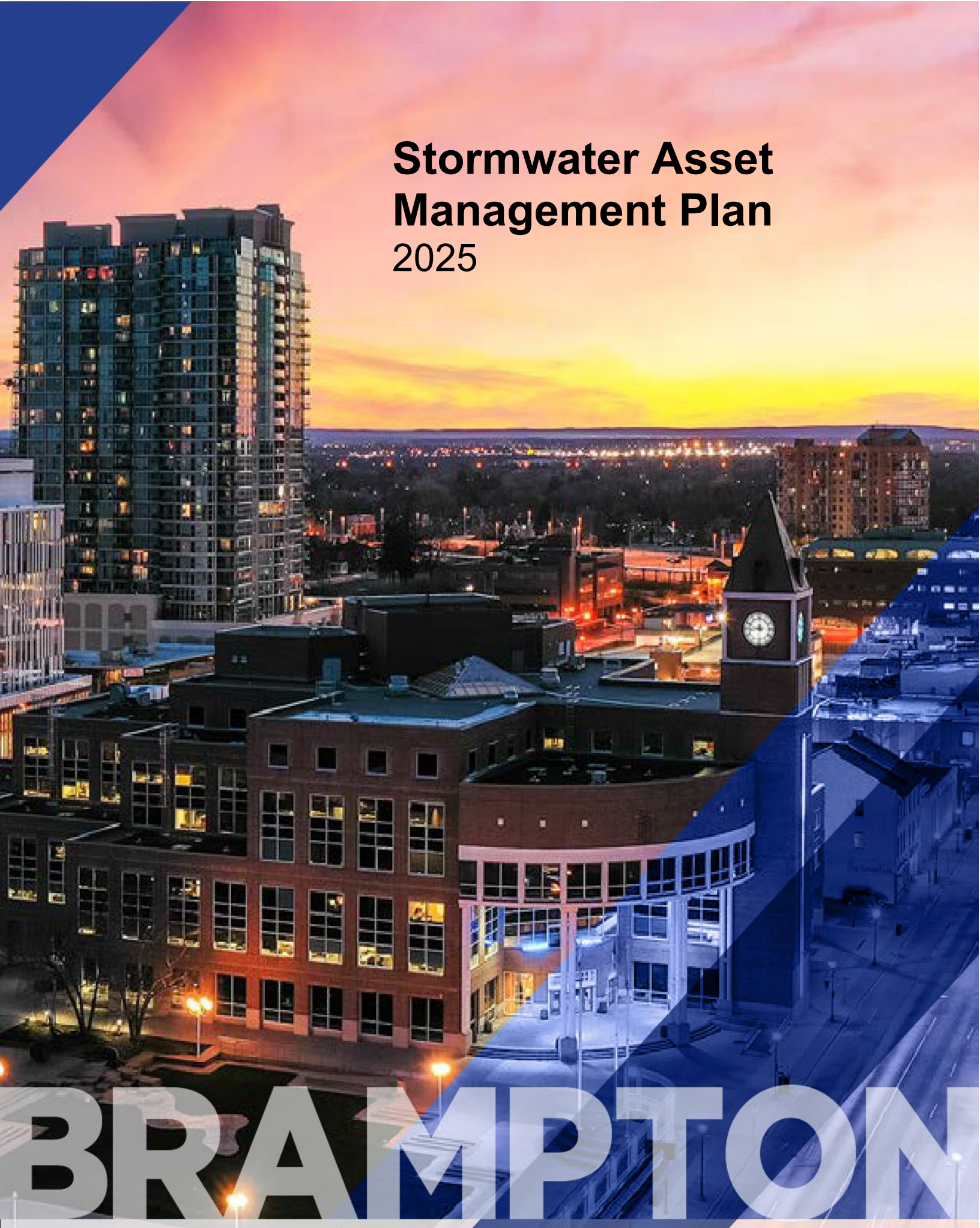
Stormwater Asset Management Plan

2025



BRAMPTON

Land Acknowledgement

The City of Brampton is located on the traditional territories of the Mississaugas of the Credit, Haudenosaunee, and Wendat Nations who have called this land home since time immemorial. We acknowledge the agreements made in Treaty 19—the Ajetance Purchase of 1818—and are committed to our ongoing role in reconciliation through meaningful action rooted in truth, justice, and respect. We are grateful to the original caretakers of this land who have ensured we are able to work, play, and live in Brampton now and in the future.

The City of Brampton has formally adopted the Truth and Reconciliation Commission's Calls to Action; the United Nations Declaration on the Rights of Indigenous Peoples; the National Inquiry into Missing and Murdered Indigenous Women and Girls, and 2SLGBTQIA+ Peoples' Calls to Justice. Through a nation-to-nation approach with our host Nations and urban Indigenous community, the City will utilize the recommendations for municipalities within these reports and frameworks to guide its work of increasing awareness, building capacity, and collaborating on solutions.

The City's relationships with the Indigenous community contribute to the continuing creation of processes for reconciliation that drive economic recovery, social development, and cultural inclusion of the Indigenous community. The City honours the uniqueness of Indigenous knowledge, histories, and traditions, and recognizes their importance in building and supporting an inclusive, successful, innovative, and brighter future for Brampton.

Staff Acknowledgement

The development of the Stormwater Asset Management Plan was a significant undertaking with contributions from staff across the organization. The document was prepared collaboratively with the City's Stormwater Management staff and stakeholders as input was collected over a series of workshops and meetings, which required extensive time and effort. The Corporate Asset Management Office would like to acknowledge the efforts of the City of Brampton staff and sincerely thank everyone including the Steering Committee, Working Group, Subject Matter Experts from the City's Stormwater Management team, and City Council, for their continued support and guidance throughout the development of this Plan.

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Executive Summary

Introduction

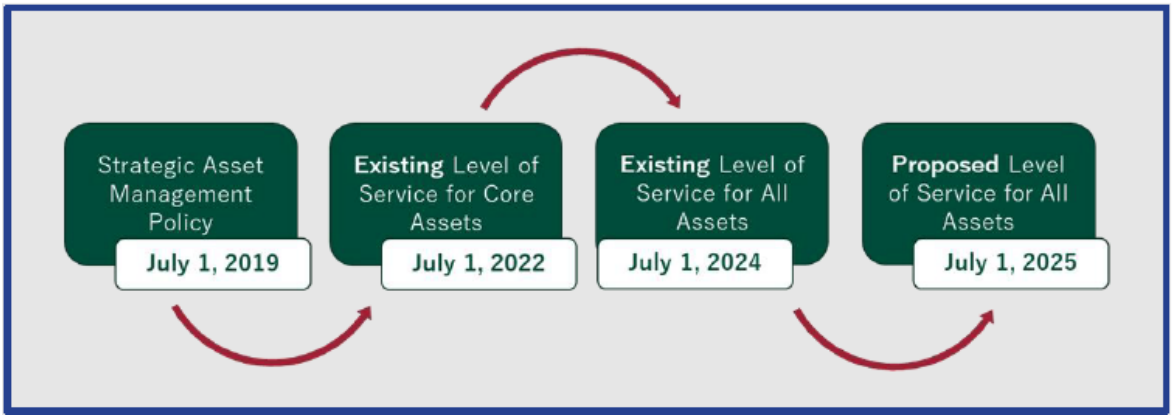
The City of Brampton is Canada's ninth-largest municipality, with an estimated population of 790,000 in 2024. It continues to be one of the largest employment centres in the Greater Toronto Area. As a result of rapid growth in recent years, the City has significantly expanded its already extensive asset inventory to meet increasing service demands.

This Stormwater Asset Management Plan (AM Plan) is a further development of the AM Plan approved by City Council in 2022 and further informs and advances the City's asset management practices. Its primary objective is to ensure that Brampton's stormwater infrastructure is managed in a financially sustainable manner while consistently delivering the expected levels of service to the community. The Plan aligns with the requirements set out in Ontario Regulation 588/17 (O.Reg. 588/17) and incorporates leading industry practices.

A summary timeline outlining the regulatory requirements is presented in Figure E-1. This AM Plan fulfills—and in several areas exceeds—the requirements set forth in the Ontario Building Together Guide for Municipal Asset Management Plans. It is also aligned with international best practices, drawing from both the ISO 55000 Global Asset Management Standard and the International Infrastructure Management Manual (IIMM).

Additionally, this Plan includes the proposed levels of service components required to meet the 2025 regulatory deadline for all stormwater asset classes addressed within this document.

Figure E-1: Regulatory O.Reg 588/17 Requirements



About the City of Brampton's Stormwater Management Charge

The City of Brampton funds its stormwater management program through a dedicated stormwater charge, which is calculated based on the amount of hard (impervious) surface area on each property. This approach ensures that properties contributing more runoff to the City's stormwater system pay proportionally for its maintenance and improvement.

Implemented on June 1, 2020, the stormwater charge provides a sustainable funding source for Brampton's

extensive stormwater infrastructure. The charge supports the City's efforts to manage stormwater runoff, reduce flooding and erosion, and protect water quality in local waterways. The stormwater charge is determined by assessing the impervious area on a property, such as rooftops, driveways, and patios, which contribute to stormwater runoff.

The revenue generated from the stormwater charge, approximately is allocated as follows:

- Pipe Reserve (50%): Set aside for future repairs and replacements of the storm sewer system as components reach the end of their service life or experience failures.
- Projects & Programs (45%): Used for immediate stormwater management projects and programs, including inspection and maintenance activities.
- Administration (5%): Covers administrative costs such as engineering, GIS, data management, customer service, and billing support from the Region of Peel.

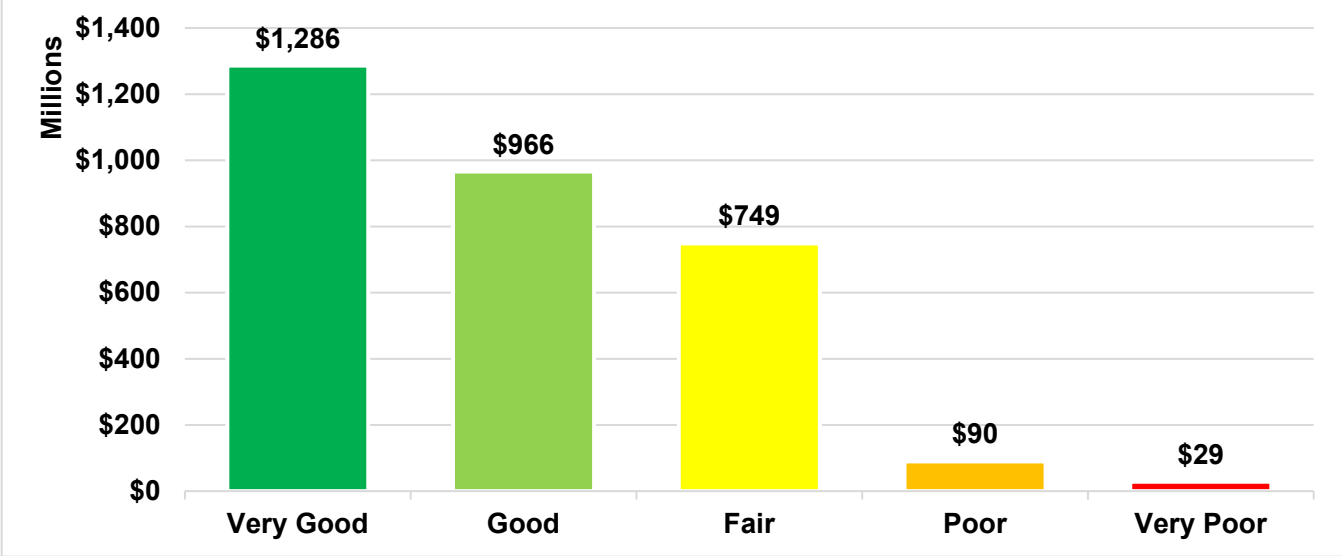
State of the Local Infrastructure

The City’s portfolio of engineered and natural stormwater assets has a total replacement value estimated at $3.2 billion. The assets included in this AM Plan predominantly consist of stormwater conveyance infrastructure, stormwater management facilities and natural stormwater assets. The valuation is estimated based on an inventory of capital assets as of year-end 2024.

Many changes have been made in this iteration of the AM Plan compared to the previous version, most notably the inclusion of additional asset classes such as roadside ditches, culverts, low impact development (LIDs) features, and natural assets. These assets were not previously captured in the City's asset inventory and represent a significant step forward in improving data completeness, expanding the scope of infrastructure under management, and aligning with evolving best practices in asset management.

Figure E-2 depicts, by colour, the value of assets that fall within each of the condition grades (very good, good, fair, poor, very poor).

Figure E-2: Asset Condition Grade Profile by Replacement Value



To adequately meet service levels and manage risk while minimizing lifecycle costs, most assets should generally be preserved in "fair and above" condition. The condition assessment results show that 96.1% of the City's assets are in fair and above condition based on replacement value.

Subsequently, 3.9% or $119 million of all assets are in poor or very poor condition. A significant portion of lakes assessed in Very Poor condition represent two key assets: Professor's Lake and Donnelly Lake (valued at approximately $14.4 million).

Professor's Lake and Donnelly Lake have been identified as requiring immediate restoration due to their deteriorated state. Restoration work for Donnelly Lake is currently underway, while the renewal of Professor's Lake will occur when funding is available.

Other assets that are currently in poor or very poor condition are typically those that are included in 10-year capital renewal programs and budget forecasts, especially if deemed critical by the City.

Maturity Assessment

As part of this Stormwater Asset Management Plan, individual asset management maturity assessments were conducted for each asset class. These assessments were informed through dedicated workshops, which facilitated the collection of data related to asset information, current practices, and management approaches within each service area. The maturity levels were assessed using the 0-5 scale below.

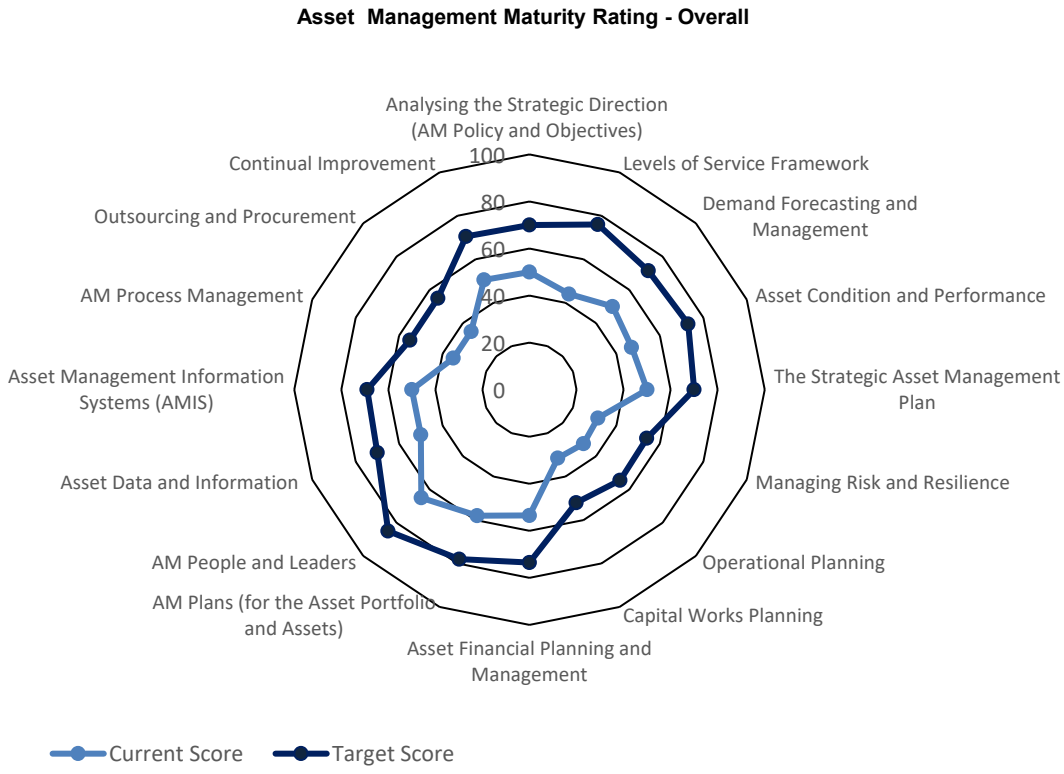
- **Level 0 – No Evidence:** There are no identifiable asset management practices; activities are unstructured and ad hoc with no documented processes or data systems in place.

- **Level 1 – Aware:** The organization recognizes the importance of asset management but lacks formal processes; efforts are reactive, and asset data is incomplete or inconsistently managed.
- **Level 2 – Basic:** Some basic asset management processes exist and are occasionally followed, data is being collected but not consistently used, and decisions are mostly short-term or reactive.
- **Level 3 – Core:** Core asset management practices are documented and routinely applied, lifecycle planning is being introduced, and decisions are increasingly informed by data and structured processes.
- **Level 4 – Intermediate:** Asset management is integrated with organizational planning, with active use of service levels, risk frameworks, and lifecycle costing, and continuous improvement practices are beginning to emerge.
- **Level 5 – Advanced:** Asset management is fully embedded across the organization, decisions are optimized using predictive tools and integrated systems, and there is a strong culture of continuous improvement and innovation.

Radar graphs illustrating the current and target maturity levels for each asset class are provided in the appendix. These visuals also outline the key activities required to progress toward the desired maturity.

Based on the results of these assessments, the City's overall current maturity score across all asset classes is 46, which corresponds to a "Core" maturity level (level 3). The City has established a strategic objective to advance to an "Intermediate" maturity level, on average, over the next five years.

Figure E-3 – Asset Management Maturity Radar Graph by Assessment Subject (Across all Asset Classes)



Levels of Service

The City of Brampton is committed to delivering high-quality services to its residents and businesses while maintaining affordability and long-term financial sustainability. As the City's asset management program has matured, it has become increasingly evident that a more advanced understanding of the scope and performance of services is required to effectively evaluate both their effectiveness and cost-efficiency.

In support of this objective, this Asset Management Plan includes detailed Levels of Service (LOS) tables for each stormwater asset class, presented in Section 3.4 of this report. These tables establish a clear link between the current levels of service and the proposed or targeted levels, and identify the associated costs required to achieve those targets. This approach provides a foundation for more informed decision-making and supports the City's commitment to balancing service excellence with fiscal responsibility.

Risk Management

In total, approximately $3.2 billion in stormwater assets have been assessed as part of this Asset Management Plan. Of this amount, around $2.2 billion (71%) have been classified as presenting *low to insignificant* levels of risk. An additional $0.8 billion (26%) are categorized as *moderate risk*, while the remaining 109 million (3.5%) have been identified as *high-risk* assets. Importantly, no assets have been assessed in the *extreme risk* category.

The City actively monitors high-risk assets through ongoing inspections and incorporates risk mitigation strategies within the capital and operating budget processes to ensure that these risks are addressed before they negatively impact service delivery or the community.

While the cumulative risk profile indicates that nearly all assets (approximately 99%) fall within the medium risk range or lower, the City continues to face ongoing risk-related challenges. Insights from the risk assessment process and consultations with service area staff indicate that the most significant risk drivers remain:

- **Capacity constraints**, particularly during peak service periods; and
- **Asset condition**, with heightened attention required for assets rated in *Very Poor* condition.

As demand for service increases and infrastructure continues to age, it will be critical for the City to closely monitor these high-risk assets to ensure timely interventions and sustained service performance.

Figure E-4: Summary of Risk Assessment by Replacement Value

PoF	Replacement Value (2024$M) by Risk Exposure (CoF x PoF)				
5	$0.0	$4.0	$24.5	$0.0	$0.0
4	$0.0	$0.0	$5.8	$84.1	$0.0
3	$0.0	$60.2	$526.8	$161.8	$0.0
2	$0.0	$268.6	$596.2	$101.3	$0.0
1	$0.0	$442.0	$840.2	$4.1	$0.0
	1	2	3	4	5

Current (2024) Risk Ratings		
Extreme	$0.0	0.0%
High	$108.6	3.5%
Medium	$799.6	25.6%
Low	$1,769.4	56.7%
Insignificant	$442.0	14.2%

Lifecycle Management

The City of Brampton manages assets across various service areas using distinct lifecycle strategies, which are currently a mix of formal and informal procedures. Consistent with the recommendations of the City's Corporate Asset Management Plan (Corporate AMP) and regulatory requirements, the City's asset-related work has been categorized into six lifecycle action categories. These categories represent the actions undertaken throughout the lifecycle of assets to ensure they provide desired levels of service:

- Non-Infrastructure Solutions
- Operations & Maintenance (O&M)
- Renewal & Rehabilitation
- Replacement
- Disposal/Removal
- Expansion/Upgrade.

Based on scenario analysis done within this AM Plan, the City has selected a proposed service level that outlines the level of service it aims to achieve across its infrastructure portfolio over the next 10 years (2025-2034). This scenario is intended to reflect a realistic, financially informed target for service delivery, balancing the need for sustainable infrastructure with fiscal responsibility and community expectations.

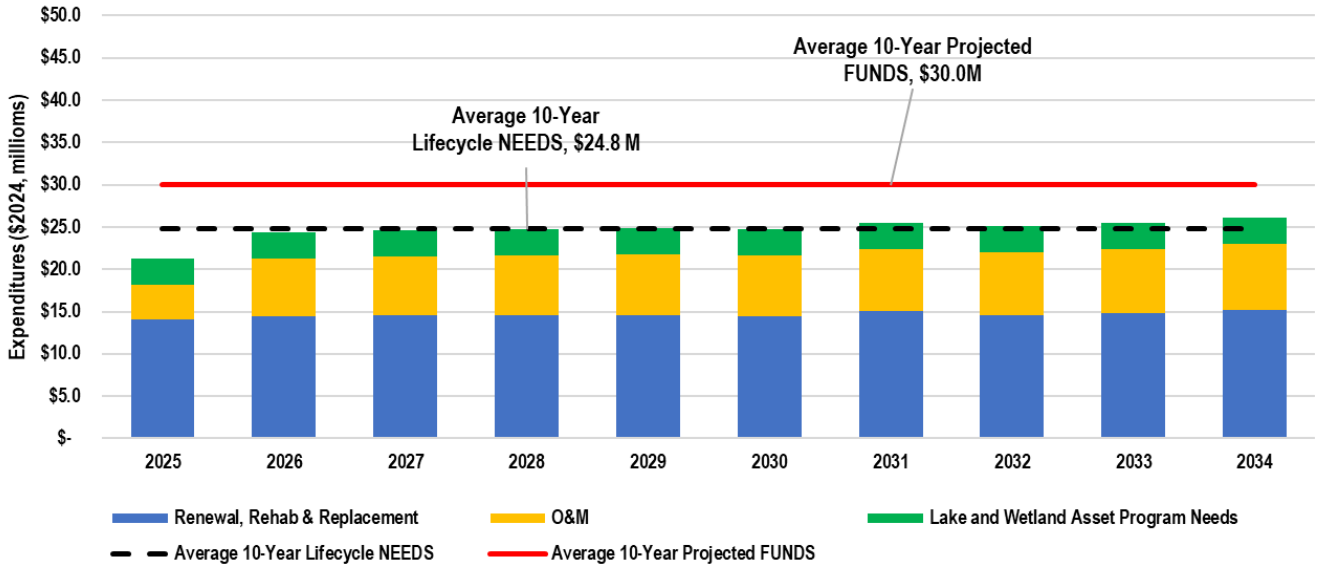
Under this selected scenario:

- the City's 10-year full lifecycle investment need—which includes the cost of maintaining, renewing, and replacing existing assets to meet these service levels—is estimated at **$24.8 million/year.**

- the average available revenue collected from the stormwater charge over the same 10-year period is projected at **$30.0 million/year**, based on current forecasts. The City's stormwater charge will cover the short-term needs, with the remaining funds to be put into a reserve to support long-term needs.

