the forecast
Operations & Maintenance	• Review of 2017-2021 historical expenditures for MiWay as it relates to average maintenance activities by asset class • The City's forecast is used as the basis for the 10-year projection of O&M expenditures under existing assets. New O&M costs for expansion related activities is also calculated and set based on the relationship of existing costs relative the replacement value of assets • Does not include employee overhead-related operating costs (example: transit operators associated to delivering the service)
Renewal/ Rehabilitation	• A more robust renewal expenditure forecast has been estimated for the City's revenue fleet (buses). The figures are based on similar assumptions used in other municipalities • The renewal activities are shown under a distinct "scenario analysis" • The total lifecycle costs include an annual provision of $8.9 million to account for asset renewal needs. Of this annual amount, over 95% is related to the revenue fleet
Replacement	• The total lifecycle cost is based only on the sum of the total replacement needs required over the first 10-years of the plan based on evaluation of each asset accounted for in this plan. Note, replacement needs for Vehicles (Revenue Generating) and Equipment & Systems were supplemented by information in the City's budget in which some fleet replacement activities were advanced to align with available funding • The average annual investment required to replace assets when they reach the end of their useful life (age/condition replacement schedule) was also calculated
Disposal/Demolition	• Analysis assumes any costs associated with "disposal" is included for in the replacement value and captured in the capital replacement requirements
Acquisition/Expansion/ Rebuild	• New first-round capital expenditures are excluded from the calculation as the cost is funded through development charges or other sources • Only Asset Management requirements associated with expansion activities are considered • The City's 2022 DC Background Study was used to inform new acquisitions to base the Asset Management requirements moving forward. Note, the growth needs associated with MiWay facilities and BRT stations outlined in the background study have been removed as the responsibility of managing those assets rests outside of MiWay. This figure was then supplemented using an assumed acquisition need over the 10-years based on internal estimates • For new acquisitions, O&M costs are maintained at the relationship of average expenditures relative to replacement value of MiWay assets (but adjusted to exclude certain ROW assets and Stormwater infrastructure)

Non-Asset Solutions

Ridership levels saw a significant drop as a result of the COVID-19 pandemic. The 2022 MiWay Business Plan presents several solutions to deal with this decrease in ridership with the goal of returning ridership levels to normal. These strategies include the following:

- Freezing of fares throughout 2021 and 2022
- Review of fare products and consideration of options to strategically increase ridership to pre-COVID-19 levels
- Focusing on building a responsive service by monitoring customer needs and ridership trends to adjust routes and timing with the goal of minimizing overcrowding
- Identifying strategies to align MiWay with the Transportation Master Plan's Action Plan through several non-asset initiatives to increase levels of service
- Performing cost/benefit analysis to evaluate opportunities for on-demand transit including an overnight service and first-mile/last-mile connections
- Providing information regarding new transit services to existing and potential customers at transit stations and terminals
- Integration of services and fares between MiWay and TTC

No additional costs have been identified for the proposed 2022 MiWay Business Plan strategies; a provision of $185,600 per annum has been included in the forecast. It is assumed the costs are already embedded with the MiWay Operating budget and no further provision is included.

Operations and Maintenance (O&M)

Figure 14 shows the City's anticipated transit maintenance expenditures over a 10- year planning period to 2031. This figure illustrates the capital asset related maintenance expenditures identified in the MiWay operating budget. **Figure 14** below includes the projected added maintenance costs associated with acquisition of new capital assets as outlined in the City's DC Study (net of facilities and BRT stations).

New transit investments coming into service are expected to cause the City's maintenance expenditures to increase steadily over the ten-year period through to 2031. Over time, assessment growth will be available to help offset the projected increases to maintenance costs. Furthermore, the timing of additional operating costs can vary relative to ridership trends and when the capital assets become in-service.

To help understand the relationship of costs relative to rides, the maintenance expenditures are correlated to projected revenue rides. The growth in expenditures is tied to the annual increase in capital assets the City is planning to acquire over the period to 2031 (excluding MiWay facilities)–the transit maintenance costs by 2031 are calculated at $65.2 million which is an increase on the $52.2 million expenditure associated with the existing infrastructure (based on 2022 budget). Cumulatively, this would equate to a spending need of $550.4 million over the next 10 years at existing levels to maintain the existing asset base plus an additional $46.5 million to capture the maintenance activities for new non-facility related transit assets. It is expected that these additional costs be revisited and benchmarked against the City's service level considerations moving forward.

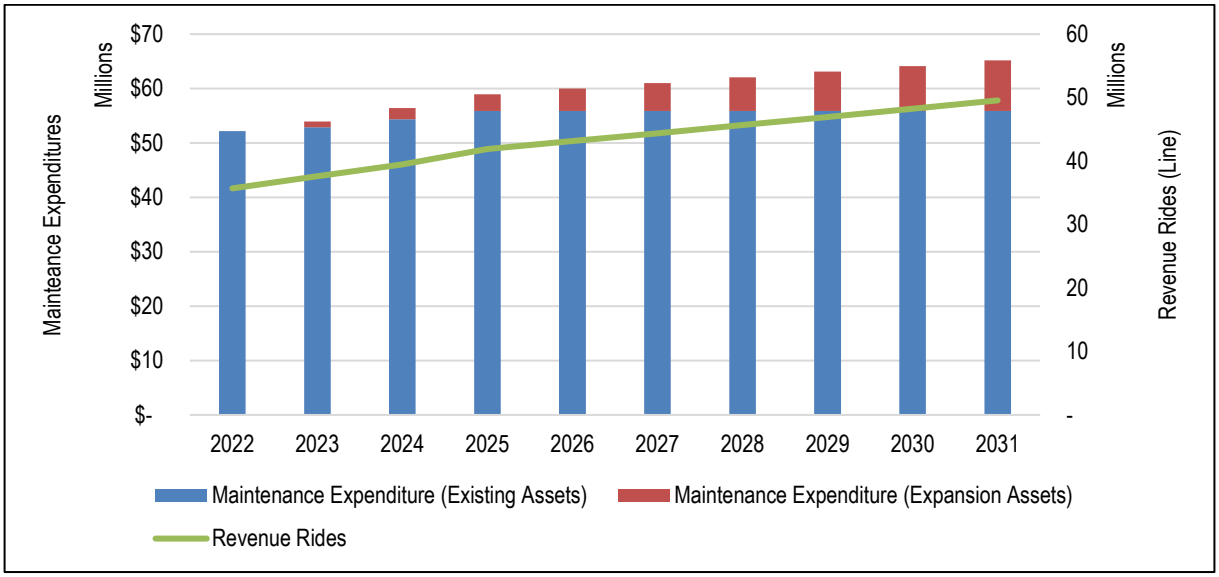


Figure 14: Forecast of Transit Maintenance Expenditures vs. Ridership (Revenue Rides)

Rehabilitation and Replacement Requirements

An analysis to understand the impacts if the City were to schedule fleet overhauls, refurbishments in addition to traditional replacement activities to extend the life of the City's revenue fleet assets was prepared. In this regard, three scenarios have been considered, with each scenario resulting in different replacement timing and lifecycle costs. The first scenario which does not include any mid life-cycle intervention activities is consistent with the current MiWay fleet capital asset management approach. **Table 19** below outlines the fleet replacement, refurbishment, and overhaul schedules under each scenario.

Table 19: Schedule of Fleet Overhauls, Refurbishments, and Replacements

Level of Mid-lifecycle Intervention	First Scenario: No Mid-Lifecycle Interventions	Second Scenario: Limited Mid-Lifecycle Intervention	Third Scenario: Extensive Mid-Lifecycle Intervention
Expected Useful Life of Buses	12 or 15 Years (depending on bus)	Extend Life by 3 Years	Extend Life by 6 Years
Mid-Lifecycle Activities	None	Body and Interior Refurbishments	Mechanical Components, Body and Interior Refurbishments
Mid-Lifecycle Activity Timing	None	General Refurbishment: 9 Years	Engine After-Treatment: 6 and 12 Years Transmission & Hybrid Drive Unit: 9 Years Battery Refurbishment: 12 Years
Risk of Unplanned Maintenance Events	High	Medium	Low

Figure 15, **Figure 16** and **Figure 17** indicate the long-term revenue fleet needs, including mid-lifecycle renewal needs under each of the scenarios detailed above. The figures indicate that significant capital asset replacement requirements are needed immediately as many of the buses currently in-service are beyond their useful lives and scheduled for replacement. This requirement only relates to those vehicles currently in-service and as MiWay continues to acquire new vehicles to meet demand additional replacement requirements would be warranted (see expansion activities).

All costs for mid-lifecycle activities have been assumed to be proportionate to the replacement value of each asset type. The cost assumptions for all mid-lifecycle activities are laid out in **Table 20** below. Additional costs related to an increased need for staff to carry out the capital activities may be required under Scenario's 2 and 3, while Scenario 1 poses an increased risk of vehicle down-time due to unplanned maintenance events.

These increased costs and risks are difficult to quantify and have therefore been left out of the scenario analysis at this time. The three scenarios have been calculated over a 36-year period to represent the timing associated with the replacement schedule of two buses that have had mid-lifecycle intervention activities.

Table 20: Rehabilitation & Refurbishment Cost Assumptions for Revenue Vehicles

Asset Type	Activity Type	Activity Cost Assumption
Conventional (Diesel) Buses – Standard 40'	Engine After-Treatment	$60,000
	Transmission	$50,000
	General Refurbishment	$184,000
Hybrid Buses – Standard 40'	Engine After-Treatment	$60,000
	Hybrid Drive Unit	$50,000
	Battery Refurbishment	$73,000
	General Refurbishment	$299,000
Conventional (Diesel) Buses – Articulating 60'	Engine After-Treatment	$60,000
	Transmission	$50,000
	General Refurbishment	$356,000
Hybrid Buses – Articulating 60'	Engine After-Treatment	$60,000
	Hybrid Drive Unit	$50,000
	Battery Refurbishment	$73,000
	General Refurbishment	$356,000

Scenario 1: No Mid-Lifecycle Refurbishments

The lifecycle of revenue fleet expects the service life of each asset to be 12 or 15 years (depending on the type of bus) when no mid-lifecycle activities are performed. **Figure 15** below shows the timing of expected replacement costs based on the service life of each asset. Over the period from 2022 to 2057, it is expected that an average of $35.8 million will be spent on fleet replacement each year totaling $1.3 billion by 2057.

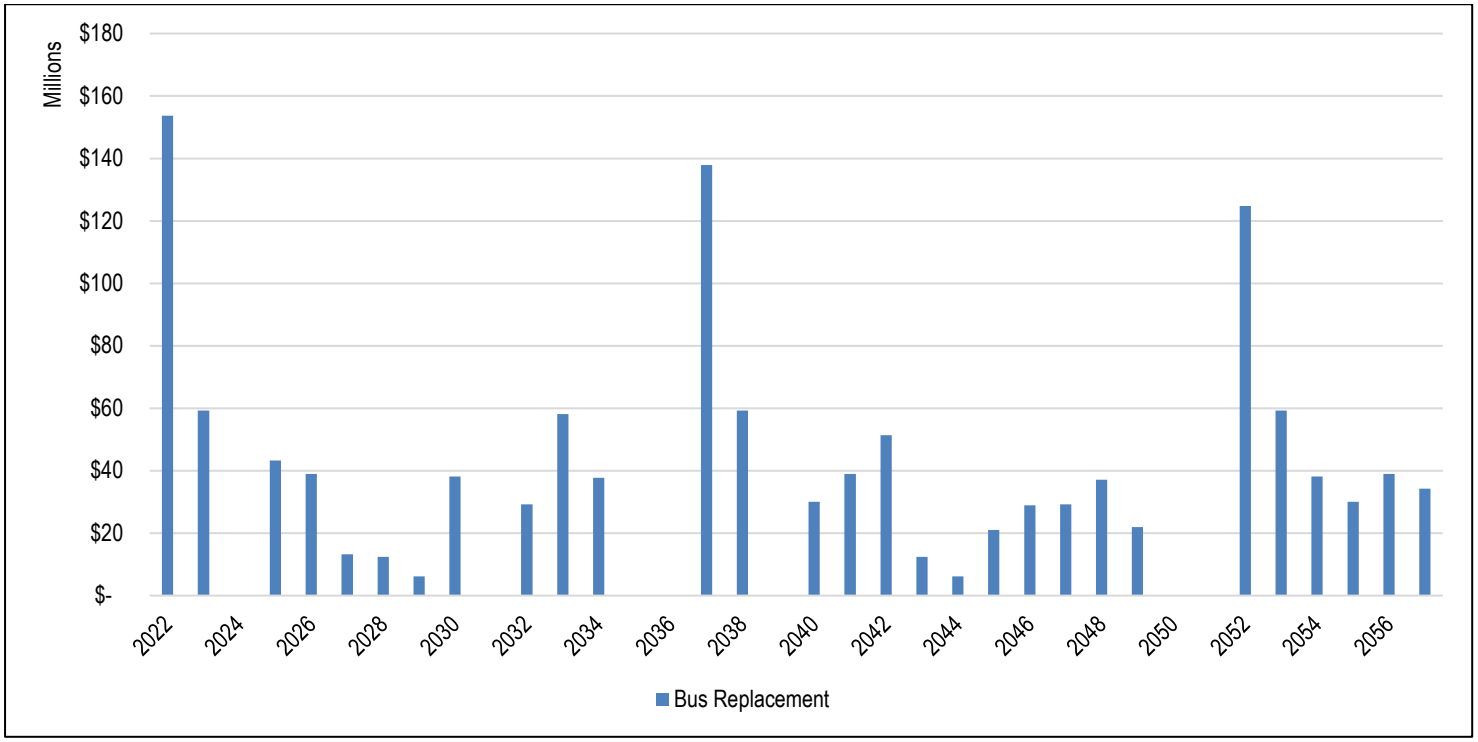


Figure 15: Scenario 1 (Fleet Replacement Schedule)

Scenario 2: Limited Mid-Lifecycle Refurbishments

The lifecycle of revenue fleet expects the service life of each asset be extended by three years when one mid-lifecycle general refurbishment is performed at in each asset's life. **Figure 16** below shows the timing and amount of expected refurbishment and replacement costs over the next 36 years. Over the period from 2022 to 2057, it is expected that an average of $33.0 million will be spent on fleet replacement and mid-lifecycle refurbishments each year. On average the capital spend of $33.0 million is calculated totaling nearly $1.2 billion by 2057.

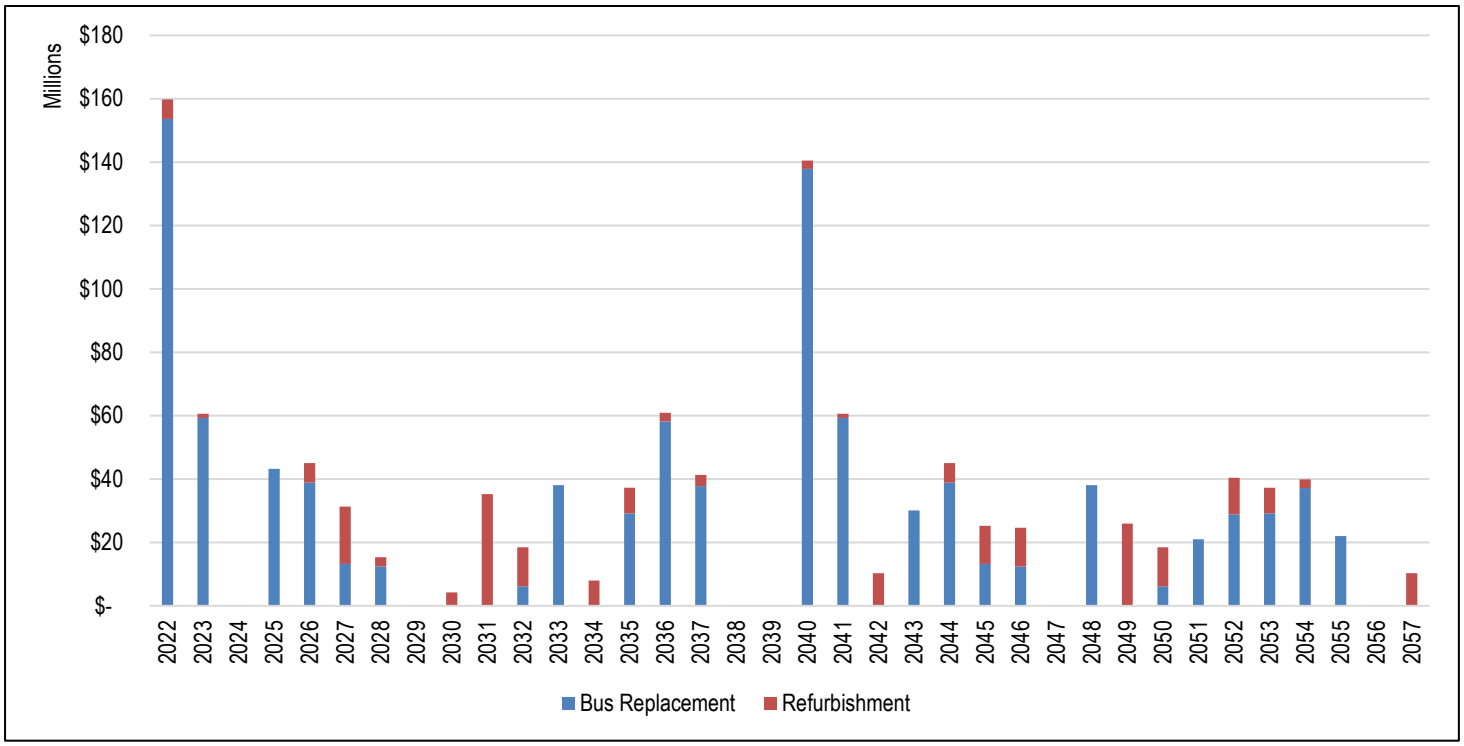


Figure 16: Scenario 2 (Fleet Replacement and Refurbishment Schedule

Scenario 3: Extensive Mid-Lifecycle Refurbishments and Overhauls

The lifecycle of revenue fleet expects the service life of each asset to be extended by six years if all identified mid-lifecycle activities are performed in each asset's life. For example, on a 60 foot bus, Engine After-Treatments will be performed twice before the bus is required to be replaced on the 18th year of service. Activities including transmission replacement in a conventional bus and battery refurbishments and hybrid drive unit replacements in a hybrid bus, for example, will be replaced once throughout the full lifecycle of the vehicle. **Figure 17** below shows the timing and amount of expected refurbishment, overhaul, and replacement costs over the next 36 years. Over the period from 2022 to 2057, it is expected that an average of $34.4 million will be spent on fleet replacement and renewals each year and totaling $1.2 billion by 2057.

Although the graphs illustrate the replacement needs to 2057, the annual provision requirement when considering the needs of repair and replacement outside the 2057 planning period, the scenarios start to align more closely.

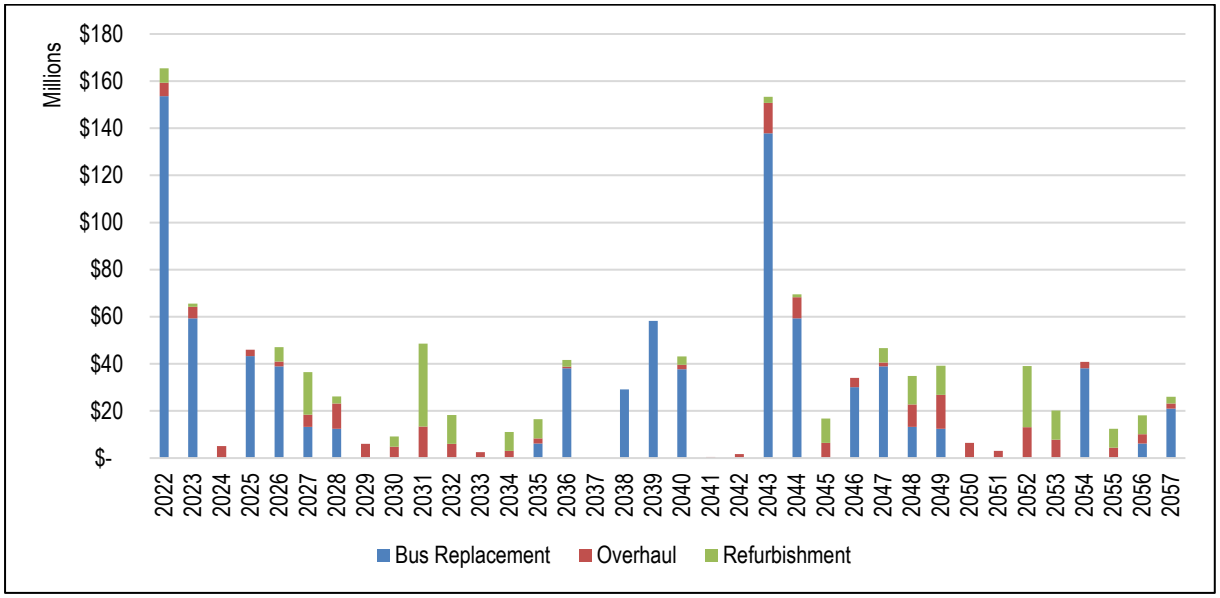


Figure 17: Scenario 3 (Fleet Replacement, Refurbishment, and Overhaul Schedule

Total 10-Year Asset Replacement Needs

A key component of the lifecycle model is to identify the asset replacement requirements for each asset based on the timing of when the asset came into service, the asset age, and the condition of the asset. Over the 10-year period, it is calculated that approximately $599 million in asset replacements is required. A few key considerations are noted below:

- Of the total 10-year asset replacement requirements, about $525 million (88%) is related to revenue generating vehicles
- Most of the replacement needs have been identified in the first year of the analysis (2022) as any asset that is “overdue” is identified for replacement in the first year. Notably most of these assets in the first year also relate to revenue generating vehicles

Importantly, the replacement needs over the 10-year period does not capture any savings for the replacement of assets which would occur outside the 10-year planning horizon. To supplement the replacement analysis outlined in **Figure 18**, an annual provision schedule for replacement is calculated for each asset based on its remaining useful life and the anticipated cost of replacement in constant dollars. The aggregate of all individual provisions form an annual capital contribution requirement for the purpose of asset replacement. The annual provision represents the average annual investment required to replace assets when they reach the end of their useful life. This average annual expenditure over the same 10-year period is calculated at $72.8 million. Although this annual contribution is not being considered in this financial strategy, it could be used as a framework for the City moving forward. Also note, the calculations summarized in **Figure 18** and **Figure 19** exclude the renewal needs identified in the additional scenarios above as this is intended to illustrate the City’s status quo practice to replace buses at the end of their useful life.

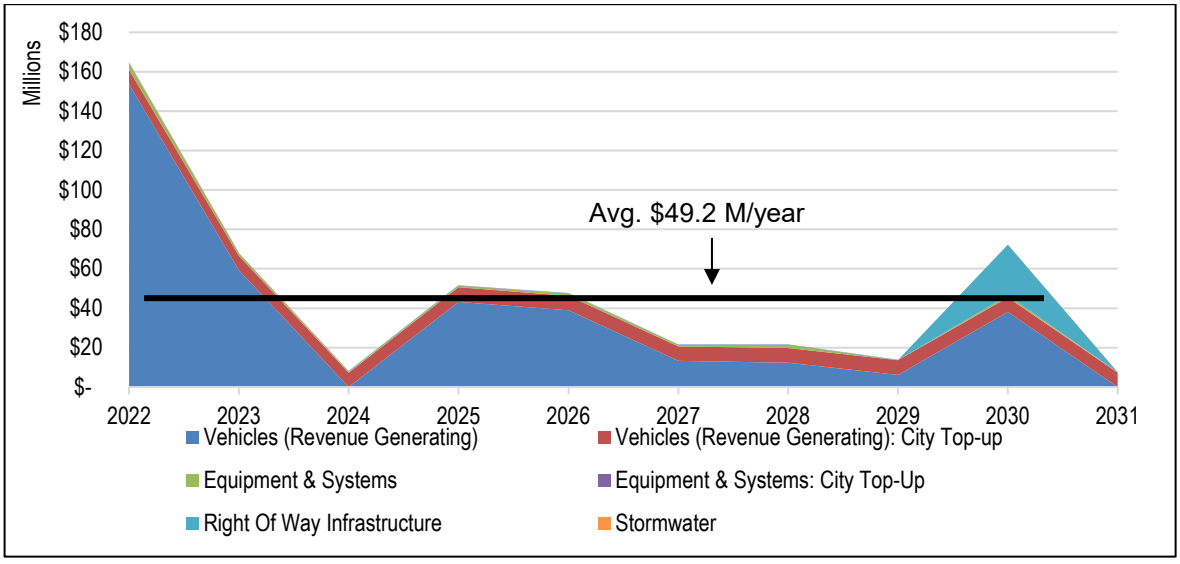


Figure 18: Capital Asset Replacement Requirements over the Next 10-Years

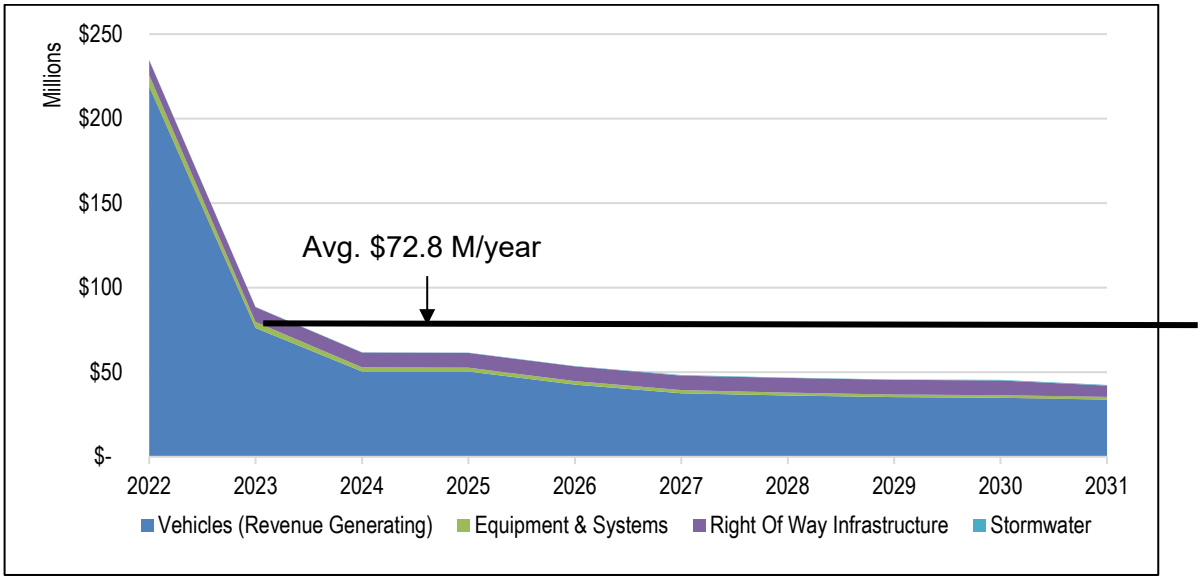


Figure 19: Annual Contribution Requirement (Scenario 1)

Acquisition/Expansion/Rebuild Activities

The City historically has used development charges, to the fullest extent allowed for, under the provisions of the DCA to pay for expansion related activities. This section aims to explore the first-round capital costs included in the DC Study as well as the annual needs required to maintain these assets over the course of their useful life.

- **First-Round Capital Costs**

The City's DC Background Study illustrates a capital requirement of $455 million for new transit assets over the 2022-2031 period, of which, $262 million is growth related and can be recovered from development charges over this period. The remaining amount would be recovered from grants and subsidies ($91 million), and $102 million to be funded through taxes. The capital works included in the City's DC Study are identified, by funding source, in Figure 20 below. Not all new assets can be recovered from DCs as there are limitations to what can be considered growth-related. For the purposes of the 2022 DC Background Study, the City's travel demand model was used to forecast future transit ridership as an indicator of the planned levels of service based on future land use (population and employment) and future network. This methodology helped determine the share of net new assets which could be funded from DCs, while the remaining share of costs would have to be funded from non-DC sources (taxes or user fees). For the purposes of this analysis, an additional $21.4 million in expansion-related capital costs have been included to match the City's budgeted acquisitions over the 10-year period.

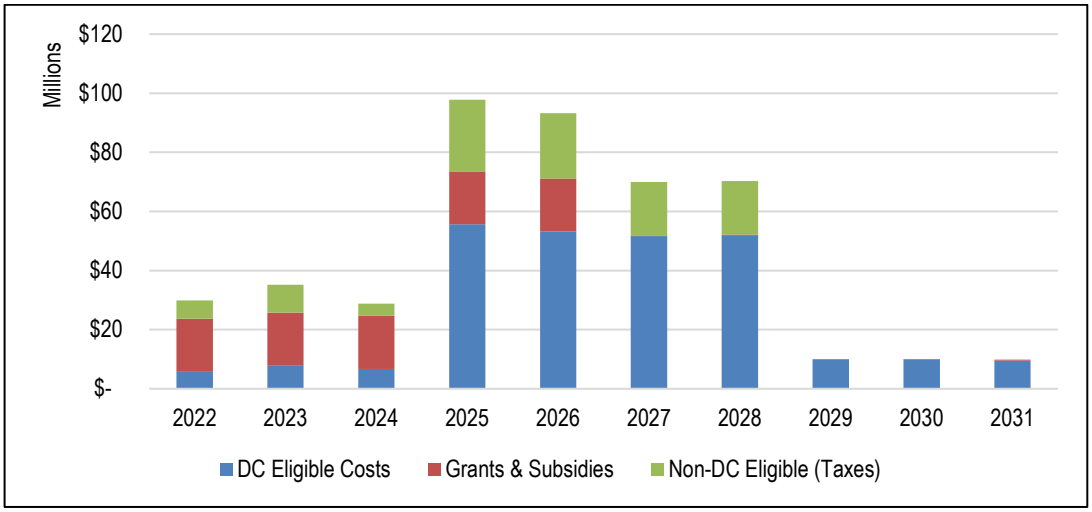


Figure 20: Development Charges Study Transit Capital Program (2022-2031), City of Mississauga Development Charges Background Study

- **Annual Asset Management Related to New Expansion Related Capital**

Although a significant share of these assets will attract funding from development charges, the assets will become the responsibility of the City to operate, maintain, repair and ultimately replace in the future. This requires careful asset management planning to ensure levels of service can be maintained. A proper understanding of the relationship between the assets required to support the demand identified and the long-term asset management implications is critical.

Based on the capital program included in the DC Study (including timing of the works, cost, and useful life of the capital asset but adjusted to net out facilities), a provision for asset replacement has been calculated for transit services. The aggregate of all the individual capital project provisions form the required annual capital provision.

Figure 21 provides the annual calculated asset management contribution for non-facility related transit assets included in the DC Study from the period 2022-2032. By 2032, the total annual provision requirement reaches $11.6 million. On average, over the 10-year planning period considered, this amounts to an annual provision to replace these assets of $3.6 million (total of $36.2 million over 10-years) the average is lower than the total reached in 2032 as the average better represents the timing of capital acquisitions and the City will be able to plan for the replacement only when the asset is acquired.

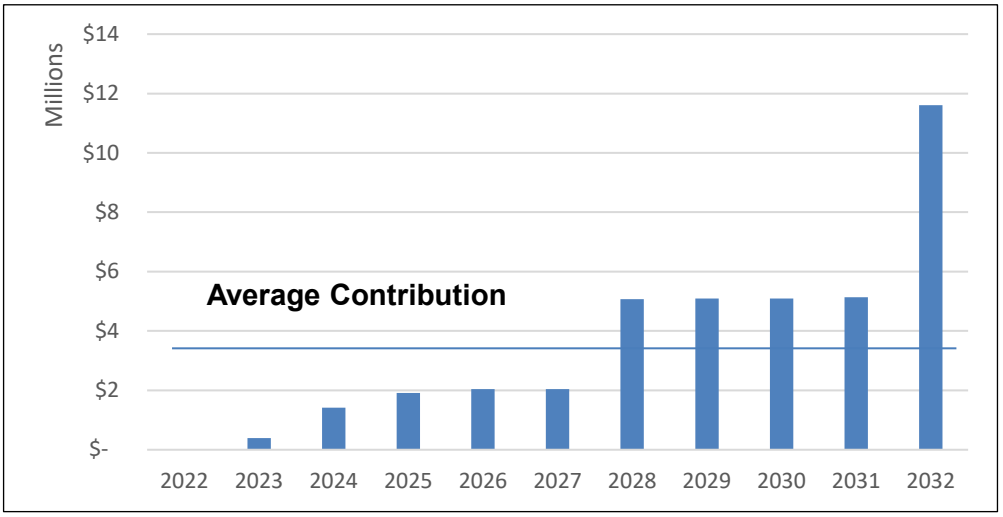


Figure 21: Annual Capital Provision to Replace Assets Outlined in the DC Capital Project List[14]

Disposal Activities

The analysis assumes any costs associated with "disposal" are accounted for in the replacement value and captured in the capital replacement requirements.

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure, and it will increase to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g. the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

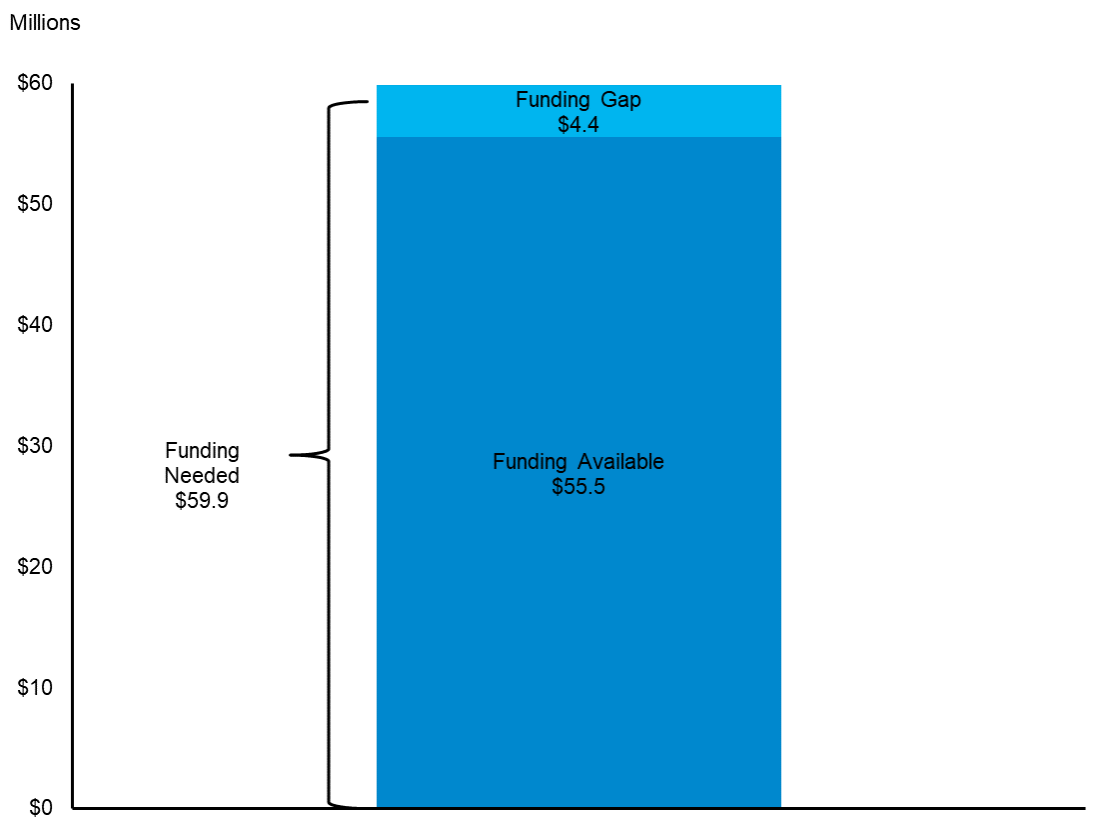
There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available. An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service. This can result in:

- Impacts to levels of customer satisfaction
- Increased liability and claims
- Impacts to transit service quality

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (Funding Needed) and the annual average budget (Funding Available) for the next 10 years as is shown in the following graphs by Service Area and by each Asset Class. Continued implementation of asset management best practices as well as assistance from senior levels of government through continued infrastructure funding programs will provide opportunities to address some elements of the funding gap.

[14] Excludes Facilities and BRT station related capital replacement needs identified in the DC Study as this set of assets would be managed by the Facilities & Property Management division, with modifications to match the City's budgeted acquisitions over the 10-year period. The gross cost of facilities omitted is $366.8 million (as per 2022 DC Study: Projects 1.3.1, 1.3.2, 1.3.3, 1.4.11 and 1.4.12)

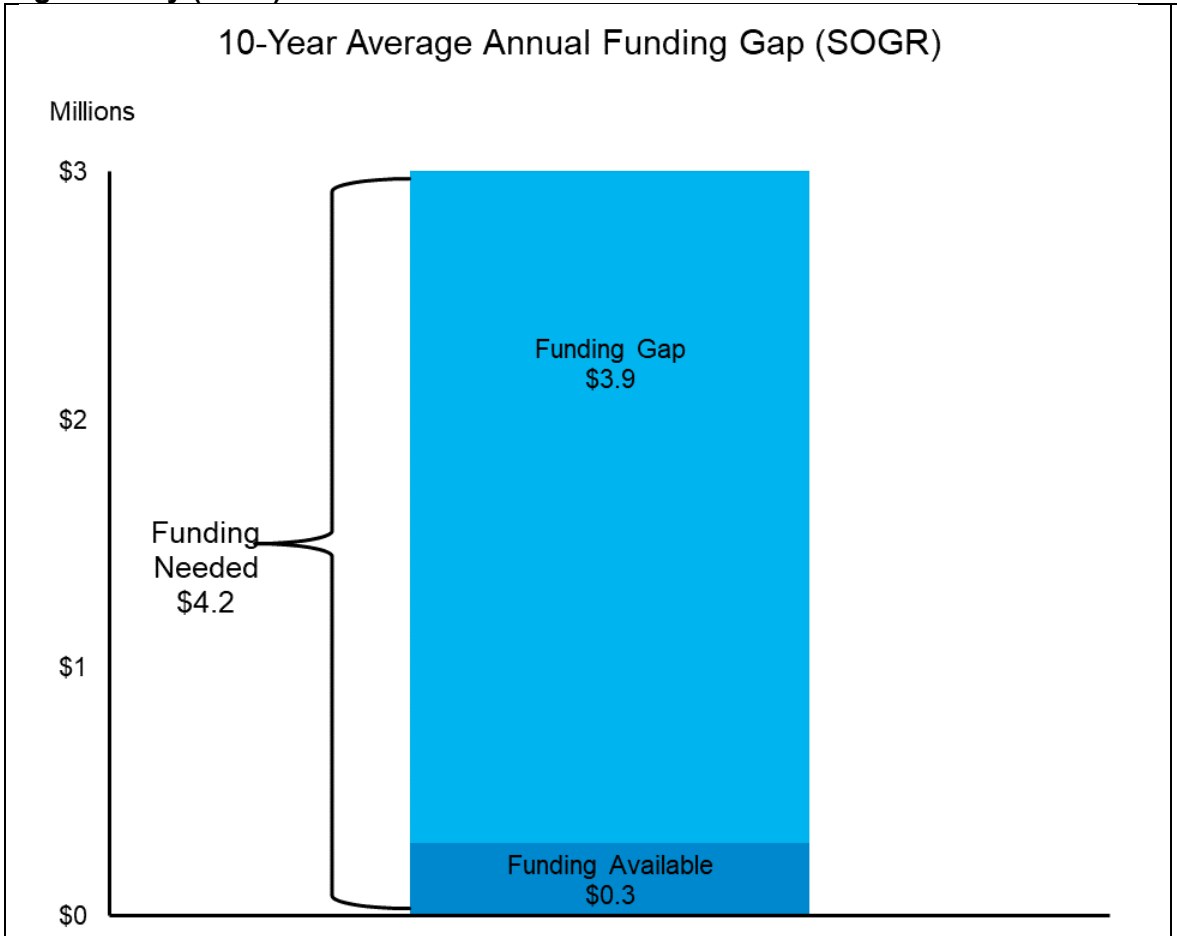
Transit- MiWay



As of this iteration of the Transit asset management plan, an infrastructure gap of $4.4 million per annum is identified over the 10-year period.
Vehicles (Revenue Generating) and Stormwater Infrastructure have not contributed to this gap due to sufficient funding for their lifecycle needs.
Of particular relevance to MiWay is that transit services is different from other City services as Federal and Provincial funding has historically been more readily available to fund transit asset repair and replacement activities than other City services.

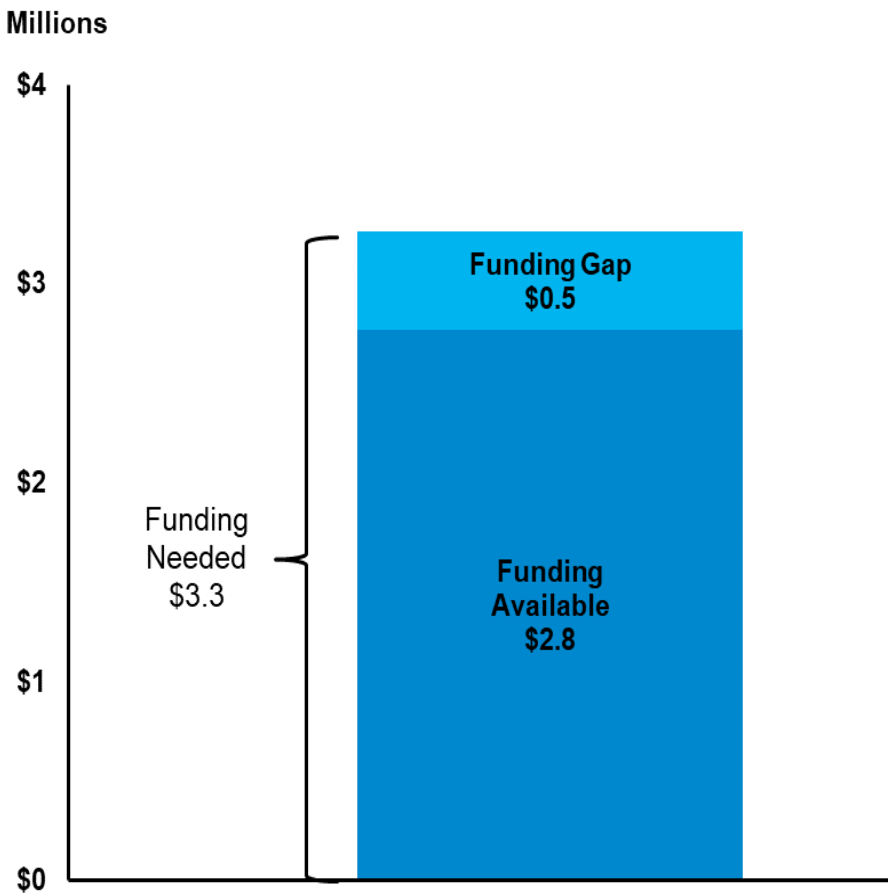
As indicated in the previous section, the City has secured funding from 2022 to 2027 for the construction, rehabilitation and replacement of MiWay assets, through the Investing in Canada Infrastructure Program (ICIP), of approximately $472.4 million. The amount is comprised of Federal funding, Provincial Funding and a portion funded by the City of Mississauga. As a result, this funding stream can be used as a viable mechanism to reduce the calculated infrastructure gap.
From a non-budgetary perspective, the City should look to improve the infrastructure gap by improving databases to achieve a proper assessment of the condition of assets.

Right of Way (ROW) Infrastructure



MiWay currently has limited funding for assets such as bus shelters, however the average annual funding gap is $3.9 million due the need to replace mainly retaining walls and living walls assets within the next 10 years.

Equipment & Systems



Within Equipment & Systems, the Fare Equipment asset type, contributes most to the infrastructure gap of $500,000 annually. Non-Revenue vehicles and On-Vehicle IT Equipment are sufficiently funded.

Continuous Improvement

One of the goals of the Transit Asset Management Plan is to establish a baseline of the current asset management practices and identify gaps in order to develop a work plan for continuous improvement.

Advancing Service Area Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards increased asset management maturity, the Corporate Asset Management office plans to conduct periodic internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for the revenue generating vehicles asset class and transit appurtenances under the Right-of-Way Infrastructure asset class. At the time of conducting the maturity assessment, MiWay's asset hierarchy was not developed and some asset classes and asset sub-types were assessed within other Service Areas (i.e. roads, bridges and structures, and stormwater infrastructure). The results for each asset class and an overall result for the Transit Service Area are scored from 0.0 to 4.0 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved.

Figure 22 and **Figure 23** show radar charts of the maturity scores for the Vehicles (Revenue Generating) and Transit Appurtenances as of 2022 year-end. Future maturity assessments will capture all Asset Classes as the hierarchy continues to be established and solidified. As the Service Area matures in each of the eight categories, they will expand outwards towards the outer ring (Target).

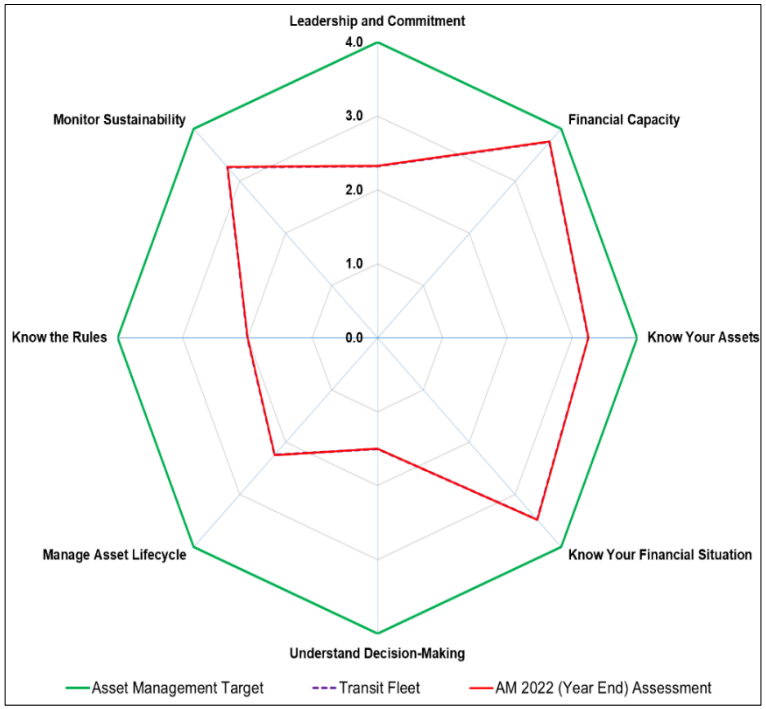


Figure 22: Revenue Generating Vehicles Maturity Rating (2022)

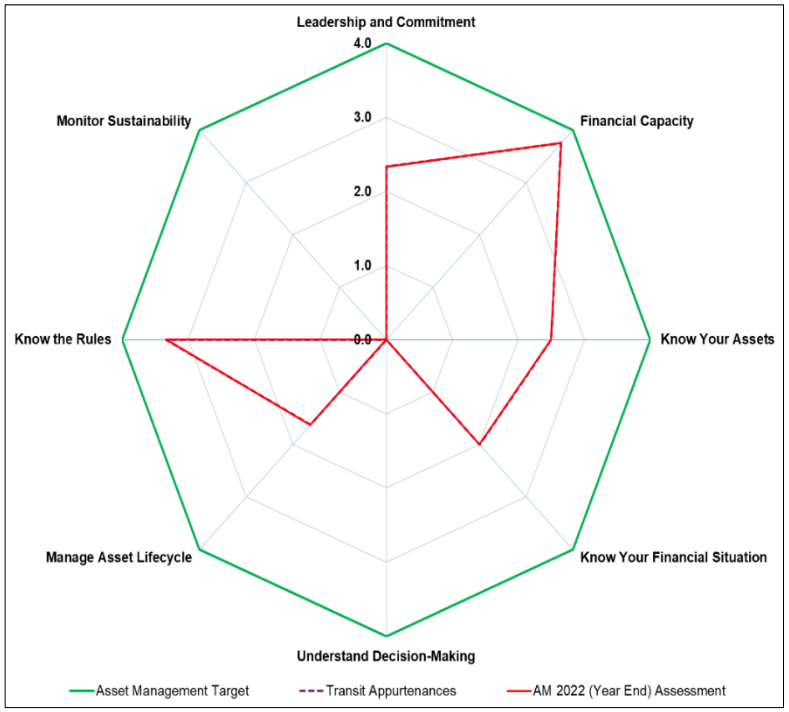


Figure 23: Transit Appurtenances Maturity Rating (2022)

The proposed work plan in **Table 21** was developed in consultation with MiWay staff through the development of this Transit Asset Management Plan iteration.

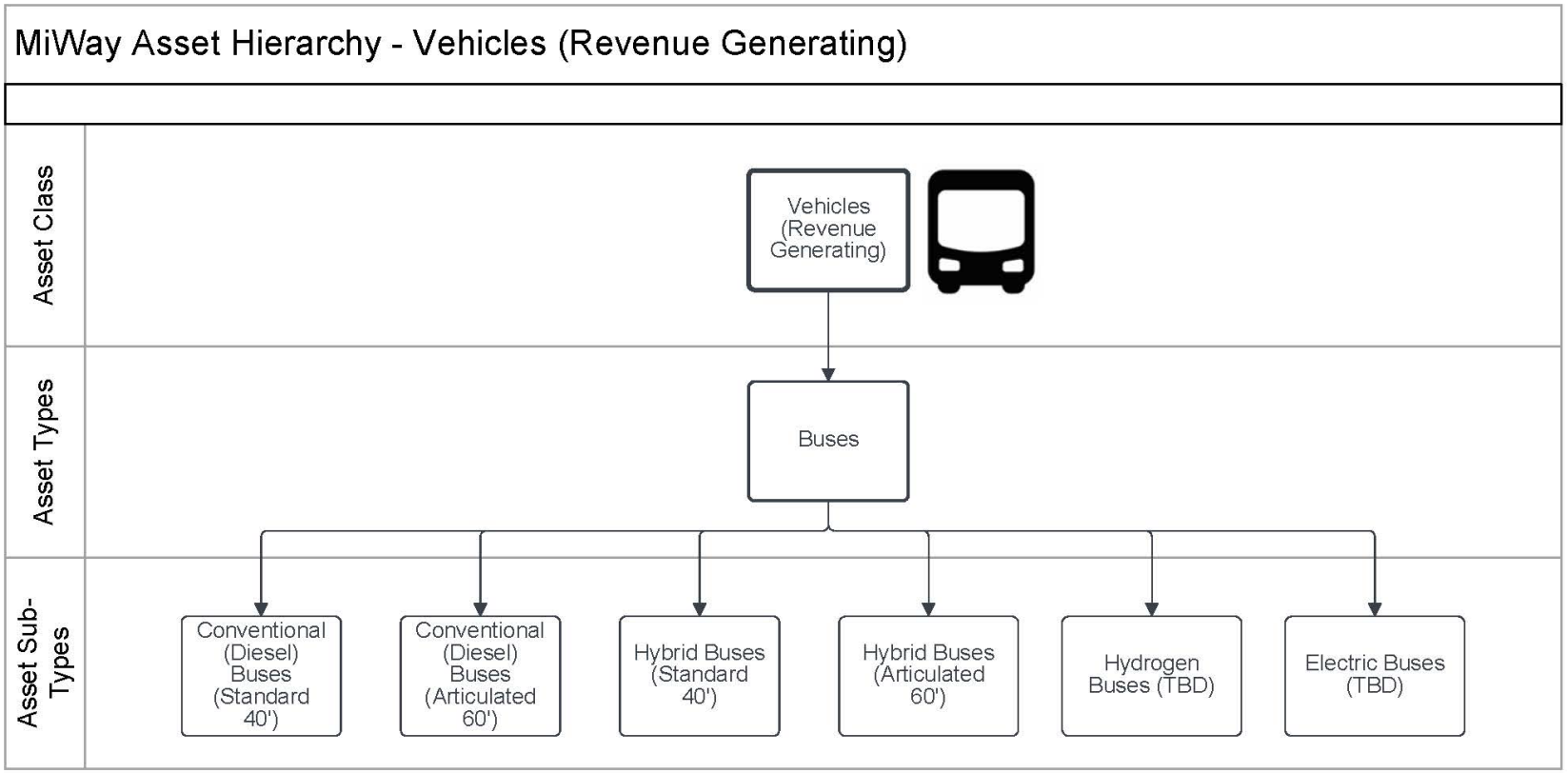
Through the maturity assessment and associated work plans, MiWay aims to build upon existing strengths to develop asset management practices that balances costs, opportunities and risk with the desired levels of service, to achieve both service area and corporate objectives.