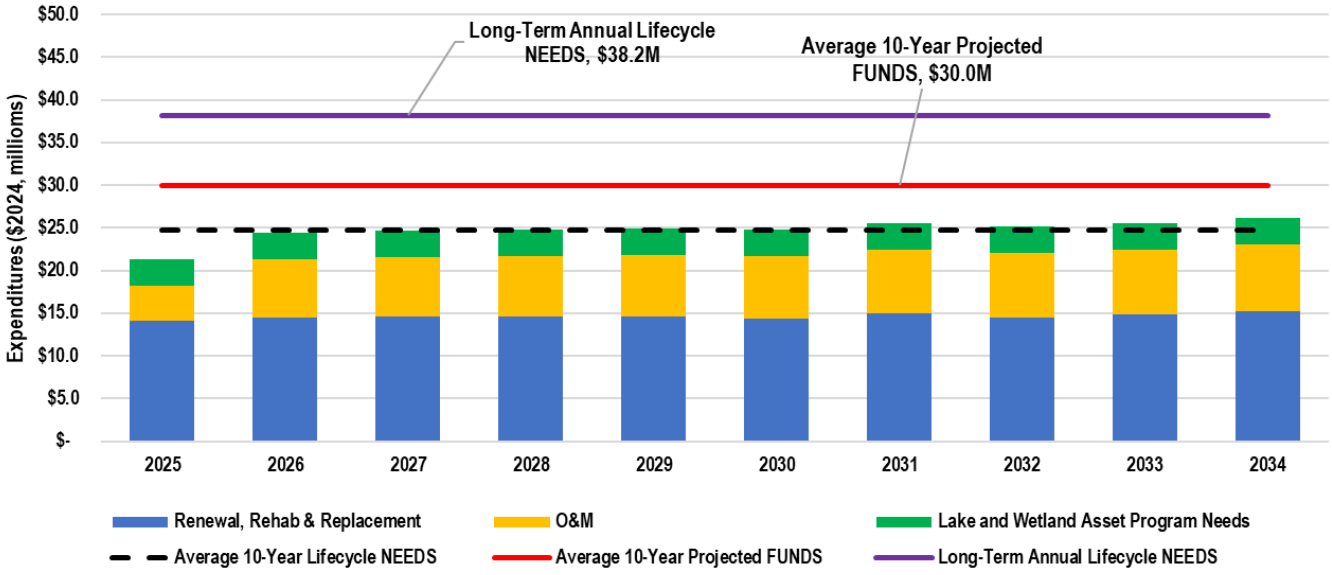
Figure E-5 below shows a breakdown of full lifecycle costs for each year in comparison to the 10-year average projected revenues.

Figure E-5: 10-Year Full Lifecycle Needs – Proposed Levels of Service[1]



While the current stormwater charge is projected to adequately support the City's short-term lifecycle needs over the next ten years, Figure E-6 illustrates that long-term funding pressures remain. The estimated long-term annual lifecycle needs are $38.2 million, reflecting broader asset renewal, rehabilitation requirements that extend beyond the current forecast window.

Figure E-6: Long-Term Full Lifecycle Needs – Proposed Levels of Service



[1] Growth-related costs have been excluded from the total lifecycle analysis, as they are assumed to be fully funded through development charges. As such, no portion of the City's stormwater charge is allocated toward growth-related infrastructure.

To ensure ongoing sustainability of the stormwater program, additional contributions to reserves or supplemental funding mechanisms may be required to address needs that are not fully captured within the 10-year planning horizon. This is particularly important to meet service levels and manage aging infrastructure in the decades ahead.

Financing Strategy

To ensure long-term asset needs are met, the following strategies outline a comprehensive plan to ensure financial sustainability while maintaining and optimizing infrastructure assets:

1. Lifecycle and Information Management

Efficiently managing expenditures is crucial for closing the infrastructure gap without compromising service quality:

- Deferring Renewals Based on Risk Exposure
- Adjusting Service Levels as Appropriate
- Minimizing the Size of the Asset Portfolio
- Implementing Non-Infrastructure Solutions
- Improved Data Quality

2. Increasing Revenues

One of the primary ways to close the infrastructure funding gap is by generating additional revenue sources:

- Increase or Maintain Stormwater Charge
- Leverage Grants and Other Revenue Sources

3. Debt Capacity and Reserve Management

Strategic use of debt financing and reserves can help balance long-term infrastructure investments:

- Debt Management/Financing
- Reserve Management

Monitoring & Improvement Plan

Continuous improvement is a fundamental aspect of municipal asset management, reflecting the City's ongoing commitment to optimize the performance, efficiency and sustainability of infrastructure assets over time. This plan builds upon prior efforts that the City has taken to improve the availability, completeness and accuracy of asset

data. These improvements have increased the confidence ratings of the data used to develop this plan and facilitate the work required to update asset management reporting in the future.

Improvement initiatives are summarized in Section 8 of this report and are aligned with the gaps and opportunities discussed throughout the preceding chapters. They provide a roadmap for enhancing data quality, planning processes, lifecycle strategies, and service delivery for each asset type.

Concluding Remarks

In summary, this Stormwater AM Plan represents a significant milestone in the City of Brampton's ongoing commitment to responsible infrastructure stewardship and regulatory compliance.

The Plan meets and exceeds the requirements of O.Reg. 588/17, aligning with industry best practices and international standards, while also laying the foundation for ongoing improvements in asset performance, risk management, and financial sustainability.

The AM Plan emphasizes the importance of strategic financing, lifecycle optimization, and continuous monitoring. It also prepares the City to adapt to future developments, including growth-related asset additions and the potential organizational changes stemming from the Transition Board's work on regional governance.

Looking ahead, the City will continue to refine and update this AM Plan to ensure it remains responsive to emerging risks, regulatory changes, community expectations, and operational realities. Through disciplined implementation, transparent reporting, and alignment with strategic objectives, Brampton is well-positioned to deliver a safe, reliable, and efficient stormwater system for its residents and businesses—today and into the future.

Key Acronyms & Abbreviations

AM	Asset Management
CAM	Corporate Asset Management
CAPEX	Capital Expenditures
City	The City of Brampton
CLOS	Current Levels of Service
DC	Development Charges
LC	Lifecycle
LOS	Levels of Service
OPEX	Operating Expenditures
O&M	Operations and Maintenance
PSAB	Public Sector Accounting Board
PLOS	Proposed Levels of Service
QA	Quality Assurances
QC	Quality Control
SA	Service Area
SLA	Service Level Agreement
SOP	Standard Operating Procedure
SOLI	State of Local Infrastructure

Glossary

Asset Management
The combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner.

Asset Management Plans (AMPs)
An Asset Management Plan (AMP) is a formal document that outlines the strategies and processes for managing an organization's assets to deliver an agreed standard level of service.

Benchmarking
A process of comparing the business processes and performance metrics including cost, cycle time, productivity, or quality to another that is widely considered to be an industry standard benchmark or best practice.

Capital Expenditure (CAPEX)
Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential. CAPEX increases the value of the asset stock.

Condition-Based Preventive Maintenance
Preventive maintenance initiated as a result of knowledge of an items condition from routine or continuous monitoring.

Condition Monitoring
Inspection, assessment, measurement, and interpretation of the resultant data, to indicate the condition of a specific asset or component and determine the need for some preventive or remedial action.

Consequence of Failure
The effects of a failure mode, including impacts on health & safety, reputation, environment, service provided and economy.

Current Assets
Those assets which are expected to be realized in cash or sold or consumed within one year of an organization’s balance date.

Critical Assets
Those assets that are likely to result in a more significant financial, environmental and social cost in terms of impact on organizational objectives.

Demand Management
Actions taken to influence demand for services and assets, often undertaken as part of sustainability initiatives and/or to avoid or defer required asset investment. Demand management may be ‘SUPPLY-SIDE’ demand Management (for example minimizing wastage through pipe leak detection or customer DEMAND-SIDE management, to reduce demand for over-utilized assets or vice versa (for example through pricing, regulation, education and incentives).

Deterioration Rate
The rate at which an asset approaches failure (end of life).

Failure
The condition in which an asset fails to perform its function. Failures can be total (e.g., a pump fails to pump any water) or partial (e.g., a pump can pump only a portion of the required pumping volume).

Gap Analysis
A method of assessing the difference between a business's current (asset management) practices

and the future desirable (asset management) practices. Also called “needs analysis”.

Infrastructure Assets

Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service by the continual maintenance, replacement, and refurbishment of its components.

Key Performance Indicator (KPI)

A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Performance indicators commonly relate to safety, responsiveness, cost, asset performance, reliability, efficiency, environmental protection, and customer satisfaction.

KPIs are measures of how well a utility is conducting its duties (inward focus), as opposed to the customers’ perspective of the level of service being provided (outward focus).

Level of Service (LOS)

A measure of the effectiveness of a particular activity (e.g., the taste of drinking water as a result of treatment) or service area (e.g., brightness as the result of installed street lighting) as perceived by customers. Service levels usually relate to safety, customer satisfaction, quality, quantity, capacity, reliability, responsiveness, environmental acceptability, cost and availability.

Lifecycle Management

The cycle of activities that an asset or facility goes through while it retains an identity as a particular asset, from planning and design to operations, maintenance, decommissioning and disposal. Investment decisions should be based on understanding the total lifecycle costs and benefits.

Maintenance

All actions necessary for retaining an asset as near as practicable to its original condition and to prevent unplanned downtime, excluding rehabilitation or renewal.

Master Plans

Long range plans developed for major asset classes which consider business drivers, demand and supply projections, conservation, and rehabilitation and replacement of existing assets.

Operation

The active process of utilizing an asset which will consume resources such as labour, energy, chemicals and materials.

Optimized Decision-Making (ODM)

Two definitions are:

1. ODM is a formal process to identify and prioritize all potential solutions with consideration of financial viability, social and environmental responsibility and cultural outcomes.
2. An optimization process for considering and prioritizing all options to rectify existing or potential performance failure of assets. The process encompasses NPV analysis and risk assessment.

Operational Expenditure (OPEX)

Ongoing annual cost expenditures for running day-to-day business operations including costs of workers and facility expenses such as supplies, rent and utilities.

Operations Management

The active process of using an asset that consumes resources such as manpower, energy, chemicals, and materials. Operation costs are part of the lifecycle costs of an asset.

Performance Measure

See Key Performance Indicator (KPI).

Performance Monitoring

Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.

Probability of Failure

The likelihood or frequency that an asset will fail to perform its function, typically expressed in terms of failures per year.

Rehabilitation

Work to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally involves repairing the asset to deliver its original level of service (e.g., slip-lining of sewer mains) without resorting to significant upgrading or renewal, using available techniques and standards.

Renewal

Work to upgrade, refurbish, or replace existing assets or facilities with assets or facilities of equivalent capacity or performance capability.

Replacement

The complete replacement of an asset that has reached the end of its life to provide a similar, or agreed alternative, level of service.

Risk

The probability of an event occurring multiplied by the impact(s) of that event.

Risk Management

The application of a formal process to assess organizational risks to determine the resultant ranges of outcomes, their probability of occurrence, and what actions may be cost-effectively taken to reduce the organization's overall risk exposure.

Strategic Plan

A plan containing the long-term goals and strategies of an organization. Strategic plans have a strong external focus, cover major portions of the organization and identify major targets, actions and resource allocations relating to the long-term sustainability, value, and growth of the organization.

Useful Life

Useful life can be categorized into the following:

1. Design or Engineered Useful Life: Expected lifespan based on design and engineering specifications.
2. Manufacturer Suggested Useful Life: Duration recommended by the manufacturer for optimal performance
3. Actual Useful Life: Real-world lifespan influenced by usage, maintenance and environmental factors.

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Introduction

1. Introduction

1.1 Asset Management Plan (AM Plan) Background

The City of Brampton (City), located within the Greater Toronto and Hamilton Area (GTHA), in the Region of Peel is a diverse and rapidly growing City. The City is responsible for delivering a diverse and growing range of services to its residents including the provision of Stormwater Services.

The City proactively and responsibly manages its infrastructure portfolio to support service delivery. As infrastructure ages and demands increase, so does the challenge of ensuring the needs of the community are effectively met with the limited resources available. This Stormwater Asset Management Plan (Plan or AM Plan) addresses that concern by providing a framework for prioritizing and optimizing Asset Management (AM) efforts and providing direction for effective management of stormwater infrastructure to best achieve established goals and objectives. The resulting Plan is intended to provide the optimal allocation of resources towards meeting prescribed goals, objectives, and levels of service.

This plan is focused on achieving several key goals and objectives:

- **Ensuring Long-Term Sustainability** – management of the City's assets is a long-term commitment that must be sustainable to ensure effective service delivery for future generations.
- **Lowest Cost of Ownership** – long-term sustainability is only possible by ensuring costs are minimized through efficient management of assets by developing service area specific plans and objectives.
- **Minimizing Risk** – risk is minimized through the assessment, management and long-term planning of assets at focused levels and through consultation with individual service areas.
- **Enhancing Service Delivery** – as the City strives for continual improvement as outlined in the Corporate Strategic Plan, service area specific plans are a key objective to ensure enhanced delivery of services at a more detailed level.
- **Supporting Informed Decision-Making** – development of a set of asset management tools that help in the evidence-based decision-making process. As the Stormwater AM Plan continues to be implemented, it will support the essential evidence-based strategic planning process, including the City's Long Term Financial Master Plan and budgeting processes, well into the future.

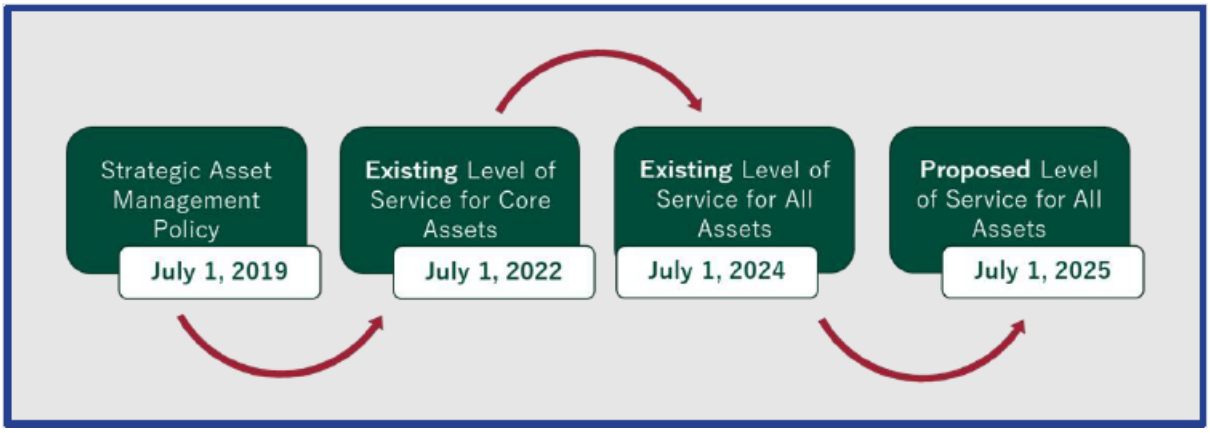
By following the key objectives above, the Stormwater AM Plan establishes a "clear line of sight" from senior management to the customer and from planners to frontline decision makers. Investment requirements

included in the Stormwater AM Plan are clearly linked to well-defined needs that are based on either maintaining or enhancing customer-focused levels of service and aligning with strategic objectives through capital and operating decisions. The linking of investments to needs will improve transparency and stakeholder confidence that the right decisions are being made, on the right assets, at the right time.

1.2 Alignment with Regulatory Requirements

The “Building Together Guide” was published in 2012 to encourage and support municipalities in Ontario to develop Asset Management Plans (AMPs) in a consistent manner. O. Reg. 588/17 was subsequently enacted in 2017 and further expands on the “Building Together Guide” by mandating specific requirements for municipal Asset Management Policies and AMPs in Ontario.

Figure 1-1 – Regulatory O.Reg 588/17 Requirements



O. Reg. 588/17 has set three AMP-related deadlines (as seen above in Figure 1-1):

- July 1, 2022 deadline: Every municipality shall prepare an AMP in respect of its core municipal infrastructure assets (water, wastewater, stormwater, roads and bridges) documenting current levels of service.
- July 1, 2024 deadline: Every municipality shall prepare an AMP in respect of all its other municipal infrastructure assets documenting current levels of service.
- July 1, 2025 deadline: Every municipality shall prepare an AMP in respect of all its municipal infrastructure assets documenting proposed levels of service and financial strategies to fund these expenditures for each of the next 10 years.

This AMP is compliant with the July 1, 2025 deadline.

In accordance with the requirements of O.Reg. 588/17, this AM Plan is posted on the City’s website and is emailed to the Ministry of Infrastructure.

1.3 Relationship with Other Municipal Documents

Asset management 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 assist 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 policies and planning documents, including the following:

Policies

- Policy - Corporate Asset Management Policy
    - Establishes principles and guidelines for managing municipal assets to ensure sustainability, efficiency, and alignment with long-term service delivery objectives.

Plans and Studies

- Stormwater Asset Management Plan 2022
    - The previous iteration of the Asset Management Plan which was developed to meet the current levels of service requirements for O.Reg. 588/17.
- Service Area Asset Management Plan 2024
    - Summarizes the current state, expected performance, and investment strategies for all City assets to ensure sustainable and cost-effective management.
- Corporate Strategic Plan 2024
    - Defines the municipality's overarching vision, goals, and priorities for governance, infrastructure, and community services.
- Official Plan (Brampton Plan)
    - A comprehensive land-use planning document guiding growth, development, and sustainability in Brampton over the long term.
- Brampton Mobility Plan (in development)
    - A strategic framework to improve mobility, accessibility, and transportation options (and associated stormwater infrastructure) within Brampton.
- Climate Change Adaptation Plan (in development)
    - Strategic framework that outlines actions to reduce the risks and impacts of climate change on communities, infrastructure, and ecosystems by enhancing resilience and preparedness.
- Lake Enhancement Strategy
    - Strategic framwork that aims to transform City lakes into vibrant eco-spaces that balance recreation with ecological restoration and community engagement.

Financial Reports

- Tangible Capital Asset (Fixed Asset) Annual Financial Statements
  - Provides an accounting of the municipality's fixed assets, including valuation, depreciation, and financial reporting compliance.
- Operating and Capital Budgets
  - Outlines planned municipal revenues and expenditures, balancing short-term service delivery needs with long-term financial sustainability.

1.4 Communication and Engagement

As mentioned prior, the City has established a dedicated funding source for stormwater services through the stormwater charge. To support transparency and community engagement, the City may consider an online survey, or other means to solicit feedback, to gather feedback on how residents feel their contributions to the stormwater charge should be allocated. The results of this information gathering will be compiled and posted in a public report following the approval of the AM Plan.

1.5 Asset Management Plan Scope

The Scope of the AMP includes all the assets within the City's Stormwater Service Area and the services they deliver. These include:

Stormwater Conveyance

- Storm Sewer System
- Ditches
- Culverts
- Watercourses

Stormwater Management Facilities

- Stormwater Ponds
- Water Quality Units
- Low Impact Development (LID)

Natural Stormwater Assets

- Wetlands
- Lakes

1.6 Interdependencies and Key Stakeholders of the Plan

As with any entity, the City's stormwater management staff do not deliver service in isolation and hence is reliant on other Service Areas, departments, and external stakeholders to support service delivery. Similarly,

the stormwater management staff also support other internal stakeholders.

As an example, major refurbishment or replacement for storm sewers and other system components is coordinated with internal departments (e.g. Transportation) and other stakeholders, such as the Region of Peel. Although project funding is typically kept separate, project coordination is essential to maximize customer value. Communication is essential to ensure that refurbishment or replacement projects do not conflict with activities planned by other stakeholders. This coordination is typically managed through consultation with stakeholders during annual planning periods. For example, capital coordination is required between capital works (Transportation services) and stormwater services for adding stormwater retrofits to the capital works projects

A summary of the inter-dependencies is presented in the Table 1-1. Each stakeholder is defined as:

- Dependant – Stakeholders on whom the SW Service Area is dependent upon to deliver its own level of service objectives.
- Contributor – Stakeholders who are supported by the SW Service Area to deliver that stakeholder's level of service objectives.

Table 1-1: Summary of Stormwater supporting Stakeholders

Stakeholder	Inter-dependency	Relationship Context through LOS/Lifecycle activities lens	Governed By
Development Engineering and Development Construction (internal)	Dependant	Growth/Expansion* - Responsible for overseeing design and construction. This determines the quantity and increase of the stormwater system.	Managed through development agreements
Environmental Planning (internal)	Dependant	Growth/Expansion – Responsible for developing environmental management plans and climate change master plans that have connections to stormwater. This provides a preliminary estimate of the potential growth in the stormwater system.	Driven by Municipal Official Plan

Stakeholder	Inter-dependency	Relationship Context through LOS/Lifecycle activities lens	Governed By
		Renewal – Responsible for wetland and lake restoration and monitoring that contributes to the stormwater system.	
Digital and IT Teams (internal)	Dependant	All – provides digital infrastructure (networks, software, and system support) which forms the collective understanding for assets. They also manage the procurement and implementation of digital management systems on behalf of the SW Service Area.	Issues managed 'by request', formalised procurement process for new systems, and managed through business process documents (e.g. SOPs, SLAs)
Fleet (internal)	Dependant	All – provides the right type, quality and quantity of vehicles and all lifecycle activities to enable effective year-round operation and maintenance services.	Issues managed 'by request'
Facilities (internal)	Dependant	All - Provide quality, well maintained facilities to enable the SW Service Area with working spaces and storage for fleet vehicles.	Managed through general provisioning of office spaces and services
	Dependant	Growth/Expansion* – Coordinate and provide SW services on site to meet applicable criteria.	Site plan approval
	Contributor	Quality/Renewal, O&M – Inspect and maintain lot level controls outside of the building and downstream, receiving infrastructure. The costs for this work are recovered from facilities.	Managed informally through personnel relationships and considering SLA for future use

Stakeholder	Inter-dependency	Relationship Context through LOS/Lifecycle activities lens	Governed By
	Dependant	Replacement or upgrade – Coordinate Stormwater replacement or upgrade projects on sites.	Managed informally through personnel relationships and considering SLA for future use
Region of Peel, Mississauga, Town of Caledon (external)	Dependant and Contributor	Growth/Expansion – Responsible for developing stormwater infrastructure master plans.	Driven by Municipal Official Plan
	Dependant and Contributor	O&M - Coordinate stormwater inspection and maintenance in regional or neighbouring authorities. Coordination occurs to ensure that connected systems are functioning.	Managed informally through personnel relationships
Emergency Management	Dependant	Capacity - Where stormwater infrastructure is not sufficient to provide sufficient flood protection, we rely on Emergency Management to provide public safety programs and procedures to ensure the community is appropriately protected.	Managed by Emergency Management Plans and governed by Emergency Management & Civil Protection Act
	Contributor	Capacity - Identify high risk areas with insufficient flood protection.	Managed informally through personnel relationships
Parks Planning and Development (internal)	Dependant	Growth/Expansion* – Provides the following services: planning, construction, preliminary and final acceptance of Stormwater assets	Development agreements or site plan applications

Stakeholder	Inter-dependency	Relationship Context through LOS/Lifecycle activities lens	Governed By
		within parks.	
Parks Maintenance and Forestry (internal)	Dependant	Quality/O&M – Parks, Forestry and Horticulture support SW Service Area by providing vegetation maintenance and mowing for ditches, stormwater ponds, LIDs, watercourses, lakes and wetlands (including mowing along access roads), etc as well as ad hoc invasive species treatment when requested.	Included in annual operations
	Dependant	Function/Upgrade (safety) – Provide SWMP signage and perimeter fencing. Add access pads to SW ponds and maintaining the pads. Inspect safety stations.	
	Dependant	Quality/O&M – Parks, Forestry and Horticulture support SW Service Area by maintaining vegetation and planting beds in LIDs.	Managed informally through personnel relationships and considering SLA for future use
	Contributor	O&M - Coordinate stormwater inspection and maintenance of conveyance capacity to avoid impacts to park service areas.	Included in annual operations
Public Works and Engineering (internal)	Dependant	Quality/O&M – Manage contracts for catchbasin cleaning, street sweeping, Storm Sewer flushing and reaming, clean out of Water Quality Units, ditch maintenance and minor watercourses maintenance. Undertake	Some items are part of normal operations for transportation. Others are managed informally through personnel

Stakeholder	Inter-dependency	Relationship Context through LOS/Lifecycle activities lens	Governed By
Contract Services and Road Operations		works such as resurfacing pond access roads, removing debris from watercourses, repairing driveway/roadside culverts**. **Does not include crossing culverts construction and maintenance for which Transportation are accountable.	relationships and considering update to SLA for future use.
	Dependent	Quality/growth-Renewal, replacement and expansion: Oversee and manage repairs, replacement rehab of the stormwater system in the Road right-of-way.	Included in annual operations
	Contributor	Quality/growth-Renewal, replacement, and expansion: SW Service Area provides technical support and consulting services regarding repairs, replacement rehab to the stormwater system in the Road right-of-way.	Managed informally through personnel relationships
	Contributor	Capacity/O&M - Roads draining to SWMP and other stormwater assets are dependant on capacity of the pond, which is achieved through maintenance and dredging coordinated by SW Service Area.	Included in annual operations
	Dependant	Asset Information/All – Public Work and Engineering overseeing SW assets database in right-of-way to inform work on roads. Public Work and Engineering is responsible for notifications of construction/ownership of stormwater infrastructure under the roadway	Managed informally through personnel relationships and considering updates to business process documents (e.g. SOPs,

Stakeholder	Inter-dependency	Relationship Context through LOS/Lifecycle activities lens	Governed By
		and in the Right-of-way	SLAs)
Animal Services	Dependant and Contributor	Quality/Replacement* - Supports flood mitigation in watercourses and SWMPs through beaver management, including installation and maintenance of bafflers	Managed informally through personnel relationships

** Asset Information: responsible for notifying SW Service Area of construction/ownership of SW assets for GIS updates*

1.7 Asset Management Maturity

Background

Asset management data quality and maturity of AM practice varies across the major asset classes within the Stormwater portfolio. As part of this AMP, an AM maturity assessment was undertaken for the major asset classes presented in this AM Plan. Several workshops with City staff were conducted to gather information on the current state of asset data and overall asset management planning practices for the assets included in this AMP.

The purpose of the asset management maturity assessment was to identify the current maturity of the City's Stormwater's AM practice, along with a target maturity level and associated improvement initiatives that can be reasonably achieved over a five (5) year planning horizon.

Using the International Infrastructure Management Manual (IIMM) maturity assessment tool, information on asset maturity was collected under three categories:

1. Understanding and Defining the Requirements
2. Development of Asset Management Lifecycle Strategies
3. Asset Management Enablers

The IIMM Maturity Assessment Tool originates from the International Infrastructure Management Manual, first developed in 2000 by the Institute of Public Works Engineering Australasia (IPWEA) and a consortium of organizations from Australia and New Zealand. The IIMM itself was created to provide a structured best-practice framework for infrastructure asset management. It is internationally recognized and has been updated several times since its initial release (notably in 2006, 2011, 2015, and 2020 editions).

The three AM maturity categories are broken down into 16 elements that are assessed in the individual Asset Maturity Radar Graphs. Most of the elements are considered on an asset class level basis; however, a number apply on a corporate-wide level and are scored as such. The elements reviewed for each major asset class (stormwater network, ponds, ditches, water quality units, LIDs, wetlands, watercourses, and lakes) are outlined in Table 1-2.

Table 1-2 – AM Maturity Assessment Elements

Category	AM Element
Understanding and Defining the Requirements	Analyzing the Strategic Initiatives (AM Policy and Objectives)
	Levels of Service Framework
	Demand Forecasting and Management
	Asset Condition and Performance
	The Strategic Asset Management Plan
Developing Asset Management Lifecycle Strategies	Managing Risk and Resilience
	Operational Planning
	Capital Works Planning
	Asset Financial Planning and Management
	AM Plans (for the Asset Portfolio Assets)
Asset Management Enablers	AM People and Leaders
	Asset Data and Information
	Asset Information Management Systems (AIMS)
	AM Process Management
	Outsourcing and Procurement
	Continual Improvement

The scale, provided in Table 1-3 below, was used to determine a maturity level or score between 0 and 100 for each element. The detailed assessment framework used to score each category is provided in **Appendix A.**

Table 1-3 – AM Maturity Assessment Scoring Scale

Maturity Level	Score	Definition
Aware	0-20	The organization demonstrates initial recognition of the importance of asset management principles but has limited understanding or application. Processes are ad hoc or informal, and leadership commitment is minimal.
Basic	21-40	Asset management practices are beginning to form, with some foundational processes in place. Understanding and application are still inconsistent and typically reactive rather than proactive.
Core	41-60	The organization has established fundamental asset management practices, including defined objectives and processes. These are applied consistently but may not yet be optimized or integrated into all areas.
Intermediate	61-80	Asset management practices are more robust and integrated across the organization. The organization proactively manages assets based on a combination of historical data, stakeholder needs, and risk assessments.
Advanced	81-100	The organization demonstrates leadership in asset management, with optimized, innovative, and fully integrated practices. Asset management strategies are predictive, dynamic, and aligned with long-term goals.

Two separate scores have been assigned for each element:

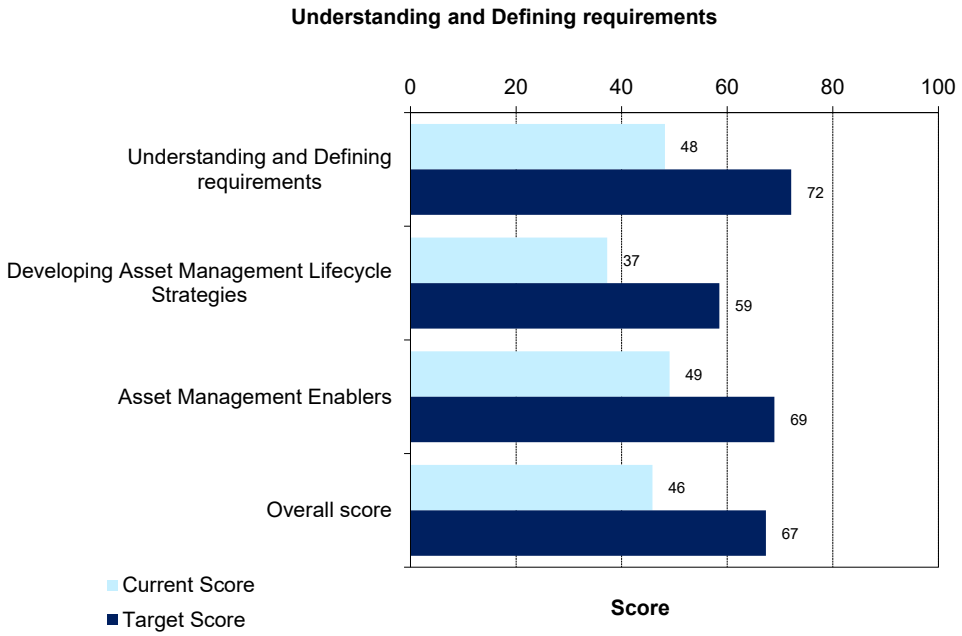
- **Current Score** - Through workshops with City staff, an assessment of current AM maturity was determined based on the outlined criteria. This score does not capture advancements made as part of the Stormwater AM Plan.
- **Target Score –** Target scores are generally set at one or two maturity levels above the current score, to be achieved in the next 5 years with input from City staff.

Upon completion of this AM Plan, the City will continue to conduct future assessments to track its asset management maturity over time.

Assessment Results

Looking at the results in aggregate across all asset classes, the overall current maturity score is 46, or at a “Core” maturity level, as shown in Figures 1-2 below. The target score across all service areas is to achieve an “Intermediate” maturity level on average in the next 5 years. It is recognized that the organization will seldom have perfect processes and data with which to manage the asset portfolio. The underlying concept of continuous improvement and reliability is key, and the basis in setting out target scores to strive for in the short to medium term.

Figure 1-2 – Overall Asset Management Maturity Score by Category (Across all Asset Classes)



The figure shown below is a radar chart that illustrates the results of the AM Maturity Assessment.

Two data series are plotted:

- Current Score: Represents the City's current maturity level in each competency area for the assets included in this AM Plan.
- Target Score: Represents the desired future state that the organization aims to achieve overtime.

Figure 1-3 – Asset Management Maturity Radar Graph by Element (Across all Asset Classes)

The following improvement initiatives are recommended in Table 1-4 for the City to meet its target maturity level. The initiatives listed are common across all asset classes assessed and detailed, asset specific, improvement actions are provided in **Appendix B.** This maturity assessment provides actions specific to the overall AM Program to increase overall maturity of service delivery practices. Actions specific to maintaining and enhancing the effectiveness of this AM Plan are provided within the "Monitoring & Improvement Plan Chapter" of this document.

Table 1-4 – Summary of Improvement Actions

Category	Improvement Actions
Understanding and Defining Requirements	• Conduct periodic environmental scans to identify strategic changes impacting the asset management system and inform necessary updates. • Promote and audit compliance with asset management policies at the departmental level to reinforce policy directives. • Continue master planning initiatives every 5–10 years, incorporating demand management scenarios (low, medium, high) to prepare for varying growth trajectories. • Establish a formal process for post-project audits to assess whether capital projects achieved their intended objectives and outcomes.

Category	Improvement Actions

	• Review and refine the asset management governance model, ensuring alignment with evolving strategies and roadmaps.
	  ○ This should include a comprehensive governance mapping exercise to clearly identify roles, responsibilities, and accountabilities across all departments involved in, or impacted by, stormwater asset management.
	  ○ Emphasis should be placed on identifying interdependencies between service areas—such as Public Works and Engineering, Parks Maintenance & Forestry, Environment & Development Engineering, and Corporate Support Services —to better understand who supports stormwater management activities (e.g., data collection, capital planning, maintenance delivery) and which areas rely on stormwater services to achieve their own service objectives (e.g., flood prevention, water quality, natural heritage protection).
	  ○ The updated governance model should promote collaboration, reduce duplication of effort, and enable more integrated decision-making across the organization.
	• Develop a skills and competency framework to assess current and required expertise in asset management, informing training needs and succession planning.

Developing Asset Management Lifecycle Strategies	• Monitor and report on service levels and associated key performance indicators (KPIs) to track effectiveness and inform decision-making. • Conduct formal risk assessments to evaluate the ability to meet service levels and the costs of lifecycle management activities, documenting the relationship between service levels, risk, and costs. • Align levels of service (LOS) with any future strategic or master plans to reflect the City's evolving infrastructure priorities. • Integrate considerations of climate change impacts (through modelling of climate projections) into future needs forecasting to inform lifecycle strategies, ensuring the resilience and adaptability of stormwater and natural assets under changing environmental conditions. • Integrate outcomes/findings from Brampton's future Wetlands Health & Restoration Study that will evaluate the health of wetlands within Brampton, identify high-functioning wetlands that can contribute to nature-based solutions for flood management (where applicable), and prioritizes restoration for these assets to improve resilience. • Incorporate outcomes/findings from studies undertaken by the TRCA and CVC (i.e. Etobicoke Creek Watershed Plan) to help inform areas where restoration is required on the City's watercourses and wetlands. • Enhance forecasting methodologies for infrastructure needs to establish future funding requirements for operations, maintenance, and other lifecycle activities. • Integrate outcomes from asset management plans into budgeting processes and long-term financial planning, ensuring compliance with regulatory requirements (e.g., O.Reg.588/17).

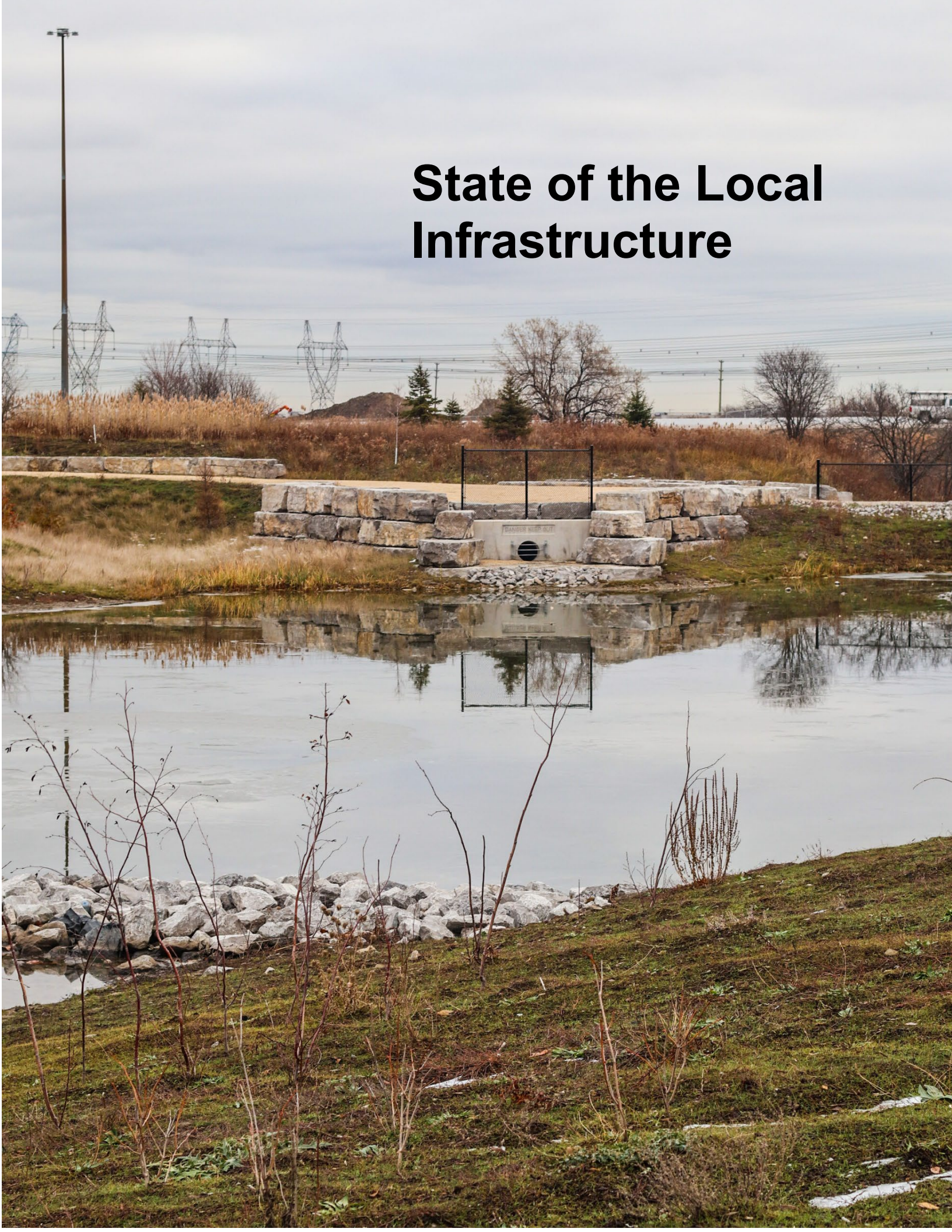
Category	Improvement Actions
	• Undertake formal assessments on a regular cadence to understand future needs for watercourse restoration. • Establish a condition and performance program for natural assets - i.e., to identify and prioritize restorative work.

Asset Management Enablers	• Develop and implement condition assessment frameworks, procedures, and lifecycle strategies tailored to stormwater and natural asset types (e.g., storm sewers, ponds, culverts, LIDs, watercourses, lakes, wetlands), including relevant sub-asset categories where applicable. Incorporate this information into programs for:
	  ○ CCTV assessments
	  ○ Pond bathymetric surveys
	  ○ Erosion assessments
	  ○ Visual inspection programs etc.
	• For the above, adopt industry-standard methods for forecasting future asset conditions and performance (such as deterioration modeling, observed trend analysis from inspections) to enhance lifecycle planning efforts.
	• Integrate the corporate risk management framework to establish and maintain asset risk profiles, aiding in lifecycle intervention prioritization.
	• Identify and address data gaps while enhancing the accuracy, completeness, and accessibility of critical asset data, particularly for high-value or high-risk components within the stormwater and natural asset portfolios. Key data gaps will be discussed in the plan improvement and monitoring section of this report, however, key focus areas for data collection include:
	  ○ Erosion Control and Flood Protection Infrastructure
	  ○ Wetlands and Lakes
	  ○ Watercourses
	  ○ Ditches
	  ○ LIDs
	  ○ Culverts
	• Develop and maintain a standardized data dictionary specific to stormwater and natural assets to ensure consistency, clarity, and integration across departments and systems.
	• Establish formalized data governance practices within relevant municipal departments to support the effective management of asset data, supporting systems (e.g., GIS, asset management software), and analytics platforms (e.g., dashboards, reporting tools).
	• Document and regularly update key asset management processes, reflecting changes in responsibilities, technology, and data workflows.

1.8 Plan Structure

The contents of this AM Plan follow the recommended elements prescribed by O.Reg 588/17 regulation on AM development for municipalities.

- **1.0 Introduction:** An overview of the Stormwater Asset Management Plan.
- **2.0 State of Local Infrastructure:** Summary of the Local Infrastructure's overall state for all asset classes. This section meets regulatory requirements for reporting on the current asset base as outlined in O. Reg 588/17.
- **3.0 Levels of Service:** Documentation of standard Levels of Service (LOS), detailing links between Technical LOS, Customer LOS, and Corporate LOS, based on current performance. Proposed levels of service are provided for the City's assets, meeting reporting requirements on current and future service levels in accordance with O. Reg 588/17.
- **4.0 Asset Management Strategy:** Details a comprehensive Asset Management Strategy at a granular level for each asset class. This includes various functional components and addresses requirements for developing strategies that cover asset management, risk, climate change integration, and lifecycle management, as mandated by O. Reg 588/17.
- **5.0 Financing Strategy:** Evaluation of asset-based needs, coupled with revenue projections, to support the infrastructure gap analysis. This section fulfills requirements for developing a financial plan to achieve proposed service levels as per O. Reg 588/17.
- **6.0 Monitoring and Improvement Plan:** Outline of approaches for monitoring progress and implementing improvements in asset management, underscoring the city's commitment to continuous enhancement as outlined in the City's Strategic Asset Management Plan.



State of the Local Infrastructure

2. State of Local Infrastructure

This section of the AM Plan describes the City's Stormwater asset inventory, and provides an overview of the valuation, age, and condition of its assets. Recommendations for the regular frequency of data collection and reporting are provided in the AM Plan Improvement and Monitoring section.

2.1 Asset Hierarchy and Inventory

Understanding the assets owned by the City that are used to support each major service area is important to enable their effective and efficient management. In this AM Plan, the City's asset inventory has been organized around the major service groups and program areas shown in Table 2-1 in the following sub-section.

Most infrastructure assets owned by the City are included and organized into the functional classifications of stormwater conveyance, stormwater management facilities and natural stormwater assets. The detailed hierarchy for the City's stormwater management program can be seen in **Appendix C.**

In the previous iteration of the City's stormwater AM Plan, certain asset categories, including ditches, LID features, and natural assets, were not included in the valuation and analysis due to limited information and data availability. The absence of comprehensive inventories, condition assessments, and standardized valuation methodologies for these asset types posed significant challenges in accurately estimating their value and integrating them into the overall asset management framework. Addressing this limitation has been a key focus in the current AM Plan to provide a more complete and informed understanding of the City's asset portfolio.

The asset inventory used to develop this AM Plan is predominantly based on asset records within the City's GIS layers for each asset type.

2.2 Asset Valuation

For this iteration of the Asset Management Plan, the City undertook an extensive and detailed costing exercise to improve the accuracy and consistency of asset valuation. An engineering consulting firm was engaged to develop unit cost estimates using a combination of benchmarking data, industry tools, and localized expertise. This included the use of RSMeans, a widely recognized commercial cost estimating database that provides up-to-date construction cost information based on material, labor, and equipment rates across different regions in North America. The use of RSMeans helped ensure that replacement cost estimates reflect current market conditions and industry standards.

The current valuation approach is grounded in evidence-based cost estimation, utilizing market-informed data and cost estimation expertise to establish accurate replacement costs for assets. This methodology ensures that valuations more closely reflect actual market conditions.

The cost estimates in this Plan analyzed specific asset parameters—such as length, diameter, area, and material type—and further validated through benchmarking against comparable municipalities and input from City staff with operational knowledge. This comprehensive methodology has resulted in more robust and realistic valuations across all asset categories.

Replacement costs for natural assets—such as lakes, wetlands, and watercourses—were determined using a *restoration-based costing approach*, which estimates the financial investment required to restore or rehabilitate these features to a functional state equivalent to their existing or intended service levels. Given that these assets are considered perpetual in nature and are not typically "replaced" in the conventional sense, cost estimates are grounded in the capital costs associated with major restoration or enhancement efforts rather than full reconstruction.

To support the development of realistic and defensible estimates, the City established a framework of cost assumptions for Natural Assets, which include:

- Cost Drivers: Factors influencing restoration and ongoing costs include the size of the asset, sediment accumulation, vegetation density, existing ecological condition, site accessibility, and management objectives (e.g., water quality targets, habitat protection).
- Contingencies: A 10–15% contingency has been applied to account for site-specific variability, unforeseen challenges, and inflationary adjustments in restoration activities.

While natural assets such as wetlands, lakes, and watercourses play a critical role in Brampton's stormwater system—providing flood mitigation, water filtration, and habitat functions—they are not funded through the City's stormwater charge.

Unlike engineered stormwater infrastructure (e.g., pipes, culverts, and ponds), which are maintained and renewed using revenues generated from the stormwater charge, the funding for natural assets typically comes from alternative sources, including:

- Grants and external funding programs from provincial and federal governments targeting environmental restoration, climate adaptation, and green infrastructure.
- Partnerships with conservation authorities (e.g., Credit Valley Conservation Authority), who often lead or support projects related to the protection and enhancement of natural watercourses and wetlands.
- Municipal funding allocations, including capital project budgets or sustainability-focused reserve funds.
- Perpetual maintenance fees as a requirement for convenance of Natural Features to the City through the Draft Plan of Subdivision process.

Detailed Stormwater asset class total values are shown in Table 2-1 below. The most valuable

asset class is the storm sewer collection system, followed by the natural assets and stormwater ponds. The valuations are based on known or calculated replacement values, with data compiled from relevant inventory and unit costing information sources.

Table 2-1: Asset Inventory and Evaluation by Asset Classification

Asset Category	Quantity	Unit	Total Replacement Value (2024$M)	Funded through the Stormwater Charge? (Y/N)
Stormwater Conveyance			**$2,720.49**	
Storm Sewer System - Linear			**$1,812.31**	
Storm Sewers	1,464	km	$1,355.46	Y
Catchbasin or Ditch-Inlet Leads	330	km	$249.84	Y
Foundation & Roof Drain Collector	265	km	$207.01	Y
Storm Sewer System – Other (MH/CB/Outfalls)			**$533.47**	
Manholes	22,819	Each	$247.88	Y
FDC Manholes	4,227	Each	$37.75	Y
CB Manholes[2]	1577	Each	$227.70	Y
Catchbasins	41,353	Each	$15.13	Y
Outfalls	1,364	Each	$5.01	Y
Culverts			**$20.27**	
Roadside Culverts	1,796	Each	$12.57	Y
Minor Crossing Culverts	211	Each	$2.88	Y
Other Culverts	458	Each	$5.26	Y
Ditches			**$29.41**	
Ditches	125	km	$29.41	Y
Watercourses			**$325.03**	
Watercourses	255	Km	$325.03	Y
Stormwater Management Facilities			**$293.02**	
Stormwater Ponds			**$281.38**	
Stormwater Ponds	180	Each	$281.38	Y
Water Quality Units			**$7.88**	
Water Quality Units	134	Each	$7.88	Y
LIDs			**$3.76**	
Bioretention	13,780	Area (m^2)	$3.76	Y
Cooling Trench	9,924	Area (m^2)		Y
Infiltration Trench	620	Area (m^2)		Y
Stormwater Tree Trench	1,678	Area (m^2)		Y
Detention Chamber	381	Area (m^2)		Y
Stormwater Harvesting Chamber	24	Area (m^2)		Y
Infiltration Chamber	1,214	Area (m^2)		Y

[2] As part of the data refinement process for this iteration of the Asset Management Plan, Catchbasin Manholes and their variations have been reclassified from the Manhole asset layer to the Catchbasin asset layer. This change reflects a more accurate representation of asset function and alignment with current operational practices and data management standards. The reclassification enhances data consistency and supports improved lifecycle planning and reporting for stormwater infrastructure.