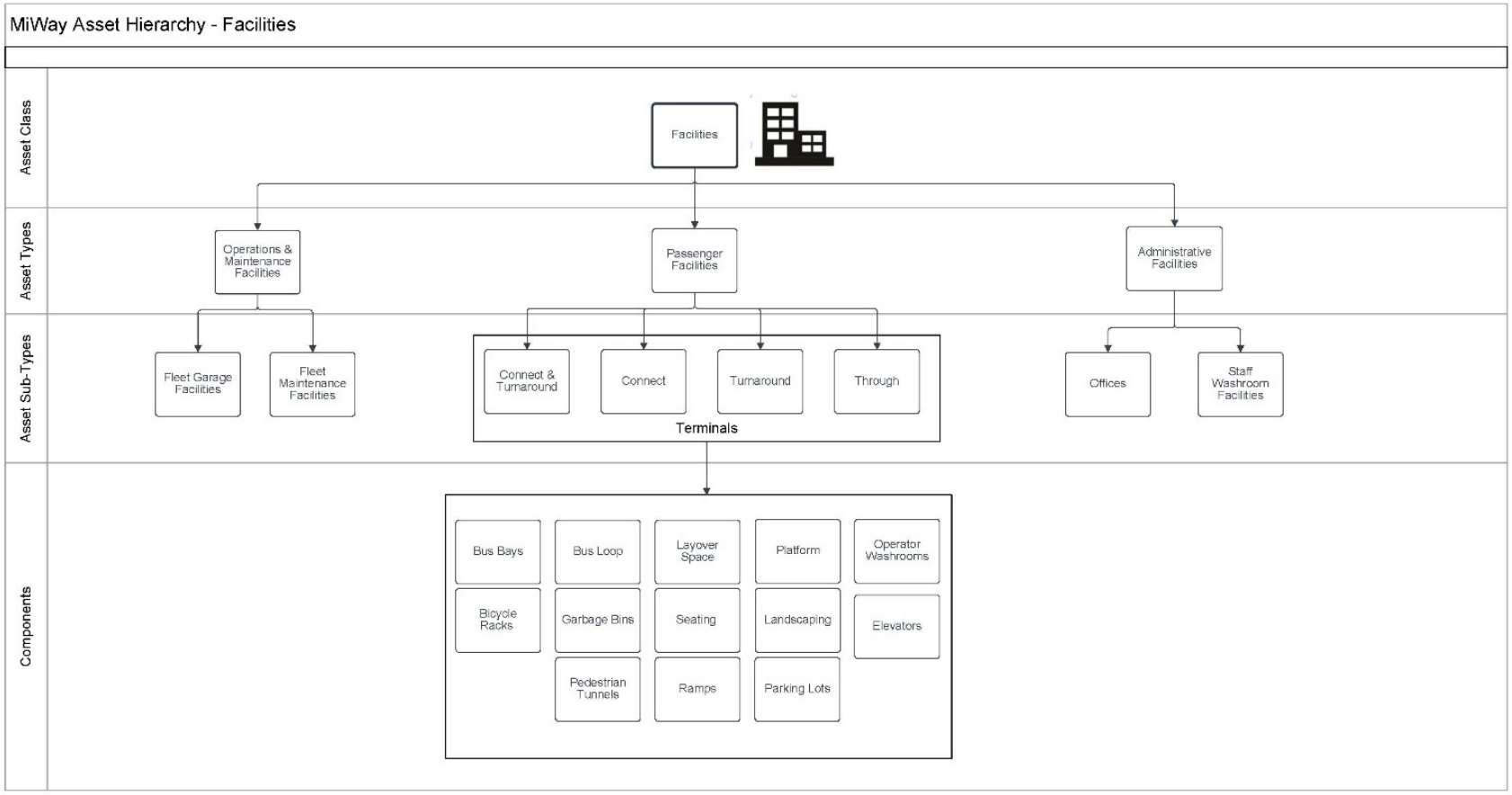
Table 21: Continuous Improvement Workplan

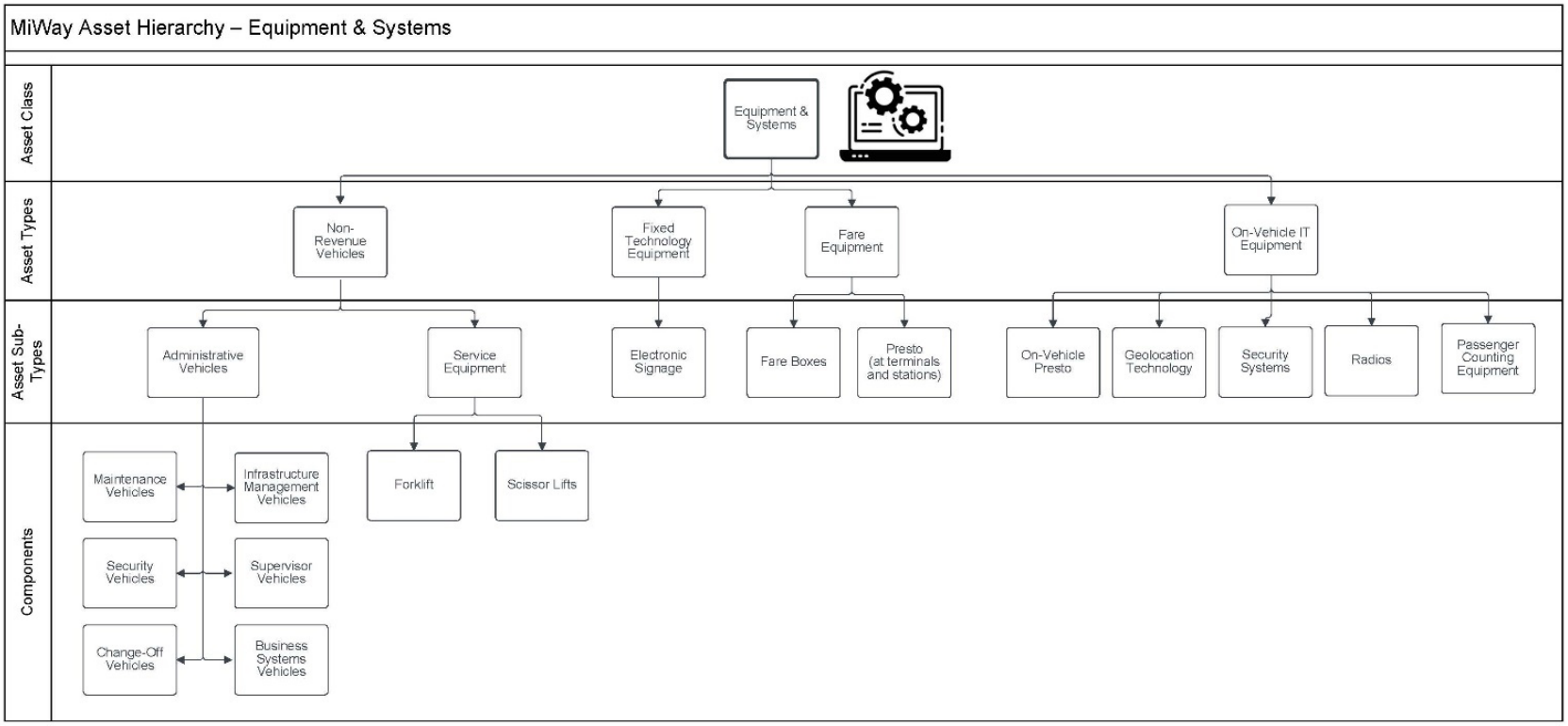
AM Plan Element	Continuous Improvement Tasks
Overview	• Formalization of Asset Management Governance model including additional dedicated resources to support and sustain the Asset Management Plan development and future of the overall MiWay's Asset Management Program • Additional review of all data management systems and assess feasibility of system integration as part of a corporate-wide Asset Information Roadmap (multi-year phased) • Ongoing asset management training for all key stakeholders including development of customized training for each member of the Asset Management team
State of Infrastructure	• Data collection to address data gaps in asset information • Improvements on overall data confidence & reliability, by limiting multiple sources of data • Development of data guidelines and data governance strategy moving forward for all systems • Expansion of asset hierarchy to include component and sub-components for all asset classes • Holistic and integrated condition assessment program for all asset classes • Ongoing updates to replacement cost estimates for all assets
Levels of Service	• Ongoing collection of data to support the Levels of Service metrics (minimum 3–5 years) with robust data confidence and reliability • Providing the basis for assessing a range of scenarios • Customer Consultation - Undertake Willingness to Pay surveys
Lifecycle Management Strategy	• Ongoing consideration of lifecycle costs when evaluating asset-related projects • Additional asset management strategies such as data governance strategies, and asset information management strategies and additional asset-class maintenance strategies into future iterations of Asset Management Plan • Future climate change and decarbonization strategy to be developed with the onset of new zero emissions fleet moving forward • Mid-life overhaul or suitable replacement and rehabilitation strategies with associated documented and analysis • Incorporation of full asset lifecycle management strategy targets within Service Level Agreements across all services to ensure sustainment across all asset classes are sufficient to maintain all MiWay's Assets • Improving lifecycle analysis tools for more automation and use of technologies

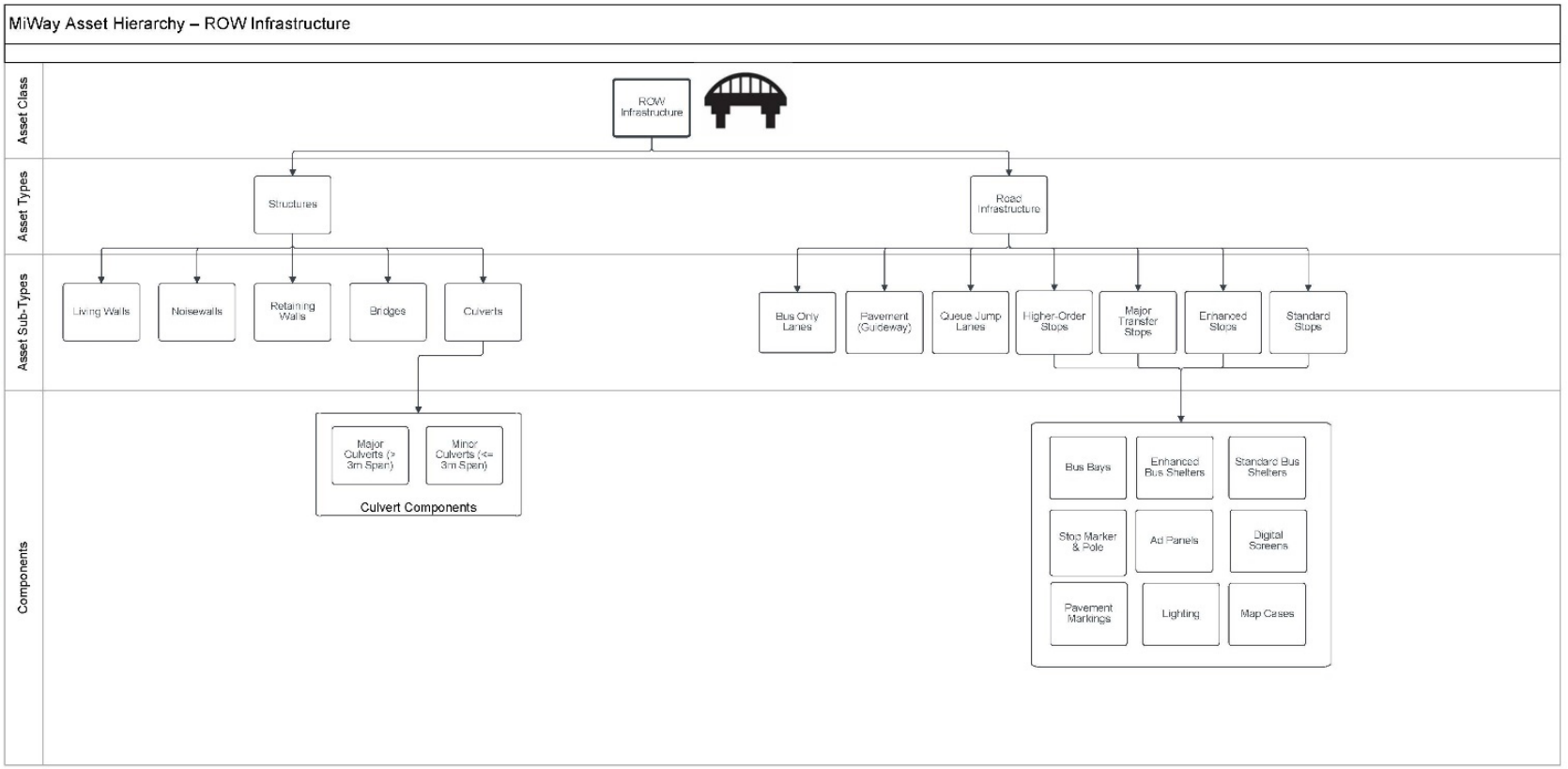
AM Plan Element	Continuous Improvement Tasks
Demand Management	• A proper understanding of the relationship between the assets required to support the demand identified and the long-term asset management implications is critical. The technical information relating to the full life cycle costs associated with these expansion activities, largely resulting from new population and employment growth, has been considered in this report. However, costs associated with managing other demand related activities would need to be more fully evaluated in subsequent iterations of the plan.
Risk Management Strategy	• On-going mitigation actions need to be further developed for all assets • Additional risk strategies including adoption of a full Reliability, Availability, Maintainability, Safety (RAMS) model for asset risk and resiliency • Adopt a structured approach for continual assessment and enhancement of risk management practices in line with industry advancements and internal learnings
Financing Strategy	• Activity based tracking of costs will need to be implemented to provide full cost of current levels of service (minimum 3- 5years) of data with robust data confidence for each key asset category • Refine and optimize lifecycle activities to meet existing and proposed level of service • Better understand the renewal needs which could alter the design life of the asset to enhance services • Costs associated with the electrification of the MiWay's revenue and non-revenue vehicles with consideration for asset replacement and renewal • Continual monitoring and bridging of infrastructure gap will improve financial sustainability in the long-term. This includes • Monitoring and benchmarking of the MiWay's infrastructure gap with similar municipalities/agencies

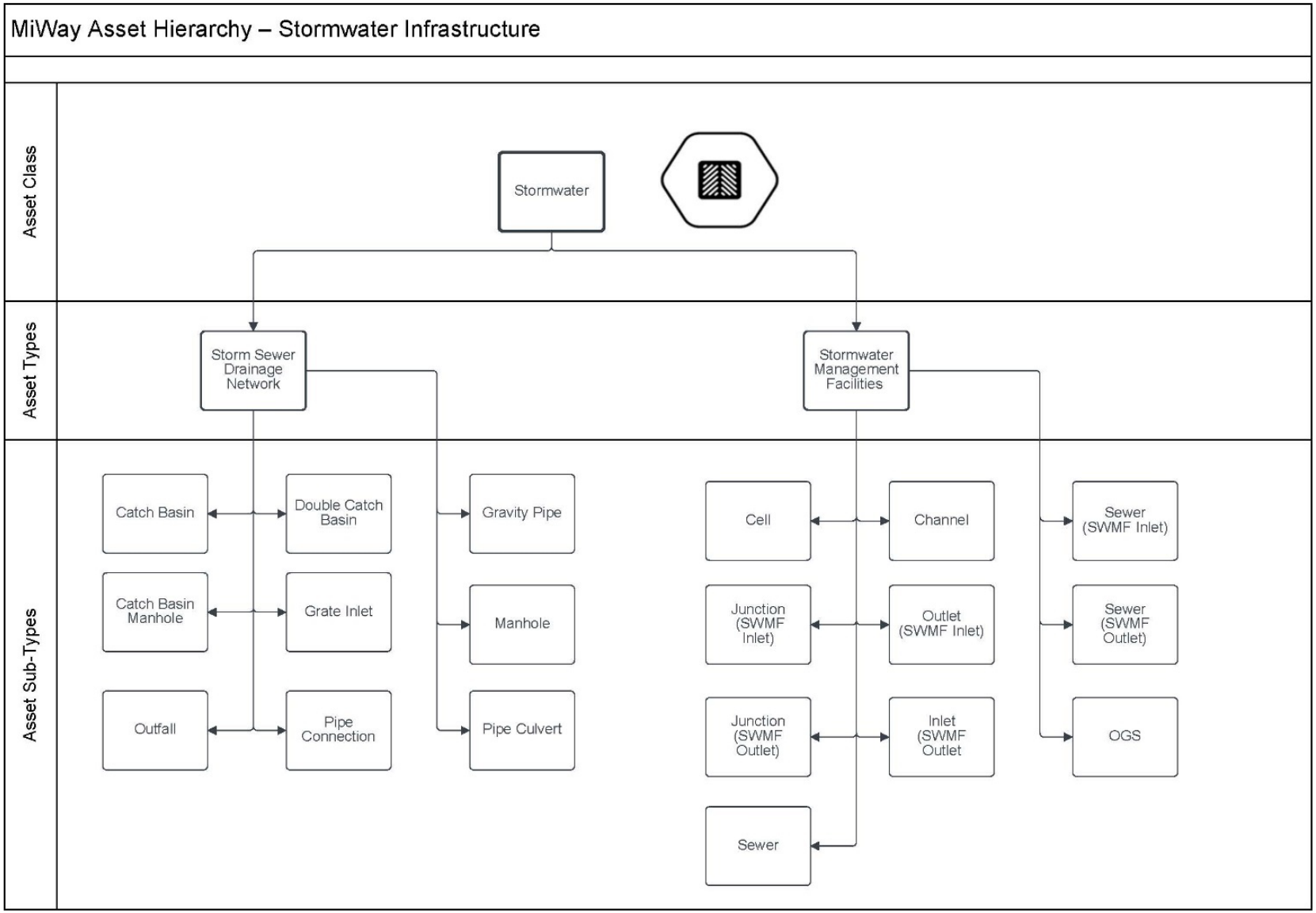
Appendix A- MiWay Asset Hierarchy




MiWay Asset Hierarchy - Facilities
Asset Class
Asset Types
Asset Sub-Types
Components
Facilities
Operations & Maintenance Facilities
Passenger Facilities
Administrative Facilities
Fleet Garage Facilities
Fleet Maintenance Facilities
Connect & Turnaround
Connect
Turnaround
Through
Terminals
Offices
Staff Washroom Facilities
Bus Bays
Bus Loop
Layover Space
Platform
Operator Washrooms
Bicycle Racks
Garbage Bins
Seating
Landscaping
Elevators
Pedestrian Tunnels
Ramps
Parking Lots


MiWay Asset Hierarchy – Equipment & Systems
Asset Class
Asset Types
Asset Sub-Types
Components
Equipment & Systems
Non-Revenue Vehicles
Fixed Technology Equipment
Fare Equipment
On-Vehicle IT Equipment
Administrative Vehicles
Service Equipment
Electronic Signage
Fare Boxes
Presto (at terminals and stations)
On-Vehicle Presto
Geolocation Technology
Security Systems
Radios
Passenger Counting Equipment
Maintenance Vehicles
Infrastructure Management Vehicles
Forklift
Scissor Lifts
Security Vehicles
Supervisor Vehicles
Change-Off Vehicles
Business Systems Vehicles


MiWay Asset Hierarchy – ROW Infrastructure
Asset Class
Asset Types
Asset Sub-Types
Components
ROW Infrastructure
Structures
Road Infrastructure
Living Walls
Noisewalls
Retaining Walls
Bridges
Culverts
Bus Only Lanes
Pavement (Guideway)
Queue Jump Lanes
Higher-Order Stops
Major Transfer Stops
Enhanced Stops
Standard Stops
Major Culverts (> 3m Span)
Minor Culverts (<= 3m Span)
Culvert Components
Bus Bays
Enhanced Bus Shelters
Standard Bus Shelters
Stop Marker & Pole
Ad Panels
Digital Screens
Pavement Markings
Lighting
Map Cases


MiWay Asset Hierarchy – Stormwater Infrastructure
Asset Class
Asset Types
Asset Sub-Types
Stormwater
Storm Sewer Drainage Network
Stormwater Management Facilities
Catch Basin
Double Catch Basin
Gravity Pipe
Catch Basin Manhole
Grate Inlet
Manhole
Outfall
Pipe Connection
Pipe Culvert
Cell
Channel
Sewer (SWMF Inlet)
Junction (SWMF Inlet)
Outlet (SWMF Inlet)
Sewer (SWMF Outlet)
Junction (SWMF Outlet)
Inlet (SWMF Outlet
OGS
Sewer

Fire and Emergency Services

Table of Contents

Fire & Emergency Services Overview

Mississauga Fire and Emergency Services (MFES) has a clear mission statement: to protect life, property, and the environment in Mississauga from all risks through education, enforcement, engineering, emergency response and economic incentive. MFES strives to be a global leader in Fire Service & Life Safety excellence. The provision of infrastructure in a financially sustainable manner will help to support this vision. As of 2021-year end, MFES assets have a combined replacement value of $117.0 Million, with an overall average condition of Fair as shown in **Table 1.** For a detailed breakdown by Asset Class, refer to **Table 2.**

Table 1: Summary Overview of Fire & Emergency Services

Fire & Emergency Services	
Replacement Value[1]	$117.0 M
Average Condition	57%
Average Annual Funding Gap	$0.4 M

The MFES Asset Management (AM) Plan details information about infrastructure assets including actions required to provide an agreed level of service (LOS) in the most cost-effective manner while outlining associated risks. The Fire & Emergency Services Asset Management (AM) Plan defines the services to be provided, how the services are provided, and what funds are required to provide the services over a 10-year planning period.

Relationship with Other Municipal City Documents & Legislation

AM planning is a medium to long-term planning activity that relies on input from strategic planning activities and informs shorter-term decision-making. The AM Plan provides a framework to validate the City's budgeting processes and assists in prioritizing work activities, including capital projects, based on risk. It also discusses LOS that support goals in the City's Strategic Plan and lifecycle management strategies intended to reduce the overall cost of asset ownership.

The AM Plan is intended to be read with other City planning documents, including the following:

- Fire and Emergency Services Master Plan (2019) – currently being updated
- Fire Community Risk Assessment (2017) – currently being updated
- MFES Infrastructure Renewal Strategy (2019)
- Policies
  - Corporate Asset Management Policy
  - Corporate Debt Management Policy
  - Reserve Fund Policy
  - Operating and Capital Budget Policy
  - Multi-year Budget Policy

[1] The overall replacement value for MFES does not include the City's Fire Facilities. The facilities for MFES have been captured within the City's Facilities and Property Management (F&PM)'s group Asset Management (AM) Plan.

In addition to being related to multiple City documents, the MFES AM Plan also supports and is line with several legislative requirements in place which support the delivery of Fire Services including:

- National Fire Protection Association (NFPA) - NFPA 1, Fire Code, advances fire and life safety for the public and first responders as well as property protection by providing a comprehensive, integrated approach to fire code regulation and hazard management. The NFPA standard includes guidance around establishing lifecycle timelines for some fire assets such as fleet
- Occupational Health and Safety Act (OHSA) - The OHSA is the main piece of legislation governing health and safety in the workplace in Ontario. It sets out the legal rights and responsibilities of employers, employees, and other stakeholders in relation to health and safety

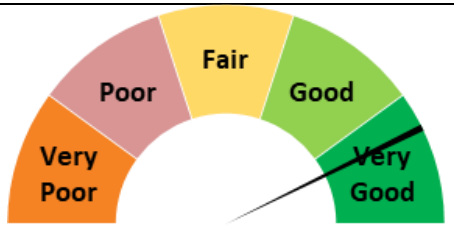
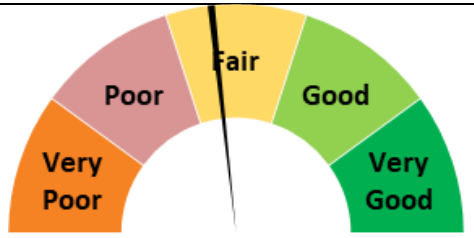
Under the OHSA, employers are required to take all reasonable precautions to protect the health and safety of their employees. This includes protecting employees from the risks of fire and ensuring that they have the knowledge and resources they need to stay safe in the event of a fire. The OHSA supports the NFPA in ensuring due diligence is done for Personal Protective Equipment (PPE) lifecycle replacement.

The Fire & Emergency Services Asset Management Plan includes the following sections:

- **Introduction:** Outlines scope, background information, relationship to other municipal documents and plans, and applicable legislation
- **State of Local Infrastructure:** Summarizes the inventory, valuation, condition, and remaining life of the assets in the inventory by service and asset type. The inventory data within this AM Plan is based on year-end 2021, expressed in 2022 dollars, except for fleet assets which are shown in 2023 dollars
- **Levels of Service:** Defines levels of service through performance indicators and targets, and outlines current performance
- **Future Demand:** Looks at the MFES's ability to meet the changing needs of the industry and its customers over time
- **Lifecycle Management Strategy:** Summarizes the asset management strategies (i.e., planned actions) that will enable the assets to provide the required levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost
- **Financing Strategy:** Summarizes the infrastructure gap based on the determined infrastructure needs and associated budget. This AM Plan uses the 2022-2031 Capital Plan and 2022-2025 Operating Plan for financial analyses
- **Continuous Improvement:** Summarizes the next steps including monitoring of AM Plan implementation progress and improving future iterations of the AM Plan

The following table summarizes the key results developed in this AM Plan.

Table 2: Summary of MFES Replacement Value, Condition, and Infrastructure Gaps

Asset Class	Replacement Value (Millions)	Condition	10-Year Funding Needs	10-Year Infrastructure Funding Gaps
Fire Fleet	$95.7		$4.1 million	$0.00
Specialized Tools & Equipment	$13.8		$1.7 million	$0.04 million
Information Technology	$1.9		$0.4 million	$0.20 million
Facility Fixtures, Furniture & Equipment	$5.6		$0.2 million	$0.15 million

State of the Infrastructure

The following section describes MFES's asset inventory, and provides a snapshot of the valuation, age, distribution, and condition of its assets. This section also includes an explanation of how condition and risk were assessed, along with limitations to this assessment based on the availability of data. Recommendations for the sustainment of data collection and reporting are provided in the Continuous Improvement section.

Asset Inventory and Replacement Value

When examining the assets reported within the MFES AM Plan, it is important to note that the majority of the assets related to Fire facilities (i.e., the substructure and superstructure, shell (envelope), interior construction, services, and sitework) are reported within the City's Facilities and Property Management (F&PM) AM Plan. Fire facilities are a major asset to MFES and critical to delivering LOS. MFES currently has 21 Fire Stations, which are reported within the City's Facilities and Property Management AM Plan. MFES is responsible for the preventative and demand operations and maintenance of all the fire stations as well as for capital renewal, expansion, and growth. Fire stations are a major source of current and future budgets and investments which currently includes an aggressive plan to renovate 17 of 21 fire stations over the next decade, and the construction of six new fire stations.

Although this AM Plan reflects a 2022 fiscal year horizon, MFES has seen a major spike (over 20 per cent year over year in some cases) in unit replacement costs within some asset classes due to supply chain shortages, inflation, and other factors. As a result, 2023-unit rates were used for MFES's fleet to ensure the forecasted lifecycle needs later in the AM Plan account for this increase. **Table 3** lists the sources used for estimation of replacement values presented in this AM Plan and the associated confidence in that data based on a five-level scale in accordance with **Table 4**.

Table 3: Source of Replacement Value Estimates

Asset Class	Asset Type	Source of Replacement Value	Data Confidence
Fire Fleet	Front Line Vehicles	Staff input on market unit cost(s)	A Highly Reliable
	Support Vehicles	Staff input on market unit cost(s)	A Reliable
	Mechanical Shop Equipment	Staff input on market unit cost(s)	C Uncertain
Specialized Tools and Equipment	Fire Fighting Tools and Equipment	Staff input on market unit cost(s)	C Uncertain
	Professional Development and Accreditation Equipment	Staff input on market unit cost(s)	C Uncertain
	Personal Protective Equipment	Staff input on market unit cost(s)	B Reliable
Information Technology	In-Vehicle Laptops	Staff input on market unit cost(s)	B Reliable
	Portable Radios	Staff input on market unit cost(s)	B Reliable
	Vehicle communications (VCOM) Infrastructure	Apply percentage ownership of overall replacement cost	D Very Uncertain
Facility Fixtures, Furniture and Equipment	Furnishing and Equipment	Asset lists provided by MFES staff	C Uncertain
	Fitness Equipment	Staff input on market unit cost(s)	B Reliable

Table 4: Data Confidence Grading System

Confidence Grade	Description
A-Highly reliable	Data based on sound records, procedures, investigations, and analysis, documented properly, and agreed as the best method of assessment. Dataset is complete and estimated to be accurate ± two per cent.
B-Reliable	Data based on sound records, procedures, investigations, and analysis, documented properly but has minor shortcomings, for example some of the data is old, some documentation is missing and/or reliance is placed on unconfirmed reports or some extrapolation. Dataset is complete and estimated to be accurate ± 10 per cent.
C-Uncertain	Data based on sound records, procedures, investigations, and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available. Dataset is substantially complete but up to 50 per cent is extrapolated data and accuracy estimated ± 25 per cent.
D-Very Uncertain	Data is based on unconfirmed verbal reports and/or cursory inspections and analysis. Dataset may not be fully complete, and most data is estimated or extrapolated. Accuracy ± 40 per cent.
E-Unknown	None or very little data held.

Asset Age and Lifecycle

The average age and lifecycle of the assets used to support MFES, by Asset Class, is shown in **Table 5**. Cells designated as “Unknown” indicate that asset in-service dates, purchase years or manufacture dates were not available. A significant proportion of the assets are in the latter stage of their lives (i.e., per cent Remaining Useful Life remaining less than 50 per cent). Short-term infrastructure renewal and replacement funding for aging assets will be discussed within the Lifecycle Management Strategy section of the MFES AM Plan.

Table 5: Asset Average Age and Service Life

Asset Class	Asset Type	Average Age (Years)	Estimated Useful Life (Years)	% Remaining Useful Life
Fire Fleet	Front Line Vehicles	7	15	53%
	Support Vehicles	8	10	17%
	Mechanical Shop Equipment	4	17	79%
Specialized Tools and Equipment	Fire Fighting Tools and Equipment	2	10	84%
	Professional Development and Accreditation Equipment	Unknown	10	Unknown
	Personal Protective Equipment	6	11	47%
Information Technology	In-Vehicle Laptops	6	5	-20%[2]
	Portable Radios	6	10	41%
	VCOM Infrastructure	Unknown	50	Unknown
Facility Fixtures, Furniture and Equipment	Furnishing & Equipment	3	9	71%
	Fitness Equipment	1	10	90%

[2] In Vehicle Laptops are being fully replaced in 2023.

Asset Condition

The condition distribution of MFES's assets is shown in **Figure 1** below.

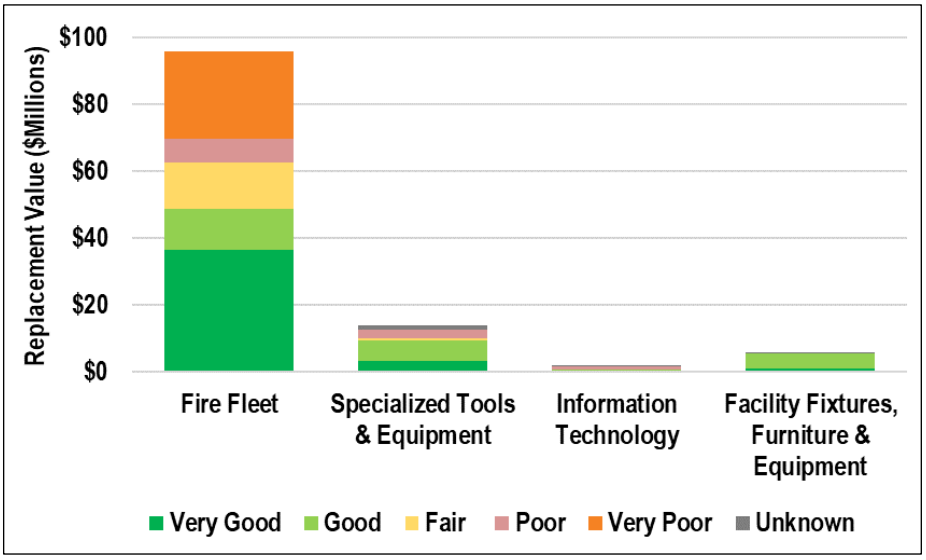


Figure 1: Asset Portfolio Condition Distribution

The figure shows that 69 per cent of MFES's assets are in fair or better condition and 23 per cent of assets are in Very Poor condition. Assets in Very Poor condition are due or overdue for renewal and represent MFES's Renewal Backlog. Approximately 1.5 per cent of the assets are of Unknown condition, largely made up of Fire Fighting Tools and Equipment.

The condition ratings used in **Figure 1** are defined in **Table 6** and are aligned with the International Infrastructure Management Manual's (IIMM) five-point condition scale. For this AM Plan, condition assessment data was incorporated where available, specifically for fire fleet. MFES uses a 15-point scale to assess the condition of front line and support vehicles based on:

- Age
- Maintenance and Repair Cost
- Meter-KM/Hours
- Physical Condition

For the remaining assets, condition was estimated based on age or was reported to be unknown. Condition data based on industry standard inspection assessments is considered Highly Reliable, on staff inspection and knowledge as Reliable, and otherwise as Uncertain.

Table 6: Condition Rating Scale

Condition Rating	% of Remaining Useful Life (RUL)	Fleet Condition Rating	Description
Very Good: Fit for the Future	RUL ≥ 75%	0-3	Asset is physically sound and is performing its function as originally intended. Required maintenance costs are well within standards and norms. Typically, asset is new or recently rehabilitated.
Good: Adequate for Now	75% > RUL ≥ 50%	4-6	Asset is physically sound and is performing its function as originally intended. Required maintenance costs are within acceptable standards and norms but are increasing. Typically, asset has been used for some time but is within mid-stage of its expected life.
Fair: Requires Attention	50 > RUL ≥ 25%	7-9	Asset is showing signs of deterioration and is performing at a lower level than originally intended. Some components of the asset are becoming physically deficient. Required maintenance costs exceed acceptable standards and norms and are increasing. Typically, asset has been used for a long time and is within the later stage of its expected life.
Poor: Approaching End of Life	25% > RUL > 0%	10-12	Asset is showing significant signs of deterioration and is performing to a much lower level than originally intended. A major portion of the asset is physically deficient. Required maintenance costs significantly exceed acceptable standards and norms. Typically, asset is approaching the end of its expected life.
Very Poor (End of Life): Requires Renewal	RUL ≤ 0%	13-15	Asset is physically unsound and/or not performing as originally intended. Asset has higher probability of failure or failure is imminent. Maintenance costs are unacceptable, and rehabilitation is not cost effective. Replacement/major refurbishment is required.

Dashboards

The following dashboards provide a summary of the current state of the infrastructure by each Asset Class. Each dashboard includes a breakdown of the number of active assets, their age, estimated useful life, and replacement value by asset type. A summary of the assets' average condition is illustrated in each dashboard through graphs.

A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete, and accurate key asset information is as it relates to supporting asset management decision-making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

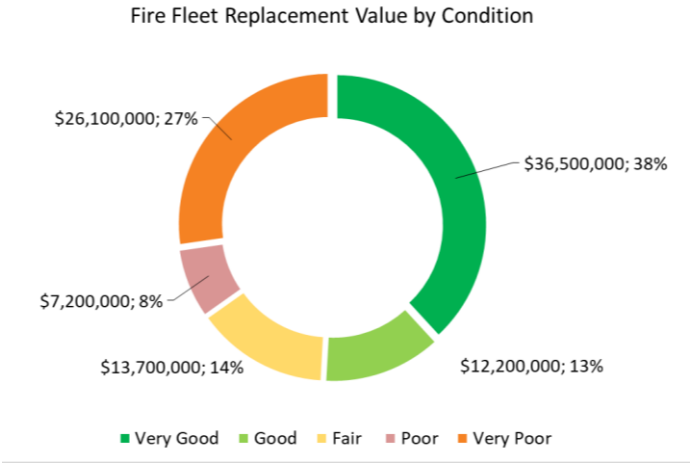
Asset Class:	Fire Fleet	Replacement Value	$95.7 Million

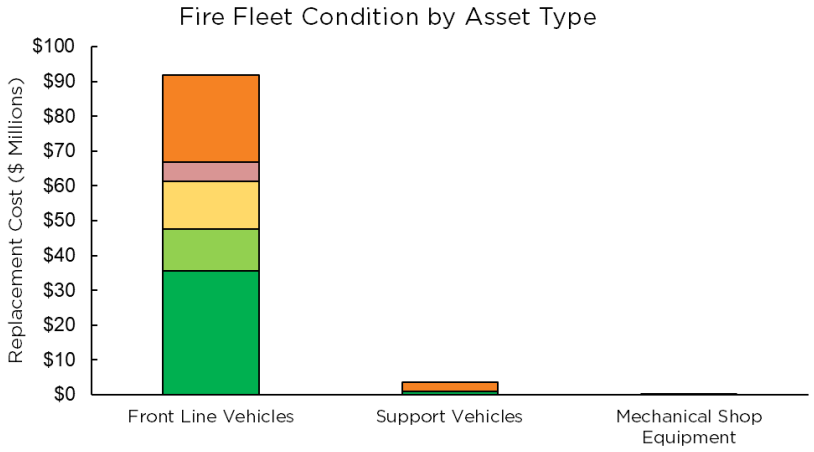
DATA QUALITY

A	A	B
Asset Inventory	Condition	Replacement Value

Front Line Vehicles – Ladder Truck

Asset Type	Asset Sub-Type	Inventory	Unit	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value ($000)
Front Line Vehicles	Pumper, Aerial, Squad, Heavy Duty 5TN	47	Ea.	7.0	15.0	$91,800
Support Vehicles	Small Front Line Response Vehicles Light & Medium Duty, Other Vehicles Light & Medium Duty, Small Engine Equipment	96	Ea.	8.0	10.0	$3,700
Mechanical Shop Equipment	Hoists & Lifts, Jacks & Jack Stands, Ground Ladders, Other	42	Ea.	4.0	17.0	$225





Asset Class:	Specialized Tools & Equipment	Replacement Value	$13.8 Million

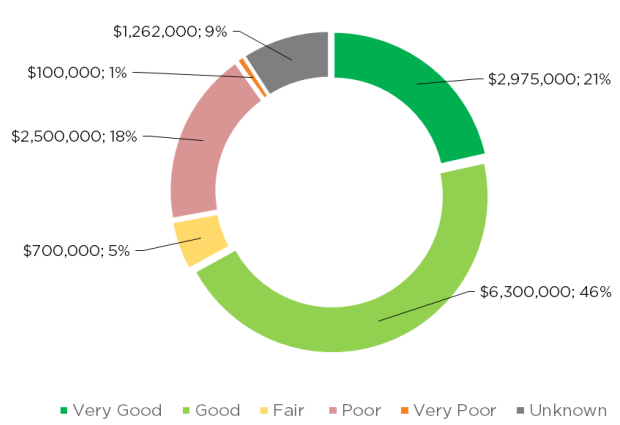
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	B

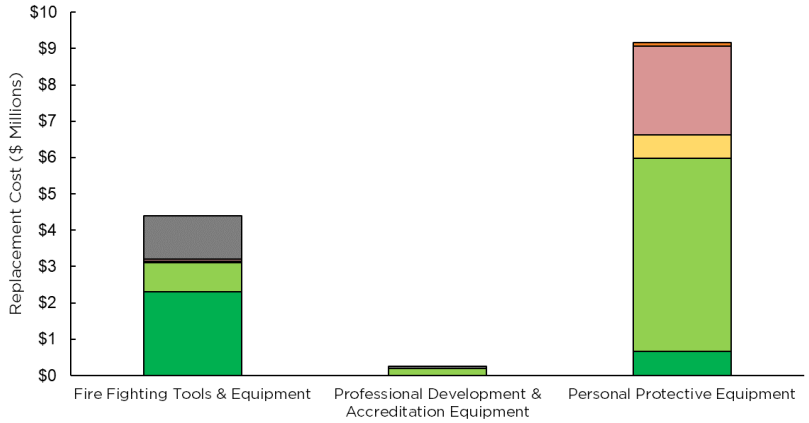
Personal Protective Equipment – MSA Air Pack & Cylinder

Asset Type	Asset Sub-Type	Inventory	Unit	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value ($000)
Fire Fighting Tools & Equipment	Rescue Equipment, Front Line Equipment, Medical Equipment, Hoses & Nozzles	1,883	Ea.	2.0	10.0	4,403
Professional Development & Accreditation Equipment	Training Hose, Training MSA Air Pack & Cylinders, Other	203	Ea.	N/A	10.0	262
Personal Protective Equipment	Life Safety-MSA Air Packs, Life Safety-MSA Air Cylinders, Life Safety-Other, Specialized PPE	2,640	Ea.	6.0	11.0	9,172

Specialized Tools & Equipment Replacement Value by Condition



Specialized Tools & Equipment Condition by Asset Type



Detailed AM Plan
Fire & Emergency Services

Asset Class:	Information Technology	Replacement Value	$1.9 Million

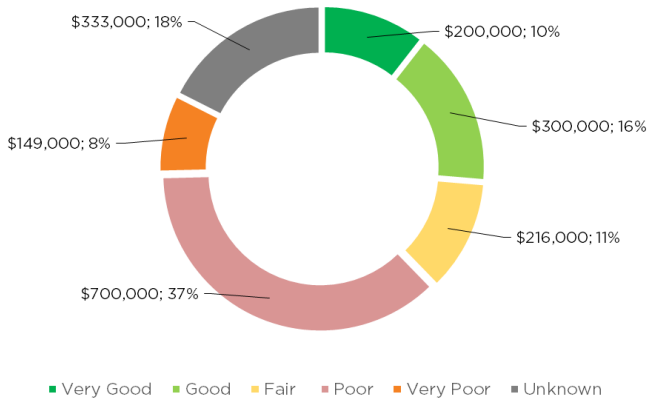
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	B

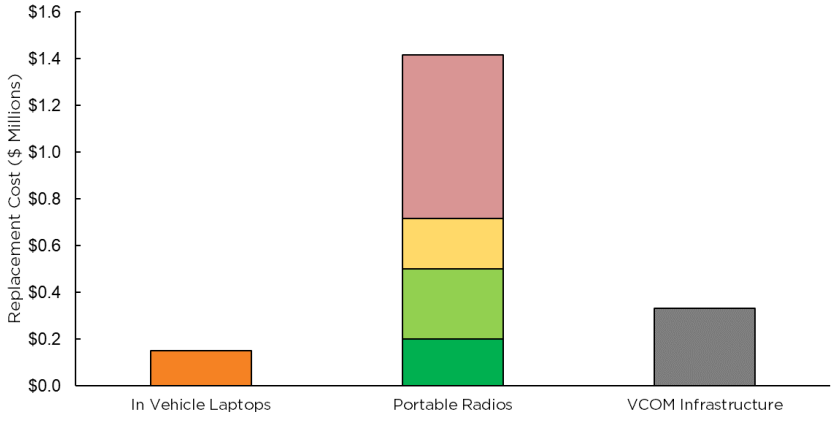
VCOM Infrastructure

Asset Type	Asset Sub-Type	Inventory	Unit	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value ($000)
In-Vehicle Laptops	Laptops mounted in emergency vehicles	37	Ea.	6.0	5.0	149
Portable Radios	Handheld and mounted radios used for emergency response communications	211	Ea.	6.0	10.0	1,416
VCOM Infrastructure	Network of equipment used by regional emergency services – shared service	1	Ea.	N/A	50.0	333

Information Technology Replacement Value by Condition



Information Technology Condition by Asset Type



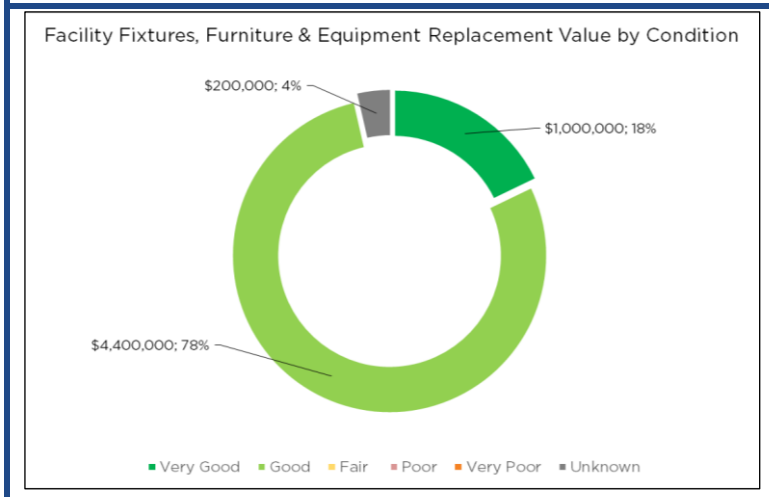
Asset Class:	Facility Fixtures, Furniture & Equipment	Replacement Value	$5.6 Million

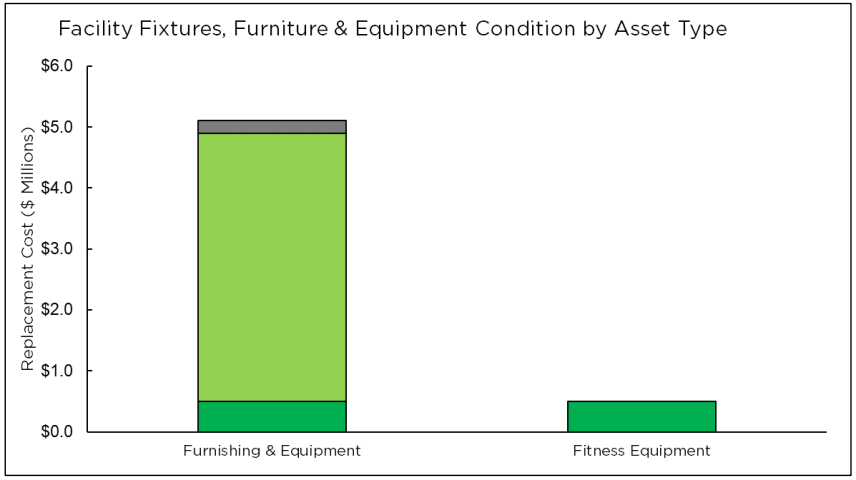
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	B

Furnishing & Equipment

Asset Type	Asset Sub-Type	Inventory	Unit	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value ($000)
Furnishing & Equipment	Tables, Chairs, cabinets, and appliances in Fire Stations	958	Ea.	3.0	9.0	5,434
Fitness Equipment	Treadmills, weight sets, bikes, etc.	164	Ea.	1.0	10.0	176





Asset Risk Framework

The ISO 31000 Risk Management Process provides guidelines on managing risk faced by organizations and includes the activities of establishing the risk context and assessing, treating, monitoring, reviewing, recording, and reporting risk as well as monitoring, reviewing, communicating and consulting on risk. This process is illustrated in **Figure 2** and is summarized for MFES below:

- **Establish Context:** the environment in which MFES seeks to define and achieve its objectives
- **Identify Risks:** that could affect achievement of MFES's LOS
- **Analyze Risks**: estimate the level of a risk by approximating consequence of impact and likelihood of occurrence
- **Evaluate Risks:** determine whether or not a specified level of risk is acceptable or tolerable
- **Treat Risks:** select and implement one or more treatment options
- **Monitor and Review:** determine the current status and whether or not required LOS are being achieved
- **Communicate and Consult:** an iterative, two-way dialogue between MFES and its stakeholders throughout the risk management process

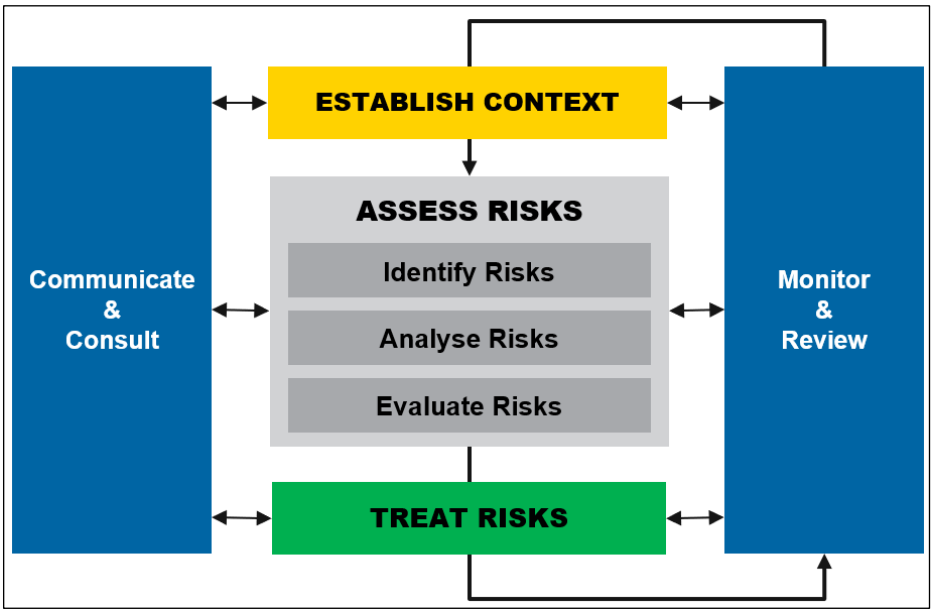


Figure 2: ISO 31000 Risk Management Process

Risk Context

For this AM Plan, risks are defined as adverse impacts on MFES's ability to meet Customer LOS expectations, as measured by the Technical LOS Indicators outlined in the following chapter.

Criticality Assessment

Risks are identified as the failure to meet target or assumed target Technical LOS. The risk grading scales to quantify asset criticality are outlined in **Table 7**. The risk assessment for the MFES AM Plan excludes full asset risk profiles (which include likelihood of failure), and instead focuses on asset criticality.

Table 7: Consequence of Failure Ranking

Consequence / Impact	Description	Score
Very Low	• Easy to replace • Can be non-operational for multiple months without significantly impacting core service delivery to many users	1
Low	• Somewhat difficult to replace • Can be non-operational for multiple weeks without significantly impacting core service delivery to many users • Asset does not perform a safety function or meet a regulatory requirement	2
Medium	• Moderately difficult to replace • Outages of more than a couple of days may significantly impact core service delivery to many users • Asset may perform a safety function or meet a regulatory requirement	3
High	• Highly mission-sensitive asset with no redundancy • Mission-critical asset with very limited redundancy • Significant community investment	4
Very High	• Mission-critical and unique asset • Significant service disruption from any outage • No redundancy • Significant community investment	5

Asset Criticality Assessment

The potential consequence of not keeping assets in a state of good repair was assessed, by Asset Class and Asset Type, using the frameworks above. The rationale for the assessment and the resulting asset criticality were provided by MFES staff and are detailed in **Table 8** below. Based on the criticality assessment, the Current Risk profiles were evaluated using a Risk Rating Matrix. Critical risks are those assessed with ratings of 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action).

Table 8: Asset Criticality Ratings

Asset Class	Asset Type	Asset Sub-Types	Criticality	Rationale/Notes
Fire Fleet	Front Line Vehicles	Pumpers (All makes)	4	Highly mission sensitive, little redundancy
		Aerials (All Makes)	4	Highly mission sensitive, little redundancy
		Squads (All Makes)	4	Highly mission sensitive, little redundancy
		Heavy Duty 5TN (All Makes)	3	Specialty vehicles, however, Brampton can offer redundancy
	Support Vehicles & Motorized Equipment	Small Front-Line Response Vehicles, Light & Medium Duty	3	Specialty equipped not easily replaced
		Other Vehicles Light & Medium Duty	1	N/A
		Small-Engine Equipment	1	N/A
	Mechanical Shop Equipment	Hoists & Lifts	3	Trucks cannot be lowered if fails, safety concern
		Jacks & Jack Stands	1	N/A
		Ground Ladders	2	Not easy to replace
		Other (Miscellaneous including Trailers)	1	N/A
Specialized Tools and Equipment	Fire Fighting Tools and Equipment	Rescue Equipment	4	Highly mission sensitive, long lead time replacement
		Front Line Equipment	2	N/A
		Medical Equipment	2	N/A
		Hoses & Nozzles	2	Specialty order, inventory tagged, are now tested annually
		Training Hose	2	N/A

Asset Class	Asset Type	Asset Sub-Types	Criticality	Rationale/Notes
	Professional Development and Accreditation Equipment	Training MSA Air Pack & Cylinders	2	N/A
		Other PDA Equipment	1	N/A
	Personal Protective Equipment	Life Safety-MSA Air Packs	2	Short lead time, have redundancy
		Life Safety-MSA Air Cylinders	2	Short lead time, have redundancy
		Life Safety-Other	1	N/A
		Specialized PPE (Water rescue gear, hazmat)	2	More difficult to replace
		Personal (bunker gear, helmet, boots, belts, flashlights)	1	Have spares, ability to rent
Information Technology	In Vehicle Laptops	MDU	3	No spares, redundancy with phones and other maps
	Portable Radios	Portable Radios	4	Hard to replace (current market conditions)
	VCOM Infrastructure	VCOM Infrastructure	4	Shared, inter-related with Portable Radios
Facility Fixtures, Furniture and Equipment	Furnishing and Amenities	Furnishing and Amenities	1	N/A
	Fitness Equipment	Fitness Equipment	1	N/A

Levels of Service

Levels of Service (LOS) describe the outputs and objectives that MFES intends to deliver to the City's residents, businesses, and other stakeholders. Developing, monitoring, and reporting on LOS are integral parts of an overall performance management program that is aimed at maintaining and improving service delivery and demonstrating accountability to the MFES's stakeholders. LOS are guided by a combination of customer expectations, legislative requirements, and internal guidelines, policies, and procedures. In many cases, LOS are also implied based on past service delivery, community expectations, and infrastructure system design. Effective asset management planning requires that LOS be formalized and supported through a framework of service statements, performance measures, current and proposed performance, and timeframes to achieve proposed performance, and that the costs to deliver the documented LOS be understood and communicated.

In alignment with O. Reg. 588/17, this AM Plan discusses LOS under community (i.e., customer) and technical LOS categories, defined as:

- **Customer LOS:** Qualitative descriptions that demonstrate customer and other stakeholder expectations of services provided from MFES assets
- **Technical LOS:** Technical metrics that translate customer expectations into technical objectives and performance measures

LOS Measures

Customer LOS measure how the customer receives the service and whether value to the customer is provided. **Figure 3**Error! Reference source not found. shows that Corporate LOS commitments and the legislated LOS referenced by them drive the definition of more specific Customer LOS, which can be categorized as relating to one of the following service attributes:

- **Capacity and Use**: Assessing whether services have enough capacity and are accessible to the customers
- **Function**: Assessing whether services meet customer needs while limiting health, safety and security, as well as natural and heritage impacts
- **Reliable and Responsive**: Assessing whether services are reliable and responsive to customers
- **Affordable**: Assessing whether services are affordable and provided at the lowest cost for both current and future customers

Customer LOS are translated into Technical LOS, where:

- Capacity and Use LOS drive assessment of expansion needs
- Function LOS drive assessment of upgrade needs
- Reliability LOS drive assessment of renewal, operations and maintenance needs
- Affordability LOS drive assessment of financial sustainability needs

Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of fire and emergency services are outlined in **Table 9**.

Table 9: Governing Legislation

Legislation	Requirements
Accessibility for Ontarians with Disabilities Act (AODA)	Developing, implementing, and enforcing accessibility standards to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures, and premises on or before January 1, 2025.
Fire Protection and Prevention Act, 1997 (FPPA)	This Act consists of a set of minimum requirements for fire safety within and around existing buildings and facilities.
Fire Protection and Prevention Act, 2022-O. Reg 343/22	Firefighter Certification, under the FPPA, which requires all municipalities in Ontario to ensure that their staff are certified to the applicable National Fire Protection Association (NFPA) Professional Qualifications standards identified within the regulation. This new regulation comes into effect in two stages beginning on July 1, 2026, and July 1, 2028.
Ontario Regulation 378/18 Community Risk Assessments	Requires that every municipality and every fire department in a territory without municipal organization complete a community risk assessment and use it to inform decisions on the provision of fire protection services. The assessment is an in-depth and comprehensive assessment to inform fire protection service levels and requires the identification, analysis, evaluation and prioritizing of risk, based on nine mandatory profiles.
Highway Traffic Act	Also known as Section 159 (2,3) of Canada's Highway Traffic Act, the Move Over Law in Ontario states that drivers are required to slow down and move over to another lane when they approach emergency vehicles with flashing lights.
Occupational Health and Safety Act (OHSA)	The OHSA is the main piece of legislation governing health and safety in the workplace in Ontario. It sets out the legal rights and responsibilities of employers, employees, and other stakeholders in relation to health and safety. Under the OHSA, employers are required to take all reasonable precautions to protect the health and safety of their employees. This includes protecting employees from the risks of fire and ensuring that they have the knowledge and resources they need to stay safe in the event of a fire.
O. Reg. 199/07: Commercial Motor Vehicle Inspections	All commercial motor vehicles and their drivers must meet strict safety standards and follow all commercial vehicle-related regulations in the Highway Traffic Act.
National Fire Protection Association (NFPA)	NFPA 1, Fire Code, advances fire and life safety for the public and first responders as well as property protection by providing a comprehensive, integrated approach to fire code regulation and hazard management. The NFPA standard includes guidance around establishing lifecycle timelines for some fire asses such as fleet.

The risks of failing to achieve the defined Customer and Technical LOS are assessed, and lifecycle activities are prioritized to address those risks. Lifecycle activities may include expansion, upgrade, renewal, maintenance or operational activities, depending on the category of LOS to be addressed. The nature of the lifecycle activity determines whether it should be funded as capital or operating, as well as eligible funding sources. As shown in the **Figure 3**, even after the lifecycle intervention, some residual risk may remain.