Asset Category	Quantity	Unit	Total Replacement Value (2024$M)	Funded through the Stormwater Charge? (Y/N)
Natural Stormwater Assets			**$105.67**	
Wetlands	162.8	Hectares	$69.91	N
Lakes	413,715	Area (m^2)	$35.76	N
TOTAL (ALL ASSETS)			**$3,119.20**	

2.3 Asset Age

Figure 2-1 summarizes, weighted by replacement value, the average age of the City's Stormwater assets, and the estimated average service life. Overall, the City's Stormwater assets are currently just under half of their expected service lives.

In the current Asset Management Plan, age data is limited or unavailable for several stormwater and natural asset categories, including ditches, culverts, watercourses, wetlands, and lakes. This limitation is due to a combination of historical, technical, and practical factors:

1. Legacy Infrastructure Records: Many stormwater assets—particularly older or minor components like ditches and culverts—were constructed decades ago without systematic documentation. As a result, accurate installation dates were not captured or have since been lost due to changes in recordkeeping systems.

2. Natural and Semi-Natural Assets: Features such as wetlands, lakes, and watercourses are not built assets in the traditional sense and do not have a clear "installation date." These systems often predate municipal development or evolve gradually through natural processes, making it difficult to assign an age using conventional asset management methods.

3. Ownership and Jurisdiction Complexity: In some cases, especially with natural assets, shared ownership or jurisdiction across multiple agencies (e.g., conservation authorities, private landowners, provincial bodies) complicates data collection and centralized recordkeeping.

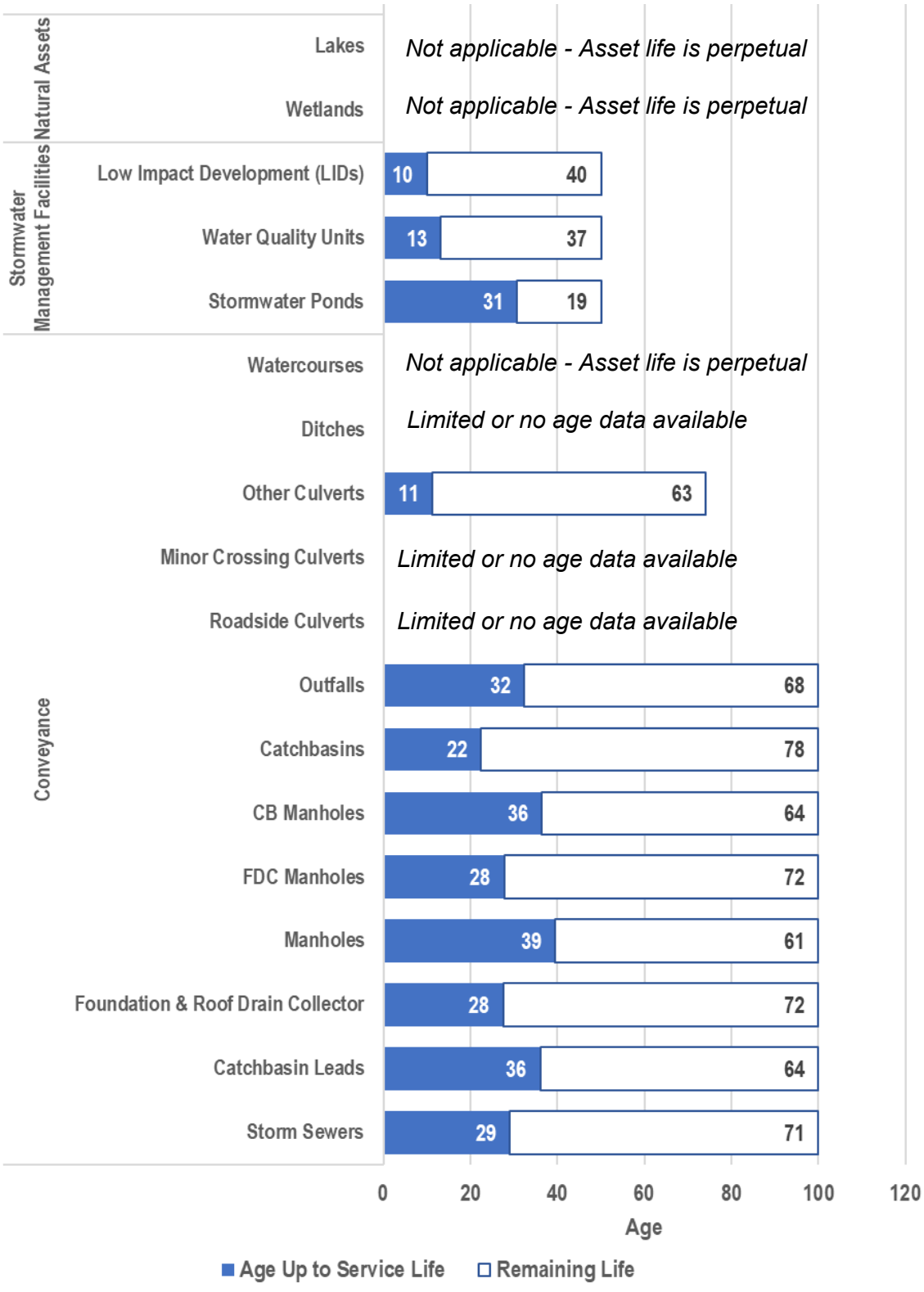
Despite these challenges, understanding asset age remains valuable for long-term lifecycle planning, risk assessment, and prioritization. It is recommended that the City work toward closing these data gaps in future updates to the Asset Management Plan by:

- Developing proxy indicators (e.g., inferring age from aerial imagery, subdivision plans, or known development timelines).

- Integrating inspection and condition assessment data to establish a performance-based estimation of lifecycle stage where age is unknown.

- Standardizing data collection protocols for newly constructed or restored natural and stormwater features.
- Collaborating with partner organizations to access and consolidate historical data where possible.

Figure 2-1: Asset Age Summary



2.4 Asset Condition

In this AM Plan, the term “condition” refers to the degree of physical deterioration of an asset, typically assessed through visual inspections, structural evaluations, or inferred from age and material type. For stormwater assets, condition may be evaluated based on structural integrity indicators such as cracks, deformation, corrosion, or sediment buildup within pipes and structures.

The term “performance” is broader and refers to an asset’s ability to achieve intended levels of service. For stormwater infrastructure, this includes factors such as hydraulic capacity (e.g., ability to convey stormwater during peak flow events), functionality (e.g., drainage effectiveness, flood risk reduction), and operational quality (e.g., frequency of blockages or maintenance issues). Performance assessments often consider both design standards and actual system behavior under varying weather conditions.Condition assessment programs evaluate current physical condition, determine rate of deterioration over time, enable forecasts of future condition, and inform the most beneficial type and timing of renewal treatment. Condition assessment methods and rating systems have become relatively standard for some assets but vary depending on the type of asset. The City is in the early stages of its condition assessment program, making initial progress in understanding the state of its infrastructure assets.

Notably, the City has begun a multi-year program of CCTV assessments for its stormwater pipes to provide valuable insights into the condition and performance of these assets. It is critical that the collection of physical condition data for stormwater assets continue until such time as the entire network has been assessed to ensure that that service improvements and capital investments are optimally planned and implemented

The condition of stormwater sewers included in this Asset Management Plan was assessed using inspections conducted in accordance with the Pipeline Assessment and Certification Program (PACP). PACP is a standardized system developed by the National Association of Sewer Service Companies (NASSCO) that provides a consistent framework for evaluating the structural and operational condition of underground pipelines.

Condition scoring for stormwater sewers is based on PACP principles, which assign grades to observed defects such as cracks, deformation, joint displacement, infiltration, and obstructions. These grades are then used to calculate an overall condition rating that reflects the severity and extent of deterioration. By utilizing PACP, the City ensures that condition data is objective, repeatable, and aligned with industry best practices, enabling more informed decision-making for maintenance and capital planning.

In addition, the City also conducts annual inspections of its water quality units to monitor performance, identify maintenance needs, and ensure compliance with stormwater management standards. The City has completed a full inspection program for all stormwater outfalls to assess their condition, functionality, and environmental compliance.

Finally, the City has also undertaken ad hoc condition studies on natural assets, including wetlands, lakes, and watercourses. These studies, while informative, have been sporadic and lack the comprehensive scope required to fully inform long-term asset management strategies.

Recognizing the importance of a more systematic approach, the City is now focused on establishing more robust and comprehensive condition assessment programs for all asset categories. Expanding these programs will enable the City to gather consistent, detailed data across its infrastructure, providing a clearer and more accurate picture of the state of good repair for its assets. The intent is to build a strong foundation for data-driven decision-making, ensuring that future maintenance, rehabilitation, and replacement efforts are prioritized effectively and aligned with the City's long-term sustainability and service delivery goals. The City is currently undertaking a program of bathometric surveys of its stormwater management ponds to determine sediment cleaning needs.

For those assets with no condition data, age-based condition is estimated as the percentage of age to useful life. Using age data as a surrogate for condition data is common in municipal organizations, but it can be misleading as age does not always directly reflect condition or remaining life.

To enable comparison of condition and condition trends over time between different asset types, a generic condition grading scale is often used to translate detailed engineering data about assets into information that can be compared across asset groups. For this purpose, the City uses a five-point condition grading system, summarized in the table below, which is consistent with the general condition grading system included in the International Infrastructure Management Manual (IIMM).

Table 2-2 Five-Point Condition Grading System

	Rating	Condition Criteria
State of Good Repair	Very Good	The infrastructure in the system is in generally good condition, typically new or recently rehabilitated. A few elements show signs of deterioration that require attention.
	Good	The infrastructure in the system is in good condition; some elements show signs of deterioration that require attention. A few elements show sign of significant deficiencies
	Fair	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
End of Life	Poor	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
	Very Poor	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which is affecting service.

Details relating to the condition of each asset are currently maintained in various databases and spreadsheets. The City converts industry standard condition rating systems and age-based assets to the above condition grading system as provided in the table below.

Table 2-3 Conversion of Industry Condition to Five-Point Condition Grade

Grade (Rating: 1 to 5)	CCTV Rating (Storm Sewer Pipes)	Pond Cleaning History (Stormwater Ponds)	Estimated Remaining Useful Life (All Other Assets)
Very Good (1)	1	Pond not yet assumed or has recently been cleaned	>90%
Good (2)	2	Pond needs cleaning in the next 10-15 years	>50 to 90%
Fair (3)	3	Pond needs cleaning in the next 5-10 years	>25 to 50%
Poor (4)	4	Pond has been assumed over 15 years ago or needs cleaning immediately	>10 to 25%
Very Poor (5)	5		<25%

Natural and semi-natural assets typically do not have defined installation dates, restoration timelines, or formal construction records. As a result, it is not appropriate to assign a conventional age or expected service life to these assets in the same way as traditional engineered infrastructure.

For this AM Plan, it was assumed that these assets are in "fair" condition. This assumption serves as an interim measure to facilitate ongoing planning and decision-making while acknowledging the limitations in available data.

Figure 2-2 depicts, by colour, the value of assets that fall within each of the condition grades (very good, good, fair, poor, very poor). The total replacement value of assets within each condition grade is shown on top of the condition grade bars. Detailed “SOLI Report Cards”, outlining the condition profiles, risk profiles, and capital needs for each asset class have been developed for each major asset class and can be found in **Appendix D.**

Figure 2-2: Asset Condition Grade Profile by Replacement Value

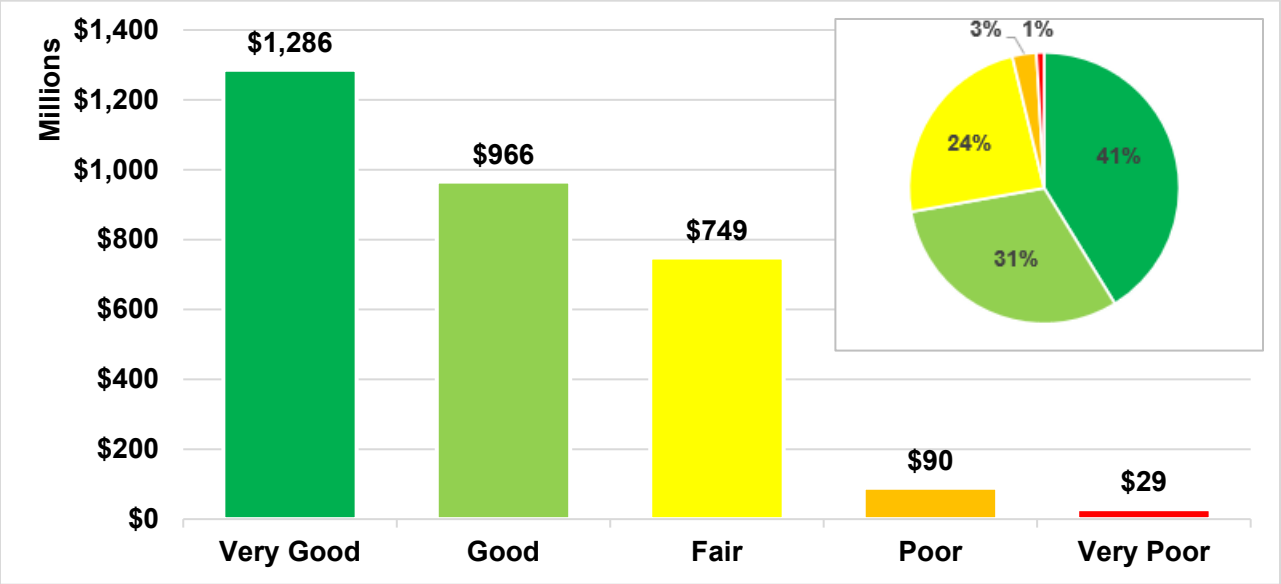
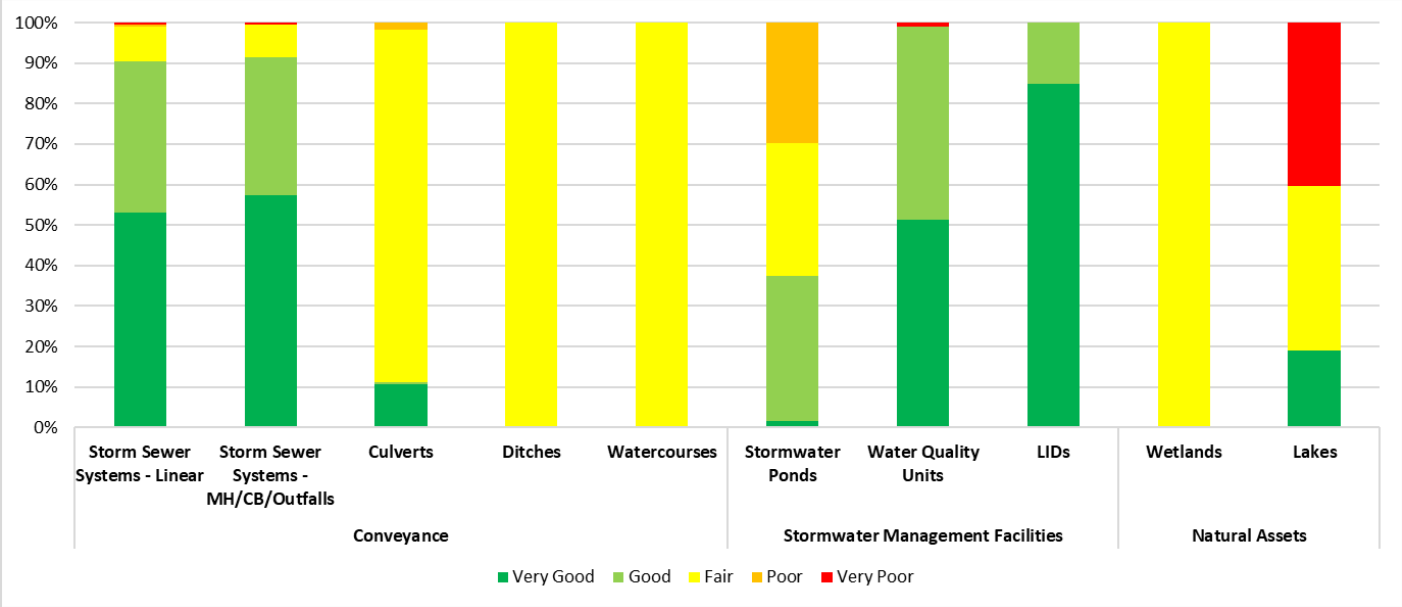


Figure 2-3 depicts, by colour, the percentage of assets that fall within each of the condition grades, organized by asset category.

Figure 2-3: Asset Condition Grade Profile by Percentage (by Asset Category)



To adequately meet service levels and manage risk while minimizing lifecycle costs, most assets should generally be preserved in “fair and above” condition. The condition assessment results show that 96.1% of the City’s assets are in fair and above condition based on replacement value.

Subsequently, 3.9% or $119 million of all assets are in poor or very poor condition. A significant portion of lakes assessed in very poor condition represent two key assets: Professor's Lake and Donnelly Lake. These lakes (valued at a combined replacement cost of $14.4 million dollars) have been identified as requiring immediate restoration due to their deteriorated state. Restoration work for Donnelly Lake is currently underway, funded by grants from the Province of Ontario, while the renewal of Professor's Lake remains pending as it awaits appropriate funding allocation. These assets have been prioritized in Brampton's Lake Enhancement Strategy given their ecological, recreational, and stormwater management value but timelines for addressing their issues are indeterminate as a result of how those activities will be funded

Other assets that are currently in poor or very poor condition are typically those that are included in 10-year capital renewal programs and budget forecasts, especially if deemed critical by the City.

Levels of Service

3. Levels of Service

In the State of Infrastructure Section, the value, age, and condition of the City's stormwater infrastructure assets were discussed. The Levels of Service (LOS) chapter builds on the State of Infrastructure by defining the performance the City's stormwater assets are intended to deliver over their service lives. For example, the City's stormwater ponds are expected to be maintained in a state of good repair such that they can perform their stormwater management function.

Why Define and Monitor Levels of Service?

Establishing and monitoring LOS is critical to ensuring that municipal assets and services align with the organization's expectations and community needs. By defining clear service levels, municipalities can effectively manage assets and service delivery, ensuring reliability, efficiency, and sustainability.

Understanding the costs associated with service delivery is essential for informed decision-making. Municipalities must balance operational and capital expenditures while ensuring that services remain efficient and accessible. This understanding also supports financial forecasting for medium- and long-term planning, allowing decision-makers to allocate resources strategically and proactively to manage infrastructure lifecycles.

Levels of service assessments also play a crucial role in identifying budgetary and full-time equivalent (FTE) shortages. By evaluating current service delivery capabilities against desired performance standards, municipalities can pinpoint resource gaps and make informed recommendations to address them. Moreover, defining service levels helps communicate the impacts of funding constraints, making it easier to convey to stakeholders and decision-makers what happens when budget allocations do not meet service needs. This transparency is vital in justifying funding requests and ensuring that the public and governing bodies understand the implications of financial decisions on infrastructure and service performance.

How to Develop and Implement Levels of Service?

To effectively develop and implement levels of service, municipalities must first identify key performance measures that determine when interventions are required. These include:

- Regulatory and Legislative: Achieving regulatory and legislative requirements for activities such as inspections, maintenance frequencies etc.
- Growth: Ensuring that infrastructure and services can accommodate population and economic expansion.
- Upgrades and Obsolescence: Addressing asset aging and the need for technological or functional improvements.
- Quality: Maintaining acceptable condition ratings and response times to service requests or failures.

Service levels should also be embedded into the Risk Assessment Program, enabling a risk-based approach to asset management. By linking service performance with risk exposure, municipalities can prioritize investments that reduce the likelihood and impact of service failures.

Finally, service level metrics must be incorporated into the Business Case process to ensure that budget requests align with performance expectations. This linkage strengthens the justification for funding by demonstrating how investments directly contribute to maintaining or improving service levels. It also provides a framework for evaluating trade-offs between service quality, risk, and financial constraints.

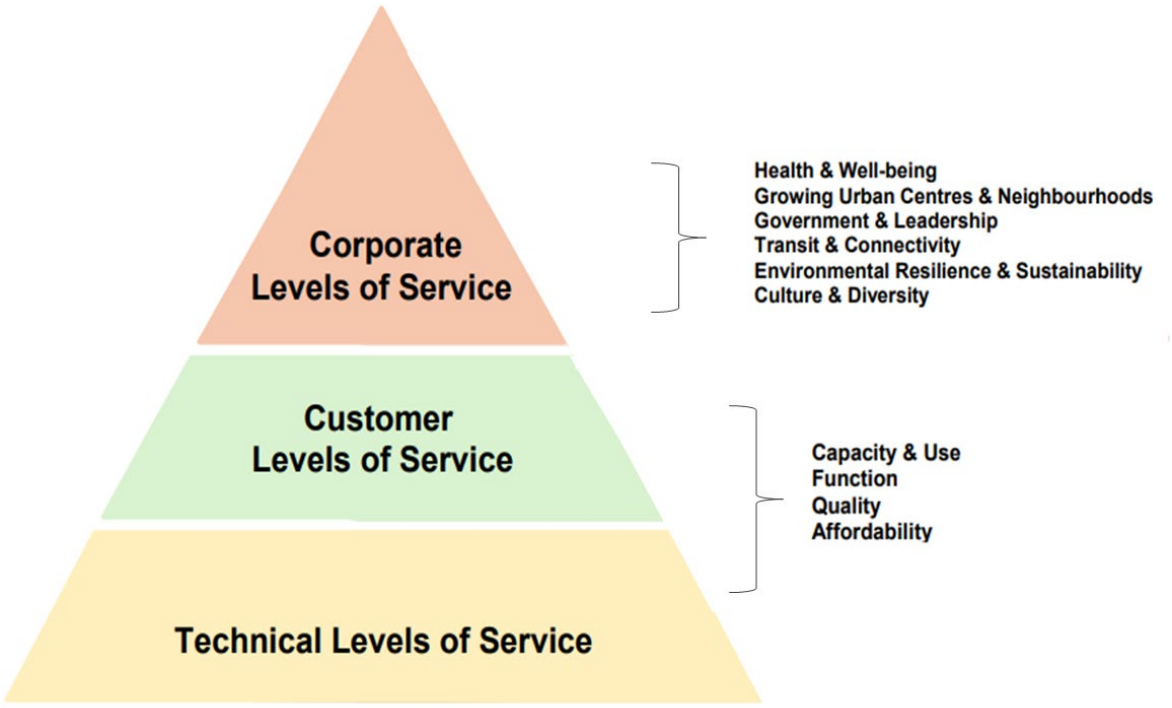
By systematically defining, monitoring, and integrating levels of service into financial and operational planning, municipalities can enhance service delivery resilience, optimize resource allocation, and ensure long-term sustainability.

3.1 Levels of Service Framework

The City's approach to developing LOS involved three main steps. Firstly, the staff identified the services provided and set Corporate Levels of Service (CLOS) aligned with business objectives, alongside measurable Technical Levels of Service (TLOS). Then, they set clear targets based on these TLOS. Lastly, they developed strategies to bridge any gaps between current performance and target LOS, considering associated costs. This approach ensures alignment with organizational goals, stakeholder expectations, and prudent resource management.

Figure 3-1 summarizes the City’s Level of Service framework which is being used as the basis for measuring performance.

Figure 3-1: Levels of Service Framework



The framework outlined in Figure 3-1 includes several key elements:

Corporate Levels of Service – Considered to be the overarching principles to ensure that levels of service are in alignment with the City's strategic themes and resulting customer and technical levels of service.

Customer Levels of Service – Definitions and statements describing the stakeholder's expectations of the services provided by the City in order to align the organization's value delivery with the community's needs.

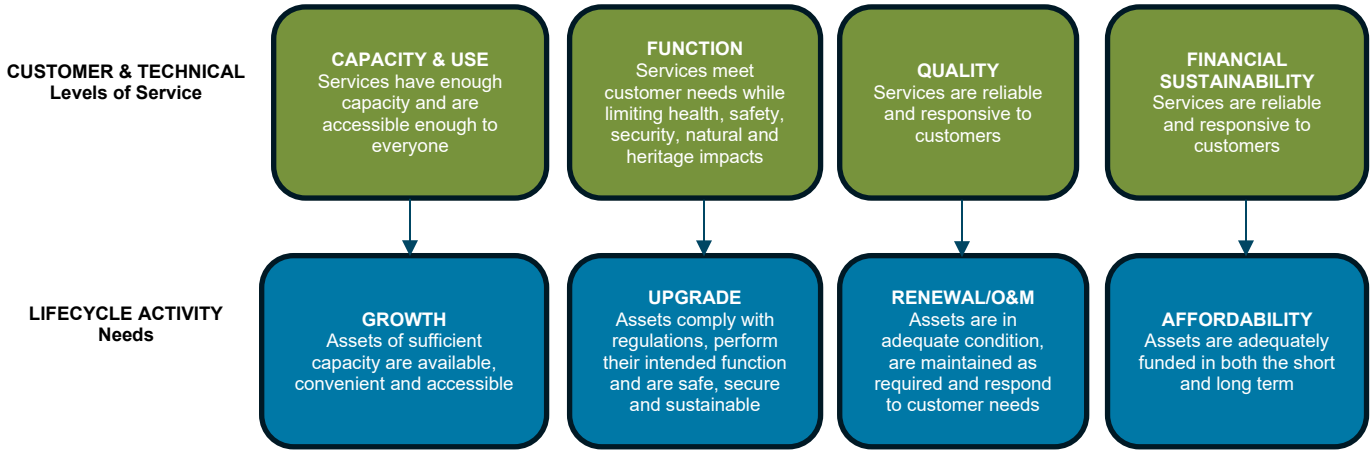
Technical Levels of Service – Measures the allocation of resources to service activities that the organization undertakes to best achieve the desired regulatory and community outcomes.

As shown in Figure 3-2, Customer and Technical LOS translate into lifecycle activities can be categorized into the following categories:

- **Capacity and Use:** Services have enough capacity and are accessible to the customers. Capacity and Use LOS informs Growth needs.
- **Function:** Services meet customer needs while limiting health, safety, security, natural and heritage impacts. Function LOS informs Upgrade needs.
- **Quality and Reliability:** Services are reliable and responsive to customers. Quality and Reliability LOS informs Renewal, Operations and Maintenance needs.

- **Financial Sustainability:** Services are affordable and provided at the lowest cost for both current and future customers. Financial Sustainability LOS informs Funding needs.

Figure 3-2: Customer and Technical Levels of Service



3.2 Corporate Strategic Goals

The Corporate, or Strategic LOS establish service levels that describe the main vision or objective of service delivery at the City. The Corporate Strategic Plan charts the City's path forward, focuses efforts, communicates progress, and measures the City's success. This critical document provides structure to prioritize and deliver what is most important to the community. It is a live document that sets the context for the City's budgets, master plans, projects, services, and resources. Council and staff curated a Corporate Strategic Plan that includes community feedback and is grounded by six (6) focus areas with concentrated themes and outcomes (Figure 3-3). The City is committed to the completion of all strategic priorities within these focus areas and this AM Plan is developed in alignment with the objectives and focus areas of the Corporate Strategic Plan.

Figure 3-3, sets a framework for the objectives and actions to be pursued to maintain and grow City as a safe, prosperous, and healthy community, and to ensure decisions set a course for the desired future.

Figure 3-3: Corporate Strategic Plan Focus Areas

Brampton Plan provides the strategic and comprehensive framework for guiding growth and development in the city. Some of the key policies related to stormwater infrastructure from Brampton Plan (which is in line with the Corporate Strategic Plan) include:

- Incorporating Low Impact Development (LID) standards, green infrastructure including green roofs and other nature-based solutions to assist in stormwater quantity and quality control. A "climate change lens" will be implemented as the approval authority for all Council decisions and planning and development applications.
- Incorporating climate change scenarios into stormwater infrastructure planning to mitigate flooding risks associated with more frequent and intense storm events.
- Encourage development practices such as rain gardens, permeable pavements, and green roofs to manage stormwater at the source.

- Improve ecological health, biodiversity, and flood mitigation capacity through strategic enhancements to existing infrastructure.

3.3 Legislated Levels of Service

Ontario Regulation 588/17, under the Infrastructure for Jobs and Prosperity Act, 2015, sets out the requirements for municipalities to develop and maintain asset management plans for core infrastructure assets, which includes stormwater infrastructure. The regulation establishes mandatory LOS to ensure municipalities provide safe, reliable, and cost-effective infrastructure for the public. The above-referenced tables are as follows:

Table 3-1: Stormwater Mandatory LOS

Service Attribute	Community levels of service (qualitative description)	Technical levels of service (technical metrics)
Scope	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.	1. Percentage of properties in municipality resilient to a 100-year storm. 2. Percentage of the municipal stormwater management system resilient to a 5-year storm.

Other regulatory drivers influence service levels for stormwater infrastructure in addition to O.Reg 588/17. In terms of specific regulations related to maintenance of stormwater assets, the Ontario Ministry of the Environment, Conservation and Parks (MECP) issues approval requirements for sewage works (including stormwater) under Section 53 of the Ontario Water Resources Act (OWRA). Prior to 2011, the MECP had issued these approvals as “Certificates of Approval” (CofA) but has since changed the name to “Environmental Compliance Approval” (ECA) for all SWMFs constructed during or after 2011. These approvals sometimes, but not always, provide prescriptive requirements and ongoing monitoring and maintenance obligations. Municipal standards and other criteria for design and maintenance are usually based on subwatershed or flood management studies and are often built to accommodate the 100-year and/or Regional (Regulatory) storm.

The MECP has released guidance for those designing, constructing, and managing stormwater management systems and seeking approvals under section 53 of the Ontario Water Resources Act. The MECP is implementing a new Consolidated Linear Infrastructure ECA (CLI ECA) for each municipality in 2022 which will establish a system-wide approval process for the City’s stormwater infrastructure and future growth of the

system. This will replace most project-by-project ECAs.

3.4 Current and Target Levels of Service

Tables 3-3 and 3-4 below present a comparison of the current and proposed levels of service for the City of Brampton's stormwater and natural assets. This comparison outlines key performance indicators to assess how the City's infrastructure is currently performing against established benchmarks and future targets. The proposed levels of service are designed to enhance infrastructure resilience to extreme weather, improve safety and efficiency, and align with regulatory requirements under O.Reg. 588/17. By identifying gaps between existing and desired service levels, this table provides a foundation for strategic planning, resource allocation, and long-term sustainability of Brampton's Stormwater network. The associated costs and the City's ability to afford the proposed service levels are detailed within the 'Financing Strategy' section of this report.

Service levels which have been assessed as "Future" do not currently have any existing data and information in place to quantitatively assess them. It is recommended for the City to capture this information for reporting moving forward.

Appropriateness Assessment

An appropriateness assessment was conducted by City staff through internal assessment workshops. This ensured that the selected levels of service are carefully evaluated based on the following criteria:

1. **Options & Associated Risks:**

Staff evaluated multiple LOS options and assessed the risks associated with each, particularly in terms of long-term sustainability. This includes consideration of service quality, operational efficiency, and financial impacts.

2. **Differences from Current Levels of Service:**

A comparison of current and proposed LOS highlights where changes may be necessary to respond to evolving stakeholder needs, regulatory requirements, or technological advancements. While many proposed measures may align with current LOS, refinements may be required to meet strategic objectives.

3. **Achievability:**

The City assessed the feasibility of achieving the proposed levels of service, considering factors such as available resources, technological capabilities, and operational constraints. Efforts have been made to ensure that the targets are realistic and attainable within the municipality's operational capacity. Notwithstanding the City's intended ability to achieve the targets, it is expected that the levels of service will continue to be

reviewed and monitored, and further adjustments may be warranted moving forward.

4. **Affordability:**

The affordability assessment for the levels of service is conducted in conjunction with the budget process, ensuring alignment with the financial resources and constraints of the municipality. This process inherently involves approval by Council and the organization, with affordability considerations integrated into budgetary decisions.

Table 3-3: Current and Proposed Levels of Service – Conveyance and Stormwater Management Facilities

Customer LOS		Technical LOS			Current LOS	Target LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Performance (2034)**
Capacity and Use	Sufficient capacity of the stormwater system	Growth	Percentage of properties in municipality resilient to a 100-year storm*	Storm Sewer Linear System	95%	95%
		Growth	Percentage of the municipal stormwater management system resilient to a 5-year storm*	Storm Sewer Linear System	80%	90%
		Growth	Percentage of private property owners implementing flood-proofing measures.	Storm Sewer Linear System	Not Available	Future
		Growth	Percentage of watercourse crossings resilient to a 100-year storm event.	Watercourses	Future	Future
Function	Stormwater assets contribute to an enhanced environment and support a sustainable City	Upgrade	Percentage of the City with water quality control measures in place.	Water Quality Units	60%	75%
Function	Stormwater assets comply with regulations and provide reliable service	Upgrade	Percentage of compliance inspections completed.	All	N/A	100%
Function	Stormwater assets contribute to an enhanced environment and support a sustainable City	Upgrade	Percentage of thermal retrofits completed.	Stormwater Ponds	2	To be determined
Function		Upgrade	% of LID retrofits completed	Low Impact Development (LIDs)	Future *(Two retrofit projects are in the process of being completed)*	Future
Function		Upgrade	Erosion control upgrades along watercourses (% of actual work completed vs. % of planned work).	Watercourses	Not available	100%
Function		Upgrade	Percentage of concrete channels naturalized	Watercourses	Future	Future

Customer LOS		Technical LOS			Current LOS	Target LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Performance (2034)**
Quality	Stormwater assets provide reliable service	Renewal/ O&M	Percent of private water quality units inspected and maintained.	Water Quality Units	35%	65%
			Percentage of the storm sewer system monitored - flow	Storms Sewer System - Pipes	0%	5%
			Average weighted condition assessment of the storm sewer system.	Storm Sewer System	Good	Good
			Average Weighted condition assessment of the Water Quality Units (WQU)	Water Quality Units	Good	Good
			Average Weighted condition assessment of the Stormwater Ponds	Stormwater Ponds	Good	Good
			Percentage of watercourses in good condition	Watercourses	Not available	95%
			Percentage of catchbasins maintained in accordance with the City's lifecycle management strategy (cleaning)	Catchbasins	35%	45%
			Frequency of Water Quality Unit (WQU) inspections	Water Quality Units	Annual	Annual
			Frequency of regular planned pond cleaning (dredging and disposal of accumulated sediments)	Stormwater Ponds	Estimated every 15 years	Estimated every 15 years
			Preventative maintenance on ponds	Stormwater Ponds	Not Available	4 per year
			Total length of roadside ditches in good condition	Ditches	Not Available	100%
			Frequency for Preventative maintenance for Vegetated LIDs (weeding, replanting)	Low Impact Development	Not Available	2 per year
			Percentage of beaver service requests resolved	Watercourses	100%	100%

The text below provides a summary of each Technical LOS measure, organized by category, with explanations of current and target performance, and rationale where applicable:

Resilience of Properties to 100-Year Storms

This measure assesses the percentage of properties protected from a 100-year storm event. The City has set a proposed target of 95%, supported by major capital initiatives such as the Riverwalk project. Achieving this level of resilience depends on confirming floodplain removals and cost estimates. Expected performance by 2034 is 97%.

Stormwater System Resilience to 5-Year Storms

This indicator evaluates the portion of the municipal storm system that meets the design capacity for a 5-year storm. The City is aiming for 90%, with current performance at 80%. This is based on planned updates to IDF curves and hydraulic modelling. Achieving the target will require significant capital investments and is aligned with the Stormwater Service Plan's long-term goal.

Flood-Proofing of Private Properties

This metric tracks the percentage of private property owners implementing flood protection measures. With current and projected performance below 1%, the City is exploring incentive-based programs and potential regulatory tools such as mandatory backflow valves for new construction.

Resilience of Watercourse Crossings

This measure considers the resilience of culverts and bridge crossings during a 100-year storm. While no performance target has been set, the City plans to assess culverts to identify those that overtop during extreme events and will use the findings to inform renewal priorities.

Water Quality Control Coverage

This metric identifies the proportion of the City that is serviced by water quality infrastructure targeting 80% total suspended solids (TSS) removal. A target of 75% has been proposed, with a current level of 60%. The City is developing a Water Quality Strategy to estimate the cost of achieving this coverage.

Compliance Inspections

This measure tracks the completion rate of compliance inspections required under the forthcoming CLI ECA. A 100% target has been proposed in alignment with regulatory requirements expected to be in place at the City.

Thermal Retrofits of Stormwater Ponds

This metric tracks the number of ponds retrofitted to reduce thermal pollution affecting sensitive aquatic habitats. Although performance is currently "to be determined," a capital plan will be developed following pond condition assessments to identify priority retrofits over a 10-year period.

% of LID Retrofits Completed

This measure refers to the evaluation and implementation of LID retrofits, which are infrastructure upgrades designed to manage stormwater more sustainably by mimicking natural hydrologic processes.

At present, the City has no formal performance metrics in place to evaluate the effectiveness or impact of LID retrofits. However, the City is actively engaged in this area, with two retrofit projects currently underway. These projects will likely inform future metrics and standards as the City gains experience and data.

Erosion Control Upgrades Along Watercourses

This measure monitors the implementation of erosion control projects along rivers and creeks. The City funds the Toronto and Region Conservation Authority (TRCA) to update its capital plan annually, identifying targeted areas of erosion and recommending stabilization or upgrade projects. The proposed performance target is to complete 100% of the projects identified in the TRCA's capital plan each year, based on a $1 million annual capital allocation. The City's approach supports proactive erosion mitigation and ecosystem health.

Naturalization of Streams

This metric evaluates the extent to which artificial channels are converted back to natural streams. The goal is to achieve full naturalization of identified channels by a future target year (date to be confirmed by the City, possibly 2034). The City partners with the Region of Peel and TRCA, sharing costs through Environmental Planning budgets. However, there is no dedicated capital funding; budgets are allocated annually. The performance target and progress will be based on historical average spending over the past three to five years and an inventory of existing concrete channels.

Private Water Quality Unit (WQU) Inspections and Maintenance

This measure monitors the inspection and maintenance of private WQUs. The proposed target is 65%, supported by increased inventory tracking and education efforts. Less than 4% were maintained before 2022; progress has since accelerated due to outreach campaigns.

Storm Sewer Monitoring

This metric reflects the proportion of the system with active flow and rainfall monitoring. The proposed value of 5% represents early-stage monitoring, beginning with the Spring Creek Subwatershed. Citywide monitoring expansions to the program to be implemented each year.

Storm Sewer Condition

This indicator reflects the average condition of storm sewers, which is currently rated "Good." The City plans to complete CCTV inspections of the full network over a 10-year cycle, prioritizing older infrastructure.

Water Quality Unit Condition

This measure tracks the average condition of water quality units. These units are inspected annually and maintained as needed. The average condition remains “Good,” supported by ongoing operational budgets.

Stormwater Management Pond (SWMP) Condition

This metric evaluates the overall condition of stormwater ponds. The City is undertaking a bathymetric study to refine this assessment. The current rating is “Good”, and will be validated or adjusted by the forthcoming bathymetric assessment data,

Catchbasin Maintenance

This measure assesses the proportion of catchbasins maintained according to the City's cleaning cycles. Industrial roadway catchbasins are cleaned annually, others biennially or every three years. Inlets to LIDs and ditches are also being incorporated into maintenance contracts. Target is set at 1 (100%).

Frequency of WQU Inspections

This indicator confirms that water quality units are inspected annually. Performance aligns with current practices and funding through the stormwater charge reserve.

Pond Dredging Frequency

This metric reflects the intended level of service, where each stormwater pond is to be dredged on a 15-year cycle, consistent with state of good repair lifecycle expectations. The City is currently conducting bathymetric surveys to better understand sediment accumulation rates and refine the timing of clean-outs. The number of ponds dredged annually will vary depending on the assessment results, however the City will look to maintain a dredging frequency of 15 years for each pond.

Preventative Maintenance on Ponds

This measure ensures pond inlets and outlets are mowed and cleared annually. The City will maintain all sites with visual obstructions at least twice per year, aligning with operational standards.

Preventative Maintenance on Vegetated LIDs

This indicator tracks maintenance on vegetated LIDs, such as weeding and replanting. The City inspects all LIDs annually and performs preventative maintenance twice per year, in line with green infrastructure best practices.

Ditch Cleaning and Sediment Removal

This measure evaluates annual ditch maintenance. The City allocated $1.2M in 2024 to address historic backlogs, and future efforts will focus on sustaining regular ditch maintenance. Performance will be measured as the length of ditches that are in good condition.

Beaver Management (Flood Risk Reduction)

This measure tracks the resolution rate for service requests related to beaver activity that may obstruct stormwater conveyance and cause localized flooding. The City's target is to resolve 100% of these service requests annually. Solutions typically involve installing drainage piping or other flood management interventions, funded through the capital budget at approximately $50,000 per year.

Table 3-4: Current and Proposed Levels of Service – Natural Assets

Customer LOS		Technical LOS			Current LOS	Proposed LOS
CLOS Category	**Customer Level of Service Measure**	**Technical LOS Category**	**Technical LOS Measure**	**Asset Class**	**Current Performance (2024)**	**Desired Target Performance (2034)**
Capacity and Use	Supports ecological function and provides access, aesthetics, and environmental benefit	Growth	Percentage of maintained wetland area.	Wetlands	Not available	Maintain current wetland area
Quality	Natural assets are in good condition and provide expected stormwater and ecological function throughout the year.	Renewal/ O&M	Restoration of lake water quality	Lakes	Not available	100%
			Percentage of wetlands in good condition	Wetlands	Not available	Future

The text below provides a summary of each Technical LOS measure, organized by category, with explanations of current and target performance, and rationale where applicable:

Maintenance of Wetland Area

This measure tracks the total wetland area maintained within the City. The proposed performance is to maintain the current wetland area, measured in hectares. Typically, the creation and maintenance costs for wetlands are covered by developers, with the Conservation Authority maintaining standardized cost estimates. Where municipal projects impact wetlands, the City accounts for remediation costs as part of project budgets. Expected performance is aligned with maintaining current conditions.

Restoration of Lake Quality

This measure monitors the proportion of lakes achieving good water quality standards. The City's proposed performance is to maintain 100% of lakes in good condition, although confirmation of this target is pending. Lake restoration efforts are currently dependent on securing external grant funding. Further costing estimates will be developed with input from the City's environmental consultants.

Asset Management Strategy

Risk Management

4. Risk Management

Managing risk is a fundamental component of effective asset management, particularly for critical infrastructure systems such as stormwater networks. Risk management enables the City to proactively identify, assess, and address potential threats to service delivery, public safety, environmental protection, and financial sustainability. This chapter outlines the City's approach to risk management for stormwater assets, including the methodology used to evaluate risk across the asset portfolio, the identification of key risk drivers, and the integration of risk into infrastructure decision-making. A comprehensive understanding of asset-related risks ensures that limited resources are prioritized toward the most critical needs, helping to maintain levels of service and support long-term resilience.

4.1 Risk Framework

A fundamental asset management principle for the City is to achieve service level objectives and effectively manage risk while minimizing lifecycle costs. The relative importance of assets in supporting service delivery, referred to as asset criticality, serves as the primary determinant in selecting the most appropriate asset management strategy for each asset. Critical assets are those that significantly contribute to performance, incur high lifecycle costs, and are most susceptible to deterioration or require ongoing maintenance investment.

Risk events, such as failures in asset capacity, function, or reliability, may compromise the City's ability to achieve its strategic priorities. Lifecycle activities are implemented to mitigate the risk of failure by reducing the likelihood of asset failure to acceptable levels. The impact of asset failure on the City's strategic objectives informs the type and timing of lifecycle interventions.

The City of Brampton has historically considered risk as an integral part of its daily operations, using it as a guiding principle to determine appropriate lifecycle interventions that ensure assets continue to meet their defined levels of service. This practical application of risk has long supported decision-making related to maintenance, renewal, and rehabilitation activities across various asset types.

However, during the development of the previous departmental AM Plans, it became evident that risk was being assessed and managed inconsistently across departments, with varying methodologies, criteria, and levels of documentation. Recognizing the need for greater alignment and transparency, the City developed a Risk Management Strategy (RMS) as a core component of the Service Area AMP.

The RMS provides a standardized and systematic framework for assessing and managing asset-related risks across all service areas, regardless of asset class. It facilitates consistent decision-making, particularly when prioritizing projects within and across departments, by ensuring that risk evaluations are objective, comparable, and aligned with corporate goals.

Key features of Brampton’s RMS include:

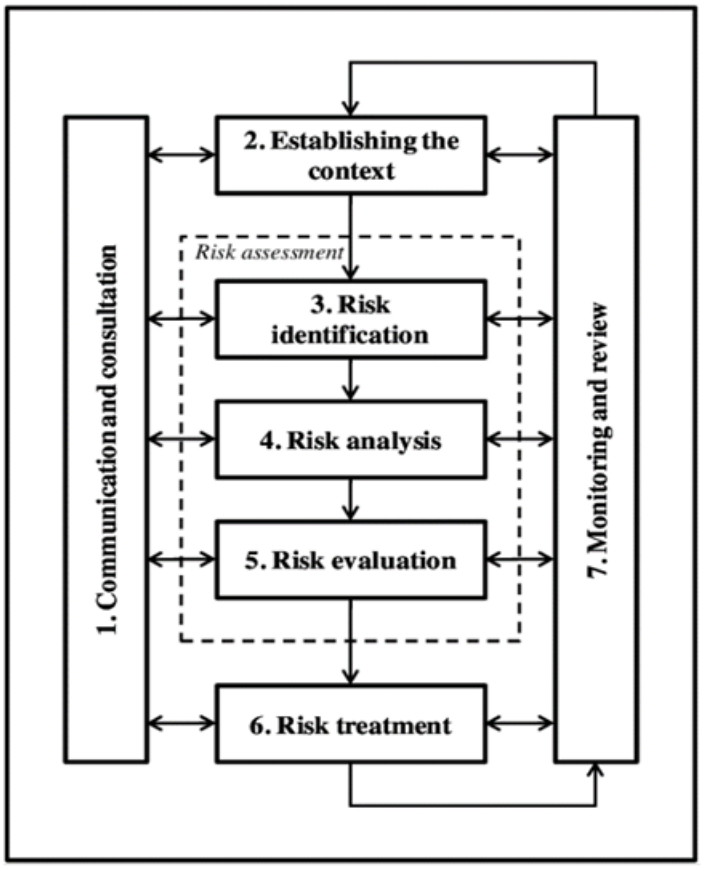
- Alignment with ISO 31000: The strategy is grounded in internationally recognized risk management principles, offering a benchmark for best practices in identifying, evaluating, and mitigating risk. This alignment enhances credibility, repeatability, and strategic rigor in Brampton’s asset management processes.
- Consistent Risk Scoring Methodology: The RMS incorporates both probability and consequence factors to evaluate risk. It considers potential impacts on safety, service delivery, financial performance, reputation, and environmental outcomes.