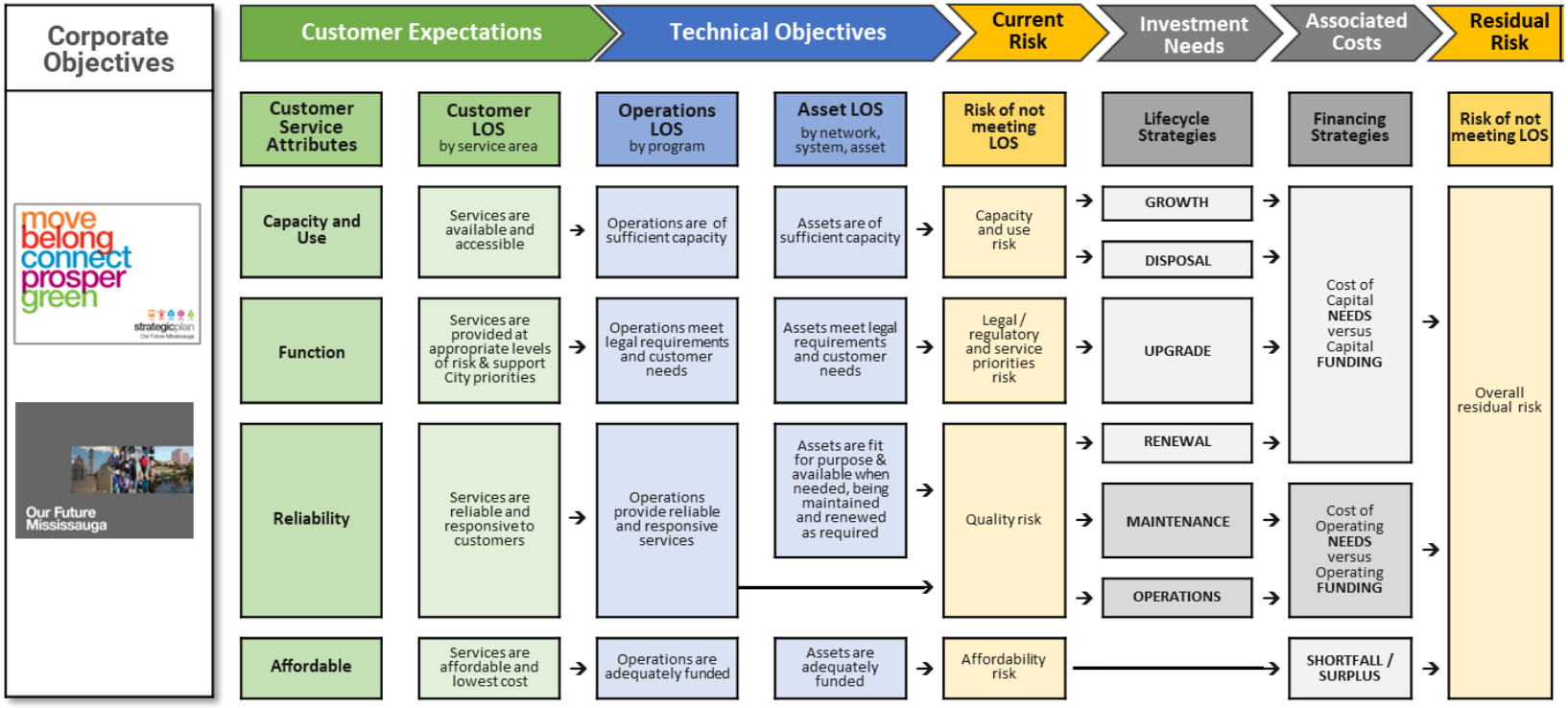


Figure 3: Levels of Service Framework

Current Performance – Capacity

Capacity and use service attributes assess whether services have enough capacity and are available and accessible to customers. Deficiencies in these levels of service would indicate a need for expansion of the asset portfolio (e.g., to increase capacity or areas served).

Response Times

The National Fire Protection Association (NFPA) identifies a target of 240 seconds of travel time for the initial arriving fire apparatus, aiming to achieve this target 90 per cent of the time. MFES has more recently targeted a 75th per centile travel time.

MFES identifies the following concentration (depth of response) targets:

- 610 seconds or less travel time for seven apparatus to a fire in a confirmed high rise (90th percentile)
- 480 seconds or less travel time for five apparatus to a fire in a defined high-risk occupancy (90th percentile)

As the City continues to grow, MFES has been unable to achieve travel time targets. As a result, MFES has identified the need for six new fire stations over the next 12 years. The goal is to have stations located so that the response time for the first arriving vehicle from a station to an incident will occur in four minutes (240 seconds) or less, 75 per cent of the time.

To augment travel time goals, MFES has prioritized public fire safety education and enforcement through:

- The expansion of targeted public education and proactive fire safety inspections
- The use of operational staff more effectively to deliver public education
- The implementation of provincial certification requirements
- The reinforcement and consistent application of all available enforcement strategies

Growth-related lifecycle activities and strategies will be discussed within the next two chapters of this AM Plan.

Current Performance – Function

The service attribute related to function assesses whether services meet customer needs while limiting health, safety, security, natural and other impacts. Deficiencies in these levels of service would indicate a need for upgrades (e.g., to improve energy efficiency, or to meet latest technological standards).

Legislation

The City identified the following needs and is currently renovating 17 out of its existing 21 stations to meet the following:

- **Accessibility** - All 17 of the identified stations require upgrade work to be compliant with the 2015 City of Mississauga Facility accessibility Design Standards

- **Staffing Composition** - There are currently eight stations that do not have provisions for female washroom and change room facilities. As the staffing composition continues to change, stations must be modified to accommodate all employees
- **Health & Safety Requirements (Occupational Health and Safety)** - Cancer rates among firefighters, both active and retired, are much higher than rates in the general public. Front-line operations staff are at a high risk of exposure to contaminants, carcinogens and other hazardous substances. As a result, design standards for fire stations now include provisions for containment and avoidance of cross-contamination as well as proper storage for personal protective equipment. Specific asset upgrade activities performed on the facilities include ventilated bunker gear rooms, clean zone gym facilities, enhanced laundry facilities, among others

Energy Efficiency

In line with the City's Climate Action Plan, MFES is embarking on a number of initiatives to assist in reducing greenhouse gas emissions. These include:

Equipment

- Electric auto extrication equipment purchased and implemented in 2021/22 – previous equipment required the fire truck to be running to hydraulically power the tools
- All new lawn maintenance equipment purchased since 2021 is electric – no more gas-powered lawn equipment will be purchased
- Positive Pressure Ventilation (PPV) fans – trial will start in 2023 to evaluate the efficiency and effectiveness of Battery Electric PPV fans. The current fans are gas powered and emit very high levels of pollution
- All small hand tools and lights will be battery electric – old units were 120V and required the apparatus to be running to power

Vehicles

- 2022 – purchased six hybrid vehicles for the Command team
- 2023 – The City is currently in the delivery/commissioning stage for two electric transit vans, one electric and one hybrid pick-up truck, and one hybrid Compact SUV
- 2023 – MFES is exploring the electrification of front-line apparatus and as such as ordered its first electric vehicle (EV) fire truck (with an estimated delivery year of 2024)

Facilities

- New fire stations will be designed to achieve Net Zero Energy (FS125 opening in 2024, FS123 opening in 2025/26, FS124 opening in 2026, and FS126, FS127 and FS128 are in the planning stage)
- New Fire stations and renovated stations will be equipped with electric vehicle charging stations, and have the infrastructure for future electric fire apparatus available
- All new Fire Stations will be designed with the goal of achieving Net Zero Energy

- All new Fire Stations will be built with the necessary infrastructure to accommodate electric vehicle charging

Current Performance – Reliability

The service attribute related to reliability assesses the physical condition and age of the assets. Deficiencies in these levels of service would indicate a need for renewal (rehabilitation or replacement) or repair of assets, or changes to operations and maintenance strategies.

State of Good Repair

After a thorough review of appropriate lifecycle replacement models for front-line fire apparatus, MFES has implemented a comprehensive method of prioritizing and evaluating the lowest lifecycle cost of these assets through the Fleet Management Information System (FMIS). Each asset's eligibility and priority for replacement is determined using a point system, with points allocated on four criteria: age, meter (KMs/Hours), maintenance and repair cost, and a condition assessment. A combination of these criteria is used to determine both capital planning and replacement priority:

- **Current Age** – Every asset subject to the Fleet Asset Replacement Cycle has a pre-determined lifecycle, based on factors inherent to the type of equipment, use of equipment, and frequency of use. This was developed using industry best practices and benchmarked against similar municipalities. The further along in the assets anticipated lifecycle, the higher the point total for lifecycle
- **Current Meter** – Expected end of life meter: Every asset has a pre-determined lifecycle based on usage, recorded as mileage or hours. Every asset is tracked for usage. The higher the meter, the higher the point total for meter
- **Maintenance and repair cost** – Every maintenance and repair dollar spent is tracked in the FMIS. This data is used to ensure that the total lifecycle cost of each asset is tracked. The greater the ratio of maintenance and repair cost to the original acquisition cost of the asset, the higher the point total for maintenance and repair cost. This category is double weighted
- **Mechanical condition assessment** – Every asset receives, at a minimum, an annual condition assessment as part of the comprehensive preventative maintenance program. Technicians evaluate the overall condition of the asset and assign a point value to condition

This comprehensive method of empirically validating and evaluating asset replacement allows multiple inputs to contribute to the replacement decision-making and establishing priorities, while maximizing the useful life of the assets, at the lowest possible cost. The most important factor is that this approach moves replacement cycle decision-making into a data-centered model.

This process is ongoing with the purchase of several new, front-line vehicles to replace those which are beyond their reasonable lifecycle. A fleet preventative maintenance program has been executed, which is expected to reduce the time a vehicle is out of service for demand maintenance. As part of an overall review of capital assets, MFES will undertake a full lifecycle review of all major equipment. This will assist in the development of a more rigorous lifecycle replacement plan that will inform the 10-year Capital budget process.

Public Education

Proactive public fire safety education is the primary strategy to improve community safety. Promoting fire safety awareness among community residents has been demonstrated as an effective strategy in reducing the occurrence of fires. MFES delivers a variety of public education programs for everyone, from young children to seniors. These programs are delivered by both public education officers who specialize in developing and delivering fire safety programs, as well as fire suppression crews who interact with the community daily. The overall objective of these programs is to educate the public on the dangers of fire and provide information on how to prevent fires.

Staff Training

On April 14, 2022, the Province imposed Ontario Regulation 343/22 – Firefighter Certification, under the FPPA, which requires all municipalities in Ontario to ensure that their staff are certified to the applicable National Fire Protection Association (NFPA) Pro-Qual standards identified within the regulation. This new regulation comes into effect in two stages beginning on July 1, 2026, and July 1, 2028. The seven technical rescue services outlined in the regulation include:

1. Surface Water Rescue
2. Swift Water Rescue
3. Ice Rescue
4. Rope Rescue
5. Trench Rescue
6. Confined Space Rescue
7. Structural Collapse Rescue

The Professional Development and Accreditation Section of MFES will be responsible for overseeing certification efforts to meet the requirements of this new legislation and manage the challenges of delivery/implementation.

Inspections

The frequency of inspections is an important issue and impacts the ongoing level of fire safety and code compliance of properties. Routine inspections should be conducted at a frequency that conveys and reinforces to property owners the importance of their properties being maintained in a code-compliant condition. The inspection frequency will be based on the risk identified in the Community Risk Assessment (CRA) and the application of NFPA 1730 which defines minimum inspection frequency for fire safety inspections, based on occupancy risk. MFES completes an annual evaluation of City building stock and updates proactive inspection records to ensure inspection frequency aligns with the assigned risk. To ensure inspection cycles commensurate with the level of risk, the fire safety inspection program will be expanded to include on-duty fire operations staff to greatly increase the number of inspections that can be completed. **Table 10** shows the community levels of service statements and associated technical performance indicators established by the MFES. The table provides the current performance, the confidence in the data used to determine that performance, and the thresholds used to translate technical LOS performance into a five-point LOS grading scale from Very Good to Very Poor. Threshold values were developed with MFES staff and represent what is believed to constitute as “Very Good” versus “Very Poor” performance based on quantitative data.

Level of Service Framework

Table 10: Current Levels of Service Summary

LOS Attribute	LOS Objective	Customer LOS Measure	Current Customer LOS Performance	Technical LOS Measure	Current Technical LOS Performance (2022)
Capacity	MFES provides adequate emergency response.	City map, or a brief description, of the geographical area served by MFES.	See Figure 44: Existing and Planned Future Fire Stations	First Arriving Apparatus - Travel Time (seconds) (75th percentile) - ALL calls	310
				First Arriving Apparatus - Travel Time (seconds) (75th percentile) - FIRE calls	293
				Travel time for 7 apparatus to a fire in a confirmed high rise (90th percentile)	937
				Travel time for 5 apparatus to a fire in a defined high-risk occupancy (90th percentile)	635
Function	MFES meets functional requirements.	Description of applicable requirements for MFES facilities.	See Current Performance - Function	% fire facilities that meet AODA & other legislative compliance	20%
				Annual reduction in tonne carbon dioxide equivalent (tCO2e) for Fire Fleet	0.4%
Reliability	MFES keeps assets in a state of good repair (SOGR).	Description of inspection process and lifecycle activities MFES staff perform to ensure assets are at SOGR.	See Current Performance - Reliability	% fire assets with high or very high criticality rating (CoF=4,5) in fair or better condition	90%
				% fire assets with moderate, low or very low criticality rating (CoF= 1,2,3) in fair or better condition	60%
				% assets in very poor condition	23%
				% fire fleet that meet MTO inspection schedules	100%
				% fire fleet that meet MFES planned inspection schedules (on-time)	20%
				Preventative Maintenance Ratio	35%
	MFES provides adequate public fire education.	Description of public education and outreach goals.	See Current Performance - Reliability	% of population receiving public fire safety education	Future Metric
	MFES provides adequate fire safety standards and enforcement.	Descriptions of relevant standards.	See Table 9: Governing Legislation	% of staff trained to NFPA 1031 (Fire Inspector) Standards - captains	Future Metric
				% of staff trained to NFPA 1035 (Public Educator) Standards - suppression staff	Future Metric
				% of fire inspections completed on high-risk properties	Future Metric
Financial	MFES services are financially sustainable.	Description of impact to underfunding assets to MFES services.	See Current Performance - Capacity	Target vs. Actual Reinvestment Rate	5.5% vs 5.1%

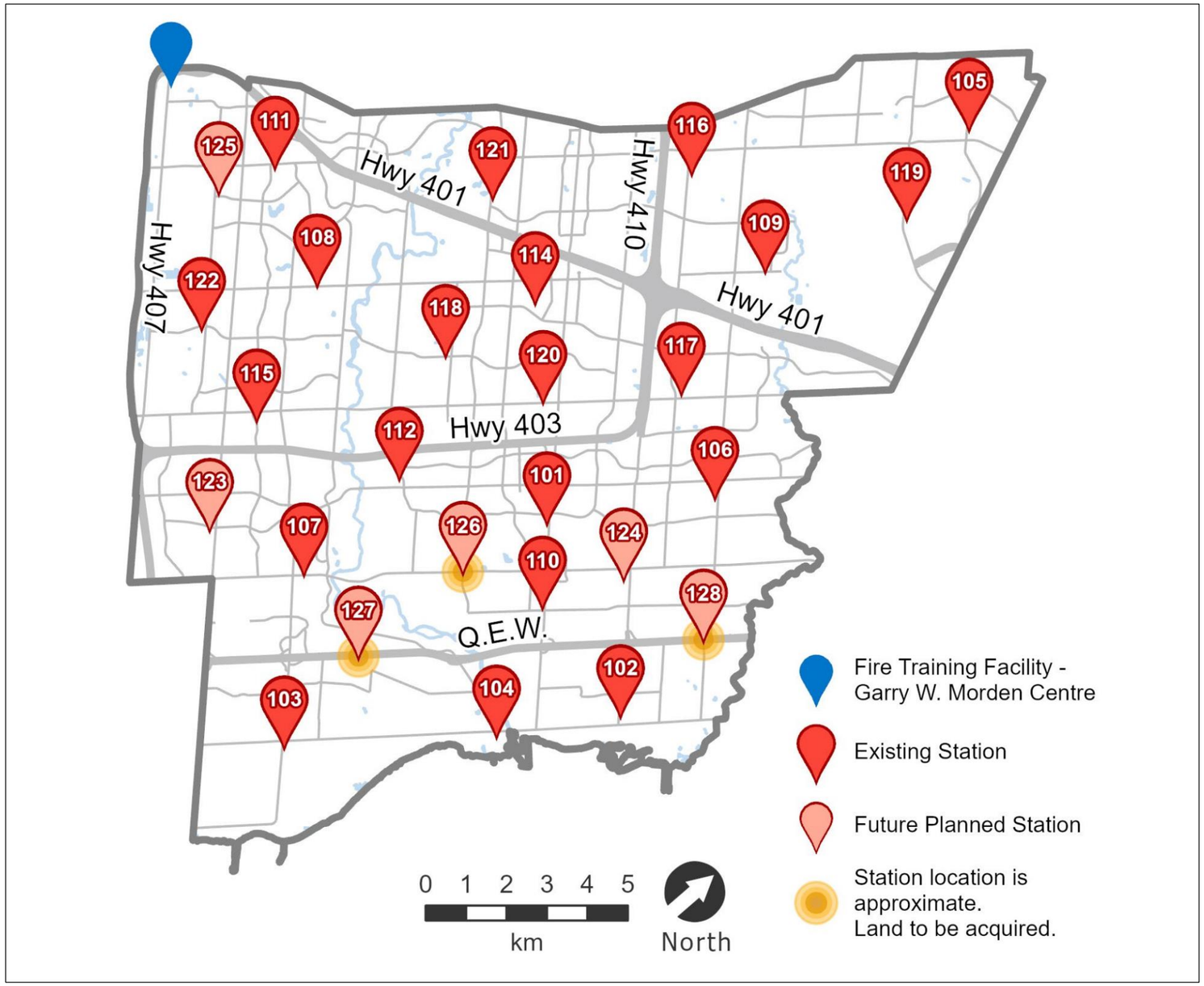


Figure 44: Existing and Planned Future Fire Stations

Future Demand

Demand Drivers

In general, drivers affecting demand include population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, and environmental awareness.

Demand Forecasts and Demand Impact on Assets

Drivers affecting demand for fire and emergency services include changes to development form and density, regulations and legislation, technological changes, economic factors, environmental awareness and the direct impact of climate change on MFES' assets.

Demand for new services will be managed through a combination of managing existing assets, upgrading of existing assets, providing new assets to meet demand, and demand management. Demand management practices include non-asset solutions such as public education, insuring against risks and managing failures.

Non-asset solutions focus on providing the required service without the need for asset ownership and management actions including reducing demand for the service, reducing the level of service (allowing some assets to deteriorate beyond current service levels) or educating customers to accept appropriate asset failures. A summary of the internal and external drivers that impact demand, and the associated demand management plan is shown below in **Table 11**.

Table 11: Demand Drivers & Demand Management Plan

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
Demographics	• Children aged 14 and under, represent 15.2 per cent of the city's total population • Seniors (age 65 & older) represent 16.37 per cent of the city's total population	• Seniors are at an increased risk of fire fatality in residential occupancies when compared to other age groups • Seniors account for a much higher percentage of fire fatalities than their proportion of the population • Most reported fire-related civilian injuries occurred in residential occupancies	• Youth represent an important demographic for the purposes of public education • There is value in targeted public education and prevention programs to this demographic. Structured education programs for children and youth can promote fire and life safety awareness for future generations which helps mitigate fire-related risks	• Develop and provide public education programming that targets: ○ Residents aged 65 and above ○ School-age children ages 6 to 14 ○ Unregistered daycares and community group homes

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
Building Stock	• Residential Occupancies represent 93.24 per cent of the city's existing property stock, and 66.9 per cent of the city's fire loss • The city currently has 2,343 buildings defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or five storeys	• The majority of civilian injuries occurred in residential occupancies • Of the fire loss incidents in Residential occupancies 29 per cent of incidents did not have a smoke alarm present and 14 per cent of incidents had a smoke alarm present but was not operational	• Potential for vulnerable individuals including seniors and youth residing in residential occupancies • Potential for exposure risk depending on dwelling type and building age • As the city continues to grow, construction may include increased numbers of multifamily dwellings and high-rise occupancies	• Assess infrastructure, equipment and deployment needs in community development nodes including Port Credit and Lakeview to ensure future population growth and provincially accelerated growth targets are addressed • Monitor development and trends along transit corridors and adjust operational programming to meet needs and circumstances • Develop and deliver a risk reduction strategy for high-rise and high-risk building stock • Complete the Fire Station Infrastructure Plan including the construction of new fire stations and renovation of existing stations • Deliver a pre-incident planning program based on the National Fire Protection Association (NFPA) 1620 standard

Demand Driver	Current Situation	Projection	Impact on Services	Demand Management Plan
Fire Loss	• Industrial occupancies represent 2.29 per cent of the city's property stock and 11.6 per cent of the city's fire loss	• Many industrial properties with potential fuel load concerns include heavy manufacturing (non-automotive), truck terminals, mini-warehousing, distribution centres, petro-chemical plants and food processing plants	• Understanding building use – large buildings such as industrial plants and warehouses, department stores and big box stores can contain large volumes of combustible materials • Building areas can cause comparable challenges. Horizontal travel distances can also mean extended response times by firefighters • Many industrial properties with potential fuel-load concerns. There are a number of warehousing units in the City to support the economic hub around the airport and the local goods movement network	• Implement a pre-incident planning program based on the National Fire Protection Association (NFPA) 1620 standard • Complete an annual evaluation of city building stock and update proactive inspection records to ensure inspection frequency aligns with the assigned risk • Reinforce and consistently apply all available enforcement strategies to ensure compliance with the Ontario Building Code, Fire Code and other legislative requirements • Develop and deliver a risk reduction strategy for high-rise and high-risk building stock

Asset Programs to meet Demand

The expected value of new contributed and constructed assets is shown in **Figure 5,** based on analysis of growth initiatives within the 2022-2031 Capital budget. These projects include:

Growth New Fire Stations (represented in the F&PM AM Plan):

- Fire Station 123 – 3050 The Collegeway
- Fire Station 124 – 2524 Cawthra Road
- Fire Station 125 – 6627 Tenth Line
- Fire Station 126 – Land to be acquired in the Mavis and Dundas area
- Fire Station 127 – Land to be acquired in the Lorne Park area
- Fire Station 128 – Land to be acquired in the QEW and Dixie

MFES Growth to Support New Fire Stations:

- New Fire Apparatus
- New Fire Apparatus Tools and Equipment
- New Fire Station Furniture, Fixtures, and Equipment
- Personal Protective Equipment for new staff for new fire stations
- Replacement of Emergency Response Tools and Equipment (partial growth-related purchases)
- Technical Rescue Equipment Replacement (partial growth-related purchases)

In addition to the growth projects above, the City is also undertaking upgrades to meet future demand such as:

- VCOM Infrastructure Upgrades
- Facility Design and Construction Renovations (partial upgrade-related purchases)

The cumulative asset inventory is expected to grow by $22.7M over the next 10 years, irrespective of the facilities the City is acquiring and/or improving through significant renovation (facilities are reported under the Facility & Property Management's AM Plan). MFES also plans to spend a total of $0.5M over the next 10 years in upgrade-related purchases.

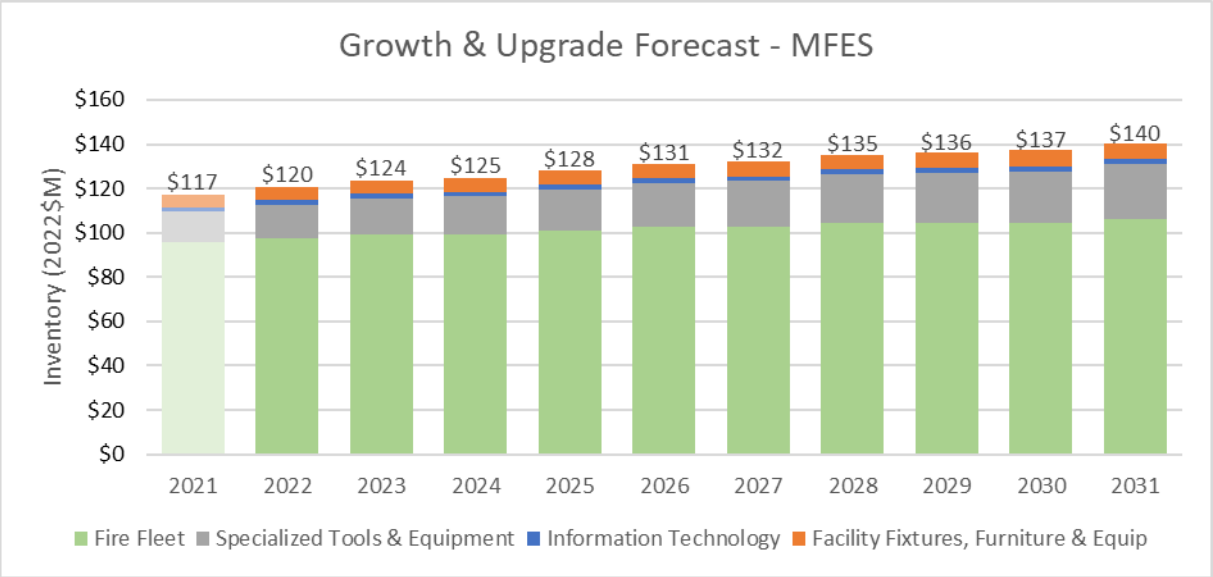


Figure 5: Upgrade and New Assets to meet Demand

Acquiring these new assets will commit ongoing operations, maintenance, and renewal costs for the period that the service provided from the assets is required. These future costs are identified and considered in developing forecasts of future operations, maintenance and renewal costs in the Lifecycle Management Strategy section.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes.

A key objective is to effectively deliver the desired LOS at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions – Expansion/Rebuild/New
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)
Operations and Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Renewal & Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Table 12 provides a summary of the different strategies and actions that staff employ for their applicable lifecycle activities, along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 12: Current Lifecycle Management Activities Summary

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Incomplete Lifecycle Activities
Operations & Maintenance	Fleet	• Routine condition inspections • Legislated inspections	• Failure to complete condition inspections can lead to unexpected operational issues • Failure to complete legislated inspections can lead to fine by the Province
	Specialized Tools & Equipment	• Routine condition inspections • Legislated inspections	• Failure to complete condition inspections can lead to unexpected operational issues • Failure to complete legislated inspections can lead to fine by the Province
	Information Technology	N/A	N/A
	Facility Fixtures, Furniture and Equipment	N/A	N/A
	Fleet	• Preventative maintenance – as and when required • Reactive maintenance – as and when required	• Failure to maintain fleet can lead to increased costs over the lifecycle of the asset
	Specialized Tools & Equipment		• Failure to maintain equipment can lead to increased capital costs over the lifecycle of the asset
	Information Technology	N/A	N/A
	Facility Fixtures, Furniture and Equipment	• Reactive maintenance	N/A

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Incomplete Lifecycle Activities
		• No preventative maintenance activities	
Renewal/ Rehabilitation	Fleet	• Refurbishment of front-line vehicles (done on adhoc basis)	• Failure to refurbish front-line vehicles can lead to increased costs over the entire lifecycle of the asset
	Specialized Tools & Equipment	• No early, mid, or later life replacement activities	N/A
	Information Technology	• No early, mid, or later life replacement activities	N/A
	Facility Fixtures, Furniture and Equipment	• No early, mid, or later life replacement activities	N/A
Replacement	Fleet	• Replace fleet asset	• Failure to replace some fleet assets within planned service life results in violation of NFPA standard
	Specialized Tools & Equipment	• Replaced Specialized Tools & Equipment asset	• Failure to replace some equipment assets within planned service life results in violation of NFPA standard
	Information Technology	• Replace Information Technology asset	N/A
	Facility Fixtures, Furniture and Equipment	• Replace Facility Fixtures, Furniture and Equipment asset	N/A

Lifecycle Needs vs. Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations
- The costs of any Non-Asset Solutions, Acquisition/Expansions/Rebuilds, and Operations & Maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of 2022-2025 operating budget and assuming year four as annual budget for years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Overhead costs

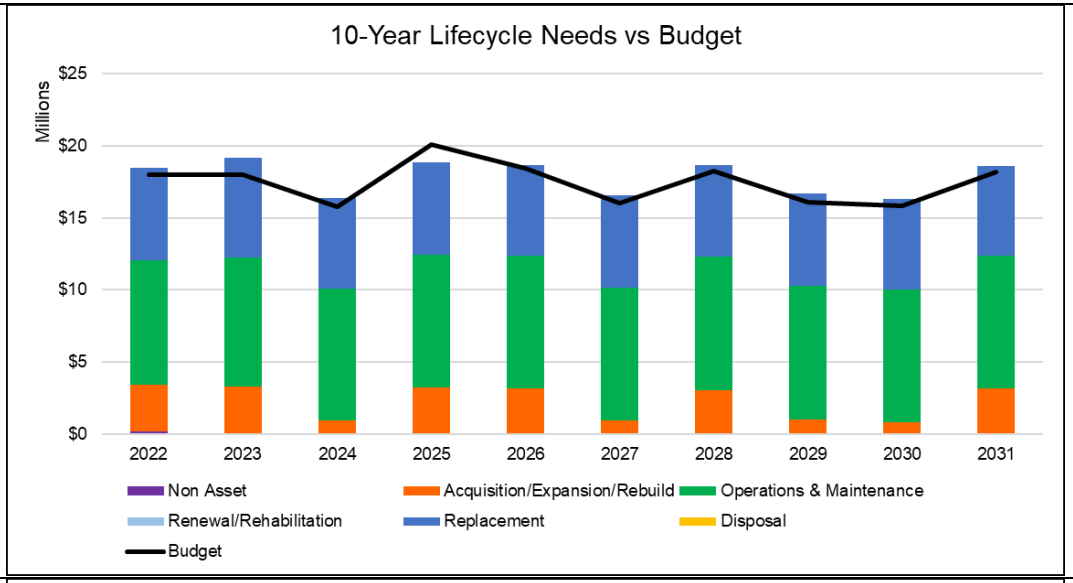
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation, and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

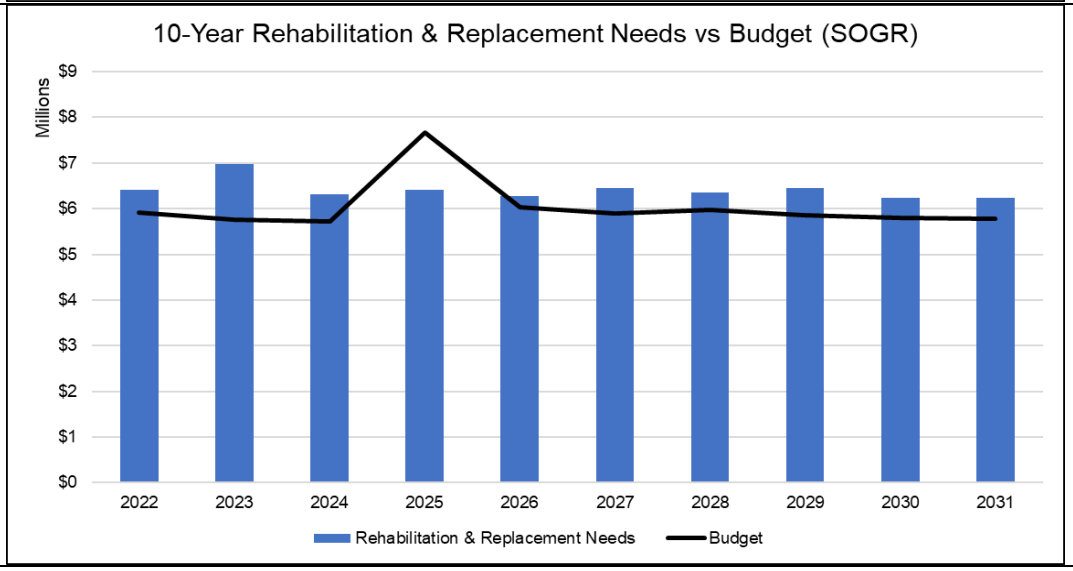
To illustrate the 10-year forecast, two graphs have been created by service area and by each asset class in this section:

- Total Lifecycle Needs vs. Budget Graph
- Rehabilitation & Replacement Needs vs. Budget (State of Good Repair[3]) Graph

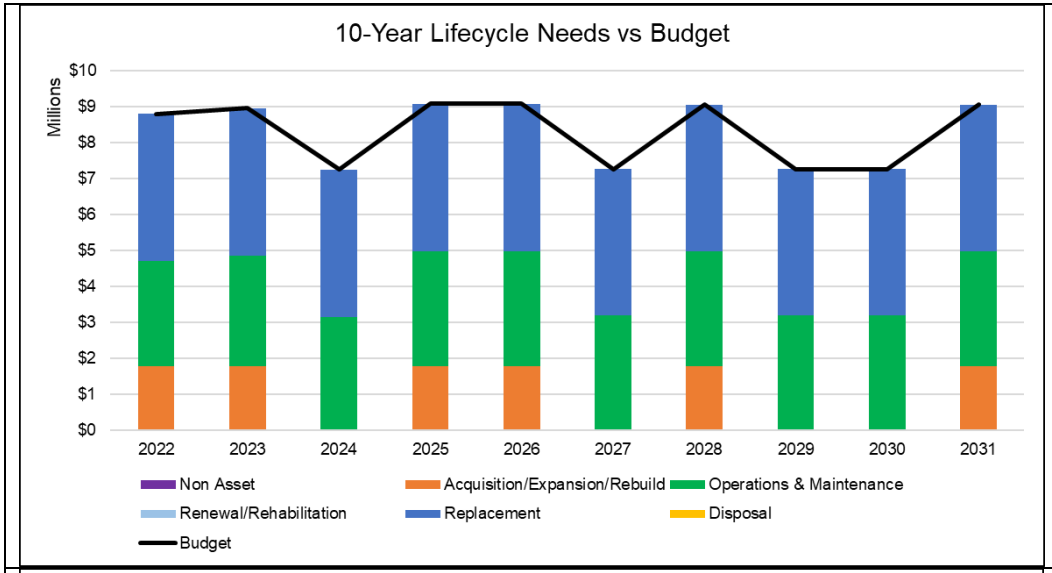
[3] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.

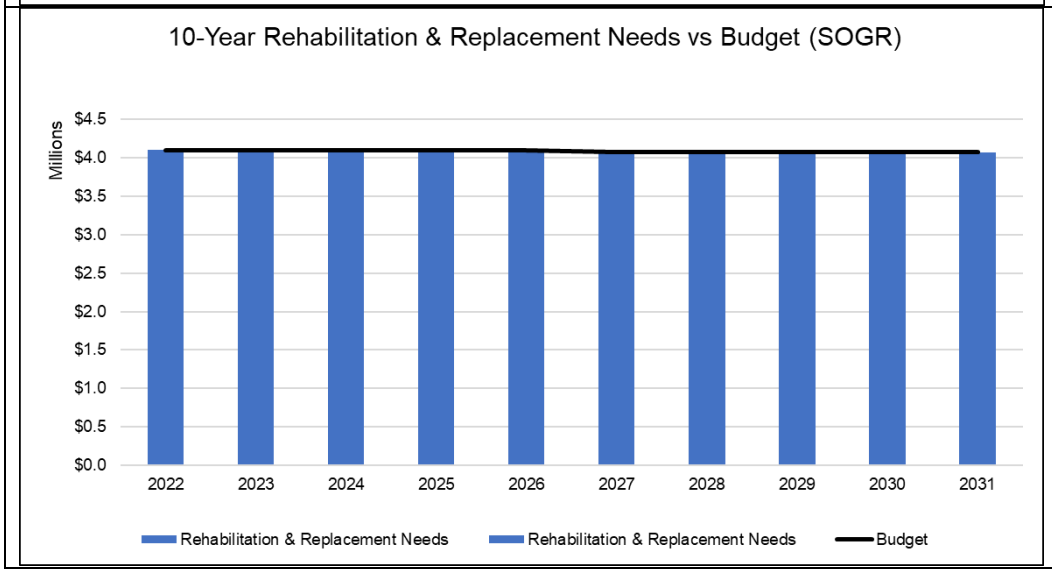
Fire & Emergency Services





Fire Fleet

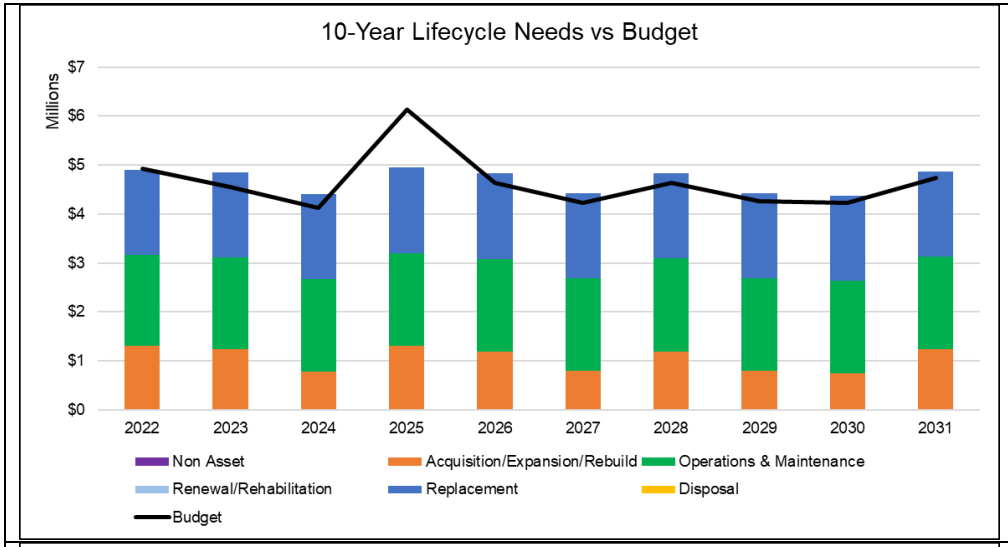


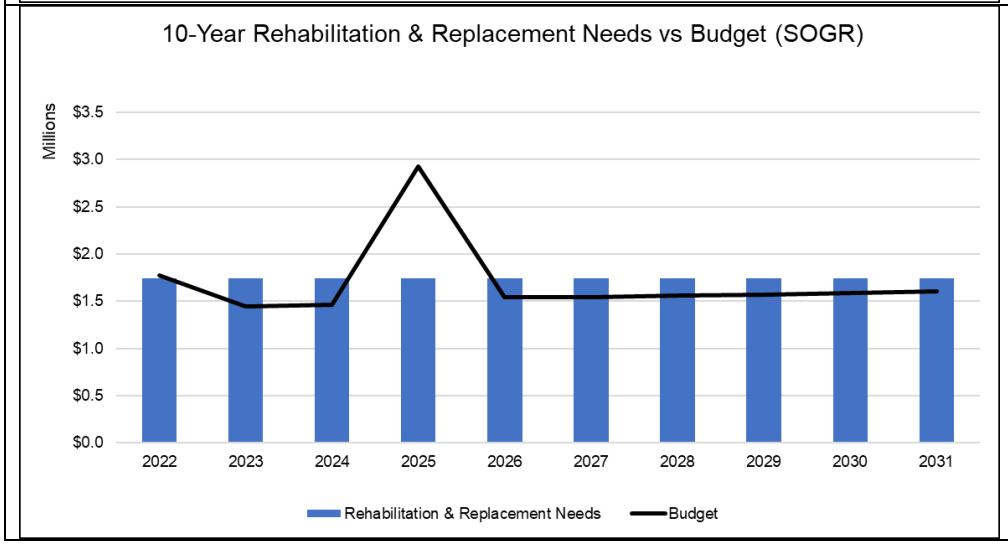


Approximately 35 per cent of the fire fleet assets are in Poor to Very Poor condition, indicating that a moderate portion of the inventory will be replaced in the next 10 years.

Staff will be acquiring several new fire fleet assets in order to improve service delivery.

Specialized Tools & Equipment

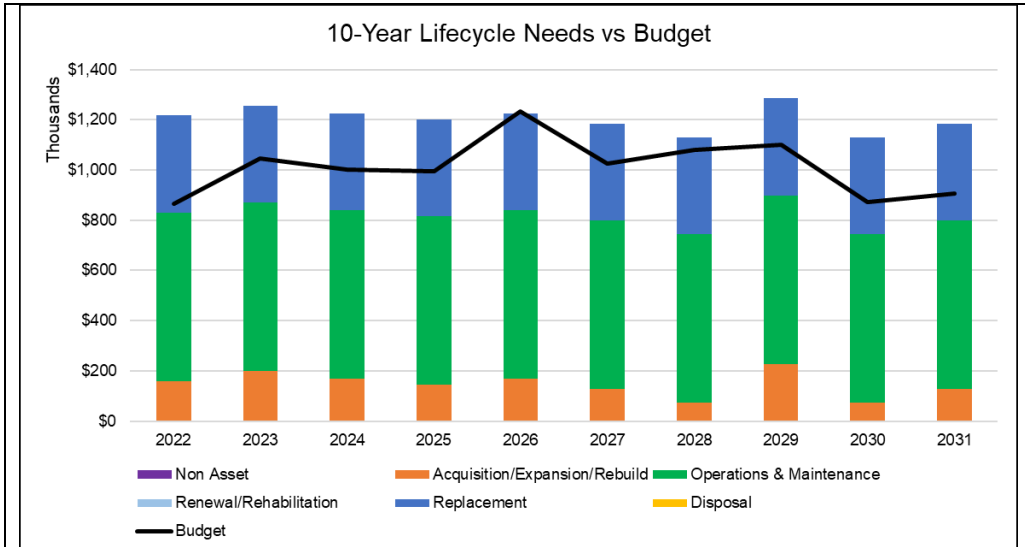


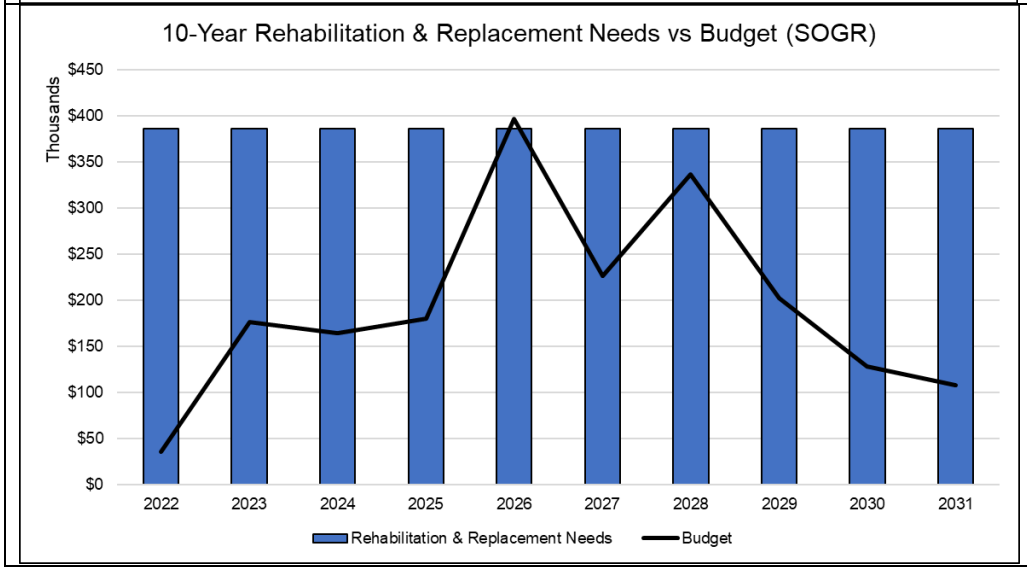


Many of the specialized tools & equipment are at the beginning of their estimated useful life and will typically be replaced on an as-needed basis when they no longer function as intended.

Around nine per cent of the assets have an unknown condition rating which could contribute to additional lifecycle needs in the next 10 years if they are found to be in poor condition upon inspection.

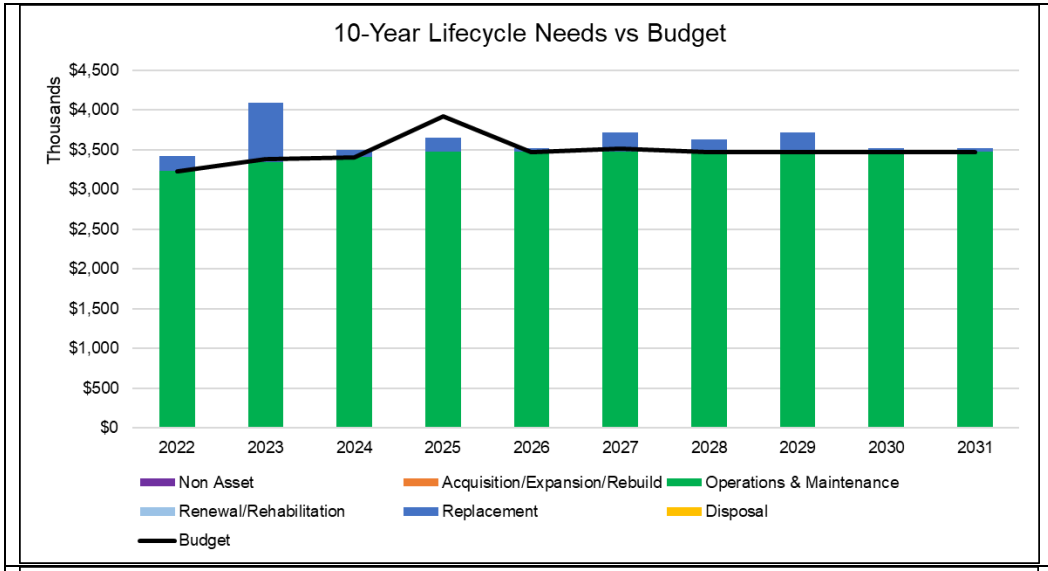
Facility Fixtures, Furniture & Equipment

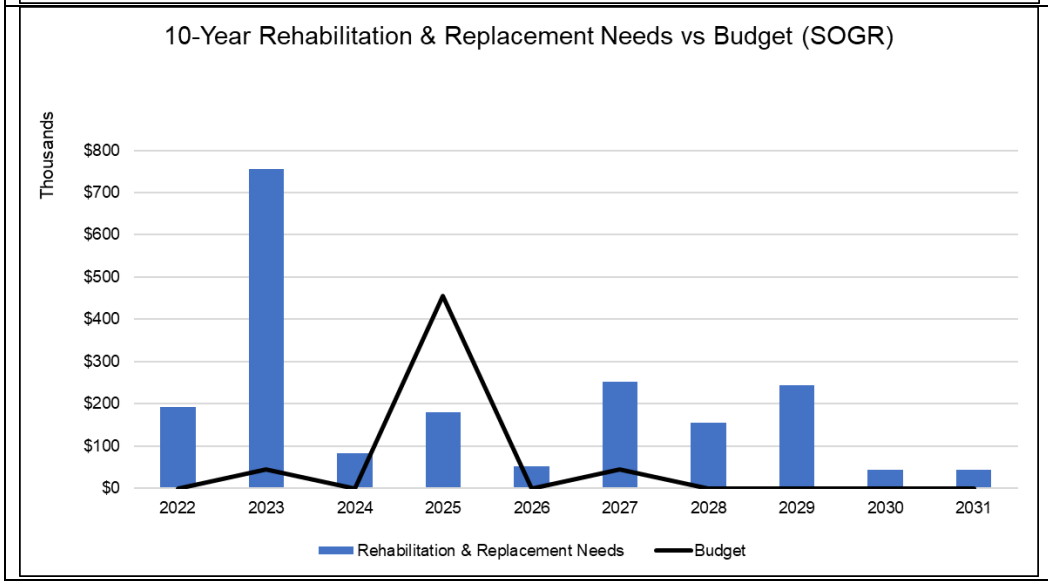




Most of the assets in facility fixtures, furniture & equipment are in fair or better condition meaning only a small subset will require end-of-life replacement in the next 10 years.

Information Technology





Approximately 45 per cent of the information technology assets are in Poor to Very Poor condition, requiring replacement in the short-term (i.e., 2023-2025). In addition, approximately 18 per cent of the assets have an unknown condition rating which may increase the rehabilitation and replacement needs if they are found to be in poor condition upon inspection.

Over the next 10 years, the Fire & Emergency Services average annual budget is $17.5 M as shown in **Figure** .

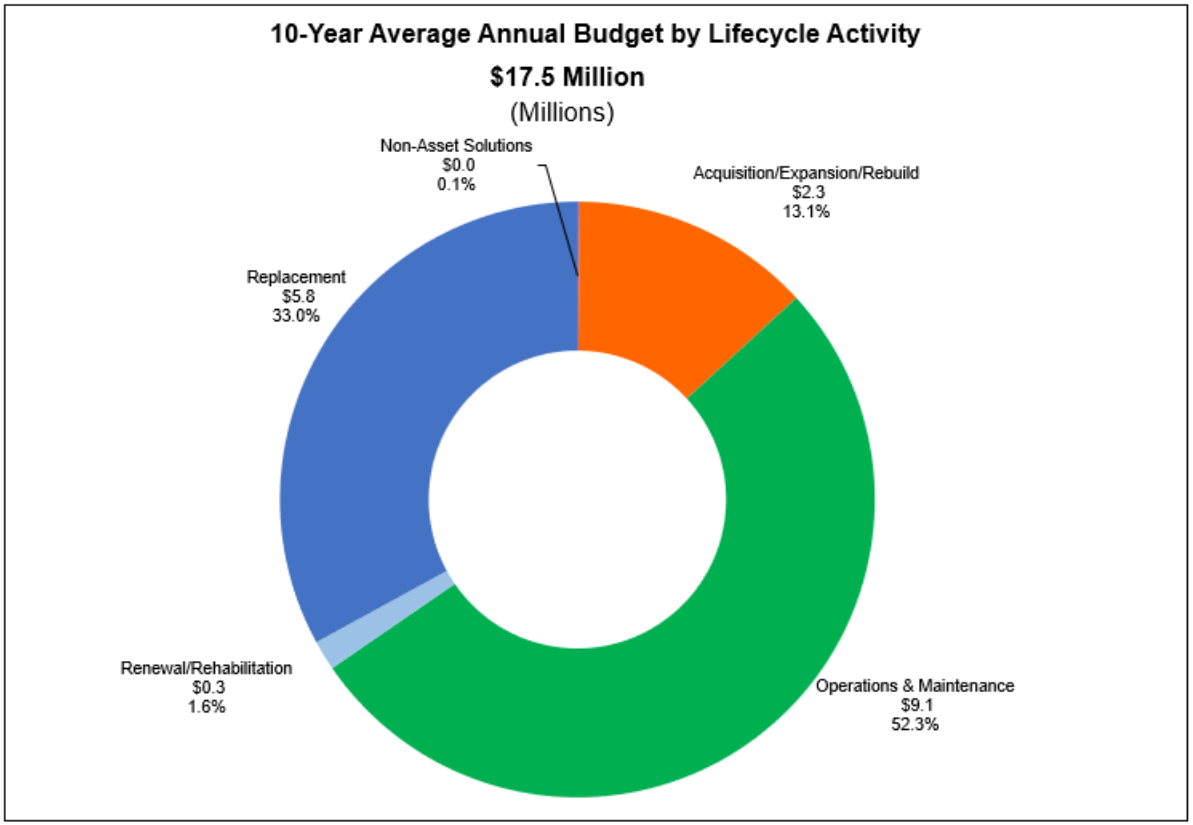


Figure 6: Breakdown of Budget by Lifecycle Activity

Table 13 shows the 10-year annual average budget breakdown by Asset Class. The majority of the of the operating and capital budget is spent on State of Good Repair (SOGR) of Fire & Emergency Services assets.

Table 13: Budget breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Fire Fleet	1.89	2.42	4.30	0.34	4.65
Specialized Tools & Equipment	3.14	4.09	7.23	1.07	8.30
Information Technology	0.67	0.20	0.87	0.14	1.01
Facility Fixtures, Furniture & Equipment	3.43	0.05	3.48	-	3.48
Other[4]		-	-	0.02	0.02
Total	**9.13**	**6.76**	**15.89**	**1.57**	**17.46**

[4] The “Other” asset class denotes lifecycle activities that span over multiple asset classes within the service area such as plans, studies, and other non-asset solutions.

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on the 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

The operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget – for example, utilities, building and sidewalk maintenance, etc.

The City uses a combination of property tax, user fees, investments, charges/levies, and other revenue to fund the operating budget.

Capital Budget Financing

The capital budget provides for significant expenditures to acquire, construct, or improve land, buildings, roads, engineering structures, or machinery and equipment, including Information Technology (IT) network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets – for example, sidewalk maintenance or licensing fees – are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 7,** the estimated available funding for the next 10-year period (2022-2031) for Fire & Emergency Services is $174.6 million. The primary sources of funding are operating revenue sources at 52.3 per cent and tax reserve Funds at 44.7 per cent which is primarily used to support capital infrastructure renewal needs.

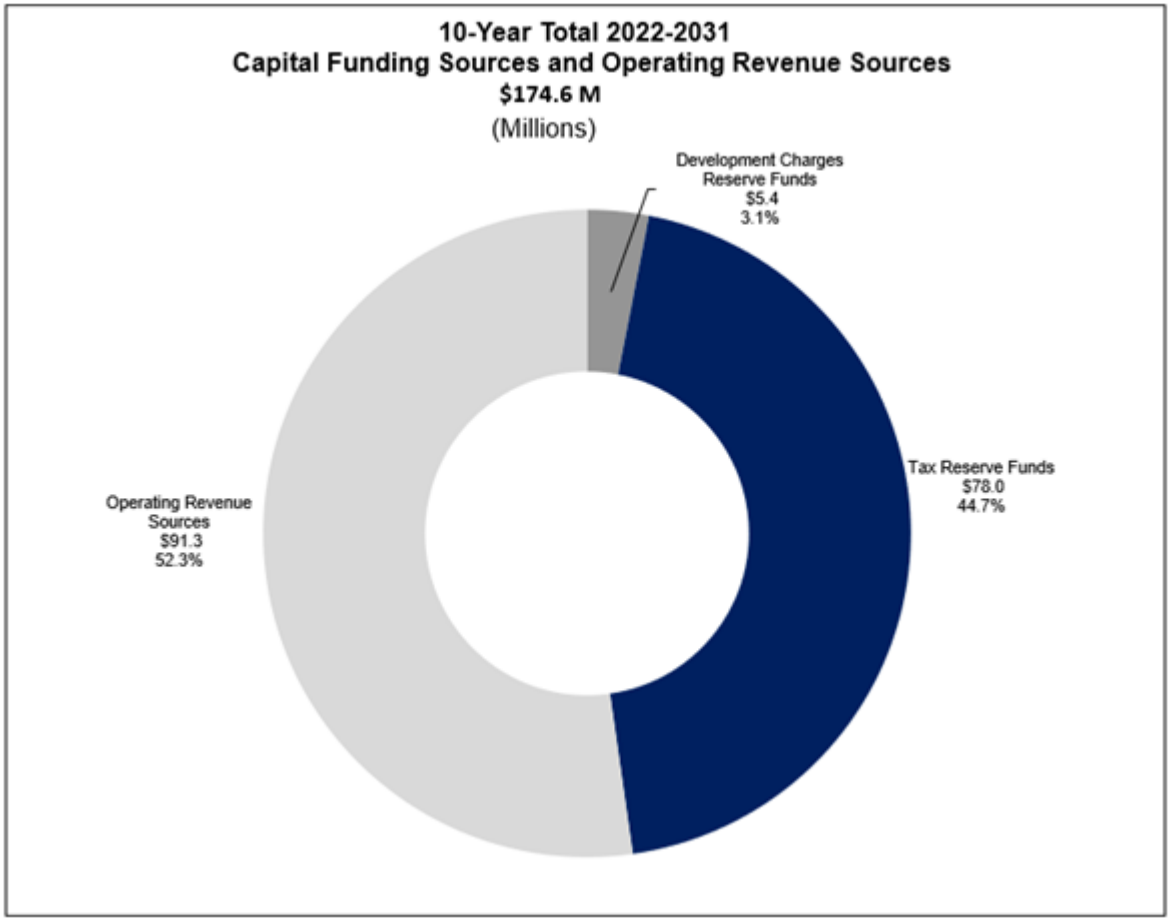


Figure 7: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure and increased to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g. the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available.