- Integration with Decision-Making Processes: Risk scores generated through the RMS are used to inform project prioritization, capital planning, and lifecycle activity selection. This ensures that limited resources are directed to the most critical needs, improving service reliability and reducing the likelihood of unexpected asset failures.

- Cross-Departmental Adoption: The RMS has been adopted across all asset-owning departments, reinforcing a unified approach to asset risk assessment. Training and guidance have been provided to ensure effective implementation and alignment with the City's broader asset management strategy.

The structure and methodology of the RMS are summarized in **Figure 4-1,** which outlines the key components of the risk framework, including the assessment matrix, risk categories, thresholds, and scoring criteria.

Table 4-1: ISO 31000 Risk Management Process



4.2 Risk Evaluation

Risk information is often used to generate a quantitative assessment based on the following formula:

Probability x Consequence = Risk Rating

where Probability = {1,2,3,4 or 5} and Consequence = {1,2,3,4 or 5}

For example, an asset with probability of 5 multiplied by consequence of 5 would generate a risk score of 25 (P5, C5). This would indicate that the asset is at high risk of failing to provide desired levels of service in the near term, and is of vital importance, therefore would require immediate effort in order to allow the asset to continue to provide service effectively.

At the heart of the RMS is an evaluation of risk across three key customer-focused LOS categories—each of which is associated with defined probability and consequence factors. This structured approach allows the City to assess risk holistically, beyond traditional failure definitions.

1. Quality

- Quality risks in stormwater infrastructure may include cracked or partially collapsed pipes, sediment accumulation in ponds, or erosion of watercourses. While these issues may not immediately lead to system failure, they can degrade overall system performance, increase maintenance needs, and reduce public trust in infrastructure reliability.

2. Capacity & Use

- In Brampton, intensifying land use and more frequent extreme weather events have increased runoff volumes. Undersized culverts or storm sewers may not have sufficient capacity to manage current or future peak flows, especially during high-intensity storm events. This can lead to localized flooding, surcharge conditions, and increased risk to nearby properties and roads as well as City properties such as parks, trails, recreation centres, libraries etc.

3. Functionality

- Functionality risks arise when stormwater assets fail to meet regulatory or design standards, such as out-of-date pond configurations that no longer meet MECP (Ministry of the Environment, Conservation and Parks) guidelines for water quality or quantity control. Other examples include assets that do not support sustainable stormwater practices (e.g., lack of LID features or flow control measures).

The respective analysis and results of the RMS for the City's stormwater assets are presented below.

Consequence of Failure

The consequence of an event affecting the levels of service is determined by the extent to which a risk event impacts service delivery. The consequence of failure is assessed based on the following criteria:

- **Health & Safety:** This criterion evaluates the severity of potential injuries that could result from a specific risk event. It is closely linked to legal and regulatory considerations, as changes in regulations and compliance requirements can influence the overall consequence of failure.

- **Reputation/Social:** This refers to the public's perception of the service provided by an asset. It aligns with the strategic aspect of risk, where factors such as demographic shifts or changes in social consciousness can affect the consequence of failure.

- **Service:** This criterion assesses the extent of disruption caused when an asset fails to deliver the intended level of service. It corresponds to the operational aspect of risk, where any changes in service levels can influence the severity of the consequence.

- **Economic**: This considers the financial and economic impact of an asset's inability to provide the desired level of service. It is associated with the financial aspect of risk, where market conditions, economic fluctuations, and cost implications serve as key drivers of consequence.

- **Environmental:** This criterion evaluates the impact of asset failure on the natural environment, including potential effects on water quality, habitat disruption, and erosion. It also considers the duration and complexity of environmental recovery efforts

The CoF table used to score each of asset categories for this AM Plan is provided in Table 4-1 below.

Table 4-1: Consequence of Failure Rating Table

Consequence Criteria	Consequence of Failure				
	C1 Insignificant	C2 Minor	C3 Moderate	C4 Major	C5 Catastrophic
Health & Safety	Negligible injuries	Minor injuries, medical attention required	Serious injuries, multiple minor injuries	Multiple serious injuries, Loss of life	Multiple loss of life or City-wide health-related disaster
Reputation/ Social	Event only of interest to individuals. No community concern.	Minor community interest. Local media report.	Public Community Discussion. Broad adverse media coverage.	Loss of confidence in Council. National publicity. Public agitation for action.	Public investigation. International coverage. Management changes demanded.
Service	Service not affected or minimal impact	Localized disruption of non-essential service	Localized disruption of essential service	Widespread short-term disruption or localized long-term disruption of essential service	Widespread and long-term disruption of essential service
Economic	Damages, losses or fines <$10,000	Damages, losses or fines $10,000 to $200,000	Damages, losses or fines $200,000 to $2,000,000	Damages, losses or fines $2,000,000 to $10,000,000	Damages, losses or fines >$10,000,000
Environmental	Negligible impact fully reversible within 1 week.	Material damage of local importance. Prosecution possible. Impact fully reversible within 3 months.	Serious damage of local importance. Prosecution probable. Impact fully reversible within 1 year.	Serious damage of national importance. Prosecution expected. Impact fully reversible within 5 years.	Serious damage of national importance. Prosecution. Long term study. Impact not fully reversible.

CoF scores and associated drivers for each asset category are provided in Table 4-4 below.

Identifying the primary drivers of CoF is important because it helps clarify the specific risks associated with each asset category. When multiple drivers are identified — such as economic, environmental impact, and service disruption — it can elevate the criticality of the asset and increase attention and priority for investment, monitoring, and risk mitigation efforts.

Table 4-4: Consequence of Failure Scores

Asset Category	CoF Score	CoF Driver
Stormwater Conveyance		
Storm Sewer Systems - Linear		
Storm Sewers	3	Service
Catchbasin or Ditch-Inlet Leads	3	Service
Foundation & Roof Drain Collector	3	Service/Economic
Storm Sewer Systems - MH/CB/Outfalls		
Manholes	2	Service
FDC Manholes	2	Service
CB Manholes	2	Service
Catchbasins	2	Service
Outfalls	3	Service
Culverts		
Roadside Culverts	3	Service
Minor Crossing Culverts	3	Service
Other Culverts	3	Service
Ditches		
Ditches	3	Service/Economic
Watercourses		
Watercourses	4	Service/ Environmental/ Economic/ Social Reputation/ Health & Safety
Stormwater Management Facilities		
Stormwater Ponds		
Stormwater Ponds	4	Service/Environmental/ Economic
Water Quality Units		
Water Quality Units	2	Service/Environmental
LIDs		
LIDs	2	Economic/Environmental/ Reputation
Natural Stormwater Assets		
Wetlands	3	Service/Environmental/ Economic/ Social Reputation
Lakes	3	Social/Environmental/ Economic/ Social Reputation

Probability of Failure

The likelihood of an asset risk event refers to the probability of a risk event occurring. The probability of failure is assessed on an asset-by-asset basis, incorporating input from subject matter experts within the relevant service areas. This assessment is based on a qualitative scale ranging from 1 to 5, where a score of 5 represents the highest probability of failure. Table 4-2 provides a summary of the likelihood definitions.

Table 4-2: Probability of Failure Rating Table

Level	Name	Description
P1	Rare	Event could occur very infrequently or only in exceptional circumstances; but is not expected.
P2	Unlikely	Event could occur infrequently.
P3	Moderate	Event should occur at some time.
P4	Probable	Event will probably occur regularly or in most circumstances.
P5	Almost Certain	Event is expected to occur very frequently or in most circumstances.

In previous Asset Management Plans, the City established a standardized Risk Evaluation Framework for infrastructure assets. This framework is intended to incorporate asset-level risks to failure specifically related to capacity, functionality, and reliability issues.

Due to limitations in available data for other dimensions such as capacity and functionality, asset condition has been used as a proxy indicator for quality-related failure risk.

Opportunities to incorporate other risk dimensions have been identified and are addressed in the Improvement Plan chapter of this document.

Risk Map

Risk mapping is used by the City to determine the significance of a perceived risk to stormwater services. A risk map represents a graphic representation of the magnitude of risk, or combination of risks, expressed in terms of the product of the consequence and likelihood of the risk. The Risk Map utilized is shown in Table 4-3.

Table 4-3: Risk Map

		Consequence				
		C1	C2	C3	C4	C5
Likelihood	P5	Medium	Medium	High	High	Extreme
	P4	Low	Medium	Medium	High	High
	P3	Low	Low	Medium	Medium	High
	P2	Insignificant	Low	Low	Medium	Medium
	P1	Insignificant	Insignificant	Low	Low	Medium

- **Insignificant (Green)** – Accept risk, no risk treatment required.
- **Low (Light Green)** – May be acceptable but monitoring of assets may be required
- **Medium (Yellow)** – Requires some consideration by management with necessary risk management and monitoring adopted as needed.
- **High (Orange)** – Requires consideration by management, risk management and monitoring are required.
- **Extreme (Red)** – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

4.3 Risk Assessment Results

4.3.1 Risk Assessment - Quality

After estimating the asset criticality and probability of failure (based on condition), the results were plotted on a risk map Figure 5-2 to show a visual representation of risk exposure across the City's stormwater assets, by major asset groups. Colors on the map denote various levels of risk and help to prioritize the City's resources, time, and effort for renewal activities.

Figure 4-1: Risk Map of Stormwater AM Plan Assets

Replacement Value (2024$M) by Risk Exposure (CoF x PoF)

PoF	1	2	3	4	5
5	$0.0	$4.0	$24.5	$0.0	$0.0
4	$0.0	$0.0	$5.8	$84.1	$0.0
3	$0.0	$60.2	$526.8	$161.8	$0.0
2	$0.0	$268.6	$596.2	$101.3	$0.0
1	$0.0	$442.0	$840.2	$4.1	$0.0

Current (2024) Risk Ratings

Extreme	$0.0	0.0%
High	$108.6	3.5%
Medium	$799.6	25.6%
Low	$1,769.4	56.7%
Insignificant	$442.0	14.2%

Based on those assets with known conditions, the figures above show that no assets are in the Very High-risk exposure category. This is due to the City managing its assets in a state of good repair,

preventing them from dropping into very poor' condition. It is important that the City monitors the condition of assets in 'High'-risk (orange), as these assets will still yield consequential impacts upon failure. The assets in the 'High'-risk zone for the City make up roughly 3.5% or $108.6 million dollars, and consist of City lakes in very poor condition, stormwater ponds which are in poor condition, and segments of the stormwater system in very poor condition.

4.3.2 Risk Assessment – Capacity and Function (Stormwater Conveyance and Stormwater Management Facilities)

The City is currently in the early stages of formalizing its approach to evaluating probability of failure for both functional performance and capacity-related issues across its stormwater infrastructure. At present, this is primarily assessed through qualitative means, based on operational knowledge, and input from service area staff. As the City continues to evolve its asset management practices, future efforts will aim to develop more data-driven and quantitative approaches to support improved prioritization and planning.

Risks related to capacity and function for stormwater assets, along with associated responses and strategies, were qualitatively identified, and are listed below.

1) **Climate Change**: Through the City's Climate Change Risk and Vulnerability Assessment, one of the key risks identified for stormwater assets are heavier rainfall events that are already impacting these assets and have the potential to overwhelm stormwater systems, leading to flooding. To mitigate this risk, the City has been conducting more detailed hydraulic analyses in high-risk areas. Measures such as backwater valves and subsidy programs will be introduced to help homeowners manage potential flooding. Additionally, the City has recently updated its Intensity-Duration-Frequency (IDF) curves based on recent climate data to improve planning and response strategies. The Climate Change Adaptation Plan will also address climate change by requiring all departments to conduct vulnerability assessments and develop appropriate treatment strategies.

2) **Blockages and Maintenance Issues:** Blockages caused by debris accumulation — including leaves, trash, sediment, and other materials — present a risk to the effective operation of stormwater assets. Such blockages can obstruct drains and pipes, reducing the efficiency and capacity of the overall stormwater system. To proactively manage this risk, the City has completed inspections of all outfalls and is addressing identified deficiencies to prevent issues from escalating.

   In addition, water quality units are inspected annually to ensure they are operating as intended, with maintenance activities scheduled based on the findings of these inspections.

   To further support stormwater system management, the City has also implemented a closed-circuit television (CCTV) inspection program to assess the structural and operational condition of the existing

storm sewer network, helping to inform maintenance planning and renewal strategies.

3) **Human-Induced Risks:** Human-induced risks, such as the introduction of hazardous materials or debris into stormwater drains, can cause both physical damage and contamination. To mitigate these risks, the City has expanded outreach programs targeting privately owned infrastructure to raise awareness and promote responsible practices. A spill response protocol is also in place, enabling City and Regional teams to respond promptly to incidents.

   Environmental Compliance Standards (ECS) guidelines will be established to prevent sediment from construction sites from entering stormwater systems. The Consolidated Linear Infrastructure Environmental Compliance Approval (CLI ECA) is also in place to ensure that new developments do not accelerate runoff rates beyond natural conditions.

4) **Urbanization:** Urbanization poses a significant risk to stormwater infrastructure as increased impervious surfaces in urban areas generate higher volumes of stormwater, straining existing systems. To address this challenge, the City has updated development standards, including runoff coefficients, to better manage increased stormwater volumes. Future revisions of the stormwater charge structure may also be contemplated to address impervious area creep that occurs after development activities have ceased, such as driveway widenings and backyard conversions as these all contribute to increasing the demands on the stormwater system.

5) **Emergency Response to Flooding:** In cases of extreme weather events and flooding, the City has an emergency response plan in place. This plan involves a lead person who assesses the extent of flooding and coordinates additional resources and contractors as needed to manage the situation effectively. Emergency procurement protocols have also been established to ensure that resources can be rapidly mobilized during urgent situations. These comprehensive response strategies highlight the City's commitment to minimizing the impacts of flooding and ensuring the resilience of its stormwater infrastructure.

   BEMO (Brampton Emergency Management Office) is the division within the City of Brampton responsible for coordinating emergency management activities, including prevention, mitigation, preparedness, response, and recovery efforts. When a flooding event occurs, BEMO plays a coordination and support role within the City's broader emergency response framework.

6) **Sedimentation and Erosion:** Poor land management practices, such as deforestation and unregulated construction activities, exacerbate sedimentation and erosion, causing sediment to be deposited into water bodies. To combat these risks, the City has undertaken watercourse erosion assessments and lake condition assessments. Furthermore, the City of Brampton has established Erosion and Sediment Control

(ESC) standards, which are scheduled for updates next year, to ensure that effective measures are in place to reduce sedimentation risks. The City is also working on an ESC Guideline to ensure that the standards to further promote the use of ESCs and ensure that they are being implemented correctly.

4.3.3 Risk Assessment – Capacity and Function (Natural Stormwater Assets)

Risks related to capacity and function for natural assets, along with associated responses and strategies, were qualitatively identified, and are listed below.

1) **Urbanization and Land Use Changes:** Urbanization and land use changes pose significant risks to natural assets such as wetlands. The practice of draining or filling wetlands to create buildable land reduces their size and function, while the expansion of roads and pavements increases runoff, decreases groundwater recharge, and heightens the risk of flooding. The City prioritizes the protection of natural assets through policies in the Official Plan, including a no-net-loss approach and strong avoidance criteria for development near sensitive features. Regulatory mechanisms under the Conservation Authorities Act and guidance from the Provincial Policy Statement support these protection measures.

2) **Stormwater Runoff:** Stormwater runoff is a critical risk factor, carrying pollutants such as oils, chemicals, heavy metals, and litter into water bodies. To manage this risk, the City has introduced a new policy in the Official Plan, allowing 25% of the urban area to drain into natural areas without being managed, thereby promoting natural filtration processes. Additionally, broader outreach efforts are being made to commercial property owners with Water Quality Units (WQUs), encouraging them to conduct regular inspections and cleanings to prevent pollutants from flowing downstream.

3) **Climate Change:** The increasing frequency and intensity of floods and storms, driven by climate change, pose risks of erosion, sedimentation, and damage to infrastructure. These events can severely impact the integrity and functionality of natural and built assets. While natural assets are impacted by climate change, they also play a critical role in enhancing community resilience. To help reduce the risks, the City is developing actions (e.g., integrating climate resilience into all plans, policies, strategies, programs, initiatives) to strengthen natural systems and increase the resilience of stormwater infrastructure.

4) **Waste Dumping:** Illegal dumping of garbage, construction debris, and hazardous waste poses a significant risk to wetlands, lakes, and rivers, contaminating these natural resources and impairing their ecological functions. In response, the City has updated its encroachment bylaw to better protect municipal properties and natural features. Signage has been installed to deter illegal dumping and to communicate the regulations clearly to the public.

5) **Sedimentation and Erosion:** Poor land management practices, such as deforestation and unregulated

construction activities, exacerbate sedimentation and erosion, causing sediment to be deposited into water bodies. To combat these risks, the City has undertaken watercourse erosion assessments and lake condition assessments. Furthermore, the City of Brampton has established Erosion and Sediment Control (ESC) standards, which are scheduled for updates next year, to ensure that effective measures are in place to reduce sedimentation risks. The City is also working on an ESC Guideline to ensure that the standards to further promote the use of ESCs and ensure that they are being implemented correctly.

6) **Insufficient Funding and Lifecycle Investment:** Natural assets require ongoing stewardship, monitoring, and periodic restoration to maintain function—yet they are often underfunded compared to engineered systems. Without adequate financial support, natural features may degrade, losing capacity and increasing downstream risks. The City recognizes this as a high-priority risk and is working to integrate natural asset management into its capital forecasting and lifecycle costing frameworks, drawing on best practices from the Municipal Natural Assets Initiative (MNAI). This includes assigning service values and condition ratings to natural assets and ensuring that sufficient resources are allocated for their long-term maintenance and rehabilitation, in line with their essential service delivery roles.

7) **Lack of Available Information:** A significant risk to the effective management of the stormwater system is the lack of available information (condition, age, asset attributes), particularly for natural assets that support stormwater functions. While the City has made progress in collecting data for engineered stormwater assets, limited condition assessments have been completed for natural features such as wetlands and lakes. Without detailed information on the structural integrity, hydraulic capacity, and ecological health of these assets, it is challenging to accurately assess risk, prioritize maintenance, and plan for long-term renewal. This information gap can lead to underestimation of vulnerabilities, delayed interventions, and potential service disruptions during extreme weather events. Addressing this risk will require the development of targeted inspection programs and monitoring strategies to better understand the current and future state of the City's natural stormwater infrastructure.

4.4 Risk Treatment

In addition to identifying risk exposure, the risk analysis also serves to develop guidelines for appropriate risk treatments—targeted actions or strategies intended to manage or reduce the risks associated with asset failure. A key focus of this process is determining which risk treatments are required to ensure that assets continue to deliver the City’s desired LOS.

Since different risk treatments can have varying impacts on LOS, the City has worked in close consultation with pertinent staff (i.e. operations, planning) to identify optimal treatments tailored to specific asset needs and operational contexts. These high-level risk treatment recommendations are presented within the lifecycle

management section of this AM Plan.

It is suggested that the City prioritize investment in assets assessed as being in Very Poor condition for inclusion in the City's capital planning and lifecycle management activities. These treatments are intended not only to mitigate immediate risks but also to support long-term service sustainability and resilience.

Next Steps: Maturing the Risk-Based Approach

While the City has made significant progress in developing a corporate-wide risk profile and risk treatment framework, it recognizes that the process must continue to evolve to deliver its full value. Over the coming years, the City intends to:

- Enhance risk analysis to support more refined prioritization of lifecycle activities and associated costs, ensuring capital and maintenance investments are directed toward the highest risk and highest impact areas.
- Strengthen integration between risk analysis and level of service development, enabling a more holistic view of how asset risk influences service performance outcomes.
- Incorporate residual risk assessments into the RMS, allowing the City to understand the level of risk that remains even after mitigation strategies have been applied.
- Embed risk-based decision-making within broader asset management processes to drive consistency, accountability, and transparency.

These improvements are further outlined in the Monitoring & Improvement Plan section of this AM Plan, which identifies actions, timelines, and responsibilities for maturing risk management practices for stormwater assets.

Climate Change Integration

5. Climate Change Integration

Municipal asset management primarily focuses on maintaining existing assets in a state of good repair while concurrently planning for their future rehabilitation and replacement across all service areas. However, the impacts of climate change are already being observed in Brampton. The 2022 Churchville flooding event, 2023 Extreme Heat Event, and the July 2024 flooding event are a few examples of the increase in extreme weather events over the last several years. These events have resulted in significant impacts on Brampton's community and infrastructure. As such, it is imperative for municipalities to incorporate climate considerations into their asset management strategies and proactively plan for future climate-related challenges to ensure the continued delivery of essential services, particularly concerning the maintenance of critical municipal infrastructure.

In accordance with Ontario Regulation 588/17, Section 3(5), municipalities are required to integrate climate change considerations into their asset management planning. This includes addressing vulnerabilities related to climate change impacts on operations, levels of service, and lifecycle management. Furthermore, municipalities must evaluate anticipated costs, mitigation and adaptation strategies, and disaster preparedness measures to comply with provincial asset management requirements. This section establishes a foundation for future policies aimed at embedding climate change considerations within the City's asset management framework.

The City's Climate Change Risk and Vulnerability Assessment Report indicates that the City of Brampton is projected to experience rising air temperatures, increased precipitation, and more frequent extreme weather

events. Specific climatic changes in Brampton include hotter, drier summers; warmer winters with heightened precipitation; an increased frequency and intensity of storms; and stronger extreme wind events. These climatic shifts are expected to elevate risks related to flooding, heatwaves, infrastructure deterioration, public health and safety concerns, and the disruption or loss of natural habitats.

Climate change planning is a critical step for municipalities in ensuring long-term resilience. Accordingly, the City is actively working to integrate climate change considerations into its asset management planning practices to enhance infrastructure sustainability and service reliability in the face of evolving climate challenges.

5.1 Impacts of Climate Change on Stormwater Assets

The Financial Accountability Office of Ontario (FAO) prepared a report in 2023 to analyze the costs that climate change impacts could impose on Ontario's provincial and municipal infrastructure, and how those costs could impact on the long-term budget outlook of the province.

Key climate risks identified for stormwater infrastructure within this report, "Costing Climate Impacts to Public Infrastructure" project (CIPI)., include:

- **Sewers:** Stormwater sewers are usually designed to address more frequent rainfall events (i.e., 5- to 10-year storm events). As the intensity of extreme rainfall events increases, pipes will require more frequent and costly inspections and preventive maintenance, as more debris, sediment and pollutants are expected to enter stormwater systems.

- **Ditches:** Ditches are generally constructed to provide higher capacity than pipes but are vulnerable to large overflow events. In urban areas, major systems must be able to convey the flow resulting from acute rainfall events such as the 100-year storm. As the intensity of extreme rainfall events increases, ditches will require more frequent clearing of debris, shape and slope maintenance, and vegetation pruning to convey increased amounts of stormwater.

- **Non-Structural Culverts:** Non structural culverts are also vulnerable to overflow events. As the intensity of extreme rainfall events increases, these assets will require more frequent clearing of debris and sediments resulting from increased water flow. Channel protection will also be subject to accelerated erosion.

Prepared by the MECP, the Ontario Provincial Climate Change Impact Assessment (PCCIA) has also identified key climate changes risk to assets evaluated within this AM Plan including:

- **Wetlands**: Projected increases in the frequency and intensity of storm events can disrupt the hydrologic balance of wetlands. Such disturbances may lead to prolonged flooding or drying periods, diminishing their ecological functions and increasing the need for restoration efforts.

- **Watercourses**: Anticipated higher flow velocities during extreme rainfall events elevate the risk of erosion, channel instability, and sediment transport. These changes can adversely affect aquatic habitats and compromise adjacent infrastructure.

- **Lakes**: Increased stormwater runoff is expected to introduce more sediment and pollutants into lakes and ponds, reducing water quality and storage capacity. This scenario necessitates more frequent dredging and maintenance to preserve their functionality.

5.2 Associated Cost Implications of Climate Change

The FAO study examined three climate change scenarios as part of the analysis of future infrastructure costs due to climate change:

- The low emissions scenario assumes a major and immediate turnaround in global climate policies.
- The medium emissions scenario assumes that global emissions peak in the 2040s, then decline rapidly thereafter.
- The high emissions scenario assumes global emissions continue to grow at their historical pace for most of the century.

In analyzing the potential impacts of climate change on municipal infrastructure, the high emissions scenario was selected as the basis for the assessment. This scenario represents a future with continued high greenhouse gas emissions and limited global climate mitigation efforts. While it may reflect a worst-case trajectory, it serves as a conservative planning benchmark, helping the City to better prepare for more extreme and uncertain climate outcomes.

Given the long service lives and high capital costs associated with municipal assets such as storm water pipes, catchbasins, culverts etc., it is critical that infrastructure is designed and managed to withstand more frequent and severe weather events, including increased precipitation, freeze-thaw cycles, flooding, and extreme heat. By planning for higher-impact scenarios, the City reduces the risk of underestimating climate stressors and being unprepared for costly or disruptive service interruptions in the future.

Table 5-1 below presents the projected median impacts of both the medium (lower limit) and high-emissions (upper limit) climate change scenarios on public infrastructure assets in Ontario, specifically focusing on stormwater assets such as culverts, ditches and pipes. The impacts are measured in terms of changes in operating and maintenance costs, life reductions, and increases in retrofit and renewal costs.

Table 5-1: Climate Change Impacts on O&M Costs (Source: FAO Costing Climate Impacts to Public Infrastructure Study)

Asset	O&M Cost ($)	Service Life (years)	Retrofit Cost ($)	Renewal Cost ($)
Stormwater Culverts	+1.0% to +2.5%	No change	-	+35.0% to +85.0%
Stormwater Ditches	+1.0% to +2.5%	No change	-	+31.0% to +74.0%
Stormwater Pipes	+2.1% to +5.1%	No change	-	+31.0% to +75.0%

At this stage, the City has chosen to focus its climate change impact assessment on operating costs rather than extending the analysis to asset service life reductions, retrofit requirements, or renewal costs.

Operating costs—such as increased frequency of maintenance, emergency repairs, or additional inspections—are more immediate, observable, and quantifiable in the short to medium term.

In contrast, impacts on service lives or the cost of retrofits are more complex and require detailed engineering assessments, long-term monitoring, and assumptions about future materials, standards, and design practices, many of which are still evolving in response to climate adaptation research. By initially focusing on operational impacts, the City is taking a pragmatic first step in understanding how climate change affects its infrastructure portfolio, while recognizing the need to expand this analysis in the future as tools, data, and methodologies improve.

As such, utilizing the table above, to account for climate change impacts, this AM Plan has adopted the following increases to the operating needs forecast (found within the lifecycle strategy section of this AM Plan). These adjustments are based on a high emissions scenario, aligned with the climate projections used in the City's Climate Change Action Plan. The O&M cost assumptions below have been applied as part of the operating needs forecast (presented in the lifecycle management strategy):

- a 2.5% future increase in O&M costs for culverts,
- a 2.5% increase in O&M costs for ditches,

- a 5.1% increase in O&M costs and for stormwater pipes.

Overall, the data underscores the substantial financial and operational impacts of climate change on stormwater infrastructure. The City will need to implement strategic asset management practices, prioritize investments in climate-resilient infrastructure, and adopt mitigation and adaptation measures to address these challenges effectively.

5.3 Draft Climate Ready Brampton

The draft ***Climate Ready Brampton (estimated completion in 2025)*** is a forward-looking plan that will address the anticipated impacts of climate change on Brampton's communities, infrastructure, economy, and natural systems. While reducing greenhouse gasses is more important now than ever, simultaneously addressing climate adaptation is a critical priority due to the accelerating impacts of climate change. As previously mentioned, the City is already feeling these effects through warmer winters, increased rainfall, and extreme events like flooding and heat waves.

By 2070, Brampton is expected to become warmer, wetter, and wilder. Average temperatures are expected to rise significantly, leading to milder winters, increased temperature variability, and more extreme heat days in the summer (e.g., days where temperatures exceed 30°C). Annual precipitation will increase, and the City will experience more intense rainfall events. As temperatures continue to rise, more snow may turn to rain in the winter, heightening flood risks across the City. With a wilder climate, extreme weather events, such as heatwaves, storms, tornadoes, and extreme wind events, are expected to become more frequent. These changes will result in widespread impacts such as property damage, threats to human health and safety, loss of natural systems, and impacts to the local economy. By acting now to prepare for future climate impacts, Brampton and its communities will be well-equipped to handle adverse impacts, developing improved resilience to these climate-induced risks.

To support the Vision and Goals of Climate Ready Brampton, a series of actions were created and designed to reduce risks from future climate hazards. The following draft actions are relevant to the City's stormwater assets and will be completed over the next several years.

- **Incentivize Flood Proofing:** Develop an incentive program for residents to implement flood-proofing measures on their property (e.g., downspout disconnection, sump pumps, rain barrels, native species planting, grass swales, etc.)
- **Green Infrastructure Open Data:** Add green infrastructure data to the City's Geohub for public access.
- **Minimize Hardscaping:** Reduce ponding, runoff, and flooding in urban areas by increasing the percentage of permeable surface required on properties based on property type (e.g. residential, ICI)
- **Green Infrastructure Standards:** Develop green infrastructure design standards that integrate climate

risk.

- **Green Infrastructure Study:** Undertake a study to identify opportunities for green infrastructure across the City, including key locations for implementation and feasibility.
- **Cost-Analysis for Flood Mitigation:** Undertake a flood mitigation cost-analysis to assess flood management interventions with detailed calibration in neighbourhoods identified as being at risk of flooding. The results will be integrated into the City's Asset Management Plans and other relevant programs.
- **Implement Solutions for Flood Mitigation:** Commence implementation of the solutions identified in the Flood Mitigation Cost-Analysis study.
- **Flood Mitigation Demos:** Identify a City-owned property for use as a demonstration site to showcase flood mitigation measures to the public (e.g., downspout disconnection, sump pumps, other flood-proofing measures)
- **Bridge & Culvert Replacement Study:** Alongside the development of the Asset Management Plans, assess current bridge and culvert conditions and replacement schedules, taking into account climate risks to determine high-priority bridge & culvert replacements and needs for re-sizing.
- **Bridge & Culvert Replacement Sizing:** Establish a standard definition for right-sized bridge & culvert replacement (e.g., 1.2x 1:100-year event for major systems and 1:10 for minor systems) into asset management planning and budgeting, as opposed to one-for-one replacements.
- **Stormwater Sewer Replacement:** Alongside the development of the Stormwater Asset Management Plan, review and update current storm sewer replacement schedules that takes into account future climate risk, determines high priority replacements and replacement details, and complete an aligned costing study
- **Stormwater Sewer Replacement Sizing:** Establish a standard definition for right-sized storm sewer replacement into asset management planning and budgeting, as opposed to one-for-one replacements.
- **Local Flooding on High-Risk Roads:** Reduce travel disruptions due to transportation routes damaged or blocked by conditions of an extreme weather event.
- **Wetland Health and Restoration Study:** Establish a process to assess the condition and stormwater management function of wetlands across Brampton, identify high-performing wetlands that contribute to flood mitigation and water quality, and prioritize restoration needs.

Lifecycle Strategy

6. Lifecycle Strategy

To achieve its program objectives, the City builds new infrastructure assets to meet growth needs and manages existing assets to meet reliability needs – all with limited funds. Asset lifecycle management strategies are planned actions that enable assets to provide the defined levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost. Asset lifecycle management strategies are typically organized into the following categories:

1. **Non-Infrastructure Solutions**
   Non-infrastructure solutions refer to actions or policies that can lower costs or extend asset life but is not directly related to work on the asset itself. The City currently undertakes various types of non-infrastructure solutions on an ongoing basis, which includes initiatives like integrated infrastructure planning and co-ordination with other levels of government, demand management through the growth-planning process or continual improvements to City processes to achieve cost efficiencies.

2. **Operations & Maintenance (O&M)**
   These activities refer to servicing assets on a regular basis in order to fully realize the original service potential of the assets. Operations and maintenance typically will not extend the life of an asset or add to its value, however, not performing regular maintenance may reduce an asset's useful life and/or levels of service. O&M therefore ensures the asset continues to deliver defined levels of services.

   - Operations include day-to-day activities such as system monitoring, inspections, cleaning, and minor adjustments that ensure service delivery.

   - Maintenance involves scheduled (preventative) and unscheduled (corrective) tasks to address wear and tear, minor repairs, and functional upkeep to prevent premature deterioration and

prolong asset life.

3. **Renewal & Rehabilitation**
   Renewal/rehabilitation activities are mostly associated to significant repairs designed to extend the life of an asset. These types of activities are typically undertaken at key points in the lifecycle of an asset to ensure the asset reaches or exceeds its designed useful life.

   - Renewal typically refers to activities that extend the service life of an asset, such as resurfacing a road or conducting repairs on bridges.

   - Rehabilitation may involve more intensive efforts to bring a deteriorated asset back to a functional state, often improving performance but not increasing capacity.

4. **Replacement**
   Replacement involves removing and substituting an asset or major asset component that has reached the end of its useful life or can no longer deliver the required level of service. This activity restores original capacity and functionality and typically involves capital investment. Examples include replacing a streetlight pole, or a culvert.

5. **Disposal/Removal**
   Disposal/removal activities are actions associated with removing and disposing of an asset once it has reached the end of its useful life or is otherwise no longer needed. Typically, most assets will have one-time associated disposal costs.

6. **Expansion/Upgrade**
   These are planned activities to extend or expand municipal services to accommodate various demands (growth, legislative, environmental etc.). As development occurs, additional infrastructure is required to service new residents and businesses.

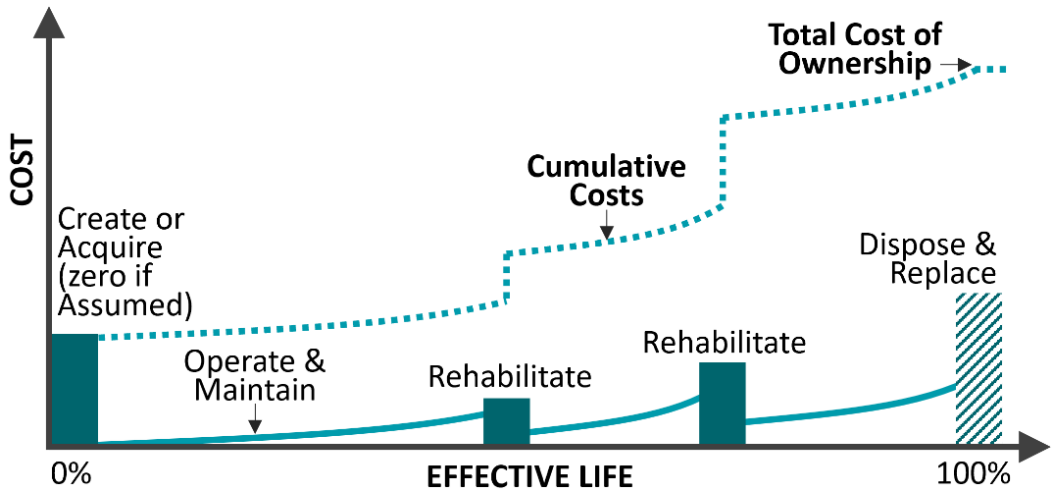
   - Expansion refers to adding new assets or extending infrastructure (e.g., new road lanes).

   - Upgrades enhance existing assets (e.g., converting lighting to LED, improving accessibility features, or increasing load capacity).

The City reviews the costs of potential lifecycle activities to determine the lowest lifecycle cost strategy while still meeting service levels. The total cost of ownership is the sum of lifecycle activity costs to sustain an asset over its lifecycle. (See Figure 6-1 for a conceptual lifecycle cost model). Sufficient investment of the right type of asset intervention, at the right time, minimizes the total cost of ownership for each asset and mitigates other potential risks such as interruption to service delivery or failure that causes damage to other nearby infrastructure. Operations, maintenance, and renewal activities are timed

to reduce the risk of service failure from deterioration in asset condition, and all contribute to the total cost of ownership.

Figure 6-1: Conceptual Lifecycle Cost Model



6.1 Lifecycle Activity Needs

Asset Expansion and Upgrade – Proposed Needs

The City of Brampton is Canada's 9th largest municipality with an estimated population of 725,000 and over 182,500 occupied households. Based on the data provided in the 2025 Mobility Plan, the City of Brampton has projected significant growth in both residential dwellings and population over the coming years. The forecast, in line with the *2051 Peel Region Land Needs Study* forecast, estimates that the City of Brampton is expected to increase their total population of residents by over 150,000 people and 50,000 dwellings over the next ten years.

Growth requirements for stormwater assets were determined using a multi-faceted approach to ensure alignment with the City's development trajectory and infrastructure needs.

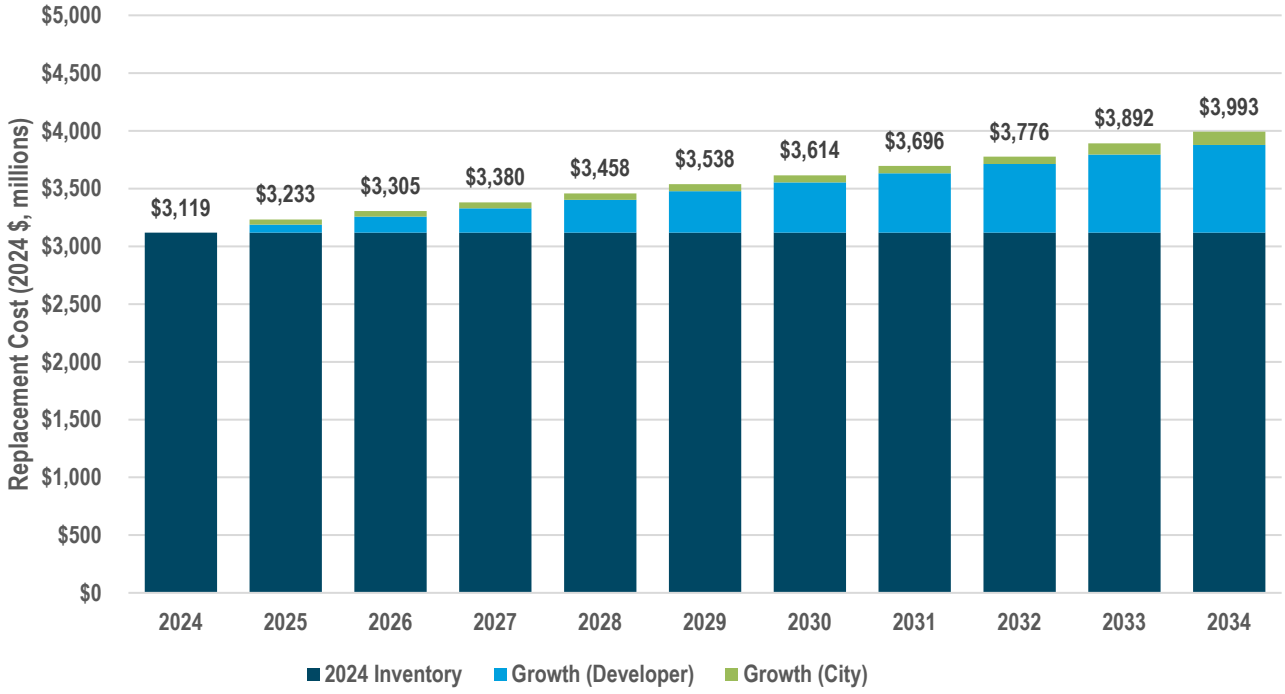
First, ***Growth (Developers)*** was calculated based on an assumed annual growth rate of 2.2% for each asset class, in alignment with previous estimates presented in Corporate reports. This approach reflects the anticipated increase in demand and service coverage requirements associated with ongoing population and development growth across Brampton.

Second, ***Growth (City)*** was informed by the City's Development Charges Study, specifically identifying future stormwater assets required to support planned urban expansion. It is important to note that this only includes stormwater assets associated with road development such as stormwater pipes, catch basins, manholes and roadside culverts – and excludes other stormwater assets such as ponds, ditches, low impact development etc.

These future infrastructure assets are expected to be funded by developers through development charges or other growth-related funding mechanisms. This ensures that growth-related infrastructure investments are both strategically aligned with City plans and financially sustainable, while also supporting the broader objectives of accommodating population and employment targets outlined in regional growth forecasts.

The growth forecast for the City's stormwater assets is presented as the red line in Figure 6-2 below. The City has several projects planned over the next 10 years that benefit both existing customers as well as future development.

Figure 6-2: City Stormwater Growth Forecast



Based on the figure above, the City is anticipating growing its overall stormwater portfolio by approximately $874 million dollars over the next 10 years.

It is important to note that while the initial capital costs of growth are covered, the subsequent operations and maintenance (O&M) costs associated with these new assets are not captured within the development charge framework. Planning for lifecycle activities for these future growth assets is essential to ensure that the City's infrastructure can accommodate anticipated increases in population, development, and service demand effectively.

6.2 Operations and Maintenance – Needs

Operations and Maintenance Activities – Current LOS

Table 6-2 below summarizes the City's current operations and maintenance activities performed for stormwater assets. The City is currently refining its O&M programs for other asset types within the stormwater network, with the goal of establishing consistent, proactive practices that align with asset management best practices and support long-term infrastructure performance.

Table 6-2: O&M Activities – Current LOS

Asset Category	Operations & Maintenance Activities
Stormwater Management Ponds	- Bathymetric surveys - Pond maintenance, including cleaning out outfalls - Removal of vegetation overgrowth and debris - Reshaping of stone overflow weir
Storm Conveyance Systems (including storm sewers, FDCs, catchbasins, manholes, and FDC manholes)	- Ad hoc inspections - Minor repairs - CCTV inspections - Sewer flushing - Underground utility locates - Catchbasin frame inspections - Catchbasin cleaning - Street sweeping - Minor adjustments
Water Quality Units (WQU)	- WQU inspections - Maintenance based on inspection results, primarily filter replacement

Operations and Maintenance Activities - Target LOS

Additional O&M program expenditure was identified to support the targeted levels of service outlined earlier within the ‘Levels of Service’ chapter, in addition to aligning activities and frequencies with industry best practices. These projections primarily address assets beyond ponds, conveyance systems, and water quality units. The additional activities are provided in Table 6-3 below.

Table 6-3: Additional Stormwater O&M Needs[3]

Category	O&M Activities
All storm culverts	Inspecting for sediment accumulation and blockages, cleaning culvert openings to maintain flow capacity.
Watercourses	Stream rapid assessment, bank stabilization and erosion repair, debris and obstruction removal, sediment management, vegetation management, water quality monitoring and improvement.
Water quality units	Inspection and cleaning of filters/screens, removal of accumulated sediment.
Roadside ditches	Regular clearing of vegetation and debris.
Low Impact Developments (LIDs)	
Infiltration chambers	Routine inspection, remove litter, clean out sediment trap and debris, maintenance inspection.
Infiltration trenches	Monitoring infiltration rate and water levels, vegetation management to prevent clogging, routine inspection, remove litter, replace filter cloth and dispose sediment and debris, flush out pipes.
Stormwater harvesting chamber	Routine inspection, remove litter, cleaning in-line filter/cleaning of inlet screens, cleaning out tank/flushing system to prevent sediment buildup, replacing pump and pressure tank, routine cistern pump test.
Cooling trenches	Clearing sediment and organic matter buildup, vegetation control around trench areas.
Stormwater tree trench	Pruning and maintaining trees for optimal performance, removing accumulated debris from inlet areas.
Bioretention	Routine inspection and maintenance of vegetation, routine operation

[3] Note: the asset activities listed in this table only relate to needs for assets being supported by the stormwater charge. Additional program needs for assets not supported by the charge are discussed in Section 6.2.3.

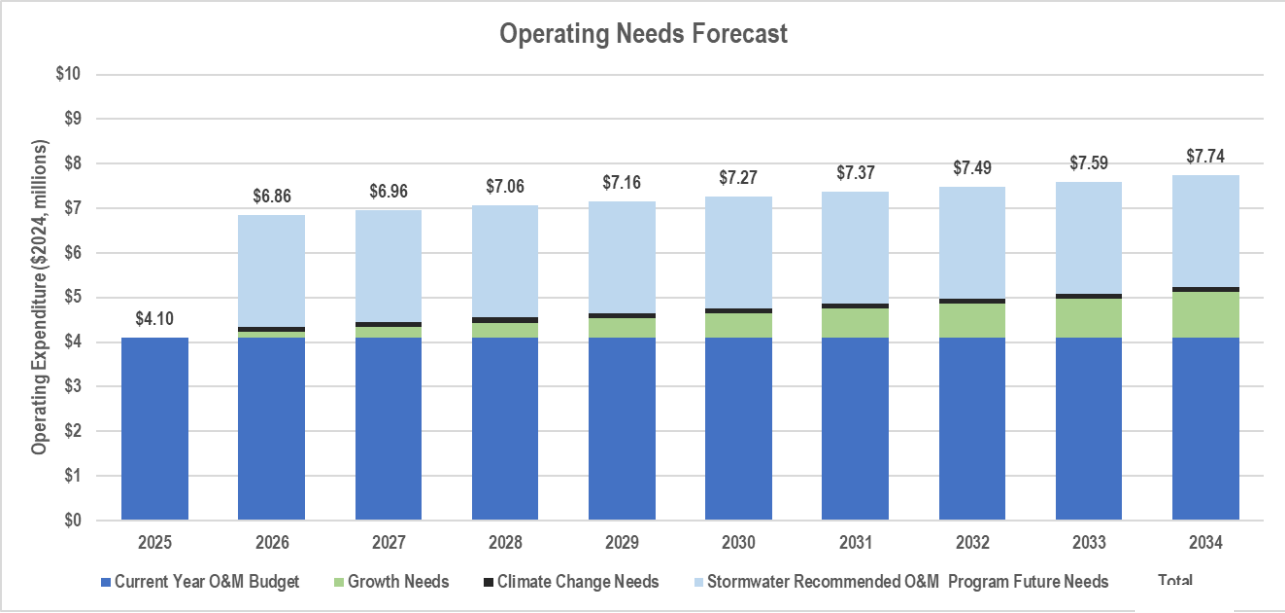
Operations and Maintenance Needs – Proposed Levels of Service

The City has chosen to adopt proposed service levels for O&M that are based on:

- the continuation of existing practices for the storm conveyance system, ponds and water quality units.
- conducting additional activities for the assets noted in Table 6-3 to align with industry standard O&M practices and also meet the targeted service levels set out.
- additional O&M expenditure to meet anticipated service demands related to growth and climate change. This includes:
    - an increase to the operating budget based on anticipated growth (as determined by the growth needs) to ensure that resources will be available to deliver services and maintain and service an expanding portfolio of assets effectively.
    - Allocating additional resources (as determined within the climate change integration section) to enhance system resilience.

Figure 6-7 shows the forecast operations and maintenance costs for the next 10 years. The increase in operating expenditures over the forecast period may appear significant when compared to the 2025 baseline. However, this is primarily due to the fact that the 2025 budget reflects a short-term constraint on operating spending. This initial budget year was set considering limitations in organizational capacity, particularly in terms of available staffing and project management resources.