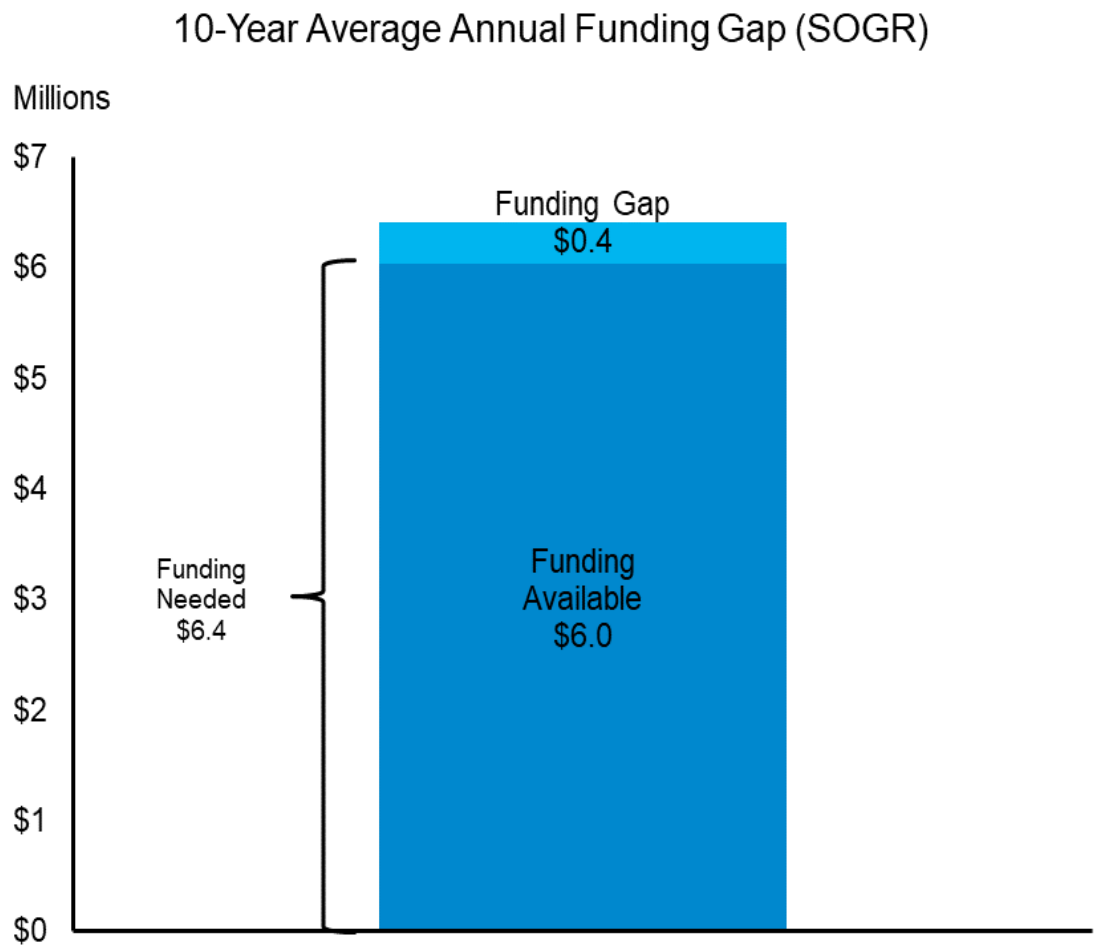
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to program delivery and sustainability
- Increased liability and claims
- Increased public complaints

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (funding needed) and the annual average budget (funding available) for the next 10 years as is shown in the following graphs by service area and asset class. Continued implementation of asset management best practices as well as assistance from senior levels of government through continued infrastructure funding programs will provide opportunities to address some elements of the funding gap.

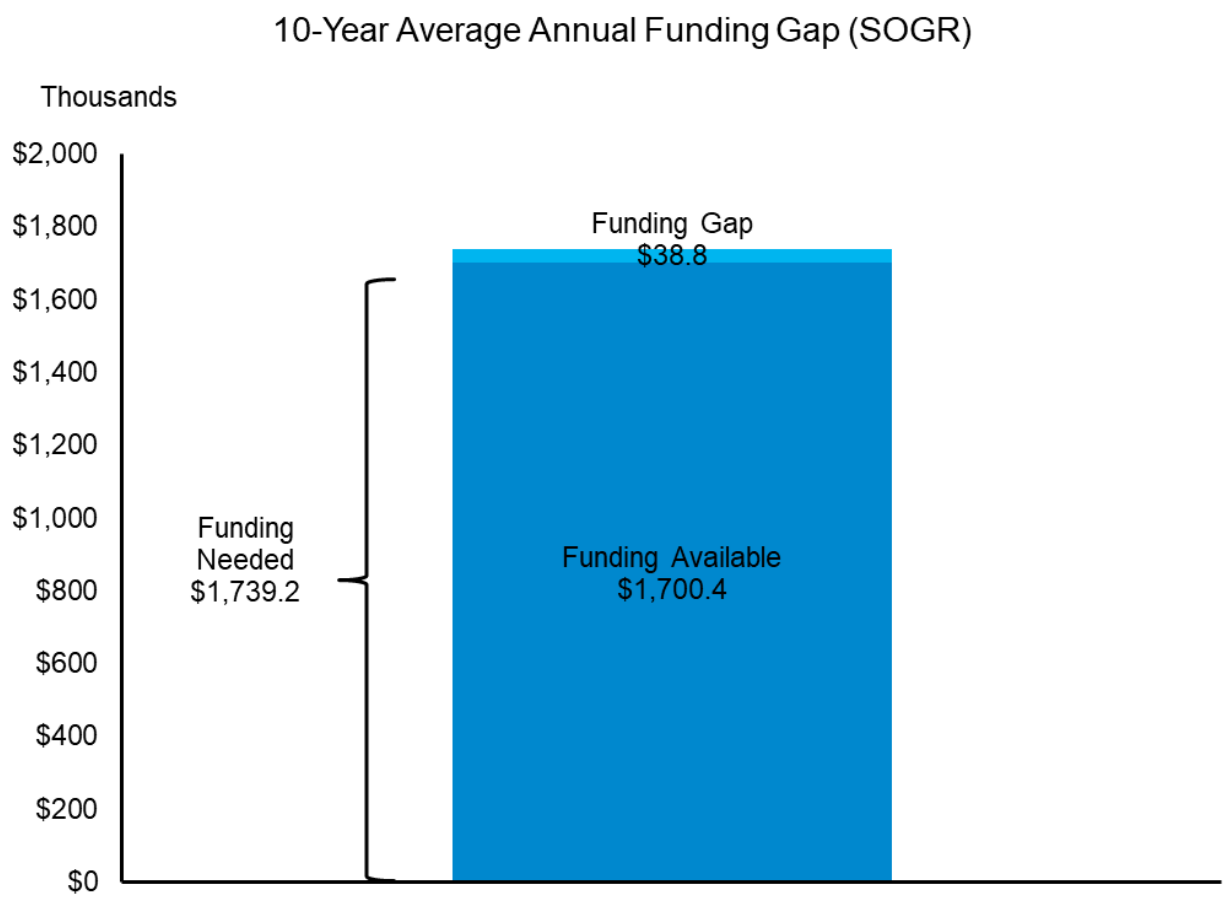
Fire & Emergency Services



Overall, the average annual renewal funding is approximately $6.0M/year and the average annual renewal needs to maintain the current LOS are $6.4/year, resulting in a shortfall of $0.4M/year.

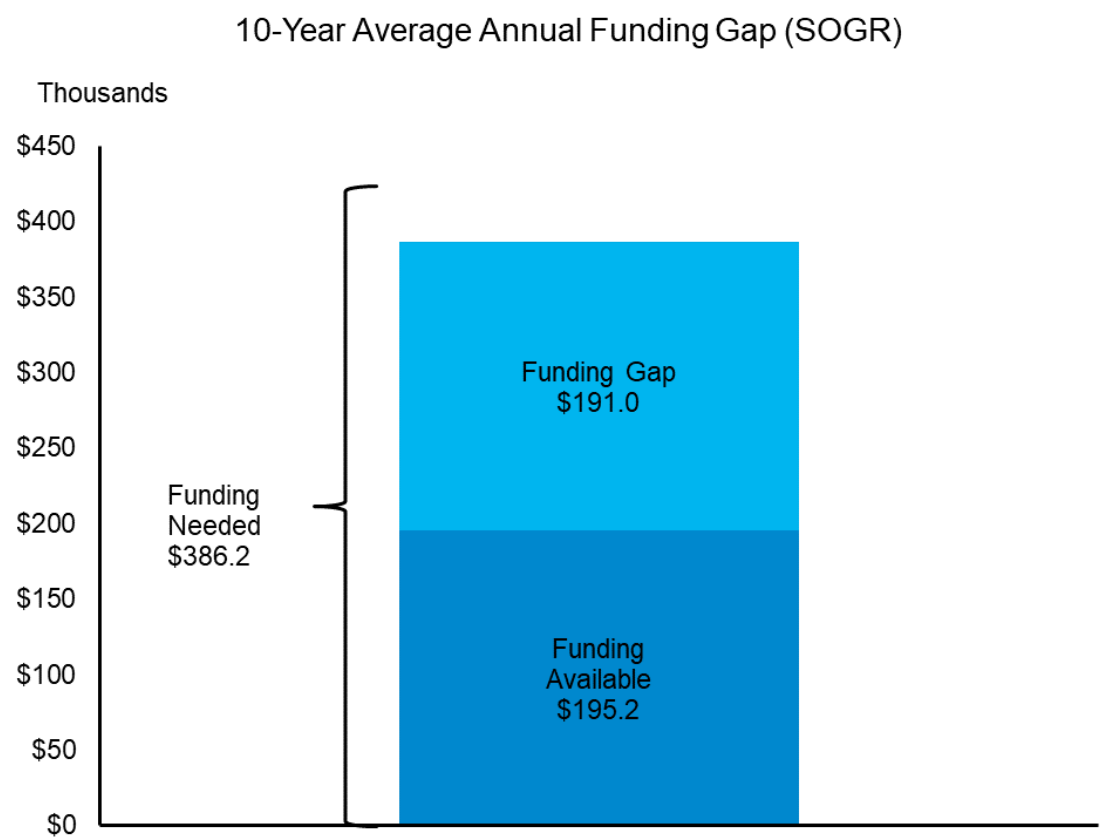
For this iteration, only the fire fleet asset class is shown to have no funding gap and is sufficiently funded to meet current service level demands.

Specialized Tools & Equipment



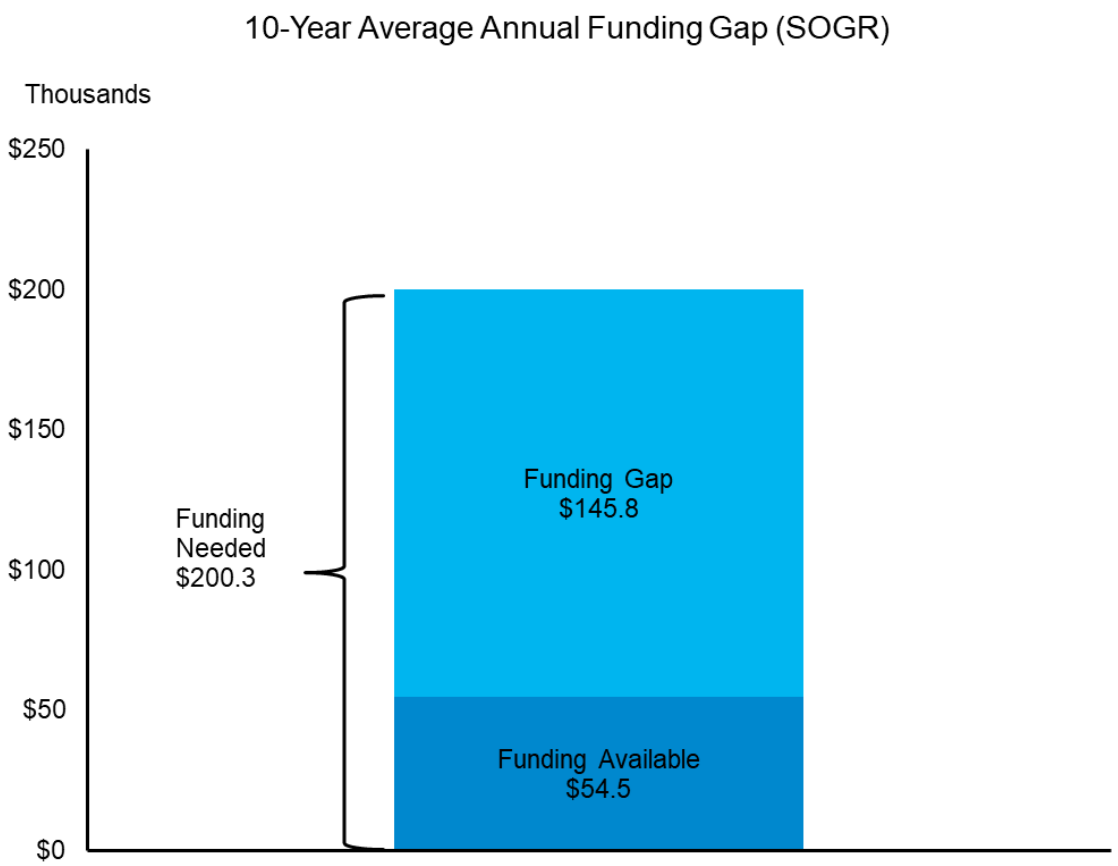
Specialized Tools & Equipment have a minor funding gap of approximately $39,000. As staff continue to assess their assets (particularly those with unknown condition ratings), this gap may increase as a result of additional lifecycle needs.

Facility Fixtures, Furniture & Equipment



Facility Fixtures, Furniture & Equipment have an infrastructure gap of $191,000.

Information Technology



Information technology assets have an average annual infrastructure gap of $146,000 based on the 2022-2031 timeframe.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for each asset class. The results for each asset class and an overall result for the Recreation Service Area are scored from 0.0 to 4.0 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved. **Figure 8** provides a radar chart that shows the maturity scores and the overall target maturity for MFES. As the service areas mature in each of the six categories, they will expand outwards towards the outer ring (Target).

Advancing Service Area Asset Management Capabilities

The proposed work plan in **Table 14** was developed in consultation with City staff through the development of the MFES Asset Management Plan. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks may differ from those in the maturity assessment improvement plan, as they are predominantly internal tasks to MFES that provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories.

Through the maturity assessment and associated work plans, MFES aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities, and risk with the desired levels of service, to achieve both service area and corporate objectives.

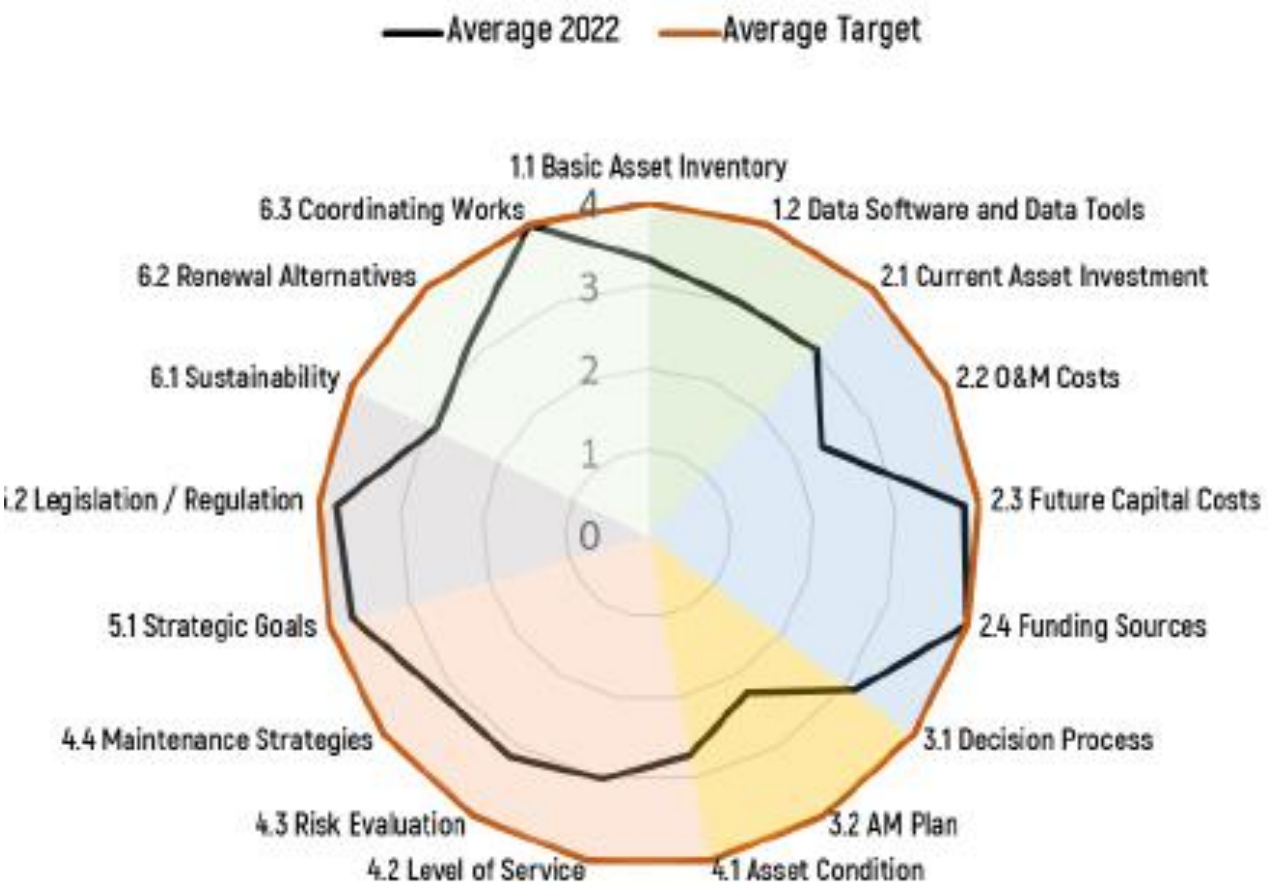


Figure 8: Maturity Assessment – MFES (2022)

Table 14: Work Plan – MFES

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority (High/ Medium /Low)	Target Benefits	Required Resources
SOI-01	Continue to develop comprehensive asset registries for inventory of operational assets. Work with City's Finance team to determine clear delineation between capital and operating assets and associated funding sources.	All	2024-2025	Medium	Ability to delineate appropriate funding sources and amounts for all assets.	Internal
SOI-02	Develop standards for required fields within the asset registry. Develop data standards for all assets, particularly for condition, performance, and utilization.	All	2024+	High	Improved data quality for future reporting within the AM Plan.	Internal
SOI-03	Work with City staff to determine ownership of VCOM infrastructure.	Information Technology	2024	Medium	Improved data quality for future reporting within the AM Plan.	Internal
SOI-04	Continue updating risk assessment based on emerging threats to the organization. Continue to drill deeper in the risk assessment and capture risk information at the asset level to support maintenance program.	All	2024-2025	Medium	Sound risk analysis assists with infrastructure decision-making through means such as justifying capital prioritization or optimizing maintenance tasks and activities.	External/ Internal
LOS-01	Continue to develop and collect updated information on technical LOS for all service attributes.	All	2024+	High	Collection of LOS current performance and targets enable the service area to track progress against established targets.	Internal

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority (High/ Medium /Low)	Target Benefits	Required Resources
LCA-01	Ongoing data collection and reporting to help support fleet decision-making.	Fire Fleet	2024+	Medium	Better asset lifecycle tracking ensures the right infrastructure decisions are made at the right time and for the right costs.	Internal
LCA-02	Continue to report any disposals for all asset classes.	All	2024+	Low	Better asset lifecycle tracking ensures the right infrastructure decisions are made at the right time and for the right costs.	Internal
FS-01	Review coding of projects to lifecycle and asset categories with Finance to improve confidence in gap analysis by lifecycle and asset category.	All	2024+	High	Improved accuracy of the funding gap estimation.	Internal
FS-02	Work with Corporate Finance to review performance targets and sustainable funding for all assets on a routine basis.	All	2025+	Medium	O. Reg. 588/17 requires the establishment of Service Level Targets by 2025.	Internal

Corporate Fleet

Table of Contents

Corporate Fleet Overview

The City of Mississauga is committed to providing corporate vehicle and equipment maintenance, replacement and operator training in a safe, reliable and environmentally sustainable manner. The management of City-owned fleet vehicles and equipment spans across four different Service Areas within the corporation: Fire; Transit; Recreation; and Corporate Fleet. This detailed asset management plan (AMP) focuses on the vehicles and equipment within the Corporate Fleet Service Area only, which are managed by Works Operation & Maintenance (WOM). Corporate Fleet owns and maintains 476 vehicle and 613 equipment assets on behalf of 18 user groups across the organization. These user groups are responsible for the planning and acquisition of the assets, but then ownership and lifecycle management of these assets are transferred to Corporate Fleet's responsibility. This decentralized approach for the procurement of fleet assets poses significant sustainability and service-delivery challenges for Corporate Fleet.

Corporate Fleet does not currently include assets with a value under $5,000. Corporate Fleet supports the planning, acquisition, maintenance, replacement and disposal of corporate fleet assets. The current Corporate Fleet portfolio is worth approximately $68.5M, with an average condition of Fair and an average annual funding deficit of $2.2M as shown in **Table 1** below. **Table 2** provides a more detailed breakdown by asset class.

Table 1: Summary Overview of Corporate Fleet

Corporate Fleet	
Replacement Value	$68.5 M
Average Condition	44%
Average Annual Funding Gap	$2.2 M

The Corporate Fleet plan includes the following information:

- **State of the Infrastructure**: Outlines the current state of the infrastructure assets including what the City owns, the condition of the assets and the cost to replace them. This section also identifies the data limitations and data assumptions required to develop these quantities. The information in this plan is based on 2022 year-end data
- **Levels of Service**: Describes and measures the service performance and outcomes the City currently provides. This includes those prescribed in O. Reg. 588/17 and additional advanced metrics to benchmark and monitor Corporate Fleet performance
- **Future Demand**: Summarizes the expected future demand on the Corporate Fleet services
- **Lifecycle Management Strategy**: Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy**: Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves and identifies any financial gap. The 2022-2031 Capital Plan and 2022-2025 Operating Plan were utilized for this strategy analysis
- **Continuous Improvement**: Documents the continuous improvements identified during the development of this Asset Management Plan and previous maturity assessments

Table 2: Summary of Replacement Value, Condition and Financial Strategy by Asset Class

Asset Class	Replacement Value	Condition	10-Year Average Annual Funding Needs	10-Year Average Annual Funding Gap
Vehicles	$36.3 Million		$13.6 Million	$2.2 Million
Equipment	$32.2 Million			

Pick-up Truck at Mavis Work Depot

Wheel Loader at Mavis Work Depot

State of the Infrastructure

The Corporate Fleet asset inventory is maintained in the FASTER Fleet Management Information System (FMIS) for tracking vehicles and equipment; issuing and managing work orders; conducting preventative maintenance and inspection programs; managing parts inventory and purchasing; and tracking fuel consumption and other associated costs. Regular updates to the inventory are completed after scheduled maintenance activities, renewal, and replacement of fleet assets.

This section provides the context for the methodologies employed to assess condition and risk while also identifying any data assumptions and limitations.

Asset Inventory & Valuation

A summary of the Corporate Fleet asset inventories using the City's available data (2022) for each of the asset classes and/or types is shown in **Table 3**. Corporate Fleet assets include light and heavy vehicles that perform a variety of services from earth-moving to snow removal. Light vehicles are smaller assets, like passage cars, SUVs and small pick-up trucks, that weigh under 4,500 kilograms whereas heavy vehicles denote assets that weigh 4,500 kilograms or over, such as heavy pick-ups, dump trucks, and aerial trucks.

Table 3: Corporate Fleet Asset Hierarchy

Asset Class	Asset Types
Vehicles	Light Vehicles
	Heavy Vehicles
Equipment	Light Equipment (on-road)
	Light Equipment (off-road)
	Medium Equipment (off-road)
	Heavy Equipment (off-road)

Corporate Fleet equipment includes on-road and off-road light, medium and heavy equipment, ranging from trailers to ice resurfacers, to tractors. On-road equipment, as the name suggests, are assets that are licensed and can be legally driven on roads.

Corporate Fleet has a robust inventory of assets in FASTER. The data is constantly being reviewed and refined to ensure strong data quality and reliability. Inventory replacement values in the FASTER are based on inflated acquisition costs. There is an ongoing effort to review these costs to ensure they are current with tender pricing and to ensure the added costs to acquire green assets are reflected. Green assets, such as electric or hybrid fleet, are those that are more environmentally beneficial (i.e., assist in greenhouse gas reductions) and advance sustainability and climate change goals.

A review of the current available data has been completed and a few gaps were identified for missing equipment assets. This is summarized in **Table 5** in the Asset Data Limitations section.

Asset Data Assumptions

The following assumptions were made in the development of this plan:

Replacement Cost

Replacement values were determined by using historical acquisition costs, an inflationary measure of four per cent, and professional judgement. The relatively short life of fleet assets and the availability of off-the-shelf vehicles make this practice feasible. For more complex equipment and vehicles (requiring a degree of customization or the addition of equipment to a base vehicle), staff analyze and investigate various opportunities at the anticipated time of purchase.

Estimated Useful Life

Fleet condition changes rapidly throughout its short life based on age (months), asset use (meter), maintenance, and repair, and overall condition. Useful life is calculated within the FASTER based on actual use. The real-time meter is entered into the fuel management solution each time the asset is fueled. This real-time meter data informs both preventative maintenance cycles as well as typical replacement timelines. As use may vary seasonally, each cycle is adjusted as required. The preventative maintenance and replacement cycles for electric powered units are informed based on age and remaining useful life. This process is a very effective way to track asset condition in real-time.

In-Service Date

At the time of delivery, a New Vehicle Information Sheet (NVIS) is completed by staff for each asset. The NVIS is an overview of all pertinent asset-related data including year, make, model, serial number, acquisition cost, etc. Both the delivery date and in-service date are recorded in FASTER, but for all the asset management analyses, the in-service date is utilized.

A review of current practices and available data has been completed and one major gap has been identified. Due to the City's decentralized fleet planning and acquisition process, there may be a number of equipment assets missing from the Corporate Fleet inventory. Having a decentralized system, where the user groups may purchase fleet assets without Corporate Fleet's knowledge, poses sustainability challenges for Corporate Fleet maintenance, replacement, and overall service delivery performance. These challenges are reflected in the Corporate Fleet's current asset condition and expanding funding gap. The City annually budgets for approximately $500,000 in additional net new assets but does not add funding for the subsequent replacement of these assets in the 10-year capital plan, nor for any operating costs. Corporate Fleet staff are looking to address this gap through an upcoming Fleet Management Policy in 2024.

Asset Condition

As noted above, asset condition for Corporate Fleet is monitored in real-time based on a weighted combination of four elements: age (months), asset use (meter), maintenance and repair, and condition factor. The overall condition is based upon the 15-point condition assessment practice, as shown in **Table 4**, adopted from the American Public Works Association (APWA) Fleet Management Best Practices. Overall condition is assigned by Motor Vehicle Technicians (MVTs) in the fleet maintenance shops each time an asset arrives for preventative or demand maintenance. The professional judgement from skilled maintenance staff provides additional visual assessment on a number of key components of the asset.

Table 4: Condition Scale for Corporate Fleet Assets

Condition Rating	Corporate Fleet Rating (15 pt)	Description
Very Good: Fit for the Future	0-2.9	The Corporate Fleet asset has greater than or equal to 80 per cent of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
Good: Adequate for Now	3-5.9	The Corporate Fleet asset has less than 79 per cent (and greater than or equal to 60 per cent) of its remaining service life. It is in good condition.
Fair: Requires Attention	6-8.9	The Corporate Fleet asset has less than 59 per cent (and greater than or equal to 40 per cent) of its remaining service life. Maintenance requirements generally begin to increase; but the asset is in fair condition.
Poor: Approaching End of Life	9-11.9	The Corporate Fleet asset has less than 39 per cent (and greater than or equal to 21 per cent) of its remaining service life. It is operable, but condition is deteriorating, asset components may need replacement as approaching the end of service life, and maintenance requirements and asset downtime may increase. Levels of Service may be impacted.
Very Poor: Requires Renewal	12-15	The Corporate Fleet asset has less than 20 per cent of its remaining service life. It is in poor condition and should be replaced or rehabilitated as the optimal service life reaches the end and minimum cost of ownership is reached. Any extension beyond this period will result in significant investment in asset maintenance and reduce reliability impacting levels of service.

Asset Data Limitations

A review of the current available data in FASTER has been completed and the data is of high quality. Corporate Fleet has a number of processes in place to ensure that as new assets are acquired, the required asset management data including inventory, acquisition data, and maintenance cycle requirements are entered during the asset onboarding process. A review of the current available data and identified gaps in attributes or assets are summarized in **Table 5** below.

Table 5: Existing Records with Missing Attributes

Asset Class	Number of Current Records	Missing Records	Asset Condition	In-Service Date	Replacement Cost	Estimated Useful Life
Vehicles	476	0%	0%	0%	0%	0%
Equipment	613	5%	0%	0%	0%	0%

Table 6 below, provides a summary of assets excluded from this iteration of the plan due to limited information or assets managed by other Service Areas. For example, equipment assets such as tractors or mowers purchased by other divisions are excluded due to ongoing ownership issues. These assets will be considered and integrated into future plans when their data quality is deemed sufficient.

Table 6: Assets Excluded in this Asset Management Plan

Asset Excluded from the Asset Management Plan
• Forklifts, golf equipment, etc. owned and managed by the Recreation Service Area • Tractors, mowers, etc. owned and managed by the Parks, Forestry & Environment Service Area • Motorized hand tools owned and managed by the Parks, Forestry & Environment and other Service Areas • Assets under the $5,000 capital threshold • Assets not owned by the City (i.e., rentals, leased vehicles)

Asset Risk

Corporate Fleet staff have identified risk management as a continuous improvement item as they begin to formalize and standardize a framework in 2024. Currently, staff prioritize assets by considering many factors such as the age, condition, location, usage and criticality of the asset. Corporate Fleet will be working with the Corporate Asset Management (CAM) Office to develop comprehensive and reliable risk models to effectively prioritize within, and across, various asset classes.

Dashboards

The following dashboards provide a quick snapshot of the state of the current infrastructure for each Asset Class.

Asset Class:	Vehicles	Current Replacement Value (CRV)	$36.3 Million

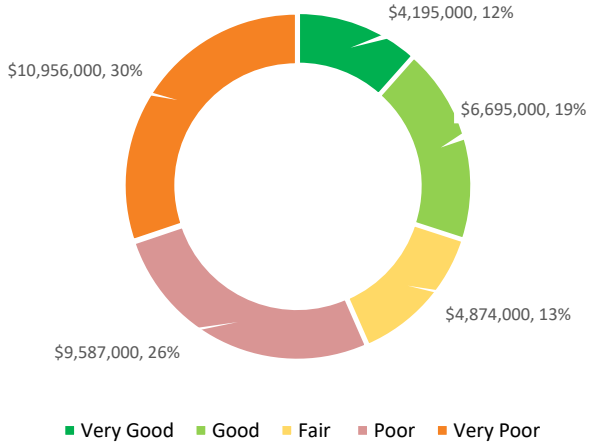
DATA QUALITY

Asset Inventory	Condition	Replacement Value
A	A	B

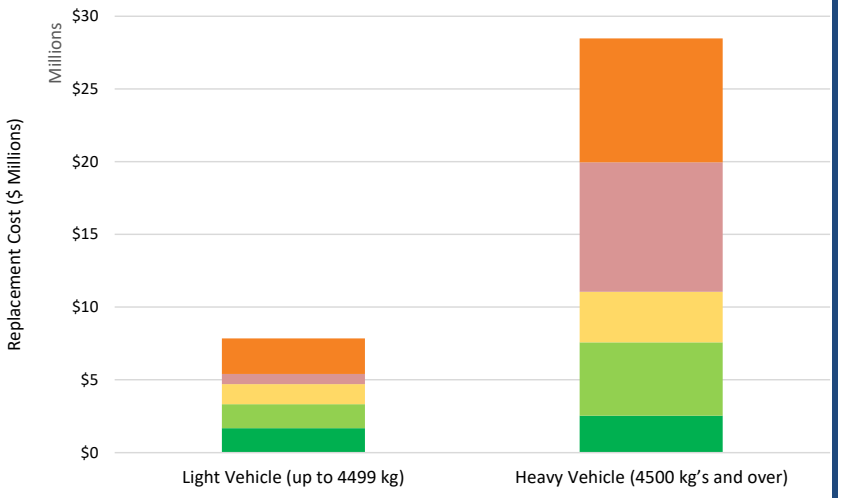
Forestry Aerial Truck and Chipper

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Light Vehicle (up to 4499 kg)	159	Ea.	9.2	4-10	$7,839
Heavy Vehicle (4500 kg and over)	317	Ea.	9.6	8-14	$28,466

Replacement Value by Condition



Condition by Asset Type



Asset Information

- Corporate Fleet vehicle assets are inspected based on Original Equipment Manufacturer (OEM) preventative maintenance schedules. Each asset, depending on the class and manufacturer, is setup for this regular preventative maintenance in FASTER. Once the trigger for meter is hit, the inspection is scheduled. Any deficiencies that affect asset functionality, use or the safety of users are addressed immediately. Once the vehicle reaches its estimated useful life, it should be replaced. Often, assets are maintained past their useful life based on the City's current level of capital replacement funding for Corporate Fleet. Staff are instructed to consider new technology, green technology and any changes for user group requirements at the time of replacement
- At a minimum, an overall condition inspection is conducted annually for every corporate fleet asset to ensure the asset is in a state of good repair and safe to use
- Heavy vehicles over 4,500 kg require an annual safety inspection that is legislated by the Ministry of Transportation (MTO) to meet a strict set of standards. These inspections are performed annually, regardless of asset use, and vehicles and drivers may be subject to inspection by the Ministry roadside team at anytime. It is critical that the vehicle has the required maintenance records available, and that the driver has the required training to complete their paperwork
- Demand maintenance is performed as required. Fleet Services relies on user groups to report required maintenance demand items or through maintenance triggers as flagged by the City's telematics solution

Signs and Pavement Markings Vehicle

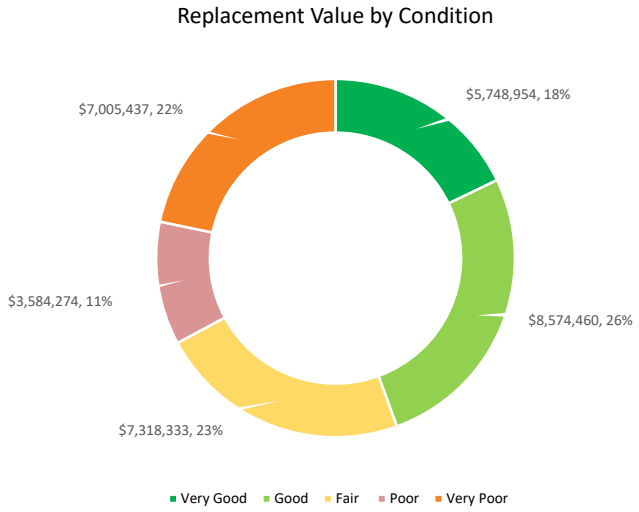
Asset Class:	Equipment	Current Replacement Value (CRV)	$32.2 Million

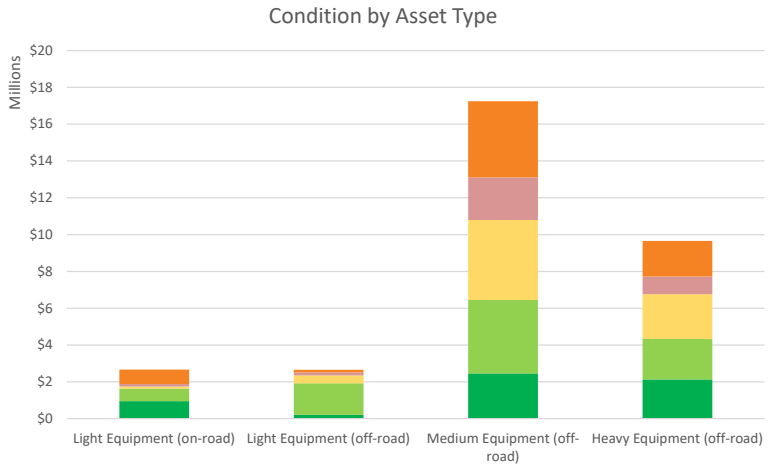
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	A	B

Technician performing maintenance on zero-turn mower

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Light Equipment (on-road)	136	Ea.	9.5	6-15	$2,670
Light Equipment (off-road)	64	Ea.	7.2	6-15	$2,653
Medium Equipment (off-road)	328	Ea.	8.2	7-15	$17,250
Heavy Equipment (off-road)	85	Ea.	8.2	8-12	$9,659





Asset Information

- Corporate Fleet equipment assets are inspected based on Original Equipment Manufacturer (OEM) preventative maintenance schedules. Each asset, depending on the class and manufacturer, is setup for this regular preventative maintenance in FASTER. Once the trigger for meter is hit, the inspection is scheduled. Any deficiencies that affect asset functionality, use or the safety of users are addressed immediately. Once the equipment reaches its estimated useful life, it should be replaced. Based on the City's current level of capital replacement funding for Corporate Fleet, assets are often maintained past their useful life. Staff consider new technology, green technology and any changes for user group requirements at the time of replacement
- At minimum, an overall condition inspection is conducted annually for every Corporate Fleet asset to ensure the asset is in a state of good repair and safe to use
- Demand maintenance is performed as required. Corporate Fleet relies on user groups to report required demand maintenance items or through maintenance triggers as flagged by the City's telematics solution

Levels of Service

The purpose of this section is to describe the levels of service (LOS) that City staff are currently providing, and aim to provide, for Corporate Fleet. In the case of Corporate Fleet, LOS are the outcomes that the service area intends to deliver to its internal customers in order to ensure service levels in the community and to manage risk. They should also be utilized as key drivers for making decisions and future investment in infrastructure assets. As such, LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its ratepayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations. Performance measures indicate what the customers and stakeholders experience from the service that is delivered.

The purpose of this section is to describe the levels of service that are currently provided by Corporate Fleet.

Table 7 presents a summary of the approach to describe levels of service and performance measures. This is based on examples from the 2015 International Infrastructure Management Manual (IIMM) which was written by a consortium of asset management professionals. It is widely accepted as the guiding document to implement the ISO 55000 standard for infrastructure asset management.

Table 7: Level of Service Criteria

Concept	Definition
Levels of Service (LOS)	Specific objectives of the service the organization intends to deliver, from the customer point of view. LOS provide the link between higher level corporate and asset management objectives with more detailed technical and operational objectives.
LOS Attributes	LOS attributes of the overall service that are relevant and meaningful to stakeholders.
Performance Measures	Criteria that can be measured and provide an indication of how the organization is doing in delivering the intended LOS performance measures. They can be defined as: Customer performance measures - measures describing how the customer receives or experiences the service. Technical performance measures -technical criteria the organization can measure to indicate how the service is being achieved.

Level of Service Methodology

City staff followed the approach described below to identify key LOS objectives and appropriate performance measures.

Identify Stakeholders

Identify the stakeholders who are affected by the delivery of Corporate Fleet. The stakeholder may use the service, rely on the service to provide their own service, regulate the service, depend on the service as part of their community service provision mandates, or connect to the service.

LOS Objectives and Attributes

Determine the key expectations (LOS objective) of each stakeholder. One or more service attribute is identified for each expectation statement. It is important to note that it is reasonable that the same attribute would apply to more than one expectation.

LOS Measures

LOS measures should identify an appropriate measurement for an attribute and describe how well the City is delivering that service attribute (e.g., how safe/reliable/affordable the service is). A useful LOS measure is quantitative and facilitates the development of SMART performance targets (that is, performance targets that are specific, measurable, achievable, relevant, and time-bound).

LOS measures can be grouped into the following categories:

- **Technical LOS measures:** Technical criteria the organization can measure to indicate how the service is being achieved
- **Customer LOS measures:** Measures describing how the customer receives or experiences the service

Current Performance

For each LOS measure, the result of the previous year (2022) is reported, unless otherwise stated. City staff have plans to review, formalize and update the operation and maintenance LOS and as such, there is potential for additional LOS measures in future Asset Management plans. **Table 9** and **Table 10** show the community and technical levels of service metrics, respectively, that have been selected by Corporate Fleet staff to track.

Legislative Requirements for Levels of Service

Review appropriate legislation and regulations that govern how the City provides Corporate Fleet services. **Table 9** identifies legislative acts that are critical or applicable to the provision of Corporate Fleet services and project delivery. In addition to legislative requirements, there are several industry best-practice manuals and guidance documents that inform staff to effectively manage the City's fleet.

Table 8: Governing Legislation for Corporate Fleet

Legislation	Requirements
Highway Traffic Act, R.S.O 1990	A Provincial Act that governs Ontario roadways, vehicles and vehicle operations
Building Opportunities in the Skilled Trades Act, 2021	A Provincial Act that defines, qualifies, and ensures compliance for skilled trades employers and workers in Ontario
Emergency Management and Civil Protection Act, 1990	Provides requirements for emergency management
Municipal By-Laws	Regulations approved by Council to safeguard and protect persons and properties including air quality and idling
Municipal Government Act, 2001	• Practices and procedures • Accountability and transparency • Finance
O. Reg 169/22: Vehicle Emissions	Rules governing emissions systems and standards for vehicles in Ontario
O. Reg 170/22: Vehicle Inspection Centres	Rules governing locations and requirements for authorized technicians
O. Reg 199/07: Commercial Motor Vehicle Inspections	Rules governing inspection schedules, performance and record keeping for CMV's
O. Reg 419/15: Definitions of Commercial Motor Vehicle and Tow Truck	Rules defining CMV's and Tow Trucks
O. Reg 424/97: Commercial Motor Vehicle Operators' Information	Rules outlining requirements for Commercial Motor Vehicle Operators (the City)
O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure	Provides policies and guidelines for levels of service considerations in managing Corporate Fleet assets
R.R.O. 1990, Reg. 611: Safety Inspections	Rules outlining the technical requirements around a safety inspection for technicians
R.R.O. 1990, Reg. 601: Motor Vehicle Inspection Stations	Rules outlining the classes of stations, licences, registration of technicians, operations and fees for an inspection station
***Occupational Health and Safety Act,* 1990**	Rules governing health and safety in Ontario's workplaces

Table 9: Community Levels of Service Framework

LOS Attribute	LOS Objective	Performance Measure	Current Performance
Scope	To ensure the scope of assets is sufficient to support the delivery of corporate fleet services for client groups.	List of client groups and fleet inventory that corporate fleet supports.	Corporate Fleet provides services to three divisions, and 18 unique user areas: • Animal Services • Survey & Inspections • Facilities & Property Management • Library • Municipal Parking • Corporate Security • MiWay Transit Security • Recreation • Culture • Works Operations • Signs & Pavement Markings • Minimum Maintenance Standards Coordination • Traffic Management • Courier • Fleet Services • Parks • Forestry • Parking Enforcement
Quality	To ensure efficient and well-maintained infrastructure that supports service objectives (maximize availability, reliability and safety of assets).	List of activities staff perform to effectively manage assets.	See **Table 12**.
Regulatory	To meet legislative requirements.	Description of regulatory/legislative requirements that staff abide by to maintain corporate fleet levels of service.	See **Table 8**.

Table 10: Technical Levels of Service Framework

LOS Attribute	LOS Objective	Performance Measure	Current Performance (2022)
Reliability	To ensure the quantity/scope of assets is sufficient to support the delivery of corporate fleet services for client groups.	Percentage of fleet availability	90%[1]
Quality	To ensure efficient and well-maintained infrastructure that supports service objectives (maximize availability, reliability and safety of assets).	Percentage of corporate fleet that is in fair or better condition	50%[2]
		Percentage compliance with scheduled preventative maintenance (PM) inspections	69%[3]
Affordability	To effectively manage corporate fleet assets to maximize usage and minimize risk and costs.	Actual vs. Target Reinvestment Rate	0.6% vs 0.9%
Regulatory	To meet legislative requirements.	Percentage of fleet that meet and/or exceed compliance with Ministry of Transportation (MTO) standards	87%[4]
		Average satisfactory safety rating (SSR) for Commercial Vehicles Operator's Registration	7.01 SSR[5]

[1] All data for these calculations is from 2022. In 2023, additional motor vehicle technicians were added to the fleet services complement to support increasing this performance indicator.
[2] As demonstrated through the infrastructure gap, corporate fleet assets are being maintained after end of useful life, which means we are maintaining an older fleet in poorer condition.
[3] All data for these calculations is from 2022. In 2023, additional motor vehicle technicians were added to the fleet services compliment to support increasing this performance indicator. This indicator relies on the user group bringing assets in for scheduled work on time.
[4] All data for these calculations is from 2022. In 2023, additional motor vehicle technicians were added to the fleet services compliment to support increasing this performance indicator. This indicator relies on the user group bringing assets in for scheduled work on time. A review of MTO inspection schedules will be completed in 2024.
[5] CVOR Safety Rating includes all Corporate Fleet and MiWay Commercial Motor Vehicles.

Future Demand

Corporate Fleet is an internal service that provides life cycle management services to 18 unique service areas across the corporation. Lifecycle management services include procurement, maintenance and asset retirement. Corporate Fleet is responsible for all corporate fleet vehicle and equipment assets (with the exception of Fire and Transit assets) as well as the provision of fuel at four fuelling sites across the City. Vehicle and equipment assets are critical to support service delivery across the organization. Corporate Fleet aligns with strategic priorities through ensuring sustainable infrastructure and a resilient environment.

Corporate Fleet is planning for the future through both mitigation and adaptation to climate change. In 2020, the City of Mississauga updated the Corporate Green Fleet and Equipment Policy. This policy outlines priority investment in low- and zero-emissions fleet, equipment and infrastructure. A series of actions to support greening of the corporate fleet is underway, including transitioning to hybrid technology; adoption of alternative, cleaner fuels; electric vehicles and electric vehicle infrastructure planning; improved vehicle maintenance; and driver training. Additionally, future proactive monitoring of driver behaviours through telematics will support these goals. All of these Corporate Fleet service objectives contribute towards mitigating climate change and support the City's Climate Change Action Plan. In almost all cases, the success of these objectives depend on Corporate Fleet user groups to be successful. As the City grows and City services are enhanced, often the fleet grows in size requiring additional fleet support to manage and maintain these assets. A robust Fleet Management Policy is required to ensure that alternatives to fleet growth are evaluated thoroughly.

Demand Drivers

Drivers affecting demand include things such as changes to development form and density, regulations and legislation, technological changes, economic factors, environmental awareness, and the direct impact of climate change on corporate fleet infrastructure. A summary of the internal and external drivers that affect demand for corporate fleet services is shown in **Table 11.**

Mississauga Van

Table 11: Demand Drivers for Corporate Fleet

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Aging Corporate Fleet Assets	Half (50 per cent) of the Corporate Fleet system is currently in Poor or Very Poor condition. As such, the maintenance and inspection capital needs are significant at this time. Capital needs consistently outpace funding allocated.	As the City's Corporate Fleet ages, the overall condition will decrease. The operating and maintenance costs have risen as we are maintaining an older fleet and will continue to increase as assets are kept beyond their useful life due to capital funding challenges.	An aging fleet in Poor or Very Poor condition without intervention can lead to more unplanned downtime; emergency repairs; rental and contracting costs and service level disruptions.	Develop and maintain a comprehensive asset management plan and fleet management policy to formalize asset inventory, replacement activities and maximize the useful service life of Corporate Fleet assets. In turn, this will inform the level of capital investment required.
New Legislation & Regulations	There are a number of existing laws and regulations which dictate how the City provides corporate fleet services.	In general, environmental awareness is strong and regulations are becoming stricter. Asset management regulations have recently been established and are expected to become more prescriptive. Legislation is subject to change based on changing governments.	New legislation may increase operating and capital pressures. Examples include continuously evolving emissions and commercial motor vehicle inspection legislation. This legislation could increase the asset service life but also potentially increase capital and operating costs.	Remain informed of changes to legislation and adjust maintenance, operating programs and budget accordingly.
City Growth & Net New Fleet Acquisition	Annual and additional growth fleet funding is provided to various services in the organization for net new additional fleet assets without operating or replacement funding to support the asset.	With capital funding challenges to replace the City's existing aging fleet, funding additional net new assets only enhances the funding pressure.	Without effective Corporate Fleet and asset management measures to mitigate these impacts, additional net new assets will add new stresses to the existing Corporate Fleet management system.	Develop and maintain a comprehensive asset management plan and fleet management policy to formalize asset inventory, net new process requests and maximize the use of existing corporate fleet assets. In turn, this will inform the level of operating and capital investment required to be

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
				funded at the time of growth acquisition.
Technology	New techniques such as low- and zero-emissions vehicles and equipment have limited availability in Ontario at this time. Market availability across all assets classes is either relatively new or non-existent. There is a high demand for these assets and production is increasing. Telematics technology at the City has expanded.	The cost to replace aging Corporate Fleet assets should become more affordable in the future if the federal government continues to mandate sales for green vehicles and the number of suppliers and availability increases. In the short term, telematics technology can be used to reduce the City's fleet size, and greenhouse gas emissions through proactive monitoring and analysis.	Corporate Fleet replacement with low- or zero-emission alternatives may become more affordable in the future as the technology becomes more available and competitive as the marketplace increases.	Monitor changes to available technologies. Research, fund and invest in charging infrastructure accordingly. Communicate with other municipalities to discuss pilot replacements and industry best practice.
Climate Change & Extreme Weather Changes	With the frequency and intensity of extreme weather changes increasing year after year, demand will increase on assets due to demand, maintenance and deterioration of vehicles and equipment. Most assets are stored outdoors, and the weather has an impact on the deterioration and maintenance requirements which can also lead to the premature end of useful life.	As temperatures increase globally, especially those in urban environments, asset maintenance and deterioration will increase. Additional funding may be required to replace assets prematurely.	Vehicle and equipment requirements for service delivery may change with extreme weather changes.	Monitor changes to available technologies. Consider indoor or covered storage requirements for fleet assets for new and existing storage sites. Communicate with other municipalities to discuss evolving industry best practice.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions – Expansion/Rebuild/New
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)
Operations and Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Renewal and Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Table 12 provides a summary of the different strategies and actions that staff employ for their applicable lifecycle activities along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 12: Current Lifecycle Management Strategies

Lifecycle Activity	Lifecycle Strategies	Risks Associated with Lifecycle Activities

Non-Asset Solutions	• Faster Fleet Management Information System
	  ○ Provides real-time condition assessment information
	  ○ Tracks work orders – both demand and preventative, including sublets
	  ○ Tracks meter readings
	  ○ Tracks technician time on repair
	• Telematics to track driver behaviour, location and repair codes
	• Standard Operating Procedures
	• Service Level Agreements with user groups
	• Driver training for vehicles and equipment
	• Annual Asset Utilization Reports
	• Green Vehicle and Equipment Policy
	• Use of Telematics in Fleet Vehicles and Equipment Policy
	• Fleet Management Policy (planned)
		• Asset life is not extended, or cost of managing an asset increases rather than decreases
		• Without a pre-trip inspection, there could be a risk to the safety of our drivers and the city could get sued
		• Service level disruptions will occur if the asset is down or not available
		• Loss of revenue
		• Removal of the City's CVOR Certificate which would cease all operations requiring CVOR vehicles (buses, forestry, snow clearing, etc.)
		• Excessive fleet size, costing taxpayers more to purchase and maintain without justification for use
		• Injury/lawsuits

Expansion/New Asset	• Fleet Management Policy (planned) and Net New Acquisition Form • Low- or zero-emissions fleet assets • Proactive planning for charging infrastructure (planned)	• Funding new assets, but not funding replacement or the operations of the asset in tandem (i.e., new assets are required however not the technicians to repair them or the funding to replace the new item in 10 years) • Inability to mitigate climate change impacts and other demand factors • Growth activities may be delayed and impact the quality of asset services provided

Lifecycle Activity	Lifecycle Strategies	Risks Associated with Lifecycle Activities
Operations & Maintenance	• Corporate Fleet assets are setup for maintenance and inspections according to manufacturers' recommendation and legislative standards at time of delivery • Drivers are required to complete and document a daily pre-trip inspection of each asset they use. Any deficiencies are to be reported to Corporate Fleet as soon as possible • Technicians assign a condition rating to each asset while it is in for service using a scale • For services not available in-house like body work, oil spraying and tire replacement, supervisors coordinate sublet repairs on behalf of user groups • Parts Team maintains a parts inventory of the most frequently used parts to reduce downtime to user groups and speed up repair time • Corporate Fleet provides fuel management activities to four-yard locations which allows for the capture of meter data through this fuel management system • Regular communication regarding scheduling of fleet assets for service • Self-booking tool for user groups to self-serve within required timelines (planned for 2025) • Proactive monitoring requirements for leaders of fleet assets to ensure safe driving practices that align with asset management requirements (planned for 2024) • Periodic inspection of driver paperwork, internal (planned for 2024)	• Asset life is not extended or cost of managing an asset increases rather than decreases • Without a pre-trip inspection, there could be a risk to the safety of our drivers and the City could get sued. Additionally, less repair items would be reported to fleet to be assessed and repaired • Service level disruptions will occur if the asset is down or not available • Loss of revenue • PM cycles not completed on time means more time and money to gather meter data • Excessive fleet size, costing taxpayers more to purchase and maintain without justification for use • Injury/lawsuits due to lack of Telematics data use and proactive coaching • Reputational risk

Lifecycle Activity	Lifecycle Strategies	Risks Associated with Lifecycle Activities
Renewal/ Rehabilitation	• Regular preventative maintenance programs assist in determining renewals/rehabilitation required • Major overhauls or reconditioning are very costly, and generally do not significantly extend the life in order to add value • Review opportunities to review add-on equipment, attachments, and outfitting past the lifecycle of the parent asset	• Delayed renewals or rehabilitation may result in unscheduled downtime due to repairs or asset failure
Replacement	• Optimal asset lifecycle is assessed on an ongoing basis to determine the replacement that minimizes maintenance/repair costs and maximizes salvage value • The optimal asset lifecycle may very greatly depend on the operational use of the asset • Communications with Supervisors in Fleet Services at end of useful life to help with service and repair decisions to mitigate non-value-added expenditures	• Delayed replacement due to funding challenges/deferral may result in unscheduled downtime due to asset failure • Service disruptions may result due to failure, and additional costs for rental (if available) and/or contracting services
Disposal.	• Optimal lifecycle analysis is completed for each asset prior to replacement. Salvage amount can vary but an average of 10-15 per cent of replacement value is consistently achieved • Auction planning ensures that similar assets are staggered and targets seasonal demands for assets to maximize return	• Improper disposal can lead to environmental damages, lost recovery from salvage and increased repair costs for assets that have already been replaced

Lifecycle Needs vs. Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs Assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life; physical condition assessments; studies and third-party recommendations; or other considerations
- The costs of any non-asset solutions, acquisition/expansions/rebuilds, and operations and maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget Assumptions

- 10-year Operating Budget consists of 2022-2025 Operating Budget and assuming year four as annual budget for years 5-10
- 10-year Capital Budget forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. Overhead costs have been excluded

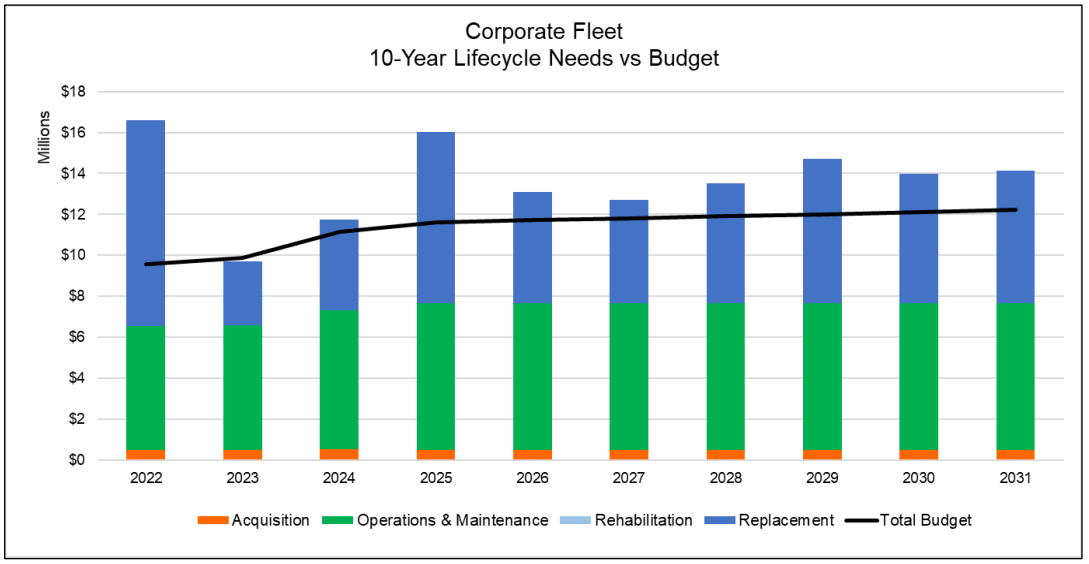
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

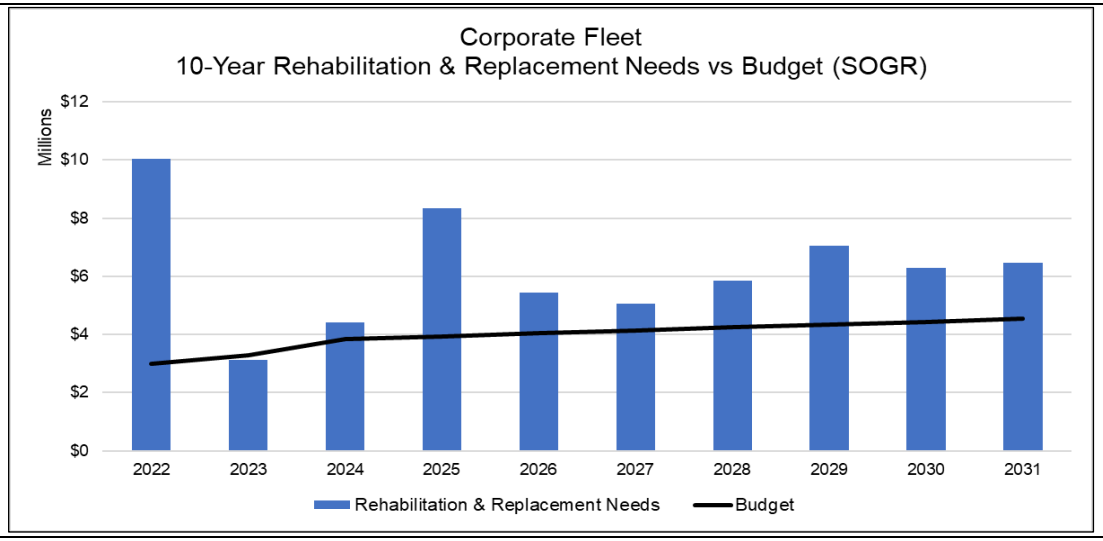
To illustrate the 10-year forecast, two graphs have been created by Service Area in this section:

- Lifecycle Needs vs. Budget Graph
- Rehabilitation & Replacement Needs vs. Budget (State of Good Repair[6]) Graph

[6] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.

Corporate Fleet





Funding is provided annually for new acquisitions, but the replacement funding is not increasing at the same rate plus inflation. This causes significant pressure on the replacement budget and forces the City to incur additional operating costs to maintain assets past the end of their useful life.

Over the next 10 years, the Corporate Fleet average annual budget is $11.4 million as shown in **Figure 1**.

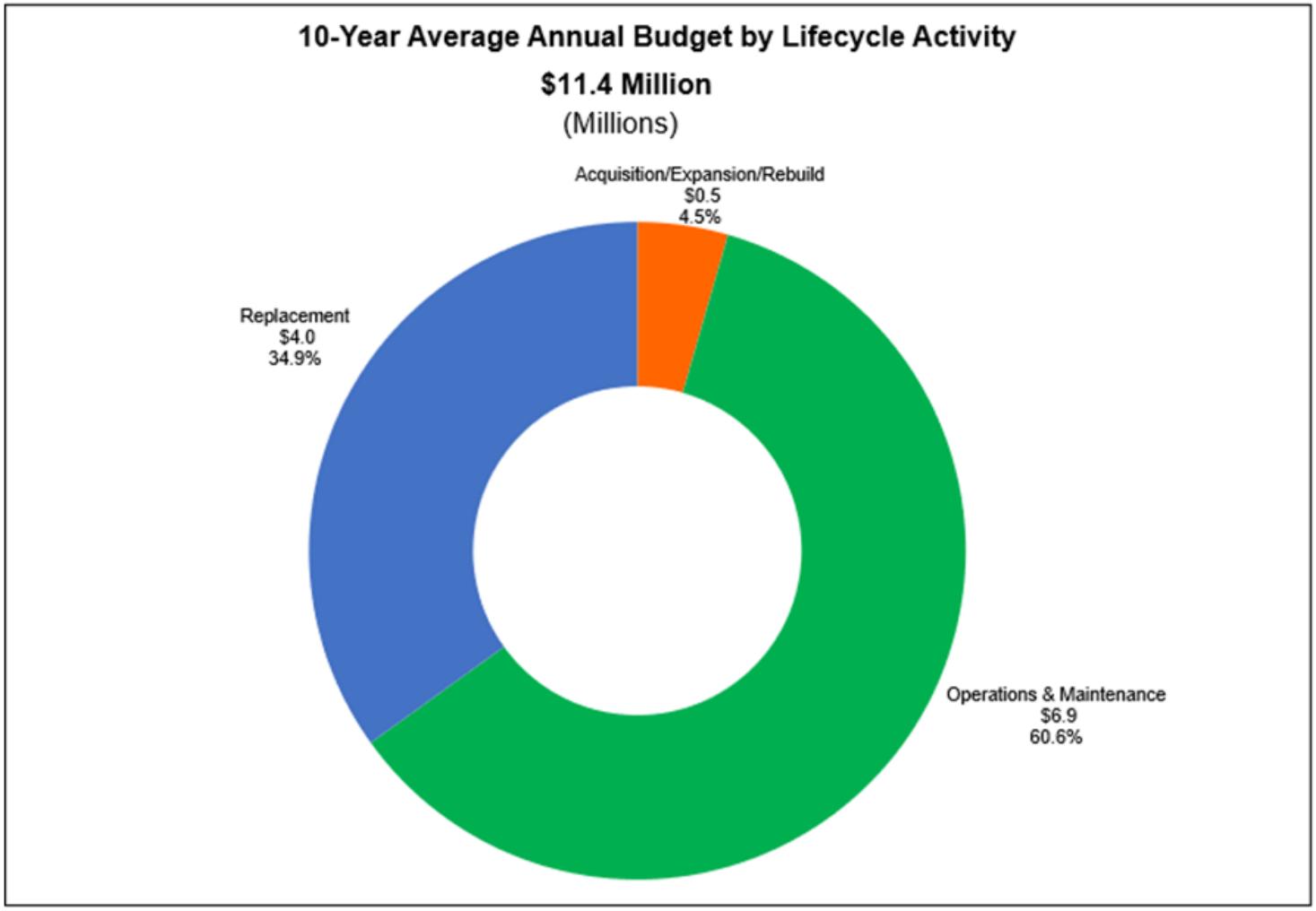


Figure 1: Breakdown of Budget by Lifecycle Activity

Table 13 shows the 10-year annual average budget breakdown by asset class. The majority of the of the operating and capital budget is spent on State of Good Repair (SOGR) of Corporate Fleet assets.

Table 13: Budget breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Corporate Fleet	69.1	39.8	108.9	5.1	114.0
Total	**69.1**	**39.8**	**108.9**	**5.1**	**114.0**

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget – for example, utilities, building and sidewalk maintenance, etc.

The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The Capital Budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment, including IT network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets – for example, sidewalk maintenance or licensing fees – are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 2,** the estimated available funding for the next 10-year period (2022-2031) for Corporate Fleet is $114 million. The primary sources of funding are Operating Revenue sources at 60.6 per cent and Tax Reserve Funds at 34.9 per cent which is primarily used to support capital infrastructure renewal needs.

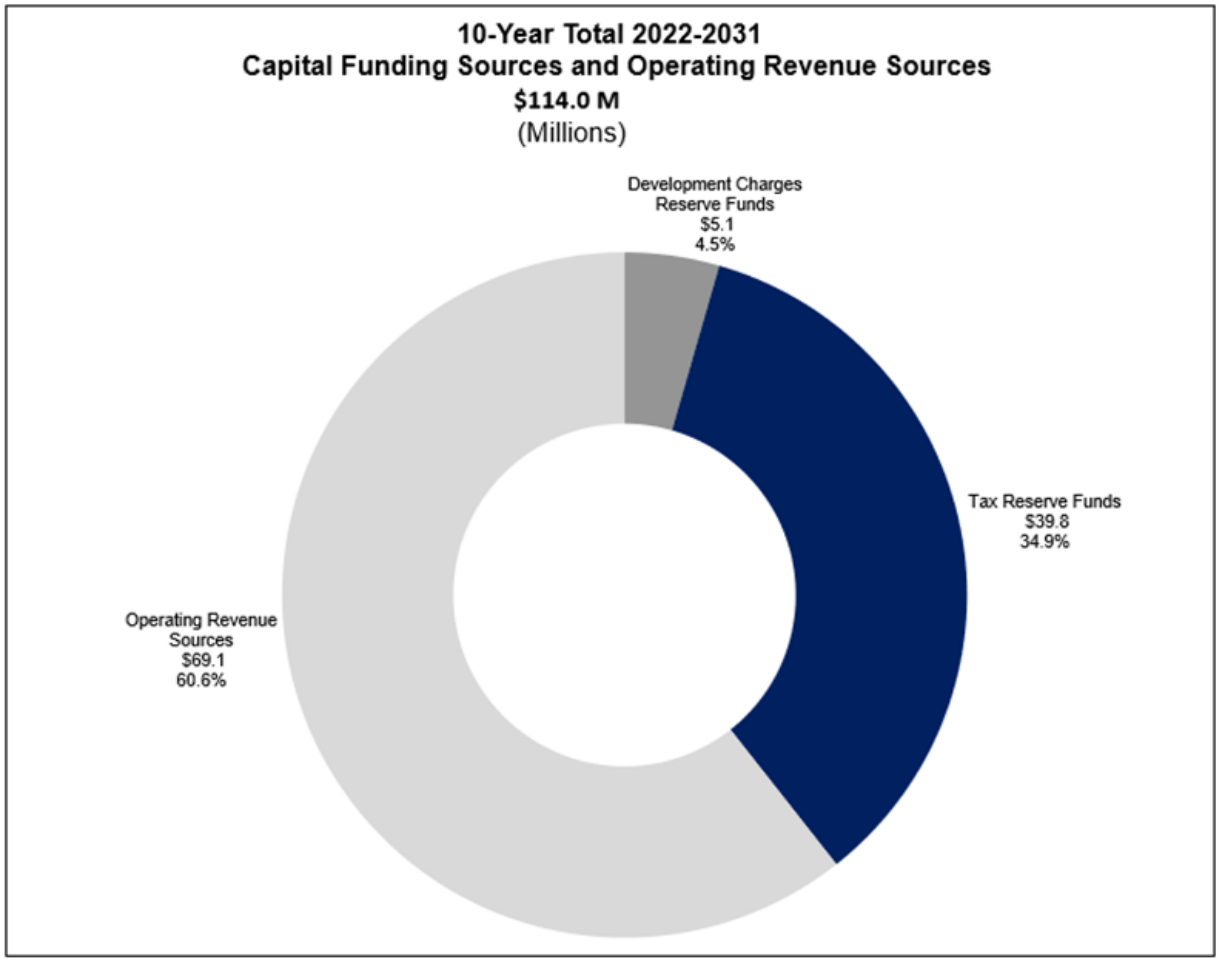


Figure 2: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure, and it will increase to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g., the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available.

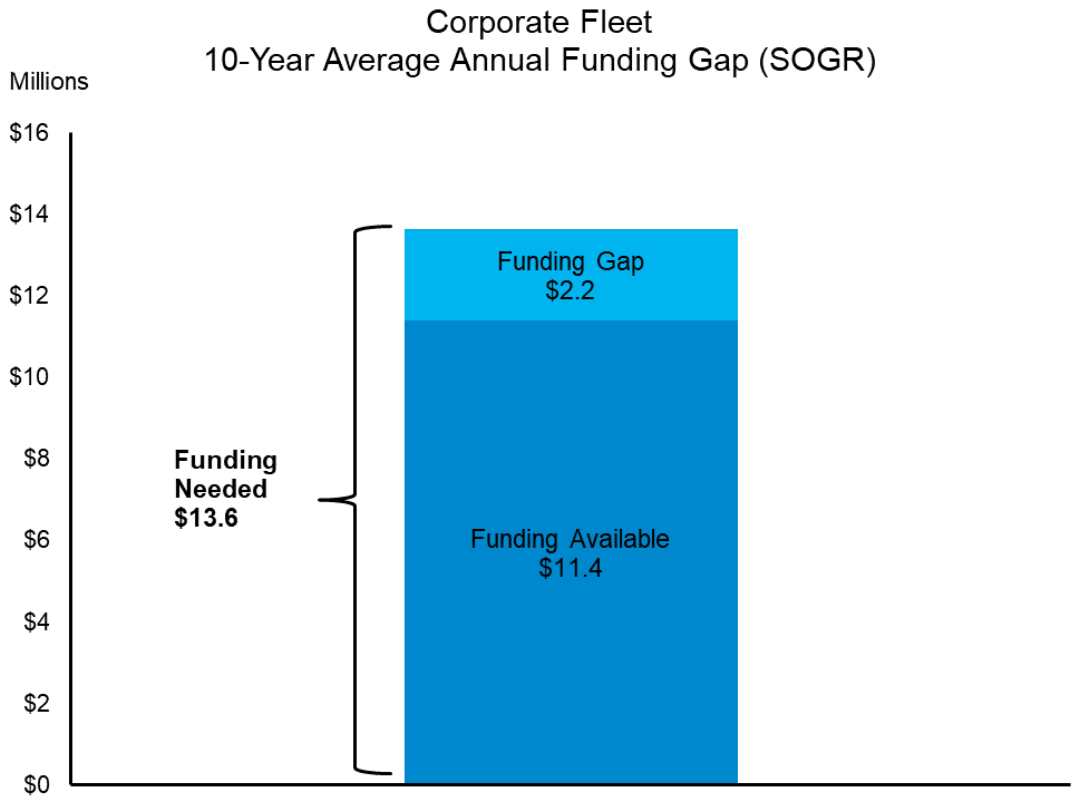
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Delays in fleet replacement
- Impacts to fleet availability and reliability
- Increase in maintenance costs as assets age

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (Funding Needed) and the annual average budget (Funding Available) for the next 10 years as is shown in the following graph by Service Area. Continued implementation of asset management best practices as well as assistance from senior levels of government through continued infrastructure funding programs will provide opportunities to address some elements of the funding gap.

Corporate Fleet



The overall infrastructure gap for Corporate Fleet is $2.2 million.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment, which has been completed for each Roads Asset Class. The results for each asset class and an overall result for the Corporate Fleet Service Area are scored from 0.0 to 4.0 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision-Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved.

Figure 3 shows the radar graph for Corporate Fleet assets based on the 2022 maturity assessment. As the service areas mature in each of the eight categories, they will expand outwards towards the outer ring (Target).

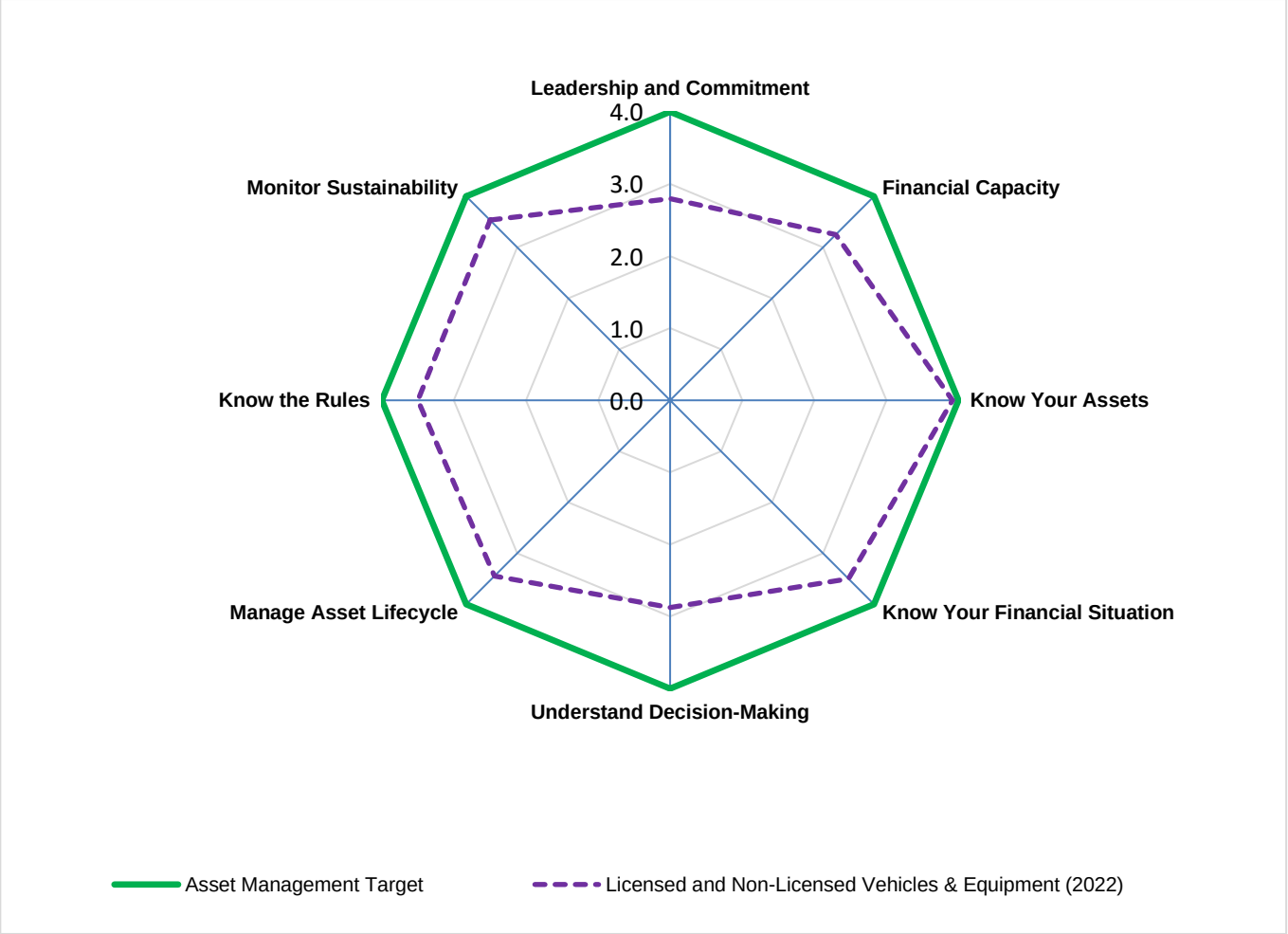


Figure 3: Maturity Assessment for Corporate Fleet (2022)

Advancing Service Area Asset Management Capabilities

The proposed work plan in **Table 14** was developed in consultation with City staff through the development of the asset management plan. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories.

Through the maturity assessment and associated work plans, the Corporate Fleet Service Area aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service, in order to achieve both service area and corporate objectives.

Table 14: Workplan - Corporate Fleet

Task No.	Workplan Task	Asset Class	Estimated Timing	Priority	Target Benefits	Required Resources
State of the Infrastructure (SOI)						
SOI – 1	Review MTO Inspection Schedules	All	2024	High	Ensure customer impact is minimized and is achievable for fleet staff	Internal
SOI – 2	Develop a risk assessment framework for corporate fleet assets	All	2024	Medium	Enable the Corporate Fleet Service Area to better prioritize funding availability across asset classes	Internal/External
SOI – 3	Develop and implement the Fleet Management Policy	All	2023 – 2024	High	Establish planning and acquisition processes for corporate fleet assets to enhance fleet sustainability	Internal
SOI – 4	Develop and implement bi-annual FASTER data audit	All	2024	Low	To ensure data sets are clean and accurate at all times	Internal
Financial Strategy (FS)						
FS – 1	Centralize all assets in one asset management system to run asset management scenarios	All	2025 – 2026	Medium	Develop a predictive performance model to forecast assets' future condition based on budget, levels of service and/or changes in lifecycle strategies	Internal/External

FS – 2	Work with Corporate Finance to formalize performance targets and sustainable funding	All	2023 – 2025	High	Develop more proactive and reliable short-term and long-term capital planning	Internal
FS – 3	Work with Corporate Finance to address/remove golf asset funding included in Corporate fleet	All	2024	High	Ensure that asset management plan structure and capital funding structure for golf assets align	Internal
Levels of Service (LOS)						
LOS – 1	Ongoing review of LOS metrics and establishment of targets	All	2023 – 2025	High	Levels of service targets enable the service area to track progress against established targets	Internal
LOS – 2	Develop and conduct user group customer service survey	All	2024	Low	To obtain feedback on service levels, user group priorities and challenges	Internal

Corporate Asset
Management Plan 2024

Information Technology (IT)

Table of Contents

IT Services Overview

This asset management plan includes assets that are owned and managed by Information Technology (IT) Services. Only tangible/physical assets have been accounted for due to their high level of data confidence; non-tangible assets such as software and licencing will be considered in future iterations as their data quality and reliability improves.

IT Services plans, acquires, installs, maintains and replaces technology infrastructure as part of the City's electronic information system. IT staff support various types of assets such as computers, printers, servers, phones, and much more that are critical to the delivery of IT services. IT works directly with many other service areas to sustain their technological needs and achieve the desired service levels. IT has six areas that support the City's technological needs; they are:

- Strategy and Innovation
- City Services
- Infrastructure Planning & Operations
- Digital Services & Mobility
- Enterprise Business Solutions
- Service Management

For this iteration of the Asset Management (AM) Plan, the portfolio is valued at approximately $46.7 million with an average asset condition of Fair and a 10-year average annual funding gap of $0.0 as summarized in **Table 1**. For a more detailed breakdown by asset class, see **Table 2.**

Table 1: Summary Overview of IT Services

IT Services	
Replacement Value	$46.7 Million
Average Condition	52% (Fair)
10-Year Average Annual Funding Gap	$0.0

Table 2: Summary of Replacement Value, Condition and Infrastructure Gap by Asset Class

Asset Class	Replacement Value	Condition	10-Year Average Annual Funding Needs	10-Year Average Annual Funding Gap
End-User Devices	$17.5 Million		$2.4 Million	$0.0
Network Services	$22.8 Million		$1.3 Million	$0.0
Platform Services	$6.4 Million		$2.3 Million	$0.0

This Asset Management Plan includes the following information:

- **State of the Infrastructure**: Outlines the current state of the infrastructure assets, as of 2021 year-end, the condition of the assets and the cost to replace them. This section also identifies the data limitations and data assumptions that have been applied
- **Levels of Service**: Describes and measures the service performance and outcomes the City currently provides
- **Future Demand**: Summarizes the expected future demand on the services each service area provides
- **Lifecycle Management Strategy**: Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy**: Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves and identifies any financial gap. This plan utilizes the 2022-2024 Operating Budget and 2022-2031 Capital Budget
- **Continuous Improvement**: Documents the continuous improvements identified during the development of this Asset Management Plan and previous maturity assessments

State of the Infrastructure

The following section provides a summary of the number of assets owned and managed by staff, their average age, condition, and replacement value in the form of dashboards.

Asset Data Assumptions & Limitations

The following assumptions were made, where information and attributes were limited for assets:

Estimated Useful Life (EUL) – A reasonable range was used for the EUL based on the type of asset, its complexity, and history according to IT subject matter experts.

Asset condition – The condition of assets has been estimated based primarily on age and remaining useful life[1] (RUL) as described in **Table 3** with individual adjustments made based on staff expertise. This approach applies well to these assets due to their relatively straightforward lifecycle. Where the in-service date was unavailable, the asset was assumed to be in Fair/Good condition.

Replacement Values – The replacement values were based on the most reasonable and applicable unit costs from recent tender prices and/or staff expertise.

Table 3: Condition Scale based on Remaining Useful Life (RUL)

Condition Rating	Physical Condition Definitions
Very Good 80%-100% RUL	**Fit for the Future** – The asset is generally in very good condition, typically new, or recently rehabilitated. It has more than 80% of its remaining useful life left.
Good 60%-79% RUL	**Adequate for Now** – Some asset elements show general signs of deterioration that require attention. A few elements exhibit deficiencies, but overall, it has between 60%-79% of its remaining useful life left.
Fair 40%-59% RUL	**Requires Attention** – The asset shows general signs of deterioration and requires attention with some elements exhibiting significant deficiencies. It has between 40%-59% of its remaining useful life left.
Poor 20%-39% RUL	**Approaching End of Life** – The asset is in poor condition and typically below established standards, with many elements approaching the end of their useful service life. It has 20%-39% of its remaining useful life left.
Very Poor 0%-19% RUL	**Requires Renewal** – The asset is below established standard conditions with widespread signs of advanced deterioration. Many components have surpassed the end of its useful service life and requires urgent renewal. It has less than 20% of its remaining useful life left.

[1]Remaining useful life (RUL) is calculated by subtracting the asset's current age (based on the chosen reporting year) from its estimated useful life (EUL).

Table 4 provides a list of assets that have been excluded from this plan due to low data confidence or ownership issues. This section also includes an explanation of how condition and risk were assessed, along with limitations to this assessment based on the availability of data.

Table 4: IT Assets Excluded from this Asset Management Plan

Assets Excluded from the Asset Management Plan
Software applications (ex. SAP Solutions, Webex, Questica, Infor, GIS, etc.)
Licences, intranet and staff productivity tools, VPN services
IT assets that are owned/managed by other Service Areas (i.e. specialized/unique IT assets)
Public Sector Network (PSN); Network Fibre

Asset Risk

Asset-specific risks are determined by assessing the asset's 'Consequence of Failure' (CoF) and 'Likelihood of Failure' (LoF). While the loss of some assets or components may have little impact on service delivery and negligible risk of damage or injury, the loss of other assets can severely impact desired service levels. The criticality of an asset is therefore linked to the inherent consequence of the loss of its function, including related impacts on the function of a system or network of assets. Currently, IT Services utilize risk informally when prioritizing what asset lifecycle strategies and projects to conduct. A more formalized risk model will be explored in future iterations of the Asset Management Plan.

Dashboards

The following dashboards provide a quick summary of the state of the current infrastructure for each asset class. The information in this plan was prepared using 2021 year-end data.

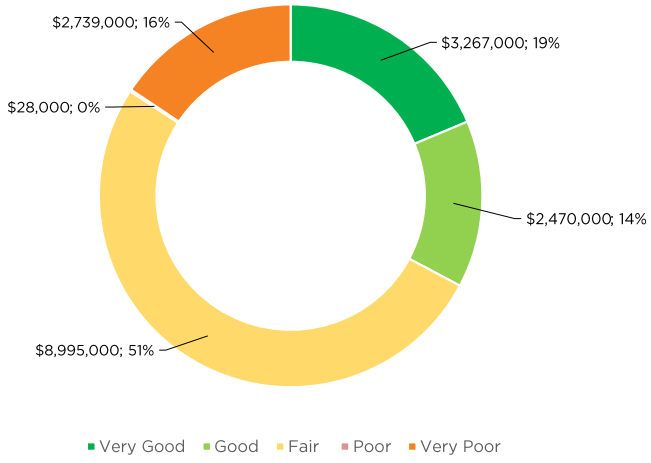
Asset Class:	End-User Devices	Current Replacement Value (CRV):	$17.5 Million

DATA QUALITY

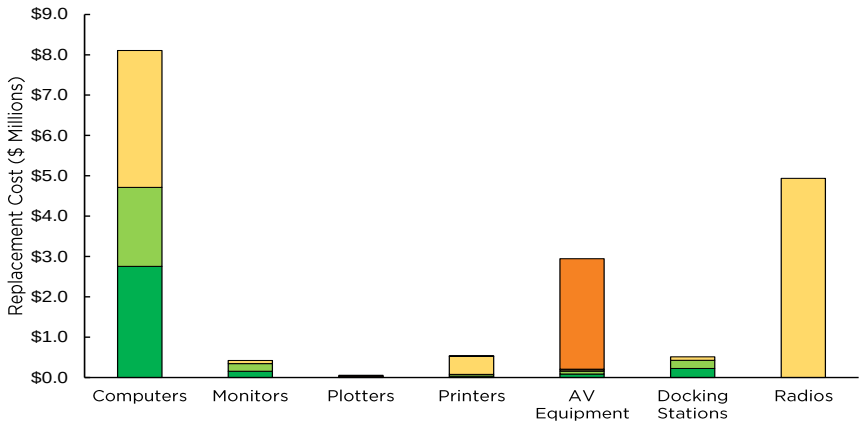
Asset Inventory	Condition	Replacement Value
B	C	B

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Computers	8,507	Ea.	2.5	7	$8,108
Monitors	1,687	Ea.	2	10	$422
Plotters	3	Ea.	4.3	10-15	$30
Printers	891	Ea.	2	3-5	$540
AV Equipment	2,762	Ea.	16.4	5-100	$2,946
Docking Stations	2,060	Ea.	1.8	7-10	$515
Radios	1,956	Ea.	-	15	$4,938

End-User Devices Replacement Value by Condition



End-User Devices Condition by Asset Type



Asset Information

- End-User Devices support audio-visual services, photo and video production services, and the deployment and management of desktop environments
- Age-based condition is primarily utilized to determine asset replacement, and any assets that are kept beyond their estimated useful life are used for secondary/redundancy purposes
- As shown by the data quality scoring, the inventory, condition and replacement value information are at a moderate level of confidence/quality. This is largely due to older assets having less attribute information tagged against them; however, over the last few years, staff have assigned attribute information much more consistently against assets in order to improve data reliability

Detailed AM Plan
Information Technology

Asset Class: Network Services

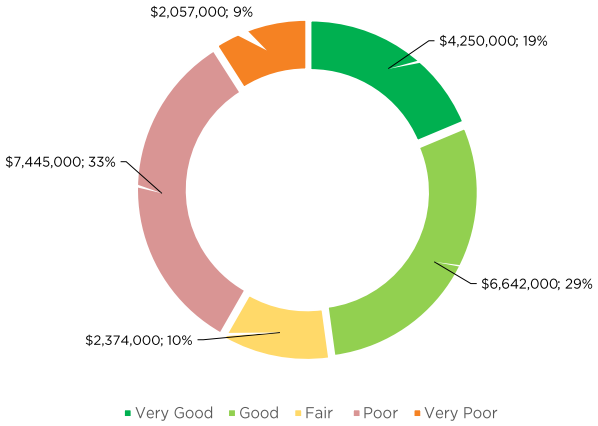
Current Replacement Value (CRV): $22.8 Million

DATA QUALITY

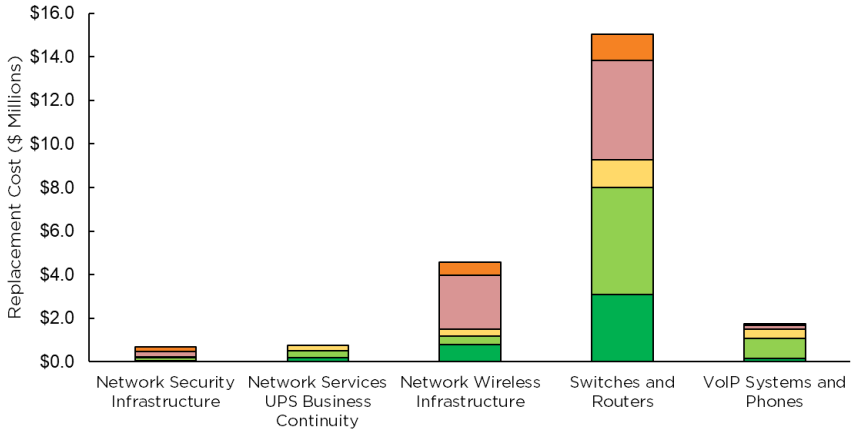
Asset Inventory	Condition	Replacement Value
B	C	B

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Network Security Infrastructure	51	Ea.	4.1	5-8	$670
Network Services UPS Business Continuity	313	Ea.	2.5	5-8	$759
Network Wireless Infrastructure	1,193	Ea.	3.5	5-8	$4,587
Switches and Routers	2,193	Ea.	3.0	5-8	$15,020
VoIP Systems and Phones	3,241	Ea.	3.0	5-8	$1,730

Network Services Replacement Value by Condition



Network Services Condition by Asset Type



Asset Information

- Network Services support both wired and wireless data communications for over 120 City facilities. They include assets such as switches, routers, Wi-Fi controllers, firewalls, access points, teleconference phones, collaboration endpoints and much more
- These assets utilize age and remaining useful life as proxies for condition; although staff also consider other factors such as performance, demand and vendor agreements when it comes to their replacement cycle
- As shown by the data quality scoring, the inventory, condition and replacement value information are at a moderate level of confidence/quality. This is largely due to older assets having less attribute information tagged against them; however, over the last few years, staff have assigned attribute information much more consistently against assets in order to improve data reliability

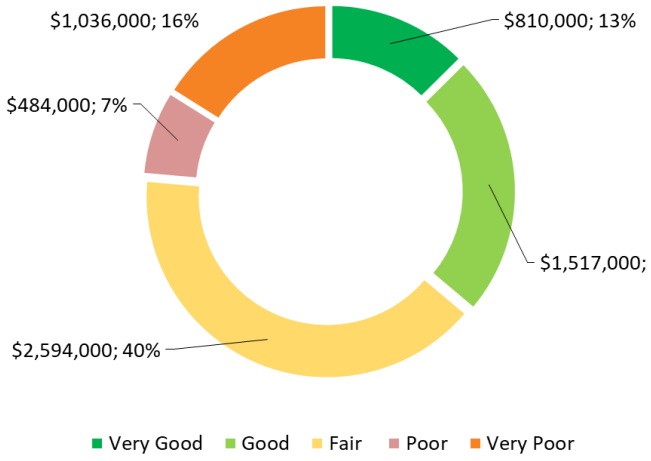
Asset Class:	Platform Services	Current Replacement Value (CRV):	$6.4 Million

DATA QUALITY

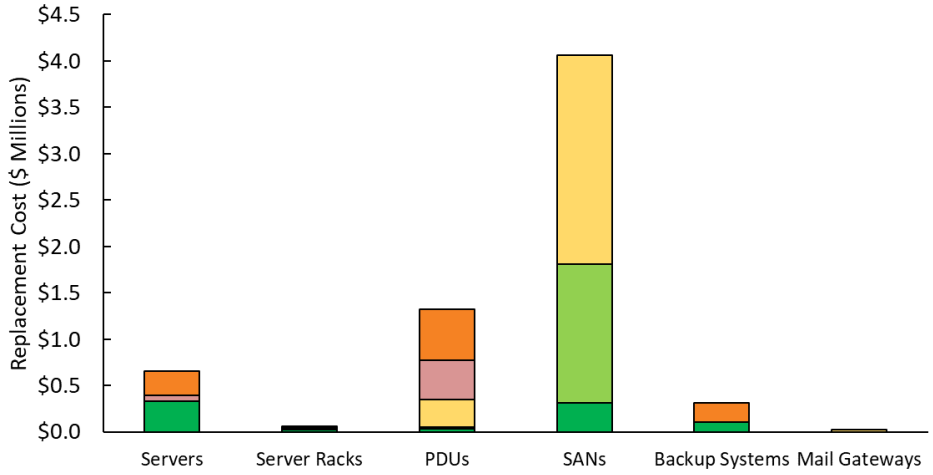
Asset Inventory	Condition	Replacement Value
B	B	B

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Servers	212	Ea.	3.3	5-10	$652
Server Racks	23	Ea.	5.3	5-10	$58
PDUs	72	Ea.	9.2	5-10	$1,326
SANs	22	Ea.	1.9	5-10	$4,062
Backup Systems	8	Ea.	6.4	5-10	$318
Mail Gateways	4	Ea.	-	5-10	$24

Platform Services Replacement Value by Condition



Platform Services Condition by Asset Type



Asset Information

- Platform Services support data operations for email delivery, user security and enterprise backups
- Condition is based on a mixture of age, remaining useful life, and vendor agreements as it relates to asset replacement
- As shown by the data quality scoring, the inventory, condition and replacement value information are at a moderate level of confidence/quality. This is largely due to older assets having less attribute information tagged against them; however, over the last few years, staff have assigned attribute information much more consistently against assets in order to improve data reliability

Levels of Service

The purpose of this section is to describe the levels of service (LOS) that City staff are currently providing and aim to provide for the IT Services.

LOS are the outcomes that an organization intends to deliver to its clients. They should also be utilized as key drivers for making decisions and future investment in infrastructure assets. As such, LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its taxpayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations.

Table 5 lists and defines the various elements of the LOS framework in accordance with ISO 55000 standard for infrastructure asset management.

Table 5: Level of Service Framework - Elements

Elements	Definition
Levels of Service (LOS)	Specific objectives of the service the organization intends to deliver, from the customer point of view. LOS provide the link between higher level corporate and asset management objectives with more detailed technical and operational objectives.
LOS Attributes	LOS attributes of the overall service that are relevant and meaningful to stakeholders.
Performance Measures	Criteria that can be measured and provide an indication of how the organization is doing in delivering the intended LOS form performance measures. They can be defined as: Customer performance measures - measures describing how the customer receives or experiences the service. Technical performance measures - technical criteria the organization can measure to indicate how the service is being achieved.

Table 6 identifies the current level of service framework that staff have established for IT Services. Staff will continue to explore more service level metrics to track as they build their asset management program and expand their asset hierarchy.

Table 6: IT Levels of Service Framework

LOS Attribute	LOS Objective	Community LOS Measure		Technical LOS Measure	
		Performance Measure	Current Performance	Performance Measure	Current Performance (2021)
Performance	IT Services assets are maintained in a state of good repair and meet service delivery needs.	Description of the lifecycle activities staff undertake to maintain assets in a state of good repair.	Staff repair and/or replace assets on a proactive basis, when possible, in alignment with manufacturer recommendations, vendor service-level agreements, or staff expertise.	Actual vs. Target Capital Reinvestment Rate[2]	End-User Devices: 1.4% vs. 1.4%
					Network Services: 0.6% vs. 0.6%
					Platform Services: 3.6% vs. 3.6%
				% of assets in fair or better condition	End-User Devices: 84%
					Network Services: 57%
					Platform Services: 89%

[2] The Actual reinvestment rate is a measure of how much funding is **available** to fund asset rehabilitation and replacement, while the Target Reinvestment Rate is a measure of how much funding is **required** to adequately fund asset rehabilitation and replacement.

Future Demand

The City's IT Services is committed to delivering services in an efficient and cost-effective manner. In the ever-evolving world of technology, there are many demand drivers that challenge staff's ability to maintain desired service levels. Some of these challenges include:

- Cyber-security and data privacy requirements
- Technological advancements and modernization
- Increased demand for more cloud-based services and infrastructure
- Aging infrastructure
- Limited resources
- Supply chain issues

There is an increasing need to plan and deliver innovative, reliable, responsive and secure services, and establish sustainable service levels for IT Services. Strategies to meet these demands include keeping up with new technologies, reprioritizing of work for business continuity and disaster preparedness, and the effective delivery of capital projects and studies. These actions also align with the City's vision and strategic plan.

Demand Drivers

Drivers affecting demand include changes to regulations and legislation, technological changes, economic factors, environmental awareness and the direct impact of climate change on infrastructure. A summary of the main internal and/or external drivers that affect demand for IT Services is shown in **Table 7**.

Table 7: Demand Drivers for IT Services

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Changing Technology	Technology is constantly evolving, and in many cases, vendors will stop supporting assets that have become obsolete or no longer meet new technological requirements.	Technology will continue to change as the demand for more cloud-based applications and online services increases, thus putting more pressure on staff to meet service levels and customer expectations.	Inability to meet customer expectations and demands for state-of-the-art technology. Using unsupported assets may increase risk of financial consequences and operational delays.	Staff remain up to date on technological enhancements that may affect the assets and services they manage. Technology is renewed in line with both industry and operational standards. Staff communicate with vendors regularly to stay apprised on upcoming major changes and adapt accordingly.
Resource Challenges	The City has recently seen many changes in staffing as a result of retirements and staff turnover. Current staffing issues focus on being able to assign the right resources to critical initiatives while maintaining an adequate level of capacity for day-to-day operations	As IT Services move toward more cloud-based and online services, staffing requirements and roles will need to adapt to manage the workload more effectively and ensure that the City's strategic goals are being met.	Without sufficient staffing in place, the quality and reliability of the City's IT services and assets will be adversely affected. Maintaining IT assets in a state of good repair and advancing key IT system enhancements will be more difficult as a result of limited resourcing.	The City employs a combination of permanent, contract and part-time staff in order to deliver on key projects, meet service level enhancements, and achieve operational requirements. IT, alongside the Human Resources department, created a pre-qualified roster for IT services so that unique skill sets can be acquired as needed; thus providing more agility to respond to increasing workloads.
Adapting to New Business Requirements	Staff must constantly adapt to changes in stakeholder expectations or new business requirements, while also maintaining	There are constantly new and different business requirements that IT needs to adapt to and factor into their capital	Adapting to new business requirements while trying to maintain current service levels for existing assets is a challenge and can	Staff maintain direct and constant communication with their key stakeholders to minimize unexpected or unplanned business requests. Staff utilize a project-prioritization

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	their current existing service levels.	and operating plans. For example, newly acquired assets or programs such as the Smart City initiative, pose a pressure on the sustainability and performance of the IT portfolio.	affect the quality of the overall asset portfolio. There may be trade-offs or delays in the timing of lifecycle interventions to accommodate the new initiatives.	technique in order to organize available resources and meet their strategic objectives.
Environmental Stewardship	For IT Services, there are more demands for digital upgrades and a more environmentally friendly service delivery that challenges the status quo.	The City is committed to decreasing its carbon footprint with clear goals to achieve within the next 30+ years. As IT Services evolve, there will be more consideration for the type of assets acquired and their replacement and disposal requirements.	There are many consequences to climate change that will affect staff's ability to deliver their desired service levels in an efficient, cost-effective and reliable manner.	Staff work with material management to establish clear wording within vendor contracts regarding asset disposals in environmentally conscious ways.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service-delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Operations & Maintenance (O&M)
Operations & Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Acquisition/Expansion/Rebuild
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Renewal/Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Table 8 provides a summary of the different strategies and actions that staff employ for their applicable lifecycle activities, along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 8:Current Lifecycle Management Activities

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	All	• IT Standards for standard hardware are reviewed annually and reported to Council • IT Master Plans are completed every 4–5 years • Annual review of budget needs for platform services (capital and operating)	• These non-asset, IT solutions are used to plan for growth effectively and to align the City with best industry practice. There are financial, reputational and operational risks associated with conducting these IT master plans and standards
Operations & Maintenance	All	• Assets are maintained per manufacturer warranty recommendations • Minor repairs of asset components (e.g., monitor screen repairs and sensor repairs) are completed on an as-needed basis • Assets are inspected on a daily, monthly or annual basis depending on their criticality and complexity	• Regular maintenance and inspections allow staff to maintain the performance and functionality of assets, and by extension, the desired service levels by mitigating hazards or premature failures

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Replacement	All	• Assets are replaced at end of life on a cyclical basis, when they no longer meet capacity/technological needs, or if they are no longer covered by vendor agreements. Where feasible, staff use those assets in a supplemental or secondary manner, as a form of redundancy	• The timely replacement of assets ensures that day-to-day operations are not impacted, and that the most cost-effective interventions are applied to the IT asset portfolio
Acquisition/Expansion/Rebuild	All	• Upgrading or expanding assets to handle more capacity (e.g., adding another shelf to the storage array, adding more switches, acquiring a larger printer) • Adapting to technological changes as a result of renovations or replacements of facilities	• Technological obsolescence or redundancy as a result of changes to the business needs • Cybersecurity risks

Lifecycle Needs vs. Budget

Per Ontario Regulation 588/17, a 10-year forecast of the lifecycle demands or activities that need to be performed to maintain current levels of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs Assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies, third-party recommendations, or other considerations
- The costs of any Non-Asset Solutions, Acquisition/Expansions/Rebuilds, and Operations & Maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget Assumptions

- 10-year Budget Plan consists of 2022-2025 Operating Budget and assumes year four as annual budget for years five to 10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Overhead costs
    - Software licenses; including SaaS (software as a service) solutions
    - Professional services
    - Resourcing/labour

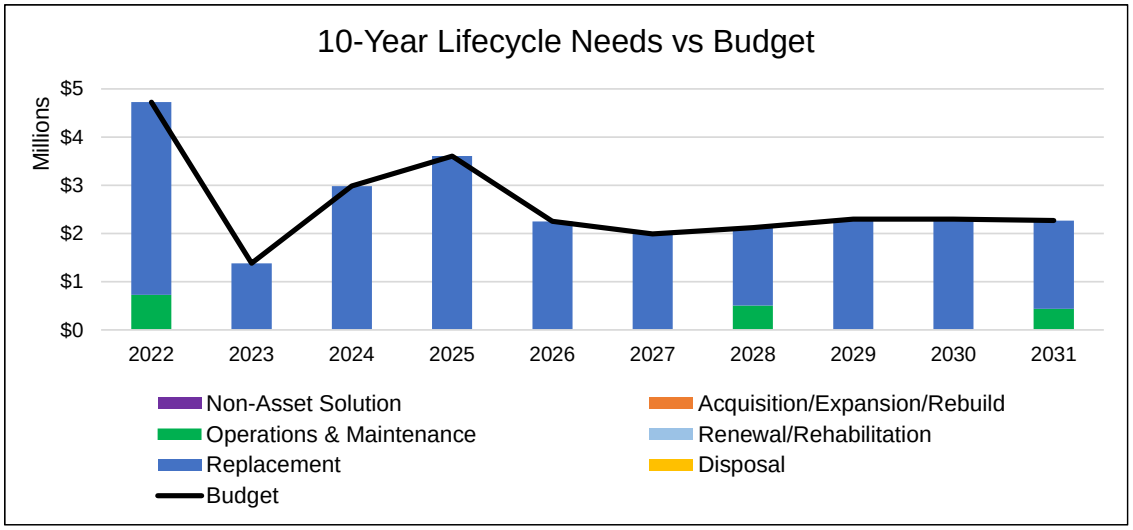
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget — except Renewal/Rehabilitation and Replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

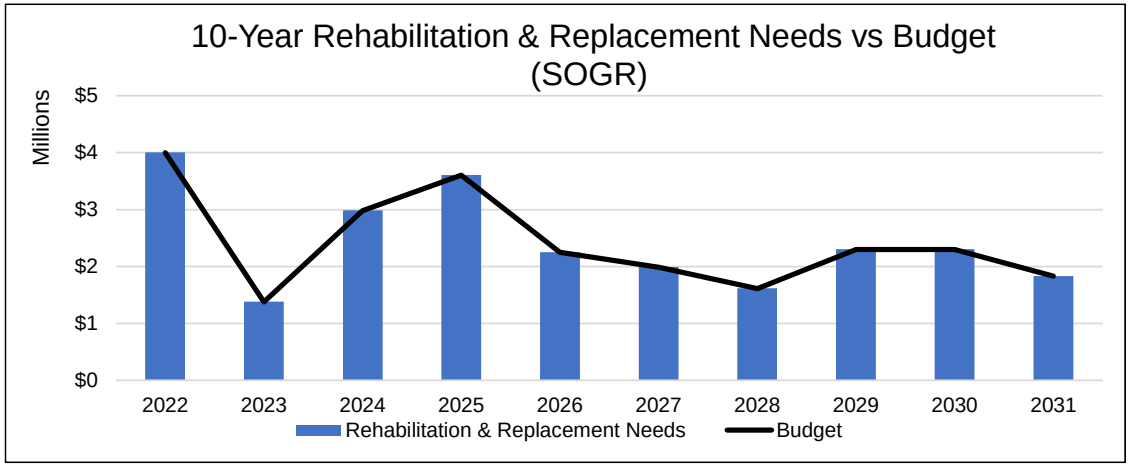
To illustrate the 10-year forecast, two graphs have been created by Service Area and by each Asset Class in this section:

- Lifecycle Needs vs. Budget Graph
- Rehabilitation & Replacement Needs vs. Budget (State of Good Repair[3]) Graph

[3] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.

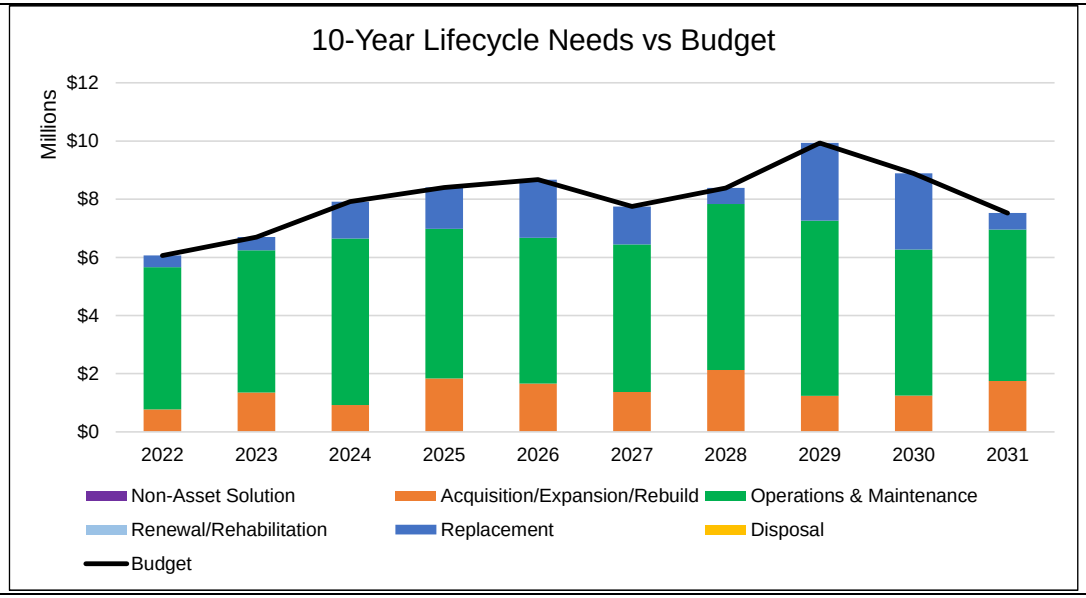
End-User Devices

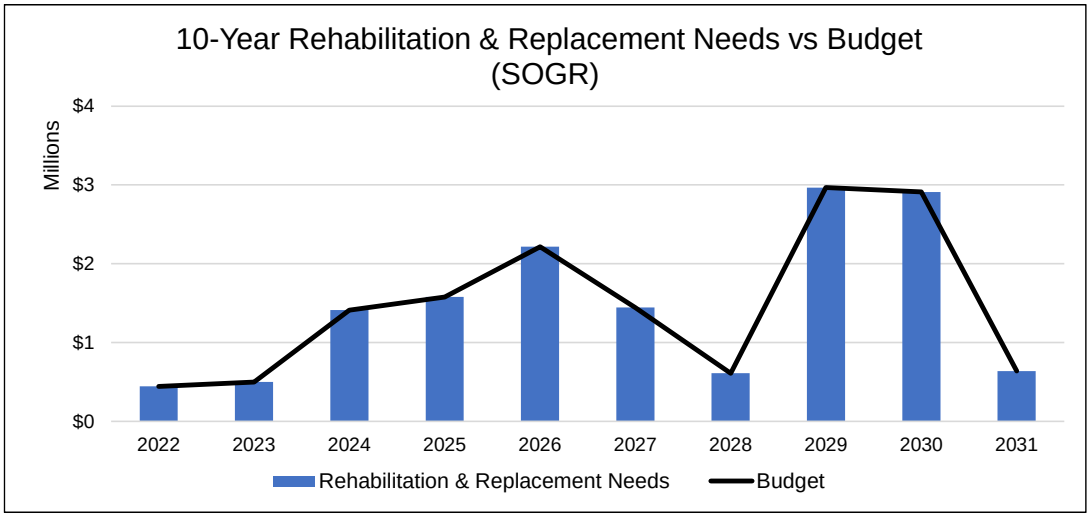




End-User Devices are replaced on a cyclical basis once they reach their end of life. Almost 67% of the assets are in Very Poor-Fair condition, meaning most rehabilitations or replacements will be required in the next 10 years.

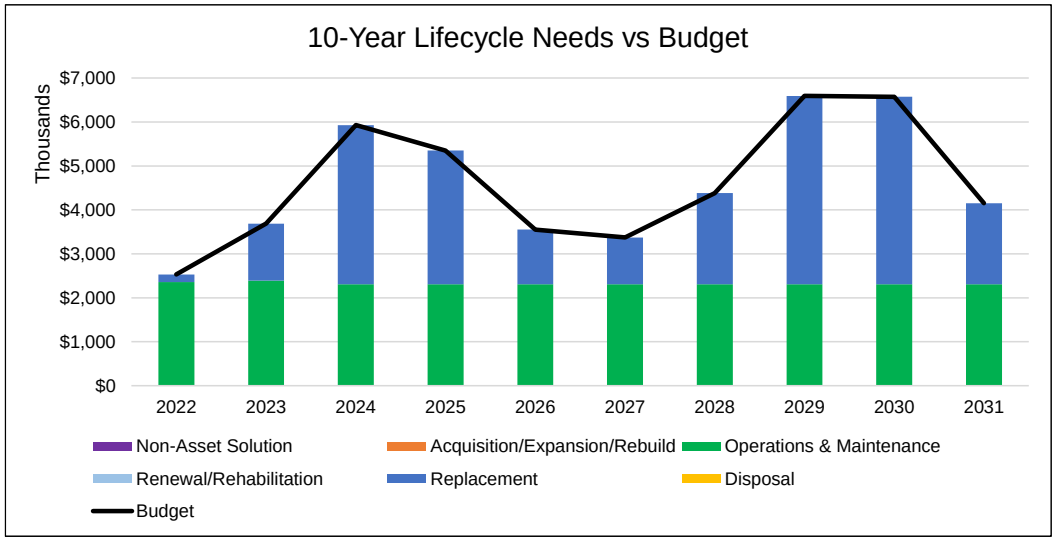
Network Services

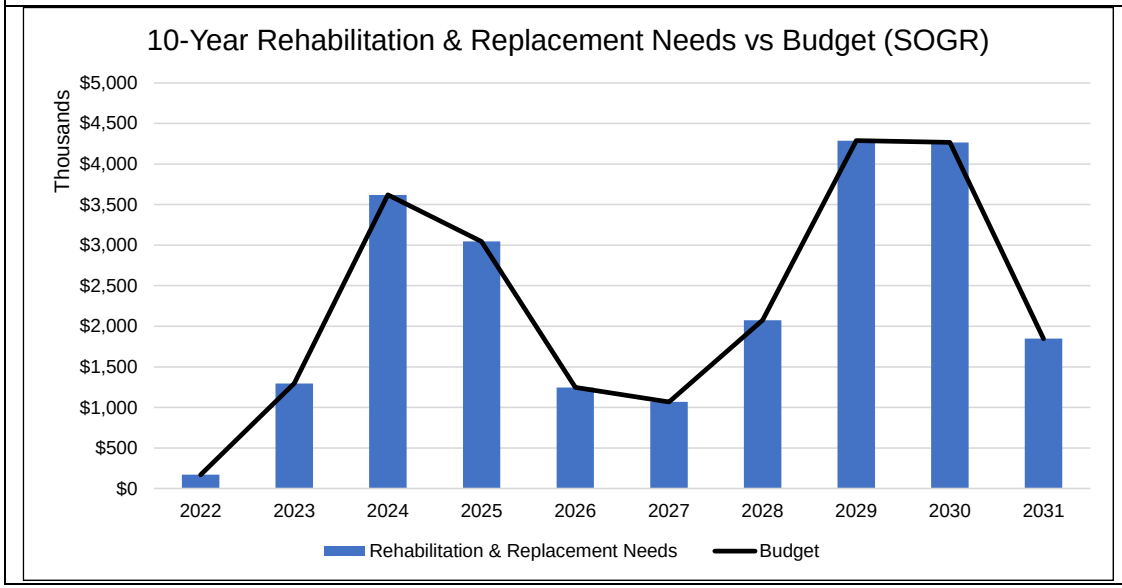




Over 58% of the Network Services assets are in Fair or Better condition with a typical useful life of five to eight years. This is consistent with the 10-year forecast showing major rehabilitation and replacement in later years (mainly 2029 and 2030).

Platform Services





Due to the shorter lifecycle of many Platform Services assets (i.e., five years estimated useful life), this 10-year forecast may include a second round of replacements of the same asset types. For example, assets forecasted for replacement in 2024 would show up again in 2029 for their next cycle of replacement.

Over the next 10 years, the IT Services average annual budget is $16.1M as shown in **Figure 1**

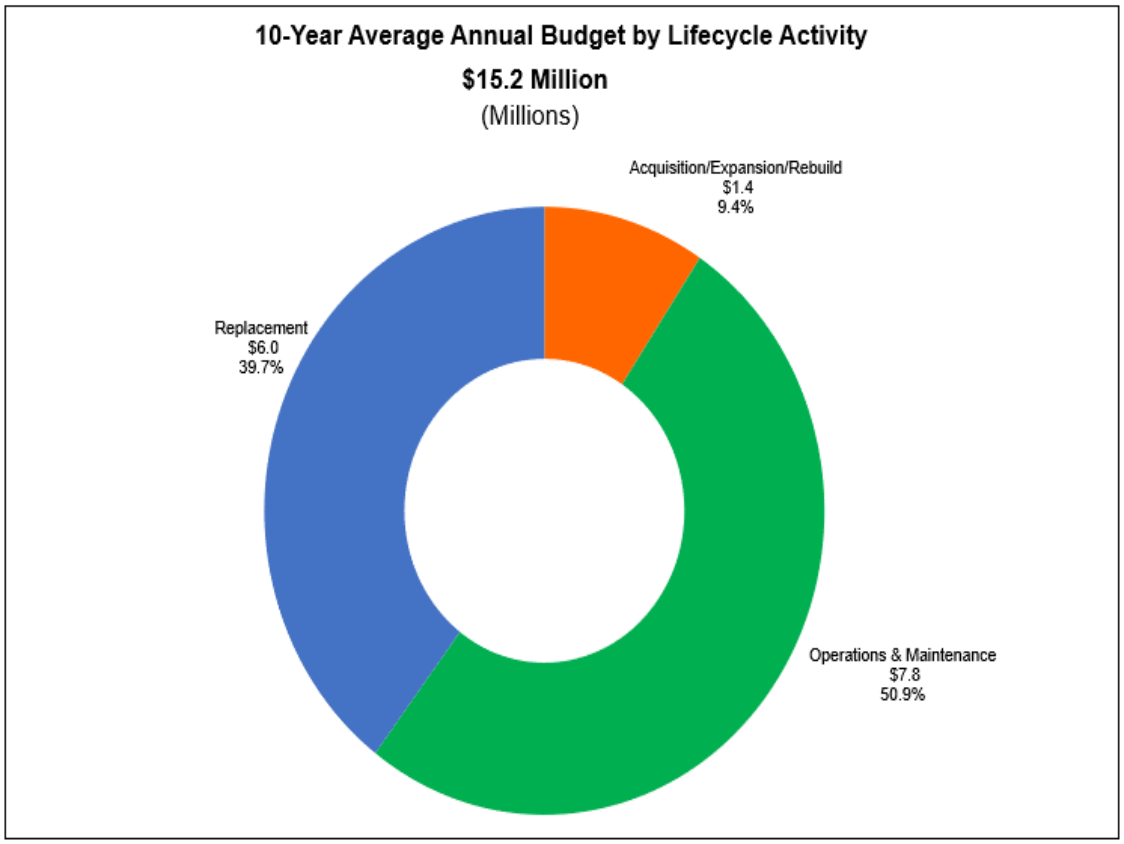


Figure 1: Breakdown of Budget by Lifecycle Activity

Table 9 shows the 10-year annual average budget breakdown by asset class. The majority of the operating and capital budget is spent on SOGR of IT Services assets.

Table 9: Budget Breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
End-User Devices	-	2.6	2.6	-	2.6
Network Service	4.4	2.2	6.6	1.4	8.0
Platform Services	2.3	2.3	4.6	-	4.6
Total	**6.7**	**7.1**	**13.8**	**1.4**	**15.2**

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan, as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, taking stock and inventory of what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on the 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

The operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget — for example, utilities, building and sidewalk maintenance, etc.

The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The capital budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment, including IT network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to, or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets — for example, sidewalk maintenance or licensing fees — are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 2,** the estimated available funding for the next 10-year period (2022–2031) for IT Services is $161 million. The primary sources of funding are Tax Reserve Funds at 53.6 per cent and Operating Revenue Sources at 46.4 per cent.

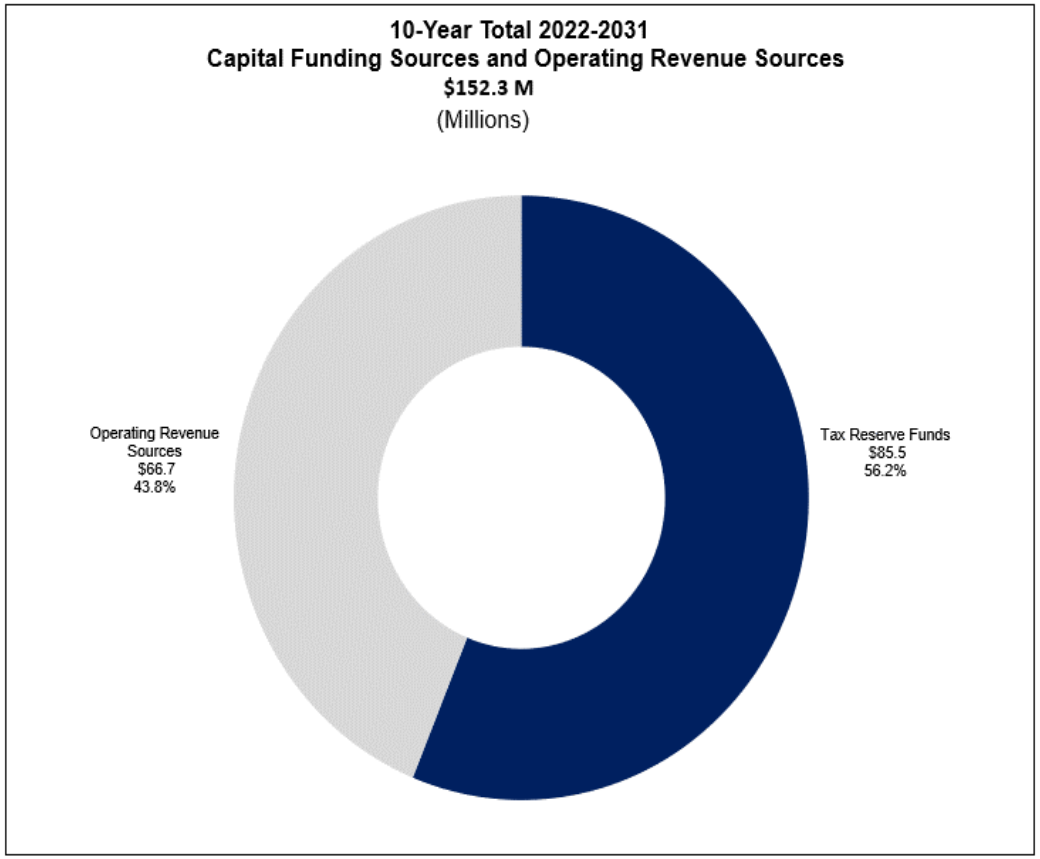


Figure 2: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022–2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent Capital Infrastructure and Debt Repayment Levy to provide funding to maintain and replace its critical infrastructure, and it will increase to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g., the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap — a gap between how much is required to maintain assets and service levels and how much funding is available.

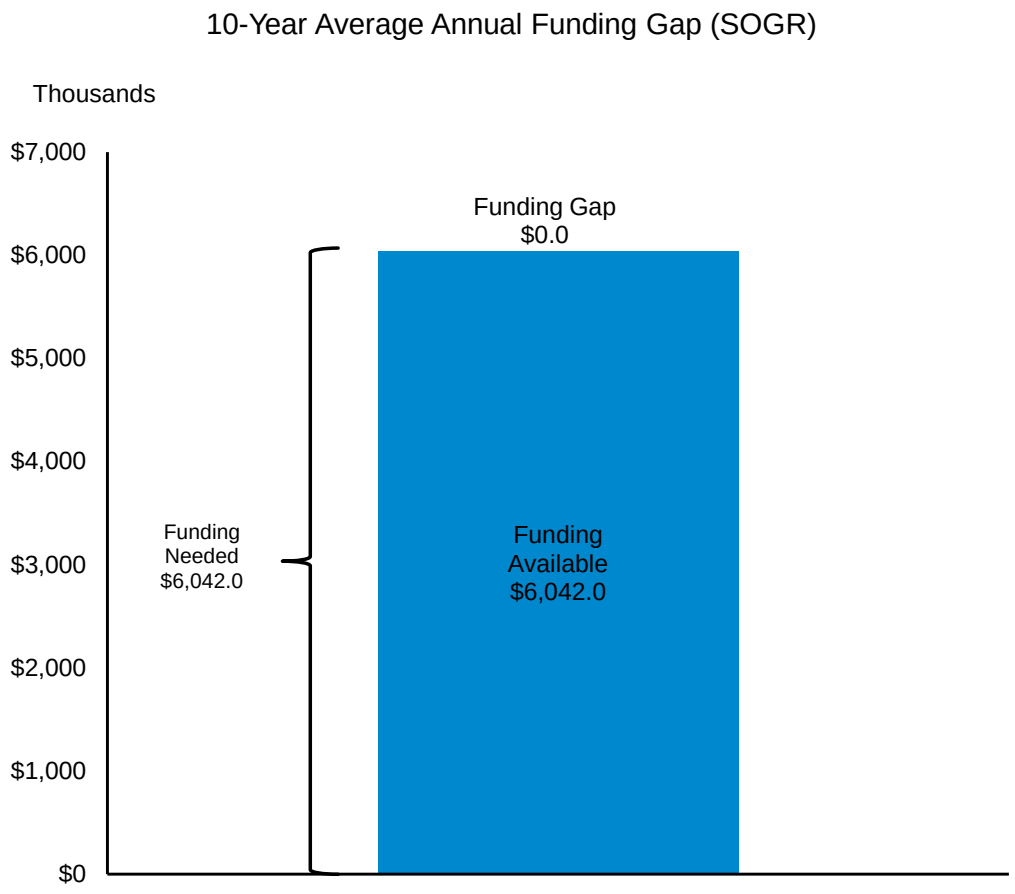
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to timeliness and quality-of-service delivery
- Increased security threats and liability
- Impacts to critical, day-to-day applications and systems

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (funding needed) and the annual average budget (funding available) for the next 10 years — as is shown in the following graphs by service area and asset class. Continued implementation of asset management best practices, as well as assistance from senior levels of government through continued infrastructure funding programs, will provide opportunities to address some elements of the funding gap.

IT Services



As of this plan iteration, IT is deemed to have sufficient budget to address its lifecycle needs to meet current levels of service for End-User Devices, Platform Services and Network Services. Further analysis and data refinement will be conducted for these asset classes to determine the true gap.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic, internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for each IT asset class. The results for each asset class are scored from 0.0 to 4.0, based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved.

Although the maturity assessment was completed in 2021 staff plan on updating data quality to reflect a more realistic and holistic approach in the approval process in the next iteration of the plan.

Continuous Improvement Workplan

The proposed work plan in **Table 10** was developed in consultation with City staff through the development of the Asset Management Plant. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure, LOS = Levels of Service). Through the maturity assessment and associated work plans, IT Services aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service— to achieve both service area and corporate objectives.

Table 10:Work Plan – Information Technology Service Area

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority (High/Medium/Low)	Target Benefits	Required Resources
SOI-01	Review asset inventories and populate missing information	All	2022-Onwards	High	Ensures accurate asset information to help make informed decisions	External
SOI-02	Expand asset hierarchy to include additional assets	All	2022-2024	High	Includes all asset types within asset class, ensuring a complete asset class	Internal/External
LOS-01	Establish more levels of service metrics	All	2022-2025	Medium	In addition to being required to meet O. Reg. 588/17, LOS targets enable the service area to track progress against established targets	External

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority (High/Medium/Low)	Target Benefits	Required Resources
FS-01	Review lifecycle costing and infrastructure gap calculations	All	2022-Onwards	Medium	Ensuring the correct allocations and lifecycle costing assumptions are used will lead to more detailed forecasts for operating and capital budgets	Internal
FS-02	Centralize all assets in one asset management system to run asset management scenarios	All	2022-Onwards	High	Develop a predictive performance model to forecast assets future condition based on budget, levels of service and/or lifecycle strategies changes	Internal/External

Corporate Asset
Management Plan **2024**

Recreation & Culture

Table of Contents

Recreation & Culture Overview

The City's Recreation & Culture Service Area focuses on keeping Mississauga residents healthy and active, and to grow the City as a vibrant arts, culture and heritage hub. and connected in partnership with the community. Recreation staff continuously strives to deliver responsive and effective services that satisfy the diverse needs of residents within all Mississauga communities. Recreation operates and maintains 12 major and 12 minor recreational facilities across the City including: 8 equipment-based fitness centres, 12 indoor swimming pools, 7 outdoor pools and 13 arenas. These various recreational facilities are outfitted with a variety of equipment to support the effective delivery of recreational services for City residents. Recreation staff focus on the equipment assets and programs within these facilities whereas Facilities & Property Management is responsible for the building structure itself.

For Culture assets, there are five sections divided between Recreation & Culture and Parks, Forestry & Environment Divisions that are responsible for Culture Services; they are: Public Art, Culture Programs, Events & Media Production, Venue & Event Services as well as Heritage & Museums.

As of 2021 year-end, the Recreation & Culture Service Area has a replacement value of approximately $21.7 million, with an overall average condition rating of Fair and an average annual funding gap of $0.0 as shown in **Table 1**. For a detailed breakdown by Asset Class, refer to **Table 2.**

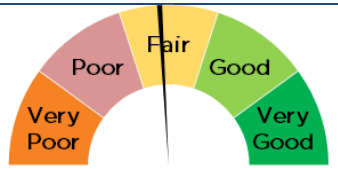
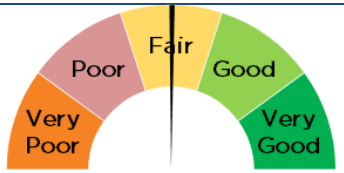
Table 1: Summary Overview of Recreation & Culture

Recreation & Culture	
Replacement Value	$21.7 Million
Average Condition	58%
Average Annual Funding Gap	$0.0

The Recreation & Culture Asset Management Plan includes the following sections:

- **State of the Infrastructure**: Outlines the current state of the infrastructure assets including what the City owns, the condition of the assets and the costs to replace them. This section also identifies the data limitations and data assumptions required to develop these quantities
- **Levels of Service**: Describes and measures the service performance and outcomes the City currently provides
- **Future Demand**: Summarizes the expected future demand of the Service Area services.
- **Lifecycle Management Strategy**: Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy**: Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves, and identifies any financial gap. 2022-2031 Capital Plan and 2022-2025 Operating Plan were utilized for this iteration
- **Continuous Improvement**: Documents the continuous improvements identified during the development of this Asset Management Plan and previous maturity assessments

Table 2 - Summary of Recreation Replacement Value, Condition, and Infrastructure Gap

Asset Class	Replacement Value (000s)	Condition	10-Year Average Annual Funding Needs (000s)	10-Year Average Annual Funding Gap (000s)
Recreation Equipment	$14,203		$1,805	$0.0
Public Art	$4,680			
Culture Programs	$855			
Events & Media Production	$1,634			
Venue & Event Services	$184			
Heritage & Museums	$102			

State of the Infrastructure

The following section provides a summary of existing Recreation & Culture assets that support the effective delivery of programs and services.

Asset Inventory & Valuation

A review of the current available data has been completed and several gaps were identified. In many cases, there was inconsistency in the type of assets collected across -similar asset classes. **Table 3** provides a summary of the major gaps in data quality that staff have identified for continuous improvement.

Asset Data Assumptions

The following assumptions were made, where necessary, in this iteration of the plan:

Replacement Cost – Replacement costs were developed based on a mixture of historical inflation or the latest unit costing based on present day values (PDVs) of tenders.

Estimated Useful Life (EUL) – useful lives align with the tangible capital asset (TCA) policy. Any unknown EULs were estimated based on the type of asset and suggested manufacture lifecycle.

Asset condition – Condition ratings were based on operational staff experience, remaining useful life, and asset performance, where available. Where physical condition information was unavailable or unreliable, an estimate based on age and remaining useful life (RUL) was used - as described in **Table 3**Error! Reference source not found.**. Table 3** shows the translation used to assign a 1 to 5 condition rating based on asset age (expressed as the percentage of its lifespan remaining), and a description for each rating.

Install Date – The install date was assumed to be the same as the acquisition date because capital items are typically put into service the same year they are procured. For any assets with missing in-service information, the condition was assumed to be “Fair-Good”.

Digital Audio Console at Hammerson Hall

Weights on Rack at Fitness Facility

Table 3: Condition Rating Scale

Condition Rating	% of Remaining Useful life (RUL)[1]	Description
Very Good: Fit for the Future	80% - 100%	The infrastructure in the system or network has greater than or equal to 80% of its remaining useful life. It is generally in very good condition, typically new or recently rehabilitated.
Good: Adequate for Now	60% - 79%	The infrastructure in the system or network has less than 79% (and greater than or equal to 60%) of its remaining service life. It is in good condition.
Fair: Requires Attention	40% - 59%	The infrastructure in the system or network has less than 59% (and greater than or equal to 40%) of its remaining service life. It is in fair condition.
Poor: Approaching End of Life	20% - 39%	The infrastructure in the system or network has less than 39% (and greater than or equal to 20%) of its remaining service life. It is in poor condition and mostly below operable state, with many elements approaching the end of their service life.
Very Poor: Requires Renewal	0% - 19%	The infrastructure in the system or network has less than 19% of its remaining service life. It is in very poor, unacceptable condition and should be replaced or rehabilitated.

[1] Remaining Useful Life (RUL) is calculated by subtracting the asset's current age from its estimated useful life. The RUL is the expected time remaining before an asset will need to be replaced.

Asset Data Limitations

Recreation assets are officially housed in a work order system, INFOR, but the quality and reliability of the data is limited due to obsolete and missing information. In addition, any maintenance or repair work records are currently not being captured in the system. Many of the user groups maintain their own asset inventories utilizing excel spreadsheets instead. This poses various challenges when it comes to the proactive management and replacement of recreation assets. Recreation staff are in the process of improving and formalizing their data governance by standardizing the type of attribute information collected against assets and holding the various user groups accountable to updating that information regularly within the INFOR system. Currently, the information varies greatly between user groups which ultimately affects staff's ability to prioritize the assets and services efficiently and reliably. In future iterations of this plan, Recreation staff will endeavour to break down the asset hierarchy into further detail for better accountability and transparency. Culture assets are primarily stored in excel spreadsheets and vary in terms of data quality and maturity depending on the user groups managing them.

Table 4 identifies a number of assets or asset types that have been excluded from this asset management plan iteration due to low data quality and/or ownership issues.

Table 4 - Assets not reported in this Asset Management Plan

Assets Excluded from the Asset Management Plan
• Artifacts & Museum Collections (over 25,000 assets considered invaluable and difficult to assign replacement value to) • Assets owned and managed by other Service Areas (ex: IT assets that are the responsibility of IT Services; Building components that are the responsibility of Facilities & Property Management) • Temporary or Digital Public Art assets • Facility Art Collection assets (ex: paintings and prints that are not appraised and catalogued) • Software • Assets with low data confidence or ownership issues

Asset Risk

Risk management has been identified as a continuous improvement item for Recreation & Culture Services as staff continue to formalize their approach to prioritizing assets and projects. Staff consider many factors such as the age, performance, available funding and criticality of the assets when prioritizing which assets to rehabilitate or replace. Staff recognize the need for a proper data governance framework and are starting to take steps towards this goal.

Dashboards

The following dashboards provide a summary of the current state of the infrastructure by each Asset Class. Each dashboard includes a breakdown of the number of active assets, their age, estimated useful life, and replacement value by Asset Type. A summary of the assets' average condition is illustrated in each dashboard through graphs.

A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete and accurate key asset information is as it relates to supporting asset management decision making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

Mississauga Valley's Pool - Kayaking Equipment

Asset Class:	Recreation Equipment	Replacement Value	$14.2 Million

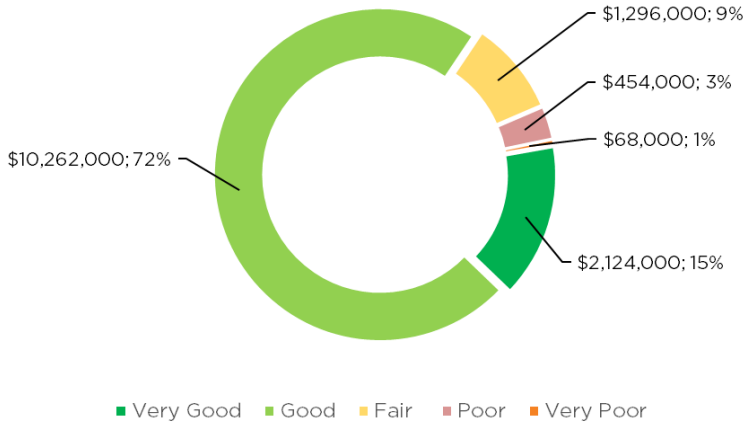
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	B

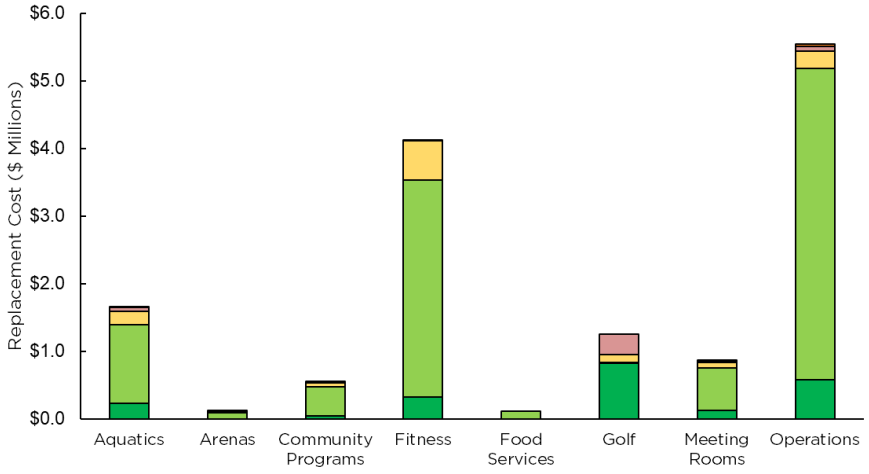
Clarkson Pool - HydroRiders

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Aquatics	669	Ea.	12	10-20	$1,660
Arenas	44	Ea.	3	10-20	$125
Community Programs	423	Ea.	4	10-20	$540
Fitness	980	Ea.	7	10-20	$4,116
Food Services	29	Ea.	-	10-20	$112
Golf	37	Ea.	11	10-20	$1,249
Meeting Rooms	285	Ea.	17	10-20	$860
Operations	1,753	Ea.	16	10-20	$5,541

Recreation Equiptment Replacement Value by Condition



Recreation Equiptment Condition by Asset Type



Asset Information

- Recreation has over 4000 recorded assets by their line of business in the Asset Type in the above dashboard.
- This inventory information currently resides in combination of recorded entries in Recreations system of record INFOR and excel spreadsheets
- Staff primarily utilize age-based condition for the Recreation equipment. Some considerations for asset usage, functionality and obsolesce are taken into account when staff are prioritizing replacements, but they are not reflected in the above condition ratings for the assets
- Where in-service date and age are missing, staff made educated estimates on the condition, with assets being mostly labelled as Good
- The condition of assets was primarily based on age and remaining useful life, with some exceptions or overrides based on staff knowledge of asset performance/condition
- As a continuous improvement item, staff will need to refine their data quality to ensure that assets are captured and updated regularly and that replacement values are more accurate

Asset Class:	Public Art

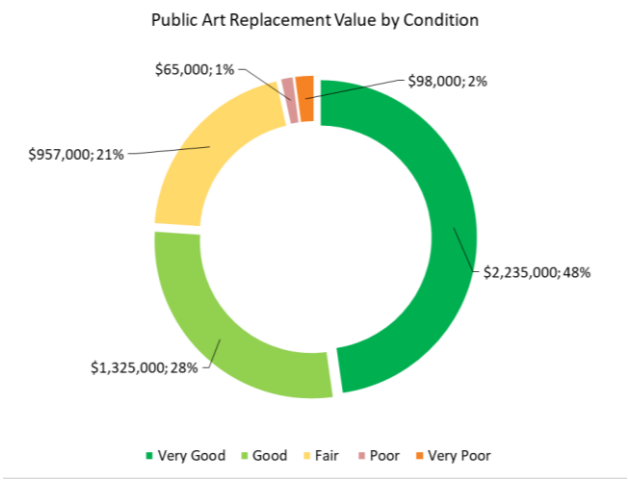
DATA QUALITY

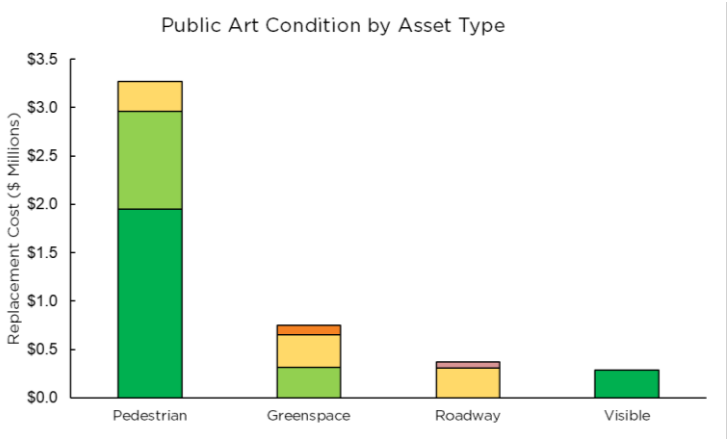
Asset Inventory	Condition	Replacement Value
A	B	A

Contemplating Child by Ferruccio Sardella

Replacement Value **$4.7 Million**

Asset Type	Asset Sub-Types	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Pedestrian	Bronze	1	Ea.	2	20	$350
	Multimedia	11	Ea.	6	20	$1,339
	Plastic	1	Ea.	4	20	$100
	Steel	4	Ea.	4	30-40	$1,190
	Stone	2	Ea.	20	50	$292
Greenspace	Multimedia	1	Ea.	34	20	$98
	Natural	1	Ea.	2	N/A	$10
	Steel	3	Ea.	18	30-40	$642
Roadway	Multimedia	1	Ea.	3	20	$65
	Steel	1	Ea.	8	30-40	$308
Visible	Multimedia	1	Ea.	35	20	$286





Asset Information

- Public Art includes 27 permanent public art pieces throughout the City of Mississauga that are well inventoried. Replacement values are based on insurance appraisals that are conducted regularly
- Depending on the material type that the Public Art asset is composed of, the estimated useful life will vary greatly.
- The condition of these assets is based on a mixture of age-based assessment as well as staff inspections. Depending on the asset, those inspections are conducted quarterly, yearly, or as required based on staff expertise. As a result, the data quality index for Condition is at a “B”

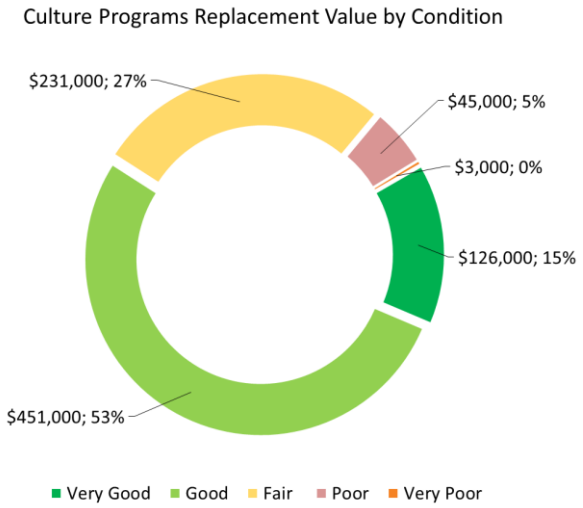
Asset Class:	Culture Programs	Replacement Value	$0.9 Million

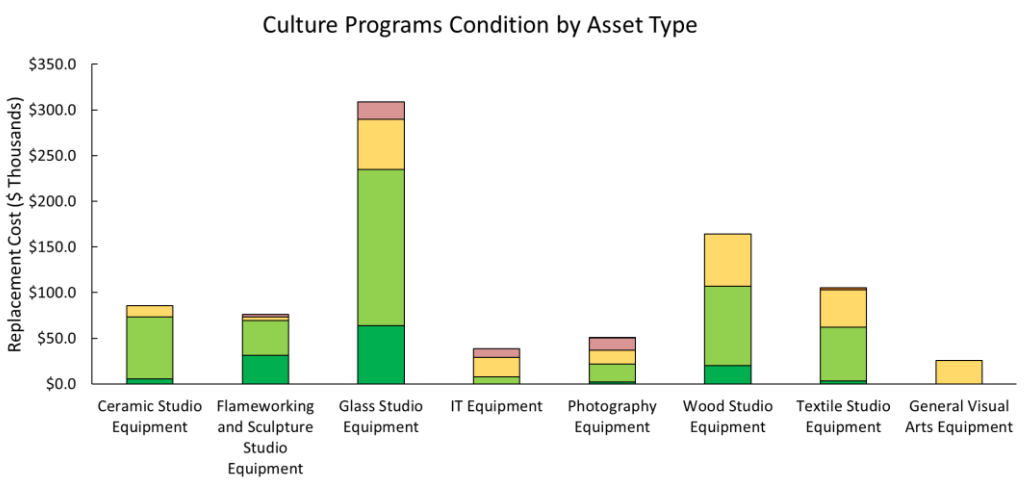
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	B

Adults participating in digital arts program

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Ceramic Studio Equipment	25	Ea.	13.9	10-20	$86
Flame-working and Sculpture Studio Equipment	22	Ea.	10.2	10-40	$76
Glass Studio Equipment	39	Ea.	11.4	5-30	$309
IT Equipment	33	Ea.	4.5	5-8	$38
Photography Equipment	37	Ea.	14.1	5-20	$51
Wood Studio Equipment	31	Ea.	13.4	6-30	$164
Textile Studio Equipment	56	Ea.	8.3	8-20	$105
General Visual Arts Equipment	23	Ea.	8.0	10-20	$26





Asset Information

- Culture Programs has 266 assets that are broken out by their function as shown by the Asset Types in the dashboard above. These assets are currently inventoried in an excel spreadsheet with critical attribute information, such as in-service date, description, quantity and replacement value, tagged against them. Replacement values were based on a mixture of inflated historical costs and current market prices, as available.
- The condition of assets was primarily based on age and remaining useful life, with some exceptions or overrides based on staff knowledge of asset performance/condition.
- As a continuous improvement item, staff will need to refine their data quality to ensure that assets are captured and updated regularly and that replacement values are more accurate.

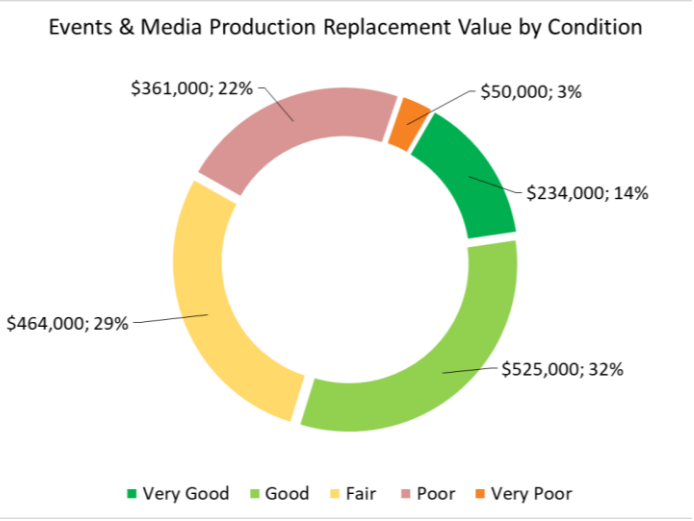
Asset Class:	Events & Media Production	Replacement Value	$1.6 Million

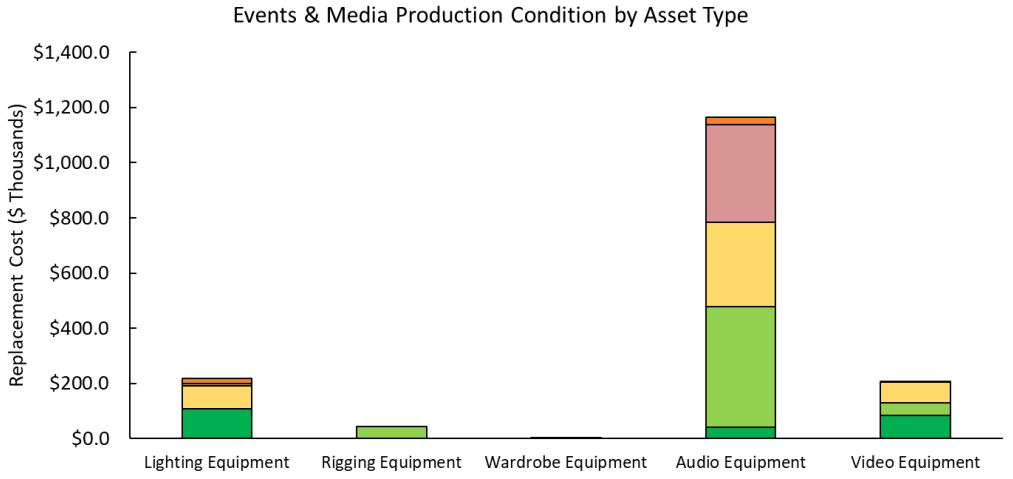
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	B

Main stage at the Living Arts Centre

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Lighting Equipment	1334	Ea.	6.0	7-25	$219
Rigging Equipment	4	Ea.	7.0	30	$43
Audio Equipment	382	Ea.	7.0	5-25	$1,164
Video Equipment	89	Ea.	5.0	7-20	$206
Wardrobe Equipment	2	Ea.	11.0	15	$2





Asset Information

- Assets within the Events & Media Production class are broken out by function as shown in the dashboard. The asset inventory is stored in an excel spreadsheet that tracks the location, age, quantity and purchase cost of the assets. As indicated by the data quality index, the inventory, condition, and replacement values are at a moderate level of data confidence. Staff will continue to refine the inventory to ensure that all active assets are captured accurately and that the replacement values are based on current market prices.
- Condition was approximated solely based on age and remaining useful life. For assets where the in-service date was missing or deemed inaccurate, a condition of “Fair-Good” was assumed.

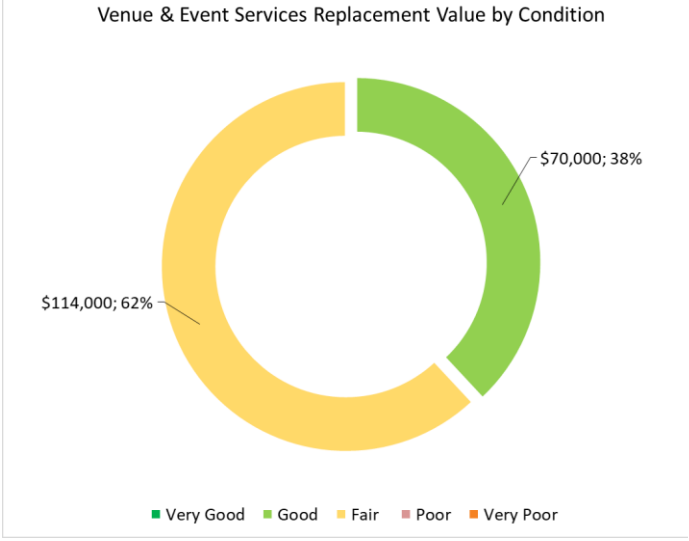
Asset Class:	Venue & Event Services	Replacement Value	$0.2 Million

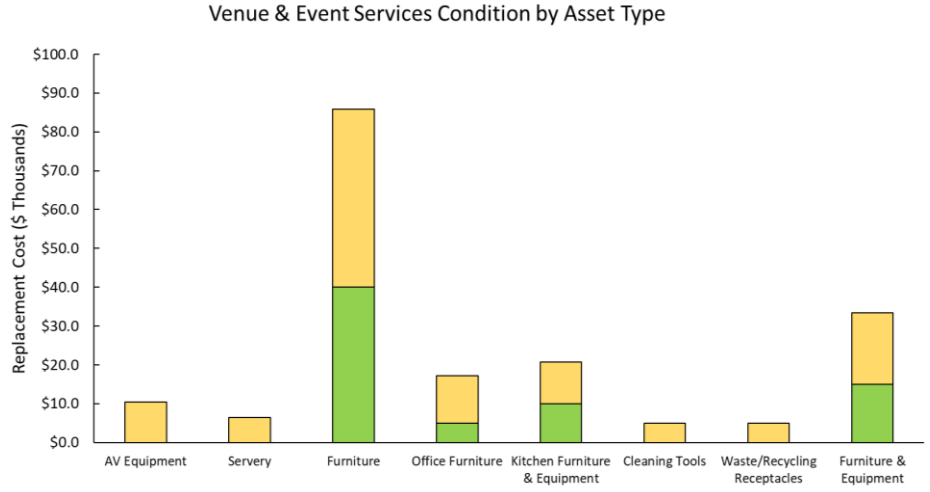
DATA QUALITY

Asset Inventory	Condition	Replacement Value
D	D	B

Servery in the Small Arms Inspection Building

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
AV Equipment	36	Ea.	N/A	10-20	$10
Servery	8	Ea.	N/A	10-20	$7
Office Furniture	212	Ea.	N/A	10-20	$17
Kitchen Furniture & Equipment	82	Ea.	N/A	10-20	$24
Cleaning Tools	37	Ea.	N/A	10-20	$5
Waste/Recycling Receptacles	39	Ea.	N/A	10-20	$5
General Furniture & Equipment	755	Ea.	N/A	10-20	$116





Asset Information

- Venue & Event Services manage various asset types within five main Cultural facilities in Mississauga; they are: Celebration Square, Living Arts Centre, Paramount Fine Foods Centre, Small Arms Inspection Building and Meadowvale Theatre. For this iteration, due to data availability and confidence, only the assets within the Small Arms Inspection Building and Meadowvale Theatre have been captured. Staff will continue to refine their data in future asset management plan iterations. As a result of these data gaps, the data quality index is at a “D” for the asset inventory.
- The condition for all assets was assumed to be “Fair-Good” as no formal condition assessments are conducted at this time, and the majority of assets lacked an in-service date in order to approximate the age. This has been identified as a continuous improvement item as staff advance on their asset management journey.
- Replacement values were based on a mixture of historical inflation and available current-day market prices.

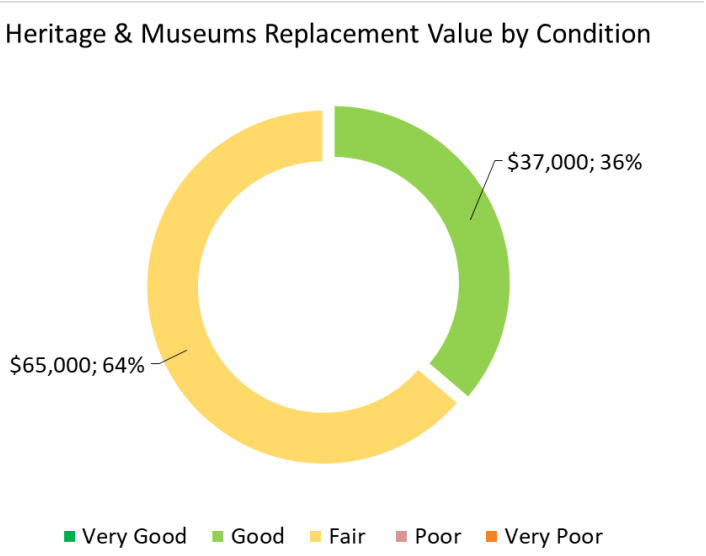
Asset Class:	Heritage & Museums	Replacement Value	$0.1 Million

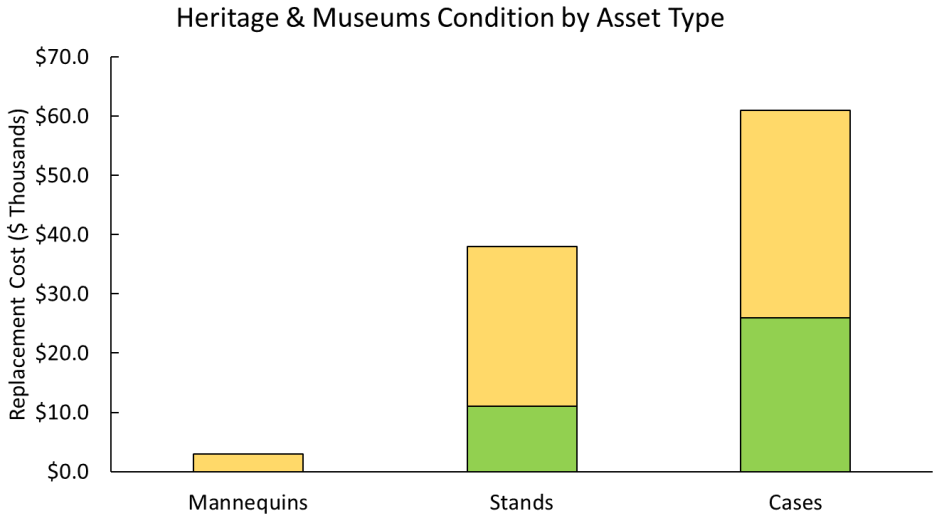
DATA QUALITY

Asset Inventory	Condition	Replacement Value
C	C	A

Benares Historic House

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Mannequins	12	Ea.	N/A	5-10	$3
Stands	19	Ea.	N/A	5-10	$29
Cases	14	Ea.	N/A	10	$70





Asset Information

- The Heritage & Museums asset class only includes mannequins, stands and cases. Although artifacts are also part of this division, they are considered priceless and have not been factored into this asset management plan. Museum collections, which are also held by this division, were not reviewed as part of this assessment as their value and lifecycle are determined through Museum standards and processes.
- The condition for all assets was assumed to be “Fair-Good” as no formal condition assessments are conducted at this time, and the majority of assets lacked an in-service date in order to approximate the age. This has been identified as a continuous improvement item as staff advance on their asset management journey.
- Replacement values were based on current market prices.

Levels of Service

The purpose of this section is to describe the levels of service (LOS) that City staff are currently providing and aim to provide for the Recreation Service Area.

LOS are the outcomes that an organization intends to deliver to its customers. They should also be utilized as key drivers for making decisions and future investment in infrastructure assets. As such, LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its ratepayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations. Performance measures indicate what the customers and stakeholders experience from the service that is delivered.

Table 5 presents a summary of the approach to describe levels of service and performance measures. This is based on examples from the 2015 International Infrastructure Management Manual (IIMM) which was written by a consortium of asset management professionals and is widely accepted as the guiding document to implement the ISO 55000 standard for infrastructure asset management.

Table 5 - Level of Service Criteria

Concept	Definition
Levels of Service (LOS)	Specific objectives of the service the organization intends to deliver, from the customer point of view. LOS provide the link between higher level corporate and asset management objectives with more detailed technical and operational objectives.
LOS Attributes	LOS attributes of the overall service that are relevant and meaningful to stakeholders.
Performance Measures	Criteria that can be measured and provide an indication of how the organization is doing in delivering the intended LOS form performance measures. They can be defined as: Customer performance measures - Measures describing how the customer receives or experiences the service. Technical performance measures -Technical criteria the organization can measure to indicate how the service is being achieved.
Future Trends	The anticipated trend for the performance metric over the next five years, assuming there is no significant change to the current lifecycle management activities.

Level of Service Methodology

City staff followed the approach described below to identify key LOS objectives and appropriate performance measures.

Identify Stakeholders

Identify the stakeholders who are affected by the delivery of Recreation & Culture services. The stakeholder may use the service, rely on the service to provide their own service, regulate the service, depend on the service as part of their community service provision mandates, or connect to the service.

LOS Objectives and Attributes

Determine the key expectations (LOS objective) of each stakeholder. One or more service attribute is identified for each statement. It is important to note that it is reasonable that the same attribute would apply to more than one expectation.

LOS Measures

LOS measures should identify an appropriate measurement for an attribute and describe how well the City is delivering that service attribute (e.g., how safe/reliable/affordable the service is). A useful LOS measure is quantitative and facilitates the development of “SMART” performance targets (that is, performance targets that are specific, measurable, achievable, relevant, and time-bound). The LOS measure identifies the ‘thing’ that the City should measure.

LOS measures can be grouped into the following categories:

- **Technical LOS measures:** Technical criteria the organization can measure to indicate how the service is being achieved.
- **Customer LOS measures:** Measures describing how the customer receives or experiences the service.

Current Performance

For the LOS measures shown in **Table 6**, data is based on 2021 year-end, unless otherwise stated. The LOS measures provided are predominantly from an asset planning and an operational perspective. City staff have plans to review, formalize and update the operation and maintenance LOS and as such there is potential for additional LOS measures in future asset management plans.

Table 6 - Recreation Levels of Service

LOS Attribute	LOS Objective	Customer LOS Measure		Technical LOS Measure	
		Performance Measure	Current Performance (2022)	Performance Measure	Current Performance (2022)
Capacity	Providing an appropriate number of recreation facilities and amenities to ensure facilities have capacity to meet demand	• Wait lists for programs • # of programs offered • Number of facilities within the City which provide readily available equipment	• Request for Program Spaces (not individuals) - 17.6K • Programs Offered – 14,185 • Number of Facilities - 12 major and 12 minor recreational facilities across the City including: 8 equipment-based fitness centres, 12 indoor swimming pools, 7 outdoor pools and 13 arenas	• Average Program Fill Rate for Recreation programs • Service level provisions • # of recreation facilities per 81,000 residents	• Program Fill Rate – 81% • Service Level Provision – 1:81,200
Performance	To ensure efficient and well-maintained infrastructure that supports the wellbeing of the community	Average corporate rating of Recreation facilities	Overall Customer Satisfaction -91%	% of assets in fair or better condition (by Asset Class)	• Recreation Equipment: 79% • Public Art: • Culture Programs: • Events & Media Production: • Venue & Events Services: • Heritage & Museums:
		Description of the lifecycle activities staff undertake to maintain assets in a state of good repair	Culture Services staff undertake maintenance, rehabilitation and replacement activities based on the criticality of the assets, their condition and available resources. **Table 9** provides examples of the different lifecycle activities based on the asset type.	% of assets that have exceeded their estimated useful life (Asset Class)	• Recreation Equipment: • Public Art: • Culture Programs: • Events & Media Production: • Venue & Events Services: • Heritage & Museums:
Affordability	Recreation services are maintained cost-effectively and are affordable to users	N/A	N/A	• Annual Operating & Capital budgets • O&M costs per capital • % Increase of membership fees (3 year avg) • Actual vs Target Capital Reinvestment Rate[2]	• Operating Budget – $28.3M • Capital Budget -$29.8M • % Annual Increase – 3%

[2] Actual vs Target Reinvestment Rate measures how much funding is available to meet state of good repair (SOGR) lifecycle needs (Actual) versus how much funding is required to meet those same lifecycle needs (Target) in order to achieve the desired service levels.

Future Demand

The City of Mississauga has an estimated population of about 718,000 residents (Census, 2021) and is projected to continue to grow in the coming years. The continuous growth of the City will impact the performance and sustainability of Recreation & Culture services. Staff consider population changes and other demand drivers when determining the appropriate service level provisions for indoor and outdoor recreational assets. **Table 7** provides an example of the desired service level provisions, by Service Area (zones), for equipment-based fitness centres. **Figure 2** provides a map to illustrate those desired service level provisions.

These service level analyses are completed for all the user groups within each line of business to better inform asset infrastructure needs. For example, in Service Area (zone) 1 – 1 community centre will be required for a population of 182,000 estimated people in 2028 based on growth and community need.

Table 7: 2019 Future Directions Service Area Provision

Service Area	Supply	2019 Provision Level	2028 Provision Level
1	1	1 : 172,000	1 : 182,000
2	2	1 : 75,500	1 : 79,000
3	1	1 : 32,000	1 : 33,000
4	2	1 : 51,000	1 : 53,000
5	3[3]	1 : 99,000	1 : 72,300
6	13[3]	0	1 : 116,000
City-Wide	**10**[3]	**1 : 94,875**	**1 : 81,200**

Note: Table only includes equipment-based fitness centres

[3] Reflects 2028 supply and service level with recommended club-format fitness centre additions at the Burnhamthorpe and Carmen Corbasson Community Centres

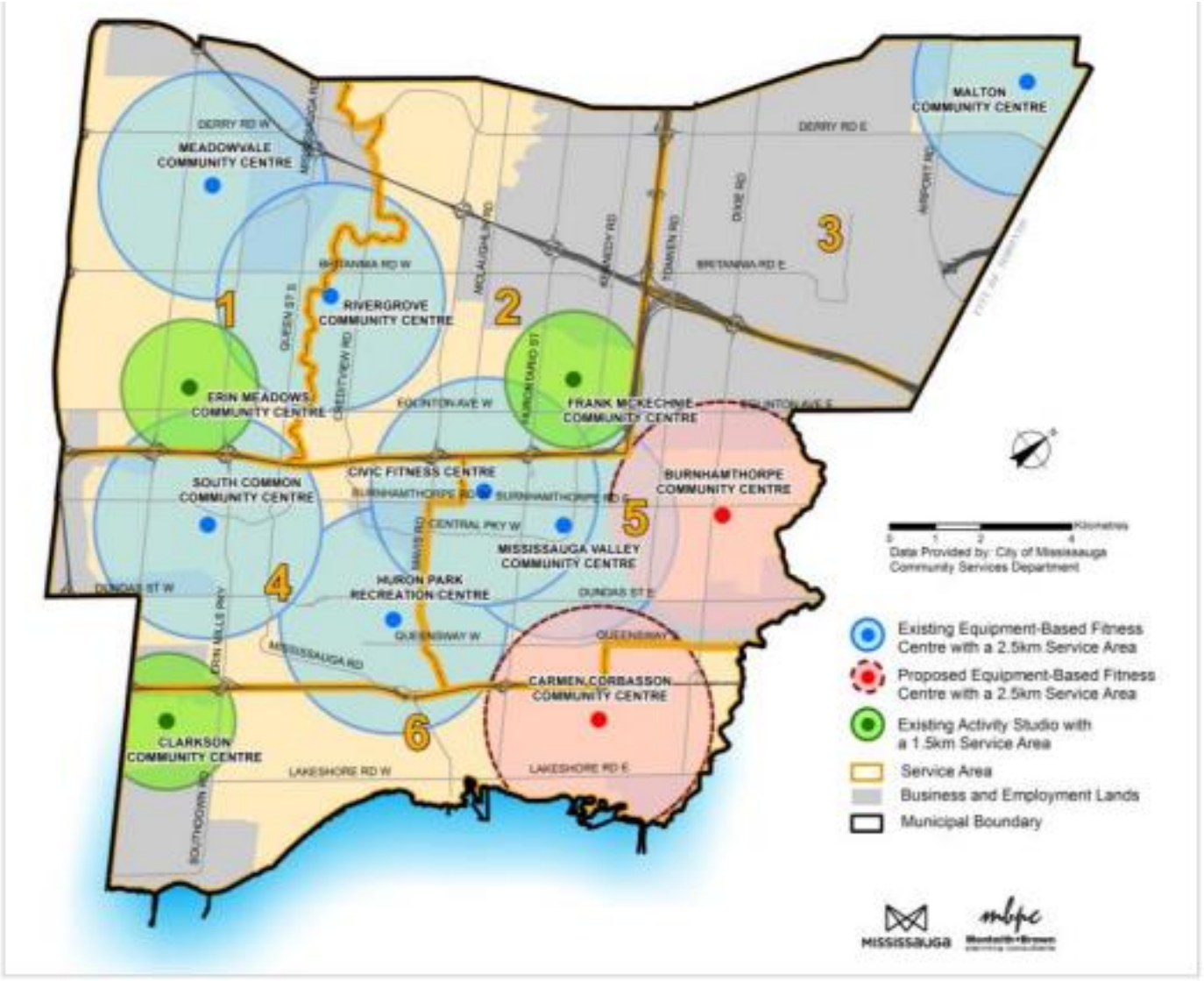
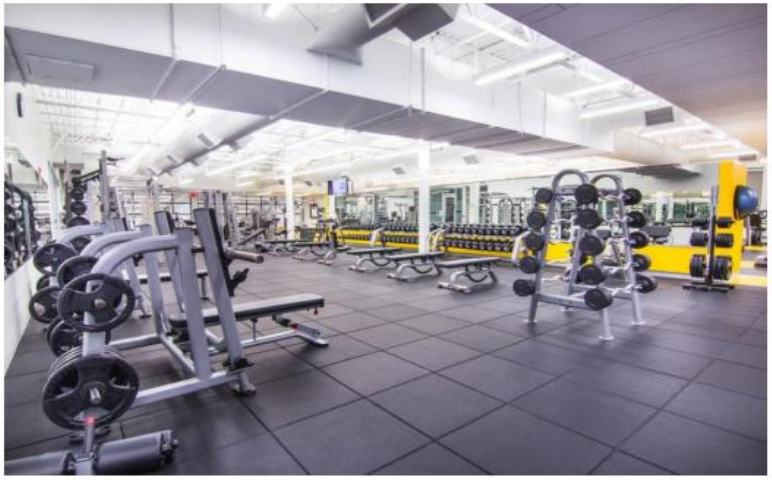


Figure 1: 2019 Future Directions Service Area Provisions Map

The Culture Division and the City of Mississauga's mission is to grow and support the creative sector, deliver cultural services and enable high quality cultural experiences. The Culture Plan guides all work undertaken by the Culture Service units. The Master Plan provides direction for investment in the City's cultural resources and outlines priorities for how arts, culture and heritage can be elevated in Mississauga beyond our borders. The Culture Plan and Cultural Policy drive the City's cultural goals. These guiding documents are brought to life through a number of priority services that celebrate traditions, stimulate the creative economy and improve quality of life and public places for residents and visitors.

There are eight guiding principles identified for Culture Services; they are:

- Improve livability
- Support multiculturalism and interculturalism
- Foster creative industries
- Build connections
- Build shared identity
- Ensure accessibility
- Support sustained cultural community activity
- Advance truth and reconciliation



Fitness Centre at Meadowvale Community

It Takes a Community to Build the Story by Jay Havens

Demand Drivers

Factors affecting demand include population and demographic changes, ongoing work on truth and reconciliation, technological advancements, and climate change. Understanding these demand drivers enables staff to strategically manage services and adapt to changing circumstances. A summary of some of the major internal and external drivers that affect Recreation & Culture services is shown in **Table 8.**

Table 8 - Demand Drivers for Recreation & Culture Services

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Demographic & Population Changes	With the population and demography of the City of Mississauga constantly evolving so do the demands and service level needs of the public. For example, an increase in the youth or senior population can drive demand for specific recreational programs and equipment tailored to these demographics' preferences and needs Changing demographics and increased diversity in many communities and neighbourhoods will affect Culture Services. There has been growing recognition in Canada of the lack of diversity in mainstream arts, culture and heritage experiences	Staff evaluate service level provisions through regular public engagements, service requests, annual business plan, as well as the Future Directions Plan review every four years. Considerations are made for the size, location, and usage rate of recreational facilities when determining the feasibility of service improvements (e.g. adding additional fitness equipment at high usage fitness centres). Future growth will result in more pressures where space is limited.	To meet the demands or needs of the public with regards to appropriate and sustainable service level provisions puts pressure on the City from an operational, economic and regulatory perspective. For example, building and equipping a new hub for youth is an increased pressure on City budget but one that was required to meet community need Changes in demographics and population may affect the scope, quantity and type of cultural services provided by the City, with limited funding and resources.	Staff quantify the costs and risks associated with enhancing or modifying the types of services they maintain through their asset management plans, master plans and capital projects Staff evaluate service level provisions through regular public engagements, annual business plan and the Culture Plan (which is reviewed every four years). Staff quantify the costs and risks associated with enhancing or modifying the types of services they provide

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	and also in the make-up of administrations, instructors, presenters and creators of arts, culture and heritage	Changing demographics and increased diversity in many communities and neighbourhoods will influence how Culture Services responds and delivers to diverse perspectives and populations when building an inclusive community that is open to all.		
Cultural and Lifestyle Shifts	Changes in cultural norms and lifestyle preferences can drive demand for specific recreational activities. For example, growing awareness of health and wellness leads to increased demand for fitness related programs and equipment.	Staff evaluate service level provisions through regular public engagements, service requests, annual business plan, as well as the Future Directions Plan review every four years.	There is additional pressure on the City from an operational, economic, and regulatory perspective to meet the evolving needs of the residents. For example, COVID brought on the pressure of providing virtual fitness programming which required additional technical equipment	Staff quantify the costs and risks associated with enhancing or modifying the types of services they maintain through their asset management plans, master plans and capital projects
Environmental Awareness	Growing environmental consciousness encourages the development of eco-friendly recreation programs & equipment.	Procuring equipment from vendors who provide more eco-friendly options with sustainable materials	Anticipated increased environmental awareness in future generations could lead to increased demand for a higher service level	Monitor changes in public satisfaction (e.g., survey, Business Plan) of recreation services and consider adjusting

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	This might involve utilizing sustainable materials for equipment or promoting outdoor activities		(e.g., greater expectations that the City make additional investment) for environmentally friendly equipment	investment accordingly to meet desired level of service.
Government Initiatives	Supportive government policies and incentives can influence the expansion or enhancement of recreation services. For example, subsidies for specific programs might lead to increased accessibility and participation.	Annual review of the various grants and subsidies available for Recreation and its residents.	Collaboration with government initiatives strengthens services, potentially expanding the reach of recreational programs and equipment to broader audience. It relieves economical pressure from Recreation's operating and capital budgets	Regularly assess the impact of government initiatives on recreation programs by implementing tracking mechanisms, conducting surveys, and analyzing participation data. In addition, fostering collaboration with government agencies and community partners can be of great benefit in receiving grants/subsidies.
Technological Advancements	Embracing technology in recreation program and equipment not only benefits the residents but also City of Mississauga in reducing operational costs and better asset management. For example, integration of technology into recreation equipment such as smart fitness trackers or more accessibility features can	Newer technologies provide more opportunities and competition, thereby allowing staff to diversify their lifecycle interventions. Technology will provide more opportunities for creative and interactive art pieces, such as virtual reality or	The ever-changing technological landscape puts pressure on Recreation's limited budget and staff resources. Staff try to adapt and utilize best industry practice, tools, and techniques in order to manage their assets effectively and sustain desired service levels. The ever-changing technological landscape	Conduct regular cost benefit analysis of new technology and potential service enhancements. Staff conduct regular cost-benefit analyses of new technology and potential service enhancements. Staff also regularly investigate new opportunities and technologies to deliver

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	attract participants who are drawn to modern and innovative experience. Public Art staff are constantly considering new trends that emerge within the artworld, such as digital exhibits or interactive exhibits, and bringing them to the City. Events & Media Production staff track changes in technology when it comes to audio, video, lighting equipment and more to optimize service delivery.	augmented reality, which will create unique cultural experiences. Technological advancements can potentially provide City staff with more options to diversify their lifecycle interventions in a more efficient and cost-effective manner.	puts pressure on Culture Service's limited budget and staff resources. Inability to meet customer expectations and demands for state-of-the-art technology. Using unsupported assets may increase risk of financial consequences and operational delays.	unique cultural experiences at the City.
Climate Change[4]	Climate change poses various challenges regarding how Public Art is created, maintained, and experienced. Increased temperatures may also lead to an increased demand for	Climate change continues to impact and challenge municipal service delivery. Increases in temperature by approximately 3.4°C. The frequency of 100-year extreme rainfall and overland flooding	An increase in the frequency and severity of storms and precipitation events may affect the longevity of Public Art assets and expedite their deterioration (ex: rusting, corrosion, physical	Staff consider the impacts of climate change on assets during the capital planning process. Public Art staff work closely with the artists to ensure new exhibits are durable and sustainable.

[4] Climate Risk Institute (CRI), Emmons & Olivier Resources Inc. (EOR), Nodelcorp, and Climalogik. 2023. Climate Change Risk and Adaptation Assessment for Asset Management. Prepared for the City of Mississauga, Ontario.

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
	indoor spaces for cultural activities including registered educational programs and outdoor day camps. It may also increase the demand for a longer programming season in the summer and shoulder seasons.	events is expected to be three times more likely. The frequency of freezing rain events for the typically coldest months could increase in southwestern and south-central Ontario by the 2050s	damages), thus affecting service levels. Adapting to increased temperatures and extreme weather events may affect the quality and sustainability of Culture programs and services	Staff also consider the procurement of environmentally friendly assets or more sustainable materials.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service delivery outcomes. A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services, but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Acquisitions – Expansion/Rebuild/New
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Operations and Maintenance (O&M)
Operations & Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Renewal & Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Table 9 provides a summary of the different strategies and actions that staff employ for their applicable lifecycle activities along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 9: Current Lifecycle Management Activities

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Incomplete Lifecycle Activities
Non-Asset Solutions	All	•Future Directions Master Plan •Recreation Business Plan •Development Charge (DC) Studies •Feasibility Studies	•Inability to identify and record asset condition to inform decision-making for maintenance and capital programs •Inability to track service requests and works orders, to understand capital/maintenance work has been completed and that customer needs have been addressed •Strategic planning/budgeting, project prioritization and capital costing is not effective without Master Plans and other studies to inform long-term decision making •Without DC studies the City cannot collect funding for growth-related projects and satisfy legislated requirements

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Incomplete Lifecycle Activities
Operations & Maintenance	All	•Ensuring front line and operational staff is trained and qualified in how each equipment functions to be of assistance to customers •Ensuring equipment and facility is well maintained ie proper cleanliness •Maintaining safety of users by minimizing on site incidents that threaten the safety of our customers and staff •Current practice is to conduct preventative and routine maintenance to prolong the life of assets •Preventative checks on equipment are done at minimum once a year •Routine maintenance is based on manufacturer specifications •Demand maintenance is also conducted when required to bring asset back to its functional state in case of unexpected failures •Condition assessments are conducted every two years on all cardio equipment.	•Damage to equipment due to improper use resulting in excess repair costs and premature asset failure •Potential loss of customers and revenues due to poorly maintained equipment/facility •Health and safety costs going over budget •Loss of reputation •Potential injury/lawsuit •Insufficient resources available to complete a series of unplanned, urgent work requests that are submitted in close succession •Unable to complete planned maintenance activities while managing reactive maintenance activities •Premature asset failure due to incorrectly planned maintenance activities •Emergency or unscheduled closures resulting in excessive replacement costs •Service disruption due to asset failures
Renewal/Rehabilitation	All	•Replacing equipment parts such as treadmill belt or motor •Various facility improvements such as maintenance of gymnasium floors, shower tiles, pool filters	•Incorrect assumptions regarding expected useful life after rehabilitation •Deferral cost of not rehabilitating items on schedule •Degradation of natural asset •Facility closures •Loss of revenues •Injury/lawsuits

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Incomplete Lifecycle Activities
Replacement	All	•Replace assets based on asset performance and staff experience, as required •Replace cardio equipment every 5 years based on actual asset usage and run life of asset •Replace strength training equipment every 10 years •Assets are replaced when they reach their end of useful life or when their performance/condition no longer meets service requirements (functionality or capacity issues). •Assets may be replaced proactively if newer or more efficient options are available that optimize cost and performance or if vendors no longer support older asset models.	•Service disruption/loss of service •Loss of reputation •Loss of revenues •Increased budget impact •Injury/lawsuits
Disposal/Demolition	All	•Decommission at End of Life if asset is no longer required •Sell or donate assets •With fitness equipment, the goal is to get maximum salvage value of the decommissioned assets to reduce the total lifecycle cost of the asset. This is done through a trade in program where the original vendor of purchase allows the City to trade in old equipment for its current day value.	•Failure to decommission assets properly can lead to: •Higher capital budget costs •Challenges the City's "Green" strategic pillar that supports commitment to the environment
Expansion/Rebuild/New	All	•New and expanded assets are prioritized within master plans and are funded through development charges. New assets are selected to best suit locational needs and service level targets. •New and expanded assets are reviewed and prioritized within the Culture Master plan	•Asset failure as a reflection of incorrect asset size, environmental tolerance, cultural tolerance etc. •Service is prematurely expanded •The ability to afford, operate and maintain any future assets

Activities	Asset Class	AM Practices or Planned Actions		Risks Associated with Incomplete Lifecycle Activities
Operations & Maintenance		Public Art	• Culture staff work with the artists to maintain the art pieces. However if the artists are unable to support the art piece, Culture staff develop a contingency plan to operate and maintain the art piece internally. • Conservator evaluations as required. • Detailed condition assessments by third parties as needed.	•
		All	• Assets are inspected on a regular basis depending on their criticality and performance demands.	• Premature asset failure due to lack of maintenance activities. • Impact to service levels due to delayed operations & maintenance, potentially requiring more drastic and costly rehabilitation or replacement intervention
		Public Art	• Depending on the Public Art asset, some undergo: annual inspections; power washing to clean dirt and debris; anti-graffiti protective coating every five years; bronze waxing every 2-3 years; sealer/stone enhancer; or other specialized work.	
		Culture Programs	• Annual maintenance on Glass Furnaces by City staff	
		Events & Media Production	• Preventative Maintenance is conducted twice a year on Living Arts Centre equipment. City staff conduct some of the work while the rest is allocated to third party technicians.	

Lifecycle Needs vs Budget

As per O.Reg 588/17, a 10-year forecast of the lifecycle needs or activities that need to be performed to maintain current level of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies and third-party recommendations, or other considerations.
- The costs of any Non-Asset Solutions, Acquisition/Expansions/Rebuilds, and Operations & Maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget assumptions

- 10-year Operating Budget consists of 2022-2025 operating budget and assuming Year 4 as annual budget for Years 5-10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Overhead costs

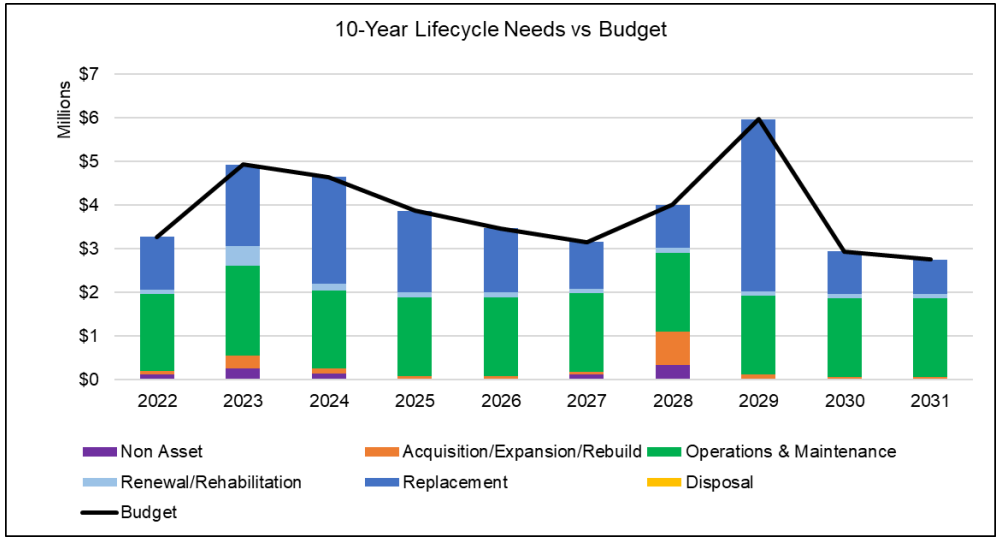
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget except renewal, rehabilitation and replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

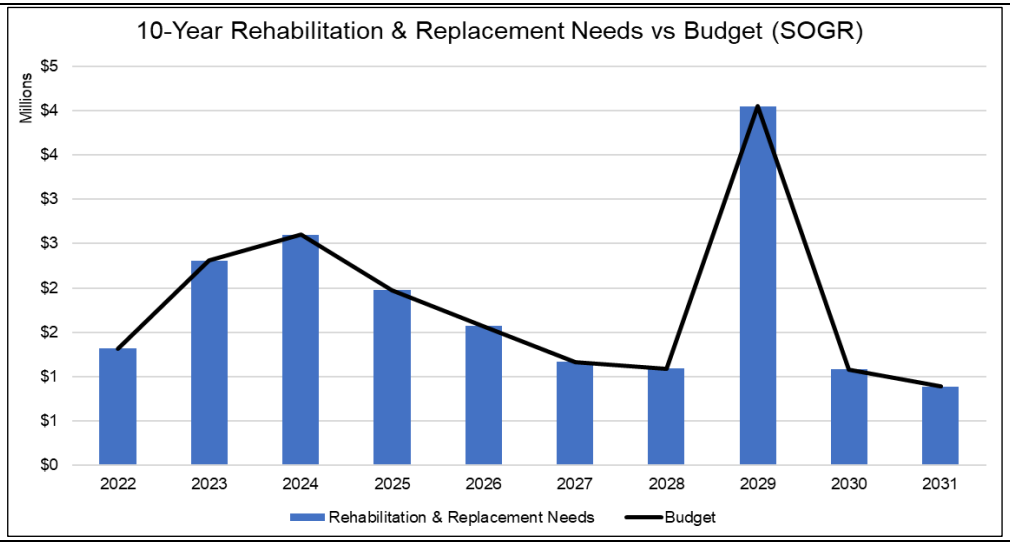
To illustrate the 10-year forecast, two graphs have been created by Service Area and by each Asset Class in this section:

- Total Lifecycle Needs vs Budget Graph
- Rehabilitation & Replacement Needs vs Budget (State of Good Repair[5]) Graph.

[5] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision making process for allocating limited capital funds

Recreation & Culture Services

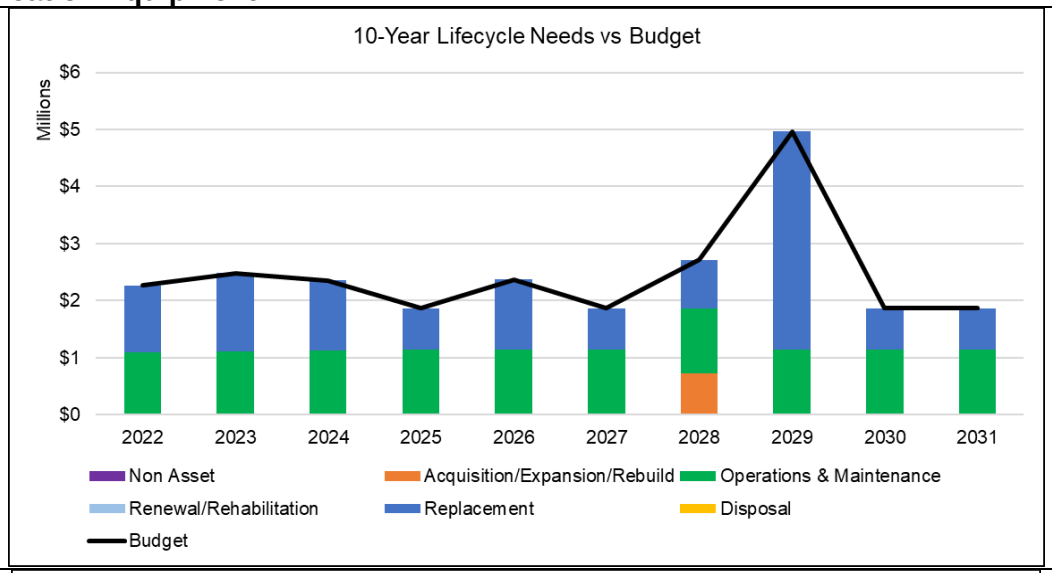


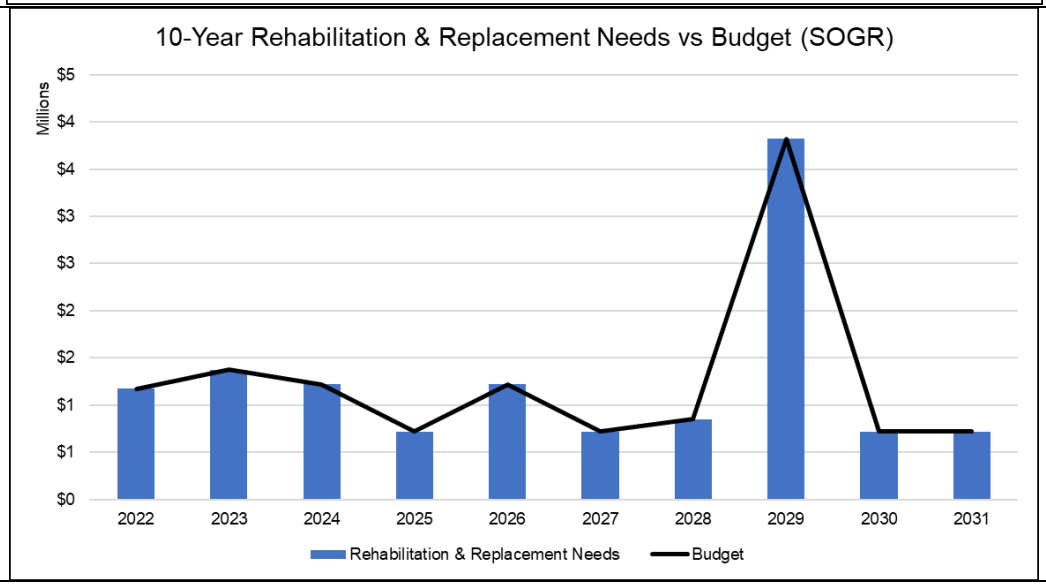


Lifecycle cost summaries are derived from the Operating and Capital budget and forecasts. It is prepared at the service area level and depicts the investment requirements by the lifecycle planned activities.

Acquisition refers to installation of new asset. Asset replacements are capital activities. Operations and Maintenance is primarily funded through the operating budget.

Recreation Equipment



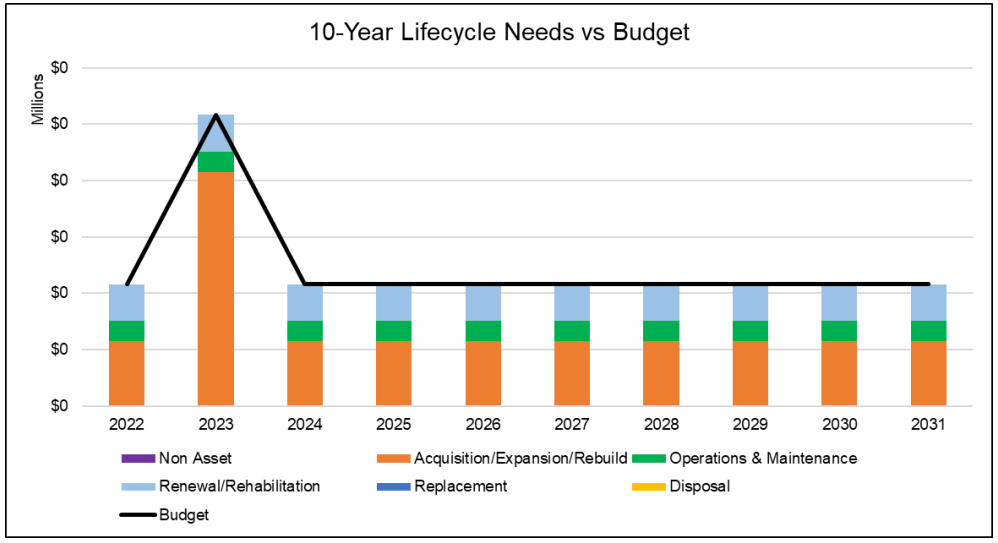


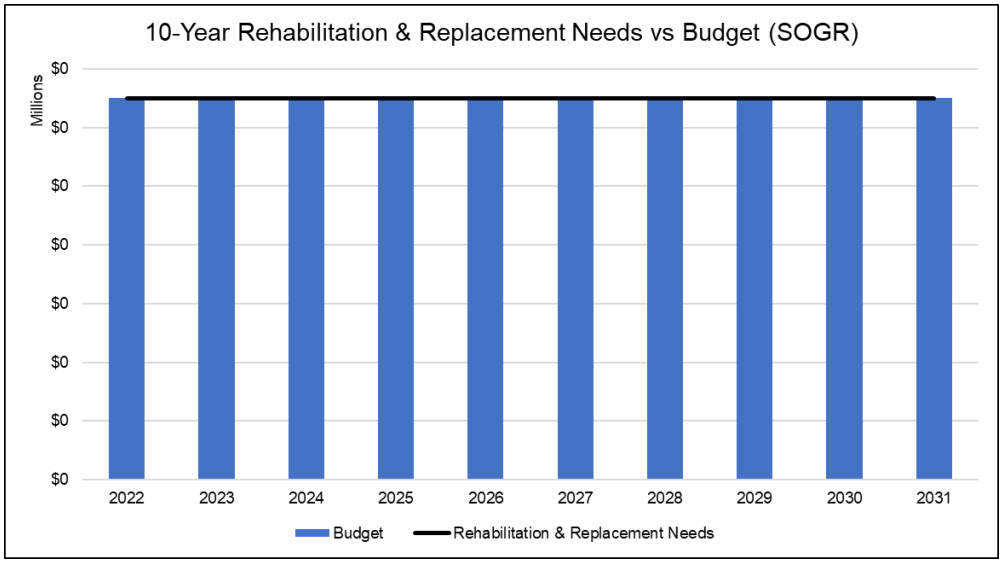
The graph shows peaks in 2028 and 2029 which indicates major rehabilitation and replacements that will need to be done to our facilities (an example would be the Cooksville design and construction in 2028 and PFFC Dome replacement in 2029).

A majority of equipment will require major renewals at the end of this 10 year cycle with many needing replacements in 2029.

It is important to note that costs have grown significantly since 2022 and budgets have remained static.

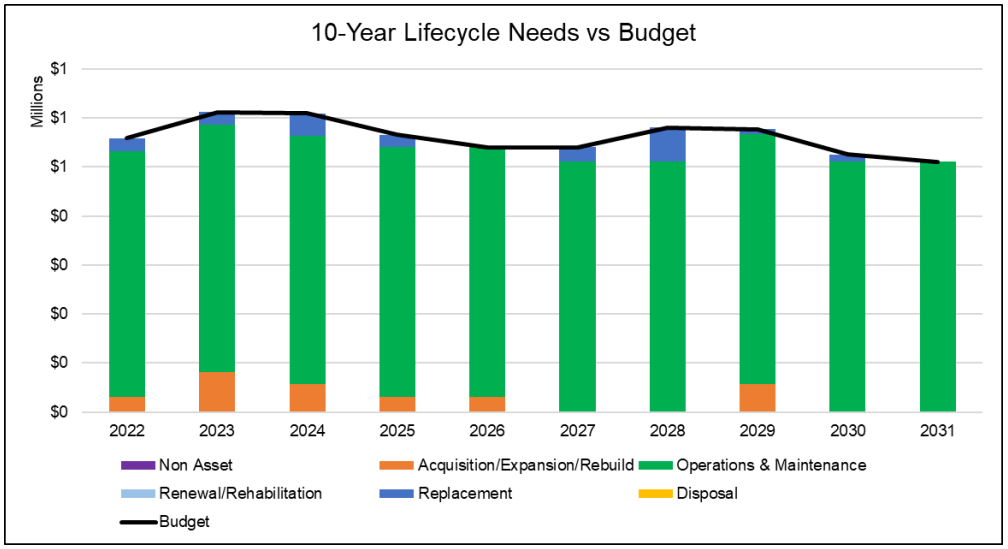
Public Art

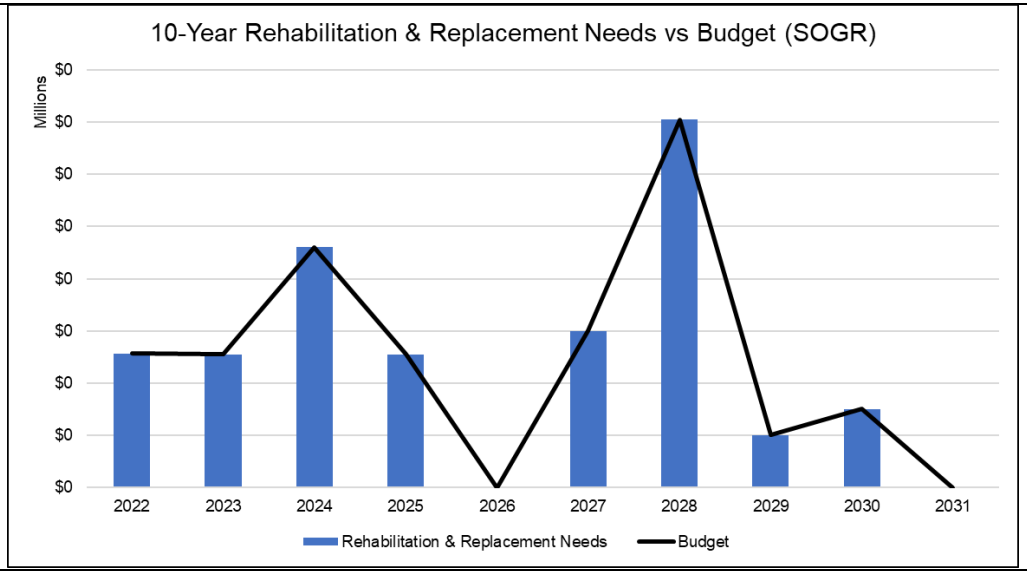




The majority of Public Art assets are in fair or better condition, however, there is a small portion that requires rehabilitation or replacement in the next 10 years. Staff typically replace components or pieces of the Public Art assets as opposed to replacing the entire structure.

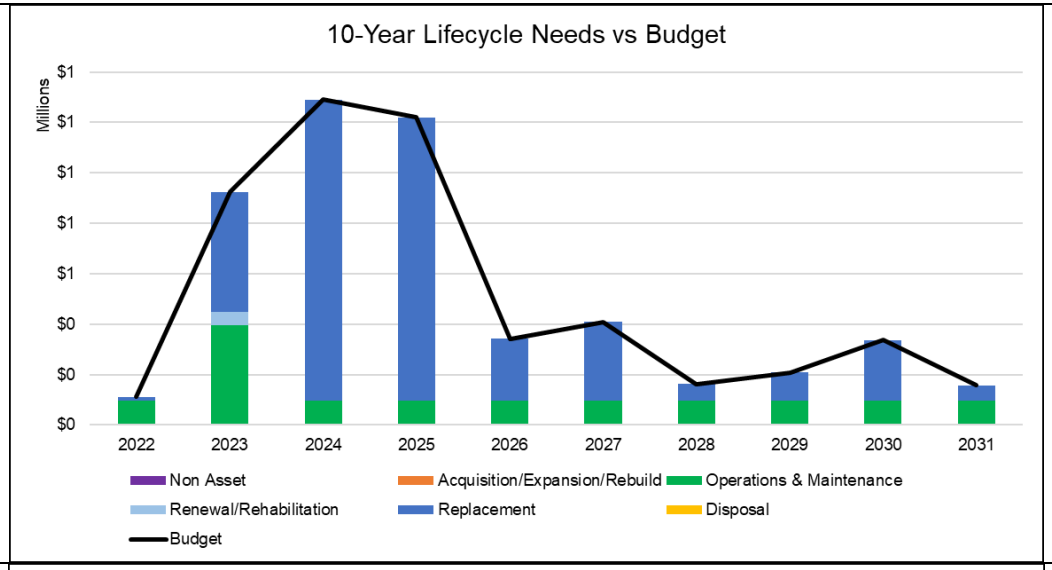
Culture Programs

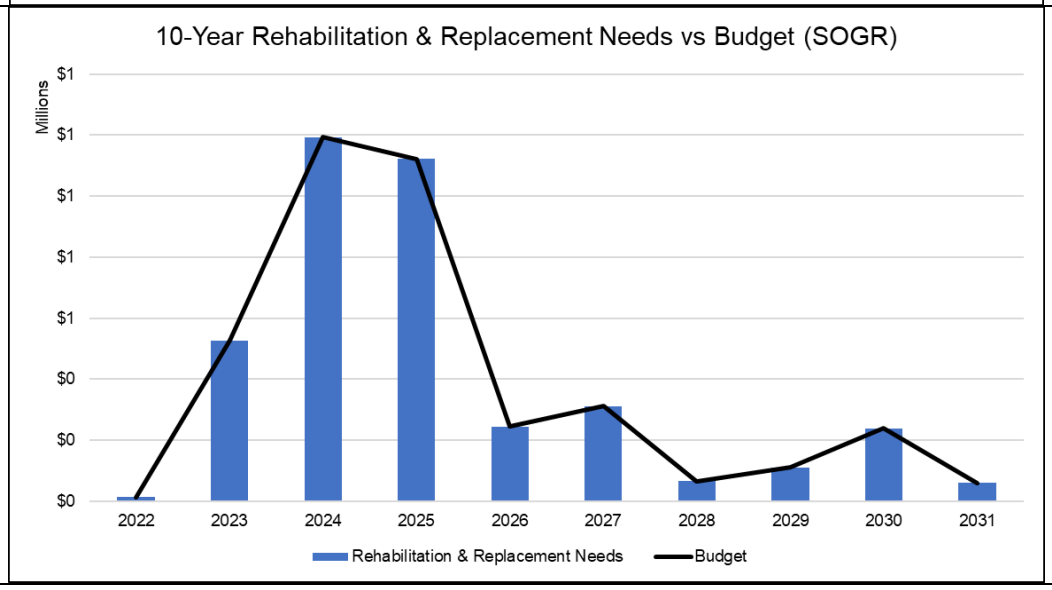




Many of the Culture Program assets are in fair or better condition. However, some will need to be replaced within the next 10 years as they reach their end of useful life. Typically, staff conduct regular operations and maintenance to extend the life of their assets.

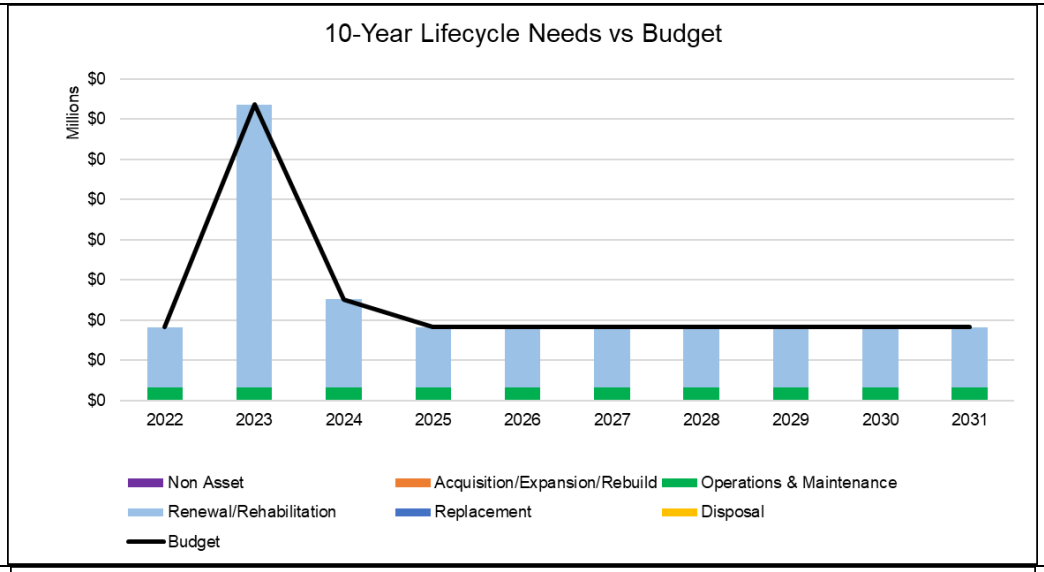
Events & Media Production

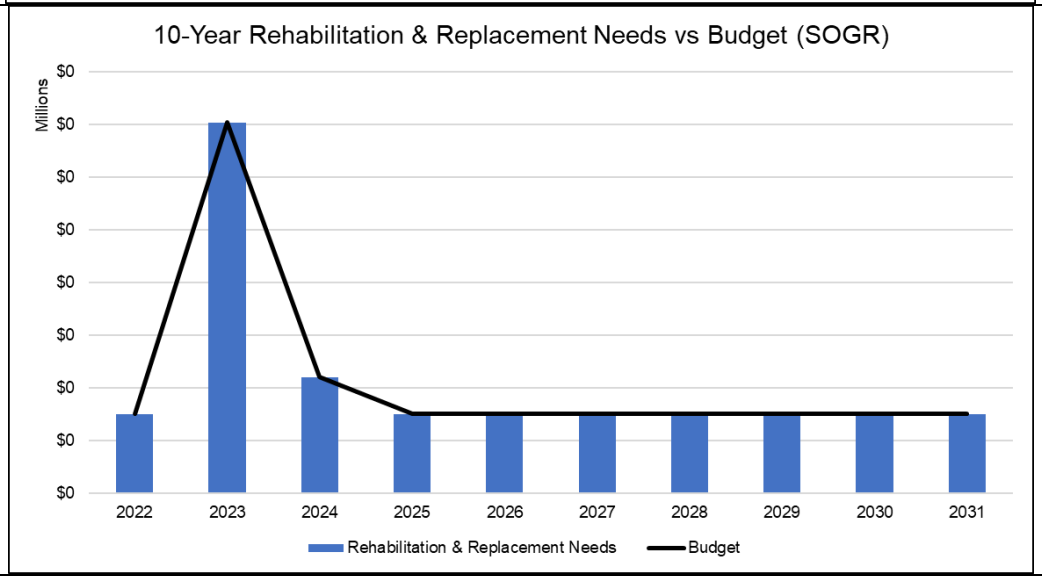




About 25% of the Events & Media Production assets are in Poor-Very Poor condition meaning they will require replacement within the next five years as shown on the forecast graphs.

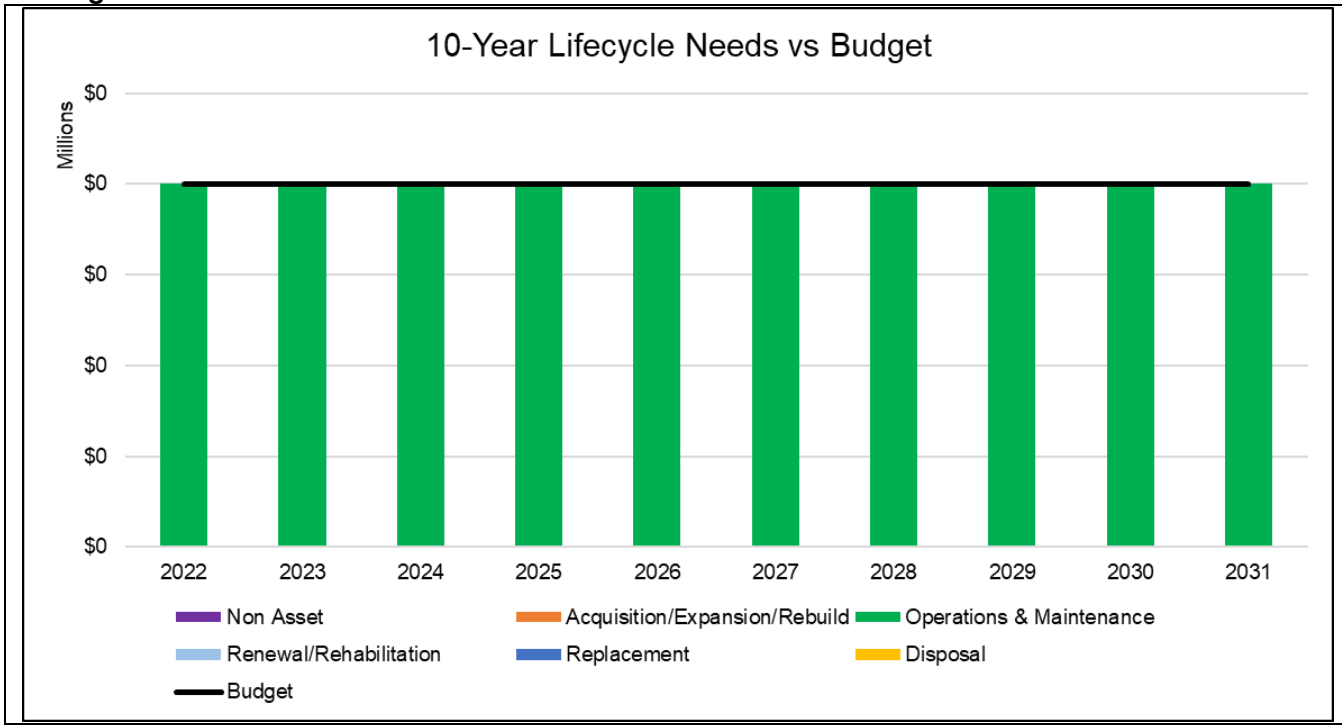
Venue & Event Services





Assets within the Venue & Event Services have an estimated useful life between 10 and 20 years; with the majority of them being in Fair condition. However, due to data quality issues, the forecast for renewal/rehabilitation and replacement has been balanced to budget for this iteration. Staff will continue to refine their inventory so that a comprehensive and reliable forecast can be developed.

Heritage & Museums



In the 2022-2031 forecast, only Operations & Maintenance activities are planned for the Heritage & Museum assets. These assets are maintained and repaired with the goal of maximizing their estimated useful life.

Over the next 10 years, the Recreation & Culture Services average annual budget is $3.9M as shown in **Figure 3** 2.

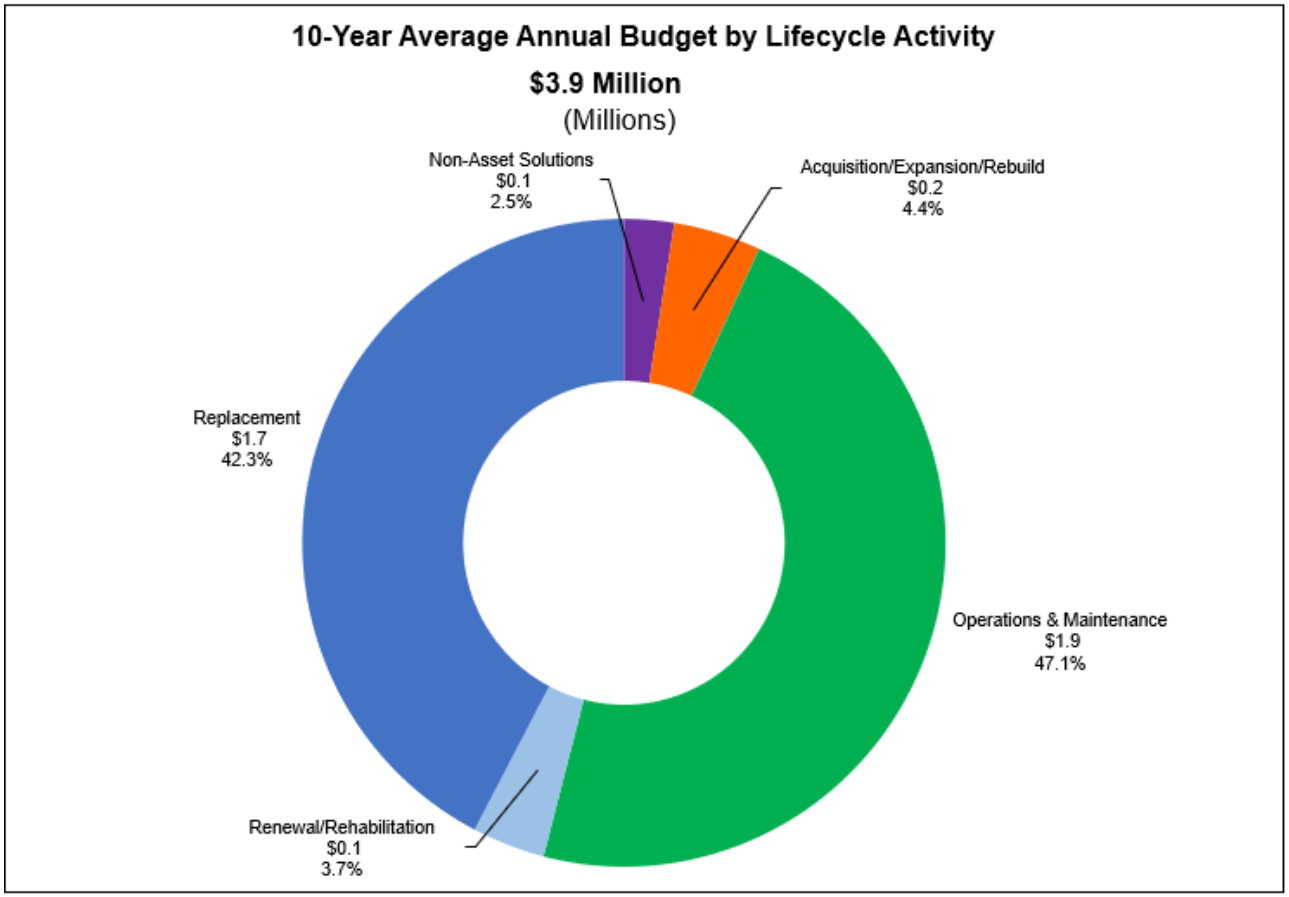


Figure 3 2: Breakdown of Budget by Lifecycle Activity

Table 10 shows 10 year annual average budget breakdown by Asset Class. The majority of the of the operating and capital budget is spent on State of Good Repair of Recreation & Culture assets

Table 10: Budget breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Recreation Equipment	1.14	1.33	2.46	-	2.46
Public Art	0.02	0.09	0.11	0.02	0.12
Culture Programs	0.51	0.02	0.53	0.03	0.56
Events & Media Production	0.10	0.42	0.52	-	0.52
Venue & Event Services	0.02	0.11	0.12	-	0.12
Heritage & Museums	0.02	-	0.02	-	0.02
Other[6]	-	0.03	0.03	0.06	0.10
Total	**1.80**	**2.00**	**3.80**	**0.11**	**3.90**

[6] The "Other" asset class denotes lifecycle activities that span over multiple asset classes within the Service Area such as plans, studies, and other non-asset solutions.

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, inventorying what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management Section of the City's Asset Management Plan.

Financial Management & Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

Operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget – for example, utilities, building and sidewalk maintenance, etc.

The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The Capital Budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment, including IT network infrastructure, used in providing municipal services.

Capital expenditures result in the acquisition of, enhancement to or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets – for example, sidewalk maintenance or licensing fees – are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves & Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 4 3,** the estimated available funding for the next 10 year period (2022-2031) for Recreation & Culture is $39.3 million. The primary sources of funding are Operating Revenue sources at 46.4% and Tax Reserve Funds at 39.8% which is primarily used to support capital infrastructure renewal needs.

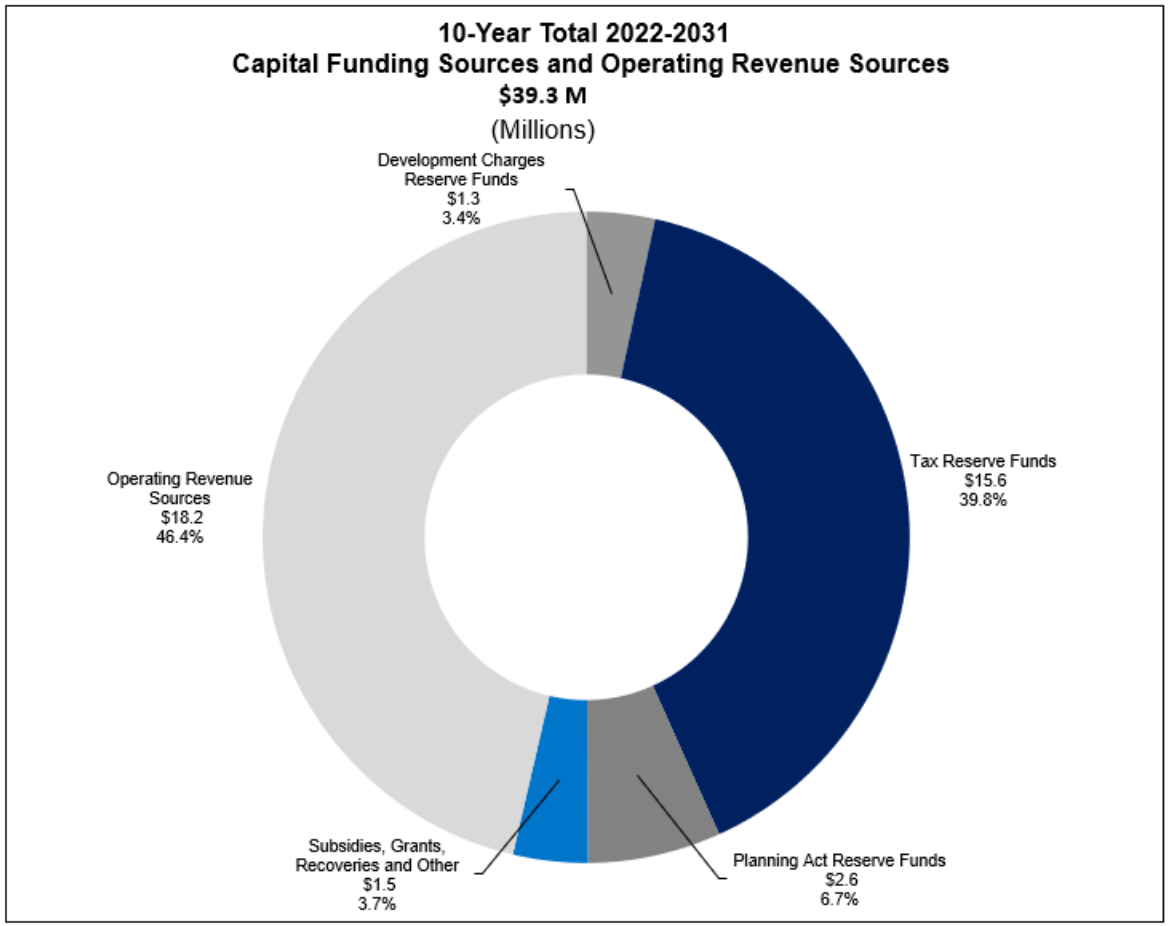


Figure 4 3: Capital Funding Sources & Operating Revenue Sources

Infrastructure Gap

The 2022-2025 Business Plan & 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent infrastructure levy to provide funding to maintain and replace its critical infrastructure, and it will increase to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g. the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap – a gap between how much is required to maintain assets and service levels and how much funding is available.

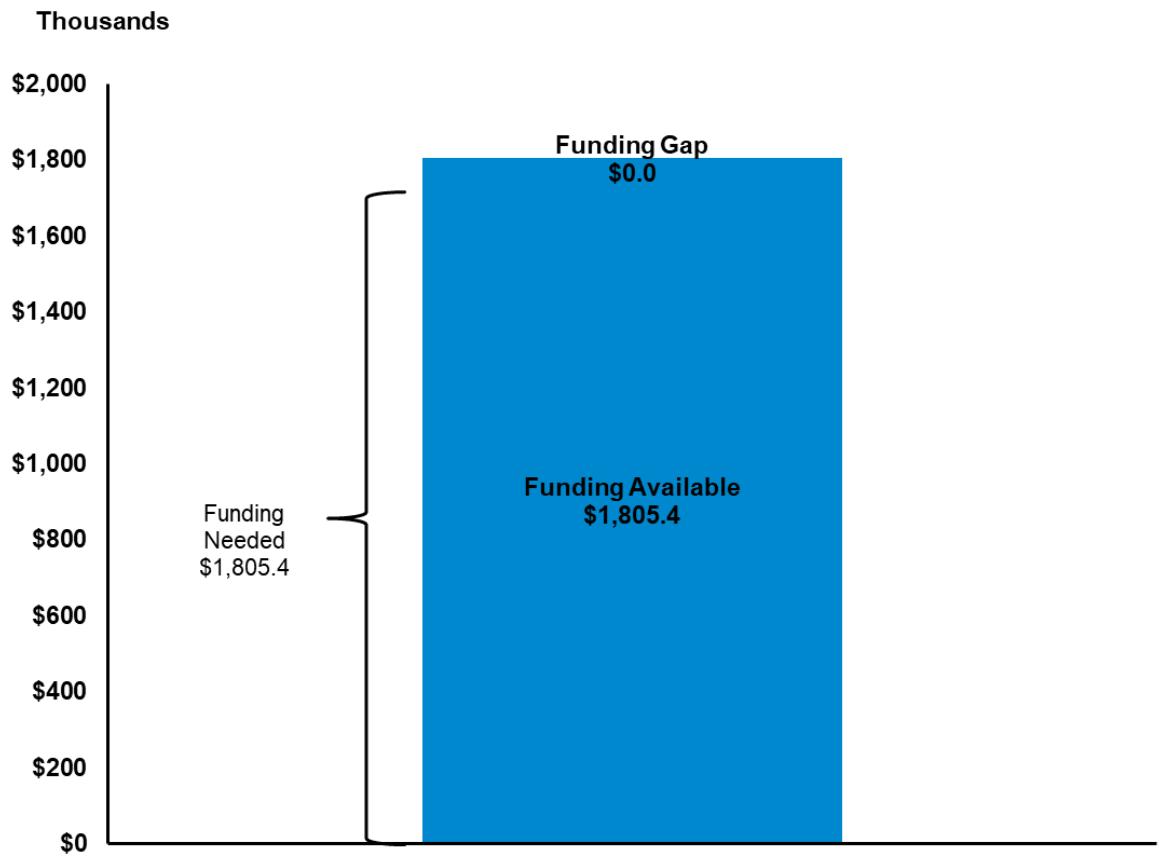
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to program delivery and sustainability
- Increased liability and claims
- Increased public complaints

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (Funding Needed) and the annual average budget (Funding Available) for the next 10 years as is shown in the following graphs by Service Area. Continued implementation of asset management best practices as well as assistance from senior levels of government through continued infrastructure funding programs will provide opportunities to address some elements of the funding gap.

Recreation & Culture Services



The overall infrastructure gap for Recreation & Culture is $0. Funding is adequate to meet lifecycle needs for the next 10 years.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for each asset class. The results for each asset class and an overall result for the Recreation Service Area are scored from 0.0 to 4.0 based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved.

The latest maturity assessments from 2021 have not been included in this section because the assets and the hierarchy reported on in this asset management plan are significantly different from when the assessments were completed. Culture Services staff have identified this as a continuous improvement item to re-evaluate their maturity as they expand on their asset management program.

Advancing Service Area Asset Management Capabilities

The proposed work plan in **Table 11** was developed in consultation with City staff through the development of the asset management plan. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure). These tasks may differ from those in the maturity assessment improvement plan, as they are predominantly internal tasks to Recreation & Culture that provide the foundation for a better asset management program/plan and support greater maturity in the corporate level improvement categories.

Through the maturity assessment and associated work plans, Recreation & Culture aims to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service, to achieve both service area and corporate objectives.

Table 11 - Work Plan – Recreation

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources
State of Infrastructure (SOI)					
SOI-01	Develop a formalized Risk Assessment Framework for Recreation	All	2023-2024	Enable the Recreation division to better prioritize funding availability across asset classes	Internal/External
SOI-02	Develop a centralized asset register which is regularly updated (ideally automated) when new assets are added	All	2023-2024	Allows for better asset management when database is up to date. Potential cost saving through better management of lifecycle activities	Internal
SOI-03	Formalize inventory, assign unique IDs and create assets/features by asset component	Recreation Equipment	2023-2025	Improved completeness and accuracy of the information within the database to improve tracking and management of assets and identifying funding requirements	Internal
SOI-04	Condition assessments on newly acquired and old assets	All	2024-2025	Assess all equipment and provide condition rating and replacement timeline	Internal/External
SOI-05	INFOR for work order management	All	2023-2024	Enhanced and expanded work order management for Recreation service requests	Internal
SOI-06	Update the Maturity Assessment and Continuous Improvement Plan and report back to Leadership Team	All	2024-2025	Providing Leadership Team and Council with regular updates on the progress made towards asset management planning will ensure that we continue to mature in our asset management practices	Internal

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources
SOI-07	Replacement Cost Update and Development	All	2024-2025	Enables precise budgeting required for lifecycle costing and sustainability of the Recreation resource. This knowledge aids in making decisions regarding optimal timing for asset replacement, maximizing operation efficiency	Internal
SOI-08	Estimated Useful life: Review and Update	Recreation Equipment	2024-2025	Allows for better lifecycle management planning	Internal
Levels of Service (LOS)					
LOS-01	Consider implementing additional recommended customer and technical levels of service metrics	All	2023-2024	Level of service targets enable the service area to track progress against established targets	Internal
Financial Strategy (FS)					
FS-01	Centralize all assets in one asset management system to run asset management scenarios	All	2025-2026	Develop a predictive performance model to forecast assets future condition based on budget, levels of service and/or lifecycle strategies changes	Internal/External
FS-02	Work with Corporate Finance to formalize performance targets and sustainable funding	All	2023-2025	Develop more proactive and reliable short-term and long-term capital planning	Internal
Lifecycle Management Strategy					
LMGT-01	Conduct maintenance plans based on frameworks such as RCM or FMECA	All	2024-2026	Allows for proactive asset management practices rather than reactive. Maintenance activities can be planned instead of taking place on as needed basis which can increase the lifespan of the assets and better prepare the City for replacement and rehabilitation	Internal/External

Table 12: Workplan - Culture

Task No.	Work Plan Task	Asset Class	Estimated Timing	Target Benefits	Required Resources
State of Infrastructure (SOI)					
SOI-01	Data Governance Strategy	All	2023-2024	Develop a data governance strategy to collect and track asset information effectively and in a standardized manner. Review asset attribute information on an annual basis, at a minimum, to ensure quality and reliability.	Internal
SOI-02	Develop a Risk Assessment Framework for Culture Assets	All	2023-2024	Enable the Culture Service area to better prioritize funding availability across asset classes	Internal
Financial Strategy (FS)					
FS-01	Centralize assets in one asset management system to run asset management scenarios	All	2025-2026	Develop a predictive performance model to forecast assets future condition based on budget, levels of service and/or lifecycle strategies changes	Internal/External
FS-02	Work with Corporate Finance to formalize performance targets and sustainable funding	All	2024-2025	Develop more proactive and reliable short-term and long-term capital planning	Internal
Levels of Service (LOS)					
LOS-01	Ongoing review of LOS metrics and establishment of targets	All	2022-Onwards	Levels of service targets enable the service area to track progress against established targets	Internal

Corporate Asset Management Plan
2024

General Government (Print & Mail Services)

Table of Contents

General Government (Print & Mail Services) Overview

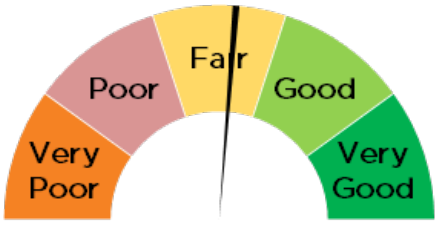
Print & Mail Services supports the delivery of quality, cost-effective, timely and environmentally friendly printing, signage, and related finishing and mailing (whether in-house or through third-party contracts). Services include:

- City printed document requirements (e.g., tax bills, business cards, public notification letters, newsletters, courthouse notices, training manuals, etc.)
- Large-format signage requirements, posters, vinyl banners
- Scanning and digitizing of City documents
- Bindery and finishing
- Letter Shop services (addressing, inserting, labelling, sealing, sorting)
- Processing registered mail

For this iteration of the Asset Management (AM) Plan, the portfolio is valued at approximately $800,000 with an average asset condition of Fair and a 10-year average annual funding gap of $0.0 as summarized in **Table 1**. For a more detailed breakdown by asset class, see **Table 2**.

Table 1: Summary of Print & Mail Services Portfolio

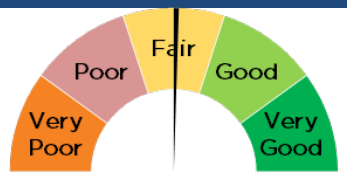
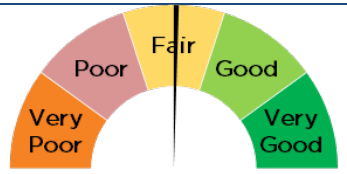
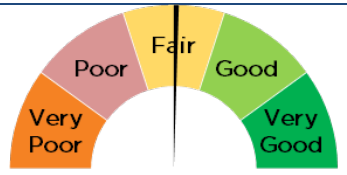
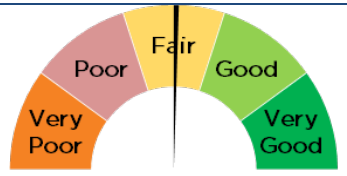
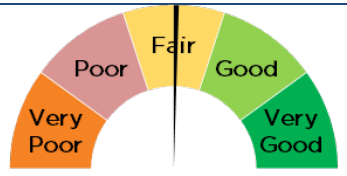
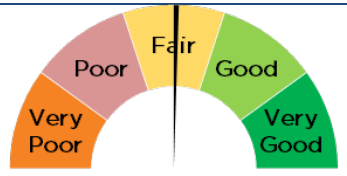
Print & Mail Services	
Replacement Value	$800,000
Average Condition	52% (Fair)
10-Year Average Annual Funding Gap	$0.0



This Asset Management Plan includes the following information:

- **State of the Infrastructure**: Outlines the current state of the infrastructure assets, as of 2021 year-end, the condition of the assets and the cost to replace them. This section also identifies the data limitations and data assumptions that have been applied
- **Levels of Service**: Describes and measures the service performance and outcomes the City currently provides
- **Future Demand**: Summarizes the expected future demand on the services each service area provides
- **Lifecycle Management Strategy**: Documents the strategies used throughout the assets' lifecycle to support ongoing service delivery
- **Financing Strategy**: Describes the forecasted budgets, revenues, capital expenses (growth and non-growth) and reserves and identifies any financial gap. This plan utilizes the 2022-2024 Operating Budget and 2022-2031 Capital Budget
- **Continuous Improvement**: Documents the continuous improvements identified during the development of this Asset Management Plan and previous maturity assessments

Table 2: Summary of Replacement Value, Condition and Infrastructure Gap by Asset Class

Asset Class	Replacement Value ($000s)	Condition	10-Year Average Annual Funding Needs	10-Year Average Annual Funding Gap
Document Scanning Equipment	$55		$85 Thousand	$0.0
Mailing Equipment	$263			
Packaging Equipment	$10			
Paper Handling Equipment	$20			
Print Finishing Equipment	$220			
Printing Equipment	$230			

State of the Infrastructure

The following section provides a summary of the number of assets owned and managed by staff, their average age, condition, and replacement value in the form of dashboards.

Asset Data Assumptions and Limitations

The following assumptions were made, where information and attributes were limited for assets:

Estimated Useful Life (EUL) – A reasonable range was used for the EUL based on the type of asset, its complexity, and history according to Print & Mail subject matter experts.

Asset condition – The condition of assets has been estimated based primarily on age and remaining useful life[1] (RUL) as described in **Table 3** with individual adjustments made based on staff expertise. This approach applies well to these assets due to their relatively straightforward lifecycle. Where the in-service date was unavailable, the asset was assumed to be in Fair/Good condition.

Replacement Values – The replacement values were based on the most reasonable and applicable unit costs from recent tender prices and/or staff expertise.

Table 3: Condition Scale based on Remaining Useful Life (RUL)

Condition Rating	Physical Condition Definitions
Very Good 80%-100% RUL	**Fit for the Future** – The asset is generally in very good condition, typically new, or recently rehabilitated. It has more than 80% of its remaining useful life left.
Good 60%-79% RUL	**Adequate for Now** – Some asset elements show general signs of deterioration that require attention. A few elements exhibit deficiencies, but overall, it has between 60%-79% of its remaining useful life left.
Fair 40%-59% RUL	**Requires Attention** – The asset shows general signs of deterioration and requires attention with some elements exhibiting significant deficiencies. It has between 40%-59% of its remaining useful life left.
Poor 20%-39% RUL	**Approaching End of Life** – The asset is in poor condition and typically below established standards, with many elements approaching the end of their useful service life. It has 20%-39% of its remaining useful life left.
Very Poor 0%-19% RUL	**Requires Renewal** – The asset is below established standard conditions with widespread signs of advanced deterioration. Many components have surpassed the end of its useful service life and requires urgent renewal. It has less than 20% of its remaining useful life left.

[1]Remaining useful life (RUL) is calculated by subtracting the asset's current age (based on the chosen reporting year) from its estimated useful life (EUL).

Asset Risk

Asset-specific risks are determined by assessing the asset's 'Consequence of Failure' (CoF) and 'Likelihood of Failure' (LoF). While the loss of some assets or components may have little impact on service delivery and negligible risk of damage or injury, the loss of other assets can severely impact desired service levels. The criticality of an asset is therefore linked to the inherent consequence of the loss of its function, including related impacts on the function of a system or network of assets. Currently, Print & Mail Services utilize risk informally when prioritizing what asset lifecycle strategies and projects to conduct. A more formalized risk model will be explored in future iterations of the Asset Management Plan.

Dashboards

The following dashboard provides a summary of the current state of the infrastructure by Asset Class. Each dashboard includes a breakdown of the number of active assets, their age, estimated useful life, and replacement value by Asset Type.

A data quality index is also included for each Asset Class. The data quality index provides a measure of how reliable, complete and accurate key asset information is as it relates to supporting asset management decision making. The index applies a five-point scale, using grade letters from A (Very Good) to E (Very Poor), towards asset inventory, condition information, and replacement values.

Detailed AM Plan
General Government (Print & Mail Services)

Asset Class:	Print & Mail Services	Replacement Value:	$798,000

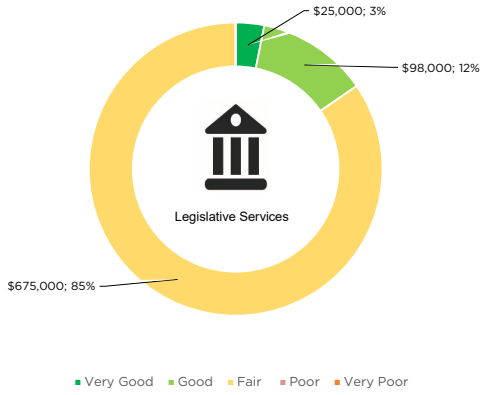
DATA QUALITY

Asset Inventory	Condition	Replacement Value
B	B	A

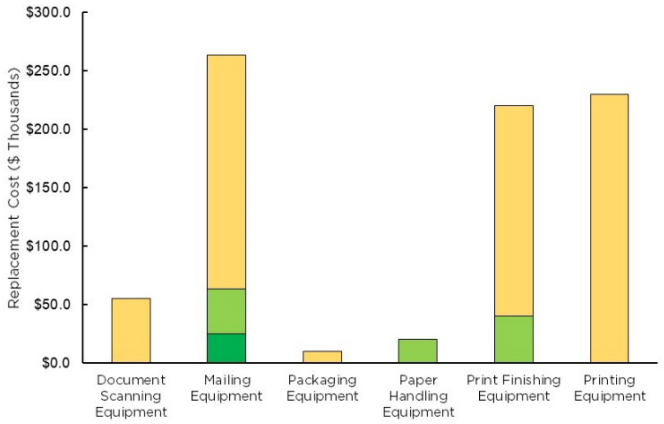
Large-Format Laminator

Asset Type	Inventory	Units	Average Age (Years)	Estimated Useful Life (Years)	Replacement Value (000s)
Document Scanning Equipment	3	Ea.	12.7	8-15	$55
Mailing Equipment	3	Ea.	75.02	5-20	$263
Packaging Equipment	1	Ea.	1.3	7	$10
Paper Handling Equipment	1	Ea.	1.8	5	$20
Print and Signage Finishing Equipment	15	Ea.	2.5	8	$220
Printing and Signage Equipment	1	Ea.	33.5	10	$230

Printing and Mail Services Replacement Value by Condition



Printing and Mail Services Condition by Asset Type



Asset Information

- All Print & Mail Services assets are in Fair or Better condition. Although some assets have far surpassed their estimated useful life, their performance remains sufficient to meet current service level needs. Staff rely on age and regular visual assessments to determine the condition of assets.

Envelope Stuffing Machine

Challenge Cutter

Levels of Service

The purpose of this section is to describe the levels of service (LOS) that City staff are currently providing and aim to provide for the Print & Mail Services.

LOS are the outcomes that an organization intends to deliver to its clients. They should also be utilized as key drivers for making decisions and future investment in infrastructure assets. As such, LOS need to be clearly articulated in terms that end users and decision makers can understand. Having well-defined service levels will allow the City to be transparent with its taxpayers and other stakeholders to find the appropriate balance between affordability and the community's service expectations.

Table 4 lists and defines the various elements of the LOS framework in accordance with ISO 55000 standard for infrastructure asset management.

Table 4: Level of Service Framework - Elements

Elements	Definition
Levels of Service (LOS)	Specific objectives of the service the organization intends to deliver, from the customer point of view. LOS provide the link between higher level corporate and asset management objectives with more detailed technical and operational objectives.
LOS Attributes	LOS attributes of the overall service that are relevant and meaningful to stakeholders.
Performance Measures	Criteria that can be measured and provide an indication of how the organization is doing in delivering the intended LOS form performance measures. They can be defined as: Customer performance measures - measures describing how the customer receives or experiences the service. Technical performance measures - technical criteria the organization can measure to indicate how the service is being achieved.

Table 5 identifies the current level of service framework that staff have established for Print & Mail Services. Staff will continue to explore more service level metrics to track as they build their asset management program and expand their asset hierarchy.

Table 5: Print & Mail Levels of Service Framework

LOS Attribute	LOS Objective	Community LOS Measure		Technical LOS Measure	
		Performance Measure	Current Performance	Performance Measure	Current Performance (2021)
Performance	Print & Mail Services assets are maintained in a state of good repair and meet service delivery needs.	Description of the lifecycle activities staff undertake to maintain assets in a state of good repair.	Staff repair and/or replace assets on a proactive basis, when possible, in alignment with manufacturer recommendations, vendor service-level agreements, or staff expertise.	Actual vs. Target Capital Reinvestment Rate[2]	Print & Mail Services: 0.9% vs. 1.1%
				% of assets in fair or better condition	Print & Mail Services: 99%

[2] The Actual reinvestment rate is a measure of how much funding is **available** to fund asset rehabilitation and replacement, while the Target Reinvestment Rate is a measure of how much funding is **required** to adequately fund asset rehabilitation and replacement.

Future Demand

The City's Print & Mail Services is designed to support City staff in providing internal and external communication from Mayor and Members of Council to residents. There are various demand drivers that impact the service delivery such as changing technology, evolving stakeholder values and climate limitations and challenges.

There is an increasing need to plan and deliver innovative, reliable, responsive and secure services, and establish sustainable service levels for Print & Mail Services. Strategies to meet these demands include keeping up with new technologies, reprioritizing of work for business continuity and disaster preparedness, and the effective delivery of capital projects and studies. These actions also align with the City's vision and strategic plan.

Demand Drivers

Drivers affecting demand include changes to regulations and legislation, technological changes, economic factors, environmental awareness and the direct impact of climate change on infrastructure. A summary of the main internal and/or external drivers that affect demand for Print & Mail Services is shown in **Table 6**.

Annapurna Large-Format Hybrid Printer

Table 6: Demand Drivers for Print & Mail Services

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
Changing Technology	Technology is constantly evolving, and in many cases, vendors will stop supporting assets that have become obsolete or no longer meet new technological requirements.	Technology will continue to change as the demand for more cloud-based applications and online services increases, thus putting more pressure on staff to meet service levels and customer expectations.	Inability to meet customer expectations and demands for state-of-the-art technology. Using unsupported assets may increase risk of financial consequences and operational delays.	Staff remain up to date on technological enhancements that may affect the assets and services they manage. Technology is renewed in line with both industry and operational standards. Staff communicate with vendors regularly to stay apprised on upcoming major changes and adapt accordingly.
Resource Challenges	The City has recently seen many changes in staffing as a result of retirements and staff turnover. Current staffing issues focus on being able to assign the right resources to critical initiatives while maintaining an adequate level of capacity for day-to-day operations	As IT Services move toward more cloud-based and online services, staffing requirements and roles will need to adapt to manage the workload more effectively and ensure that the City's strategic goals are being met.	Without sufficient staffing in place, the quality and reliability of the City's IT services and assets will be adversely affected. Maintaining IT assets in a state of good repair and advancing key IT system enhancements will be more difficult as a result of limited resourcing.	The City employs a combination of permanent, contract and part-time staff in order to deliver on key projects, meet service level enhancements, and achieve operational requirements. Print & Mail Services, alongside the Human Resources department, created a pre-qualified roster for IT services so that unique skill sets can be acquired as needed; thus providing more agility to respond to increasing workloads.
Adapting to New Business Requirements	Staff must constantly adapt to changes in stakeholder expectations or new business requirements, while also maintaining their current existing service levels.	There are constantly new and different business requirements that IT needs to adapt to and factor into their capital and operating plans. For example, newly acquired assets as a result of the Region of Peel dissolution, or programs such as the Smart City initiative, pose a pressure on the sustainability and	Adapting to new business requirements while trying to maintain current service levels for existing assets is a challenge and can affect the quality of the overall asset portfolio. There may be trade-offs or delays in the timing of lifecycle interventions to accommodate the new initiatives.	Staff maintain direct and constant communication with their key stakeholders to minimize unexpected or unplanned business requests. Staff utilize a project-prioritization technique in order to organize available resources and meet their strategic objectives. Print & Mail Services are in the process of implementing a digital storefront and information management system in order to streamline and improve

Demand Driver	Current Position	Projection	Impact on Services	Demand Management Plan
		performance of the IT portfolio.		service delivery for printing. Staff are proactive in acquiring specialized tools in order to improve efficiency and reduce the need for outsourcing.
Environmental Stewardship	There are more demands for digital upgrades and a more environmentally friendly service delivery that challenges the status quo.	The City is committed to decreasing its carbon footprint with clear goals to achieve within the next 30+ years. As Print & Mail Services evolve, there will be more consideration for the type of assets acquired and their replacement and disposal requirements.	There are many consequences to climate change that will affect staff's ability to deliver their desired service levels in an efficient, cost-effective and reliable manner.	Staff work with material management to establish clear wording within vendor contracts regarding asset disposals in environmentally conscious ways. Staff have reduced their usage of plastic shrink-wrap packaging in order to reduce the City's carbon footprint, and 90% of the paper used comes from sustainable sources. The City also works toward meeting the Forest Stewardship Council (FSC) requirements for sustainable sourcing and FSC-certified finished and labelled goods.

Lifecycle Management Strategy

Lifecycle management encompasses a wide range of practices and activities associated with the holistic management of assets and the services they provide. From the early planning stages to an asset's disposal, these strategies are determined by a range of planning processes including asset management planning, master planning, and strategic planning exercises that consider the internal and external drivers for service-delivery outcomes.

A key objective is to effectively deliver the desired levels of service at the lowest feasible cost while managing the risk and performance of the asset.

Lifecycle Activities

Lifecycle activities are classified into six distinct types. They are:

Non-Asset Solutions
Activities that do not alter the condition or performance of assets or services but provide staff with valuable information for their effective management. They include master plans, studies, surveys, and more. With the goal of providing asset management planning in an efficient and effective manner, these non-asset solutions become critical.

Operations and Maintenance (O&M)
Operations and Maintenance typically includes minor activities that preserve the condition or performance of assets and ensures the longevity of assets in line with their design and operational requirements. There are unplanned or reactive O&M activities that are carried out on an as-needed basis to reinstate service, and there are planned or proactive activities that are carried out on a set frequency to prevent disruptions and keep assets operational.

Replacement
Replacement activities that occur once an asset reaches the end of its useful life, cannot provide the intended function or performance, and renewal/rehabilitation is not a viable option. Replacement activities typically denote a like-for-like asset replacement.

Acquisition/Expansion/Rebuild
These activities expand services to previously non-serviced areas or to accommodate growth; they provide new or enhanced services beyond the current capacity and/or functionality of the existing assets.

Renewal/Rehabilitation
Significant activities designed to extend the useful life of assets, and by extension, the services they contribute to. These activities involve the renewal, rehabilitation or replacement of parts or components of an asset that require significant intervention.

Disposal/Demolition
Activities associated with the disposal or decommissioning of an asset. Disposal activities and associated costs are typically embedded within other lifecycle activities at the City.

Asset Lifecycle Strategies

Table 7 provides a summary of the different strategies and actions that staff employ for their applicable lifecycle activities, along with the associated risks of performing those activities. This table is not intended to be exhaustive, but to illustrate the various tools and strategies employed by City staff.

Table 7:Current Lifecycle Management Activities

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Non-Asset Solutions	Print & Mail	•Annual review of budget needs for (capital and operating)	These non-asset IT solutions are used to plan for growth effectively and to align the City with best industry practice. There are financial, reputational and operational risks associated with conducting these IT master plans and standards.
Operations and Maintenance	Print & Mail	•Assets are maintained per manufacturer warranty recommendations •Minor repairs of asset components (e.g., monitor screen repairs and sensor repairs) are completed on an as-needed basis •Assets are inspected on a daily, monthly or annual basis depending on their criticality and complexity	Regular maintenance and inspections allow staff to maintain the performance and functionality of assets, and by extension, the desired service levels by mitigating hazards or premature failures.

Activities	Asset Class	AM Practices or Planned Actions	Risks Associated with Lifecycle Activities
Replacement	Print & Mail	•Assets are replaced at end of life on a cyclical basis, when they no longer meet capacity/technological needs, or if they are no longer covered by vendor agreements. Where feasible, staff use those assets in a supplemental or secondary manner, as a form of redundancy	The timely replacement of assets ensures that day-to-day operations are not impacted, and that the most cost-effective interventions are applied to the Print & Mail asset portfolio
Acquisition/Expansion/Rebuild	Print & Mail	•Upgrading or expanding assets to handle more capacity (e.g., adding another shelf to the storage array, adding more switches, acquiring a larger printer) •Adapting to technological changes as a result of renovations or replacements of facilities	•Technological obsolescence or redundancy as a result of changes to the business needs

Lifecycle Needs vs. Budget

Per Ontario Regulation 588/17, a 10-year forecast of the lifecycle demands or activities that need to be performed to maintain current levels of service is required for each asset class.

Some of the assumptions that govern this section include the following:

Lifecycle Needs Assumptions

- Lifecycle needs are forecasted based on staff knowledge and the availability of reliable data such as age and remaining useful life, physical condition assessments, studies, third-party recommendations, or other considerations
- The costs of any Non-Asset Solutions, Acquisition/Expansions/Rebuilds, and Operations and Maintenance lifecycle activity needs are assumed to balance to the budget
- All values are shown in 2022 dollars and do not include inflation

Budget Assumptions

- 10-year Budget Plan consists of 2022-2025 Operating Budget and assumes year four as annual budget for years five to 10
- 10-year Capital Budget Forecast from the 2022 Budget
- All values are shown in 2022 dollars and do not include inflation
- Lifecycle activities only include asset-related operating and capital expenditures. The following have been excluded:
    - Overhead costs
    - Software licenses; including SaaS (software as a Service) solutions
    - Professional services
    - Resourcing/labour

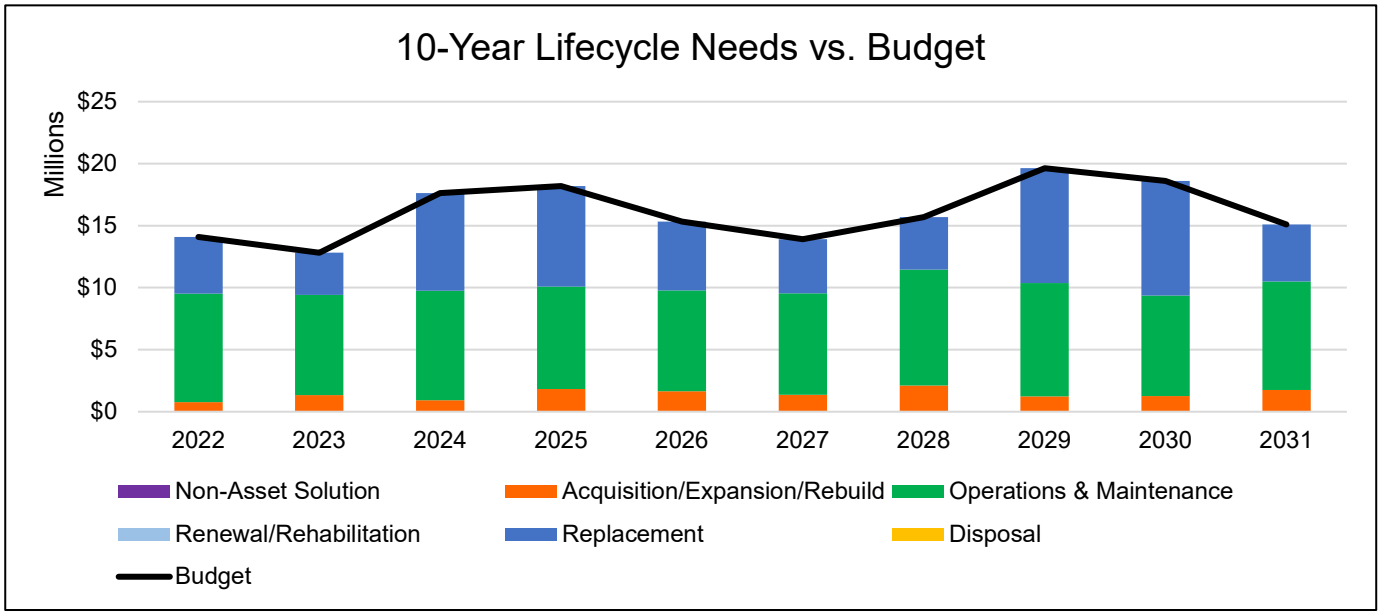
As mentioned in the lifecycle needs assumptions above, most of the lifecycle activity needs have been assumed to equal the budget — except Renewal/Rehabilitation and Replacement. Due to the high degree of reliability, only those lifecycle activities have been truly considered in this iteration of the asset management plan. The City will expand its analysis to include all lifecycle activities once data quality and reliability is deemed sufficient for them.

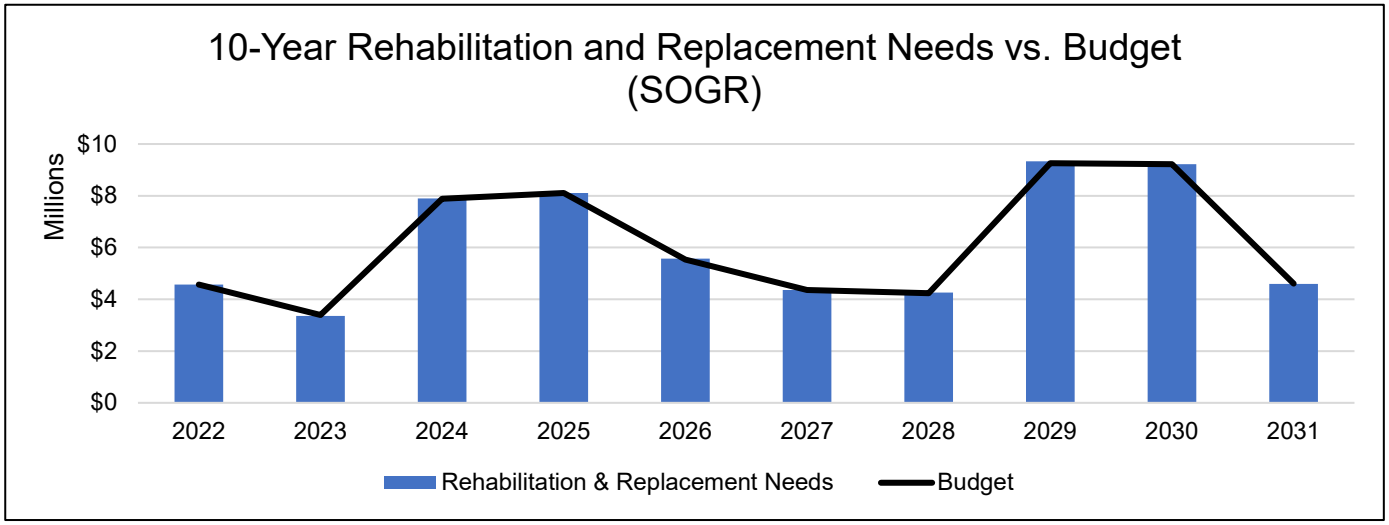
To illustrate the 10-year forecast, two graphs have been created by Service Area and by each Asset Class in this section:

- Lifecycle Needs vs. Budget Graph
- Rehabilitation and Replacement Needs vs. Budget (State of Good Repair[3]) Graph

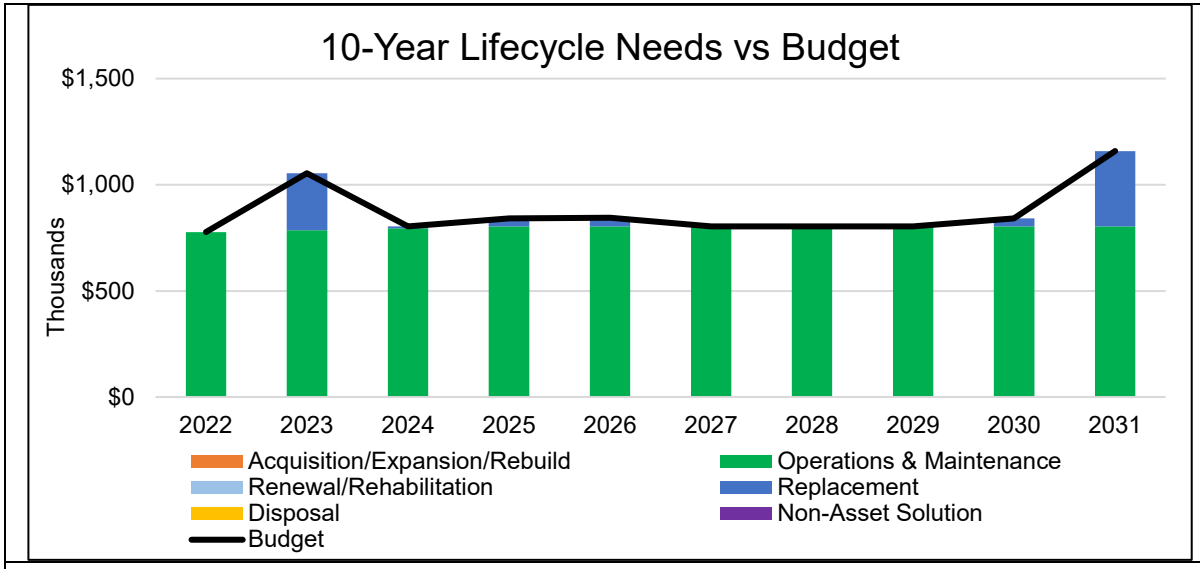
[3] State of Good Repair (SOGR) denotes projects that ensure existing infrastructure is maintained in good condition or replaced when necessary. SOGR is part of a capital prioritization model to assist in the decision-making process for allocating limited capital funds.

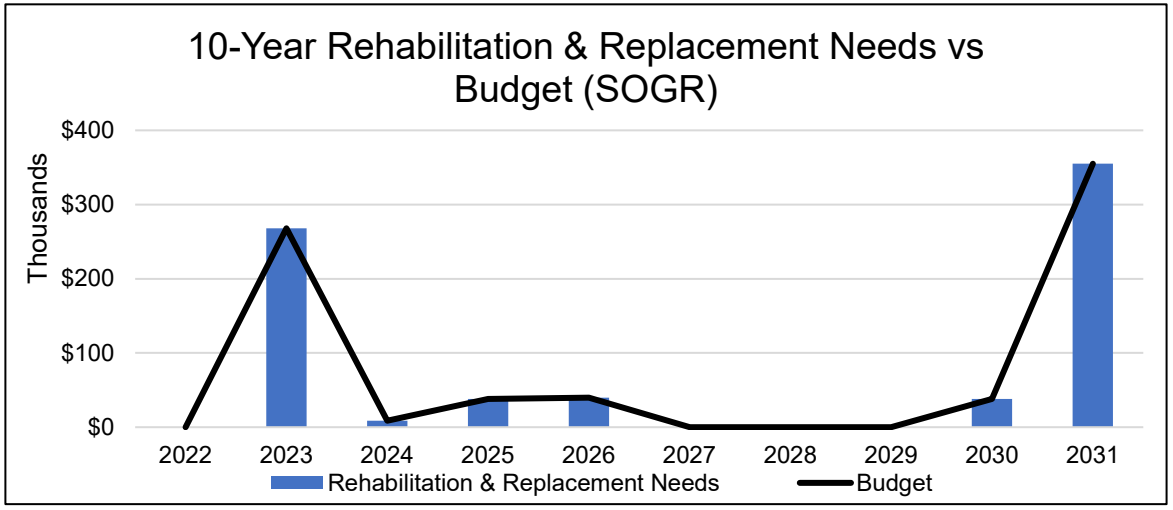
Print & Mail Services





Print & Mail Services





Most asset replacements for Print & Mail Services go beyond the 2022-2031 10-year forecast since most assets are in fair or better condition.

Over the next 10 years, the Print & Mail Services average annual budget is $0.9M as shown in Error! Reference source not found..

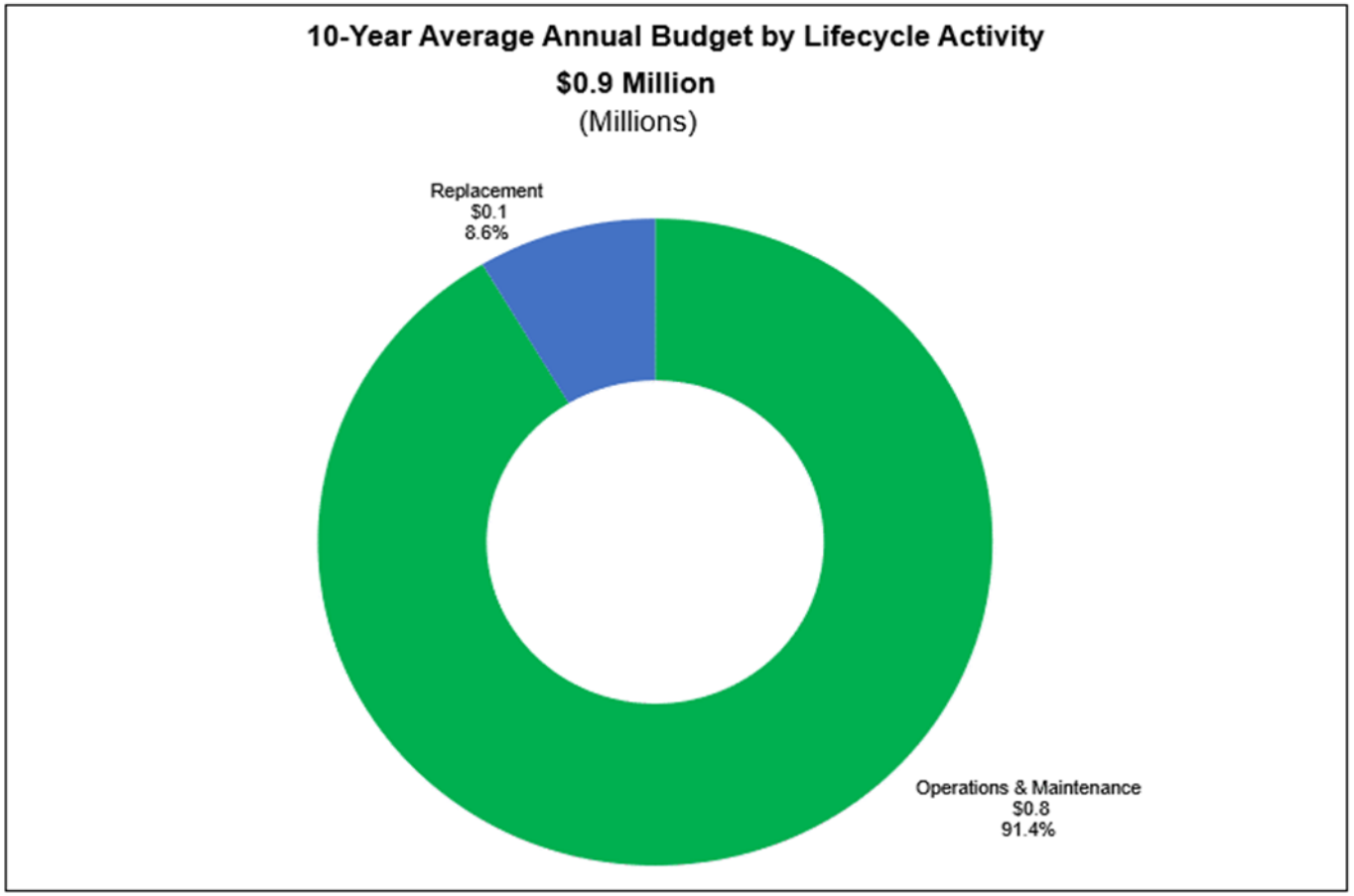


Figure 1: Breakdown of Budget by Lifecycle Activity

Table 8 shows the 10-year annual average budget breakdown by asset class. The majority of the operating and capital budget is spent on SOGR of Print & Mail Services assets.

Table 8: Budget Breakdown by Asset Class

Asset Class	SOGR Budget Type ($ Millions)			Growth Capital Budget ($ Millions)	Total Budget ($ Millions)
	Operating	Capital	Total		
Print & Mailing Services	0.8	0.1	0.9	-	0.9
Total	**0.8**	**0.1**	**0.9**	**-**	**0.9**

Financing Strategy

Building and maintaining infrastructure is one of many key strategic goals in the City of Mississauga's Strategic Plan, as well as a top priority in the City's Asset Management Plans. These goals and objectives are achieved by applying sound asset management practices, taking stock and inventory of what the City owns, conducting regular inspections, prioritizing work needs, preparing appropriate asset renewal projections and programs to address asset renewal needs, and monitoring and reporting on projected asset conditions.

The financing strategy for this asset management plan outlines the key funding and revenue sources used to finance asset management related lifecycle activities based on the 2022-2025 Operating and 2022-2031 Capital Budget Forecast. It also summarizes the current infrastructure gap based on the required lifecycle activities to maintain current levels of service and the available budget for the next 10 years. Several financing strategies are available for funding the City's capital program such as various reserve funds, recoveries, development charges (DCs) and debt. These are explained in more detail in the Corporate Asset Management section of the City's Asset Management Plan.

Financial Management and Funding Sources

Operating Budget and Funding (Operating Revenue Sources)

The operating budget provides for the normal operating expenditures with the day-to-day delivery of services. Annually recurring expenses related to capital assets are included in the operating budget — for example, utilities, building and sidewalk maintenance, etc.

The City uses a combination of property tax, user fees, investments, charges/levies and other revenue to fund the operating budget.

Capital Budget Financing

The capital budget provides for significant expenditures to acquire, construct or improve land, buildings, roads, engineering structures, or machinery and equipment.

Capital expenditures result in the acquisition of, enhancement to, or extension of the typical useful life of a fixed asset. Some of the annually recurring costs related to capital assets — for example, sidewalk maintenance or licensing fees — are included in the operating budget.

The City of Mississauga's capital program is financed through recoveries from other levels of government, various reserve funds (e.g. tax and development charges) and debt. The amount of funding projected to be available determines the size of the capital program over the next 10 years.

Reserves and Reserve Funds

Reserves are generally used to mitigate the impact of fluctuations in operating costs and revenue. Reserves are established at the discretion of Council, often as part of an overall strategy to fund programs or special projects and to stabilize the operating budget.

Reserve funds are established by Council for a specific purpose. They contain funds that have been set aside as directed by a requirement of provincial or federal legislation, or a decision of Council. These reserve funds are used to conduct major repairs, renovations or rehabilitation of buildings or large equipment; acquire new assets; and replace older assets that have reached the end of their lifecycle.

As illustrated in **Figure 2,** the estimated available funding for the next 10-year period (2022–2031) for Print & Mailing Services is $8.7 million. The sources of funding are Tax Reserve Funds at 8.6% and Operating Revenue Sources at 91.4%.

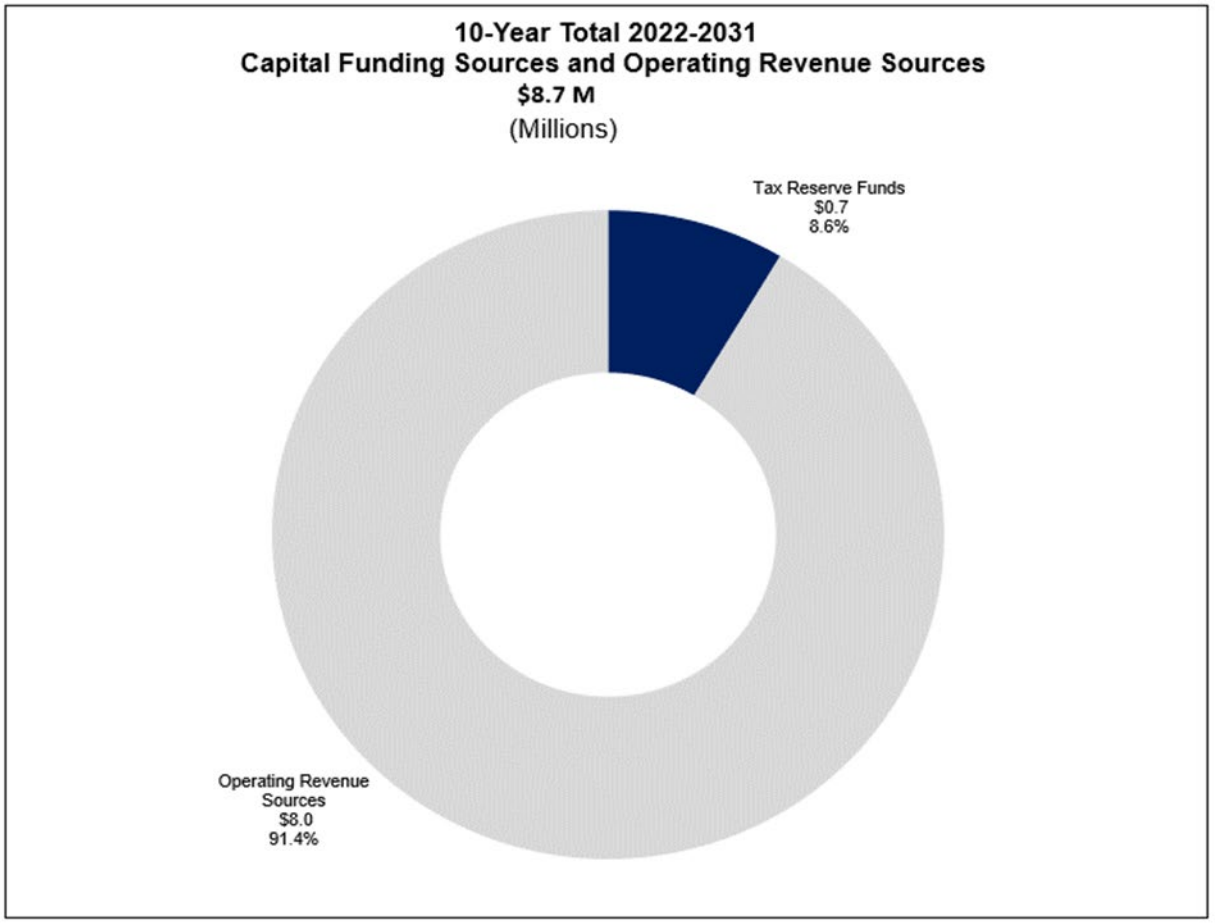


Figure 2: Capital Funding Sources and Operating Revenue Sources

Infrastructure Gap

The 2022–2025 Business Plan and 2022 Budget presents operating and capital budgets that ensure the City can continue to maintain current service levels. The City included a two per cent Capital Infrastructure and Debt Repayment levy to provide funding to maintain and replace its critical infrastructure, and it will increase to three per cent in 2023. The continued application of the infrastructure levy funds, and sustained funding from federal and provincial government partners (e.g., the Canada Community-Building Fund), provide the City with funding that can be applied to effectively manage its infrastructure.

There continues to be, however, an infrastructure gap — a gap between how much is required to maintain assets and service levels and how much funding is available.

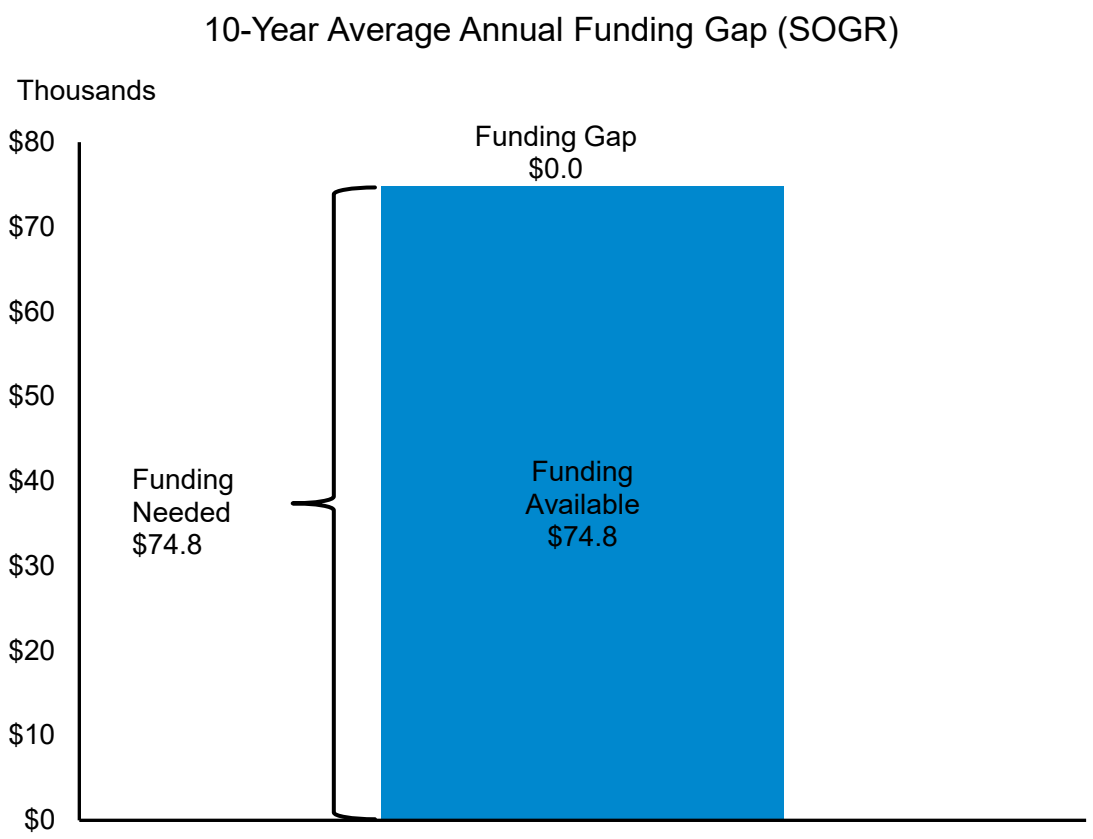
An infrastructure gap can impact the timing or scope of lifecycle activities and interventions that can be undertaken against assets and thereby affect the desired levels of service.

This can result in:

- Impacts to timeliness and quality-of-service delivery
- Increased security threats and liability
- Impacts to critical, day-to-day applications and systems

The infrastructure funding gap is based on the difference between the annual average lifecycle needs (funding needed) and the annual average budget (funding available) for the next 10 years — as is shown in the following graphs by service area and asset class. Continued implementation of asset management best practices, as well as assistance from senior levels of government through continued infrastructure funding programs, will provide opportunities to address some elements of the funding gap.

Print & Mail Services



As of this plan iteration, Print & Mail Services is deemed to have sufficient budget to address its lifecycle needs to meet current levels of service. Further analysis and data refinement will be conducted to determine the true gap.

Continuous Improvement

One of the goals of the asset management plan is to establish a baseline of the current asset management practices to inform a work plan for continuous improvement.

Advancing Corporate Asset Management Capabilities

In order to evaluate service area capabilities and develop a work plan towards enhanced asset management maturity, the Corporate Asset Management office plans to conduct periodic, internal audits of service area asset management practices.

A service area's progress in delivering or advancing asset management practices can be measured through a maturity assessment which has been completed for the Print & Mail asset class. The results for each asset class are scored from 0.0 to 4.0, based on eight key improvement categories:

- Leadership and Commitment
- Financial Capacity
- Know Your Assets
- Know Your Financial Situation
- Understand Decision Making
- Manage Asset Lifecycle
- Know the Rules
- Monitor Sustainability

Recording the questions, scores, analysis, and results allow for benchmarking the level of asset management practices. This also allows staff to re-evaluate their business practice maturity at any time in the future, and report the progress achieved.

Figure 3 illustrates the radar chart that shows the maturity scores of each asset class in 2021. As the service areas mature in each of the eight categories, they will expand outwards towards the outer ring (target).

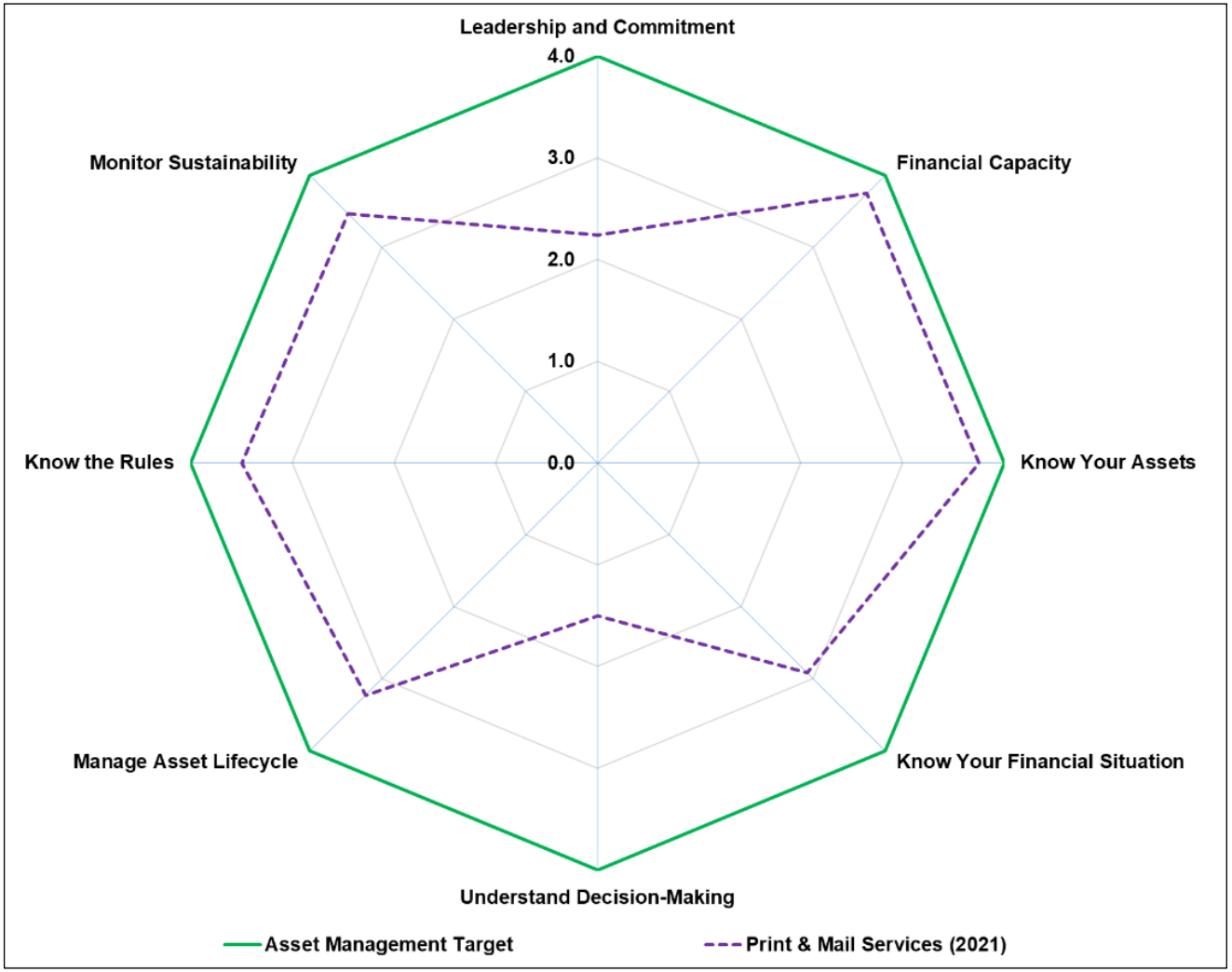


Figure 3: 2021 Maturity Rating for Print & Mail Services

Continuous Improvement Workplan

The proposed work plan in **Table 9** was developed in consultation with City staff through the development of the Asset Management Plant. Tasks are coded from the section of the plan it relates to (e.g., SOI = State of Infrastructure, LOS = Levels of Service). Through the maturity assessment and associated work plans, Print & Mail Services aim to build upon existing strengths to develop leading asset management practices that balances costs, opportunities and risk with the desired levels of service— to achieve both service area and corporate objectives.

Table 9:Work Plan – Print & Mail Service Area

Task No.	Work Plan Task	Asset Class	Estimated Timing	Priority (High/Medium/Low)	Target Benefits	Required Resources
SOI-01	Review asset inventories and populate missing information	Print & Mail	2022-Onwards	High	Ensures accurate asset information to help make informed decisions	External
SOI-02	Expand asset hierarchy to include additional assets	Print & Mail	2022-2024	High	Includes all asset types within asset class, ensuring a complete asset class	Internal/External
LOS-01	Establish more levels of service metrics	Print & Mail	2022-2025	Medium	In addition to being required to meet O. Reg. 588/17, LOS targets enable the service area to track progress against established targets	External
FS-01	Review lifecycle costing and infrastructure gap calculations	Print & Mail	2022-Onwards	Medium	Ensuring the correct allocations and lifecycle costing assumptions are used will lead to more detailed forecasts for operating and capital budgets	Internal