Figure 6-7: Operating Needs Forecast – Proposed LOS



The figure shows that the operational needs are expected to increase from $4.10 million/year in 2025 to $7.74 million/year in 2034. All figure values are shown in 2024$ (including historical operating amounts). The estimate of operations and maintenance cost increases can be refined by conducting more detailed analysis of operating costs by asset sub-types or by maintenance activity.

For the period 2025-2034, the annual operating and maintenance costs are expected to be an average of **$7.1 million/year.**

6.3 Asset Renewal, Rehabilitation and Replacement – Needs

Renewal, rehabilitation and replacement efforts enable the City to meet its quality and reliability service levels. Over time, as the City refines the asset management strategies through tracking of actual condition, costs, and benefits of the strategies, the City will improve its understanding of the deterioration rates and the lowest lifecycle cost for each asset type. Where appropriate, the City considers coordinating multiple activities across asset areas through project bundling to reduce total costs.

Rehabilitation activities extend the life of an asset and reduce its risk of failure. These activities and associated benefits are deemed more cost effective than allowing the asset to reach its end of life.

At a certain point in an asset's lifecycle, it is no longer cost-effective to rehabilitate the asset, and replacement is required. The City has identified estimated service lives for each of its assets. These replacement intervals are developed to minimize lifecycle costs while considering service levels and the associated risk. The renewal forecast considers the asset's current condition or age, the planned rehabilitation and replacement activities.

The City's strategies are summarized in Table 6-1. Over time, as the City refines the asset management strategies through tracking of actual condition and the actual costs and benefits (extension of asset life) of rehabilitations, the City will improve its understanding of the lowest lifecycle cost for each asset type. The affordability of the service levels and associated lifecycle activities are discussed in the Financing Strategy section of this Plan.

Rehabilitation costs and intervention frequencies were informed by unit cost estimates provided by the City as well as benchmarking against values from comparable municipalities and industry sources. No

Table 6-1: Asset Renewal, Rehabilitation and Replacement Lifecycle Strategies

Asset Category		Estimated Replacement Frequency (Years)	Rehabilitation Frequency (Years)	Rehab Cost (Estimated as % of Replacement Value)	Rehabilitation Activity
Stormwater Management Ponds (SWMPs)	Structural components of a SWMP	N/A	15	15%	Reshape overland flow routes and rehab for SWMP engineered infrastructure fix cracks and other defects on inlet/outlet structures, site maintenance such as light replacements, etc. SWMP restoration – bank stabilisation and erosion control
	SWMP storage	N/A	Informed by Bathymetry study, estimated at 15 years on average	Average $800k per SWMP	SWMP dredging and restoration.
Storm Sewer Systems	FDC	100	33	0.6%	Repairs
	Storm Sewers	100	33	0.5%	Repairs
	Catchbasins	100	33	0.5%	Repairs
	Manholes	100	33	0.5%	Repairs
	FDC Manholes	100	33	0.5%	Repairs
Culverts	Culverts (Concrete & Plastic)	75	-	-	
	Culverts (Other)	50	-	-	
Water Quality Units		50	-	-	Replacement of filters and minor repairs are part of maintenance
Ditches		Perpetual	-	-	Regular cleaning of vegetation and debris are part of maintenance
LIDs		50	-	-	Adjustments are part of maintenance[4]

[4] Low Impact Developments (LIDs) are currently considered primarily from a maintenance perspective within the City's asset management framework. However, many LID features—such as bioretention cells, infiltration trenches—also have significant capital components, including design, construction, and periodic rehabilitation, which are not yet fully defined by the City.

It is recommended that the City establish defined capital requirements for LID assets and incorporate these within future iterations of the AM Plan.

Asset Category		Estimated Replacement Frequency (Years)	Rehabilitation Frequency (Years)	Rehab Cost (Estimated as % of Replacement Value)	Rehabilitation Activity
Watercourses		Perpetual			
Natural Assets	Lakes	Perpetual	*Assets need discussed in Section 6.2.3*		
	Wetlands	Perpetual			

6.4 Capital Needs Scenario Analysis

Decisions related to balancing levels of service, cost of service and risk involve trade-offs. A higher level of service typically costs more. If sufficient funding is not available, lifecycle activities cannot be undertaken at the optimal time resulting in failure to minimize total cost of asset ownership and a risk of not delivering the proposed levels of service.

Capital need expenditure and condition forecasts were developed for three scenarios:

- **Scenario 1: Maintain Current LOS – Funding Need:** Activities are undertaken such that the current levels of service are maintained over the next 10 years. Activities are deferred into the future, beyond the 10 year analysis horizon, based on the risk profile of the assets. Activities of lower risk assets are deferred before assets of higher risk.
- **Scenario 2: Allocated Budget - Expected Outcome:** Activities are undertaken such that the associated costs are equal to the antiticipated allocated funding available for SW programs over the next 10 years. Historically approximately half of the revenue collected through SW charge is allocated to current SW program while other half directed to reserves for the future SW system replacements. To match the needs to allocated funding amount, projects are deferred into the future, beyond the 10 year analysis horizon, based on the risk profile of the assets – activities of lower risk assets are deferred before assets of higher risk.
- **Scenario 3: Target LOS – Funding Need:** Activities are undertaken over the next 10 years to achieve a desired level of servive that is higher than the current standard. For example, understanding the costs associated with increasing the resiliency of the stormwater system to a 5-year storm from 80% of the network being resilient to 90%.

  This report focuses exclusively on the Quality theme of LOS in its lifecycle needs analysis. The other two LOS categories—Capacity and Functionality—are not included in this assessment at this time.

  The City recognizes the importance of these additional service dimensions and is actively working to enhance its understanding of the lifecycle activities and investment requirements needed to achieve and

sustain them. Supporting studies and system modelling efforts are either underway or planned, as outlined in the Improvement Initiatives section of this report. These efforts will inform future updates to the asset management plan and ensure a more comprehensive representation of service delivery expectations.

It is important to note that the capital renewal, rehabilitation, and replacement (RRR) needs presented in this scenario exclude the requirements for natural assets, including lakes and wetlands. These asset categories are not currently funded through the City's stormwater charge and will require alternative funding approaches to ensure their long-term sustainability and integration into the broader asset management program.

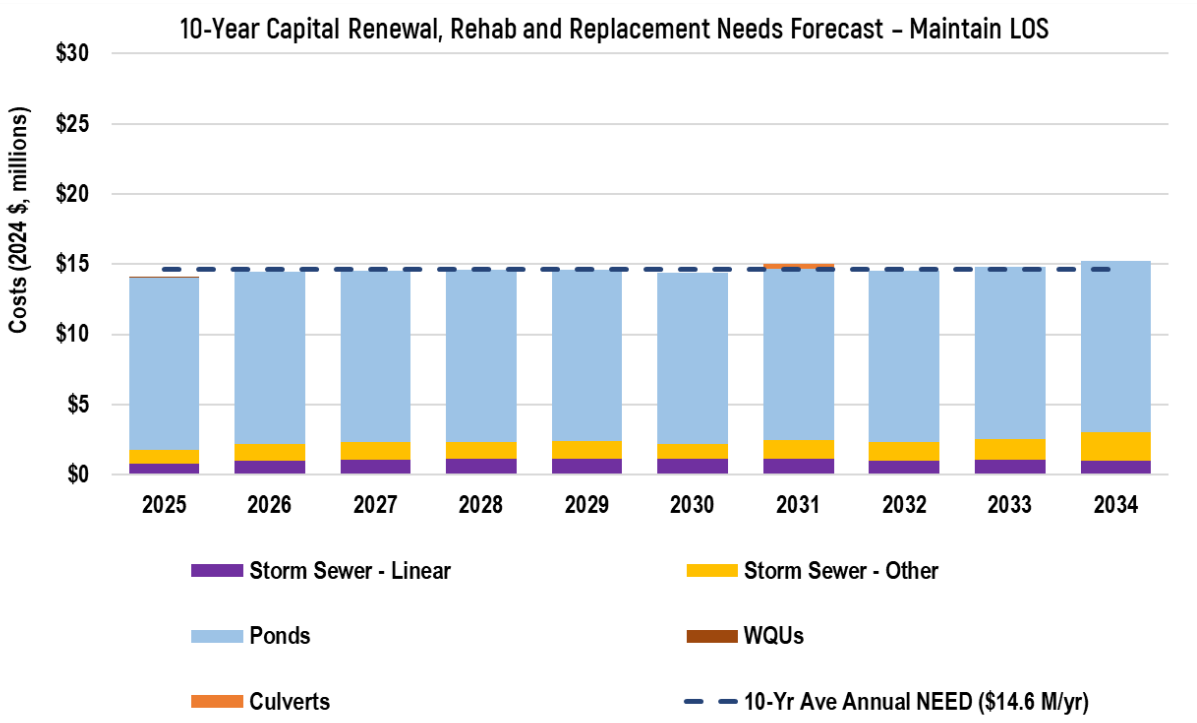
Scenario 1: Maintaining the Current LOS – Funding Need

This scenario shows the renewal, rehabilitation, and replacement activities that would be needed to sustain current asset condition performance. In simple terms, it means doing timely projects so that the City doesn't fall further behind on fixing aging or deteriorating infrastructure. This includes things like repairing storm pipes, restoring ponds, or replacing outdated components before they fail — helping to avoid more expensive fixes in the future and ensuring reliable service for residents.

According to Figure 6-3 below, the forecasts for the maintained current LOS scenario are as follows:

- The **average annual renewal, rehabilitation and replacement need to maintain the current LOS over the next ten years is $14.6 million.**

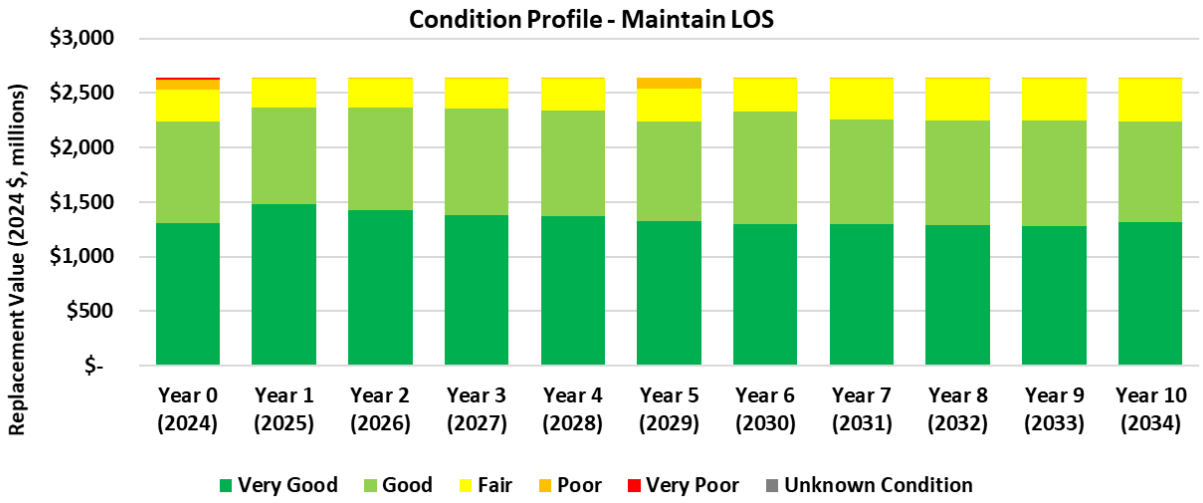
Figure 6-3: 10-Year Capital Renewal, Rehabilitation and Replacement Needs Forecast – Maintain LOS



Across the entire 10-year period, stormwater management ponds (light blue) consistently represent the largest share of projected costs. This reflects the extensive number of ponds in the system and the high cost of major rehabilitation activities such as dredging and structural maintenance, which are critical to maintaining performance and environmental function.

Figure 6-4 presents the forecasted condition distribution of stormwater assets under the Maintaining Current LOS scenario, which corresponds to the spending level illustrated in Figure 6-3. This scenario assumes that the City continues to invest at a level that is sufficient to address annual renewal needs and prevent further deterioration of the asset portfolio.

Figure 6-4: Condition Forecast – Maintain LOS

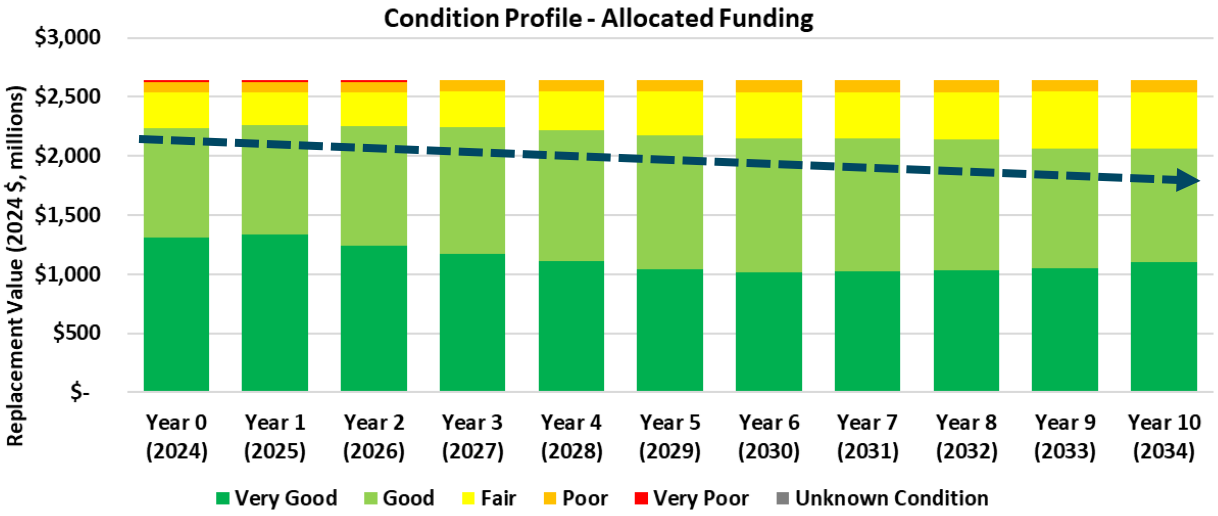


Scenario 2: Allocated Funding Scenario – Expected Outcome

This scenario shows how the condition of the City's stormwater infrastructure is expected to change over time based on the allocated level of funding to support renewal, rehabilitation and replacement activities within the Capital Budget ($4.5 million dollars on average per year). In simple terms, it illustrates what happens when the City continues to invest at the current rate.

Figure 6-5 below shows the forecast condition distribution associated with the current renewal, rehabilitation and replacement spending level. The graph shows that the City is underfunded to address the existing needs which will increase the number of fair, poor and very poor assets over time. If assets are not renewed when they reach their end-of-life, the probability of their failure increases. Depending on the asset type and failure context, an asset failure may result in various negative impacts, such as service disruptions, injuries to employees and the public, or reputational harm to the organization.

*Figure 6-5: Condition Forecast – Allocated Funding**



**As seen by the trendline, the amount of assets in good and very good condition are expected to decrease over the 10-year period.*

Scenario 3: Target LOS Scenario – Funding Need

This scenario illustrates the requirements necessary to achieve a proposed level of service higher than the current performance.

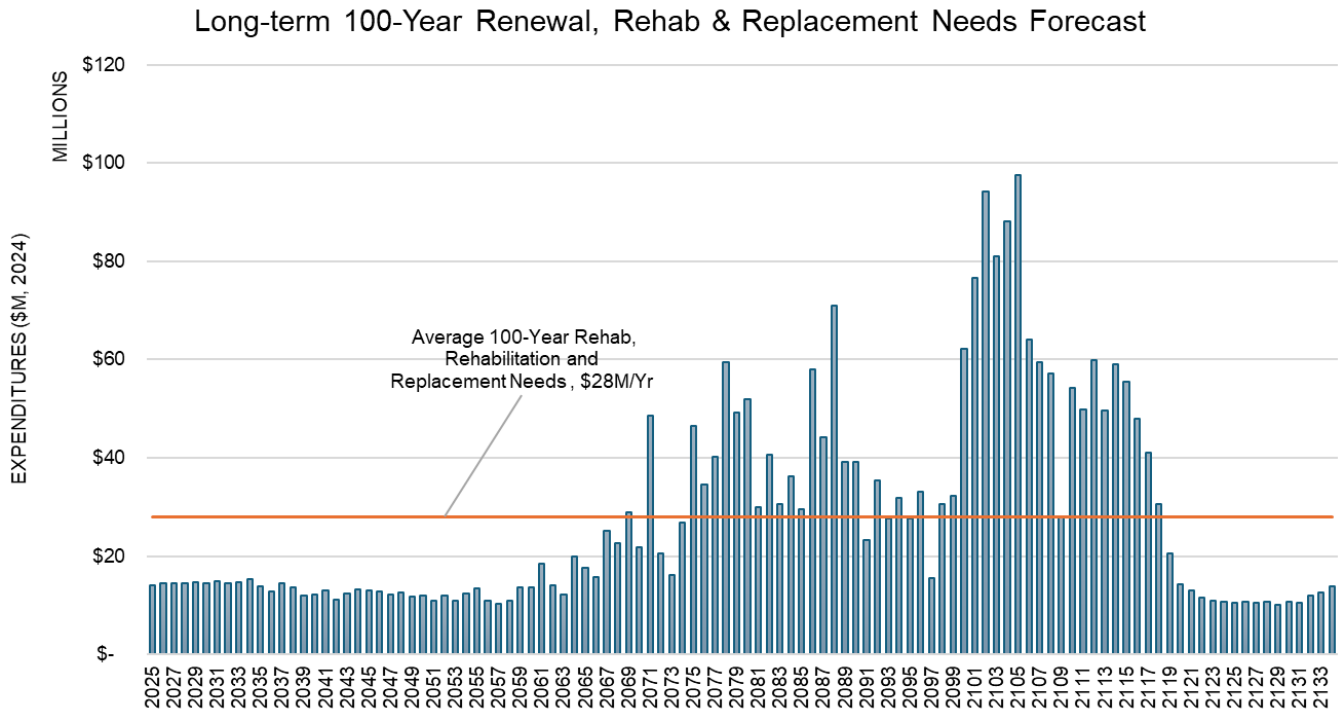
In this AM Plan, no enhanced service levels have been defined for rehab, renewal and replacement, as all state of good repair measures are focused on maintaining the existing level of service (and therefore no scenario analysis was undertaken).

Enhanced LOS defined for O&M activities have been considered earlier in this chapters, as well as in the proceeding Financing Strategy section.

6.5 Long-Term Asset Renewal, Rehabilitation and Replacement Needs

To support proactive infrastructure planning and long-term financial sustainability, a 100-year needs forecast has been developed for the City's stormwater system. This forecast provides a comprehensive view of the rehabilitation, renewal, and replacement expenditures anticipated over the next 100-years, allowing the City to better understand future funding requirements and potential investment pressures.

Figure 6-6: 100-Year Renewal, Rehab and Replacement Forecast



Over the 100-year horizon, the average annual renewal need is estimated at approximately $28 million per year. However, the forecast highlights that renewal needs are not uniform over time.

Certain periods — notably around 2075 o 2120 — show significant spikes in investment requirements, primarily due to the anticipated coordinated replacement of asset cohorts installed in earlier development phases. These spikes underscore the importance of long-term capital planning, financial reserve strategies, and flexible investment programs to manage future funding volatility.

The peaks in specific decades suggest that the City may face periods of elevated financial pressure unless proactive measures are taken. Smoothing investments through strategic rehabilitation, extending asset life through maintenance, and optimizing renewal timing will be critical to minimizing fiscal shocks.

The 100-year forecast provides a vital input into the City's asset management strategy, helping to align long-term renewal needs with financial planning frameworks and supporting sustainable stormwater service delivery for future generations.

6.6 Additional Program Lifecycle Needs for Natural Assets

Wetlands and lakes are critical components of the City's natural stormwater management system, delivering essential services such as flood attenuation, water quality enhancement, erosion control, and habitat conservation. Despite their critical functions, these natural assets are not currently supported through the existing stormwater charge. Significant lifecycle needs have been identified to ensure their continued functionality and ecological integrity, especially in light of climate change impacts. For wetlands, several key activities have been identified to support the state of good repair such as:

- Hydrologic Assessment and Management: Conducting a comprehensive wetland inventory and functional assessment to establish baseline data on wetland types and their stormwater-related functions. This information will inform evidence-based recommendations for protection, restoration, and performance monitoring.

- Invasive Species Control and Vegetation Management: Implementing a maintenance cycle, recommended every 10 years, that encompasses monitoring and removal of invasive species, replanting native vegetation, erosion control measures, sediment removal, and water quality monitoring.

For lakes, the following activities have been recommended:

- Water Quality Monitoring: Monthly sampling and annual data analysis to track nutrient and pollutant levels, ensuring early detection of water quality issues.

- Invasive Species Management: Quarterly surveys and multiple removal events per year to control invasive species that threaten native biodiversity.

- Algal Bloom Management and Shoreline Restoration: Regular inspections and maintenance to manage algal blooms, ensure connectivity, and restore shoreline areas affected by erosion.

Based on estimates, the total cost to perform these additional activities to support wetlands and lakes has been estimated at approximately **$3.1 million/year.** These identified needs highlight the importance of establishing a dedicated funding mechanism or program to support ongoing stewardship of wetlands and lakes. Without targeted investment, the City may face increased ecological risks, declining stormwater performance, and higher future rehabilitation costs. A structured approach to funding and implementing these activities is recommended as part of the broader asset management and climate resilience strategy.

Financing and Affordability

7. Financing and Affordability

In alignment with asset management best practices, this AM Plan has been developed to directly address the critical need for strategic and sustainable financial planning. Consistent with trends observed across municipalities within the province, the City's analysis highlights a disparity between current financial allocations and the projected capital investment needs required to maintain assets in a state of good repair over the next decade.

This section presents the forecasted funding requirements for the period 2025 to 2034, outlining the anticipated investment needed to support lifecycle activities such as renewal, rehabilitation, and replacement across key asset classes. In doing so, it provides a clear picture of the long-term financial commitments necessary to meet desired levels of service and manage infrastructure risk.

Furthermore, this section identifies key financial and operational strategies the City is pursuing to bridge the funding gap efficiently. These include enhancing asset data quality, improving cost forecasting methodologies, integrating risk-based prioritization into capital planning, and leveraging available funding tools and grant opportunities. Together, these strategies support the City’s commitment to responsible stewardship of public infrastructure and ensure that asset-related decisions are informed, transparent, and fiscally prudent.

The City is considered in a financially sustainable position if it:

- Provides an accepted level of service with willingness and ability to pay;
- Can adjust service levels in response to changes in economic conditions or transfer payments from other levels of government;
- Can adjust its implementation plans in response to changes in the rate of growth; and
- Has sufficient reserves and/or debt capacity to replace infrastructure when it needs to be replaced to keep its infrastructure in a state of good repair.

The key challenges to financial sustainability are:

- A discrepancy between level of service decisions and fiscal capacity;
- The future cost of infrastructure investments; and
- Unforeseen impacts to revenue.

As per O.Reg. 588/17, this section of the AM Plan identifies the annual funding projected to be available to undertake the planned lifecycle activities and discusses strategies to address potential funding shortfalls.

7.1 Expenditure Forecast – Proposed Levels of Service

Based on the analysis outlined in the lifecycle management strategy, the City has evaluated various scenarios for each asset class defined within this AM Plan. These scenarios include 1) maintaining the current LOS, 2) aligning with allocated funding amounts, or 3) achieving an enhanced target level of service. After careful consideration, the City has selected the most appropriate scenario for each asset class, ensuring alignment with strategic priorities, available resources, and long-term sustainability.

The table below provides a summary of the selected scenarios, and the corresponding lifecycle needs required to support the chosen approach. This includes the necessary investments, maintenance strategies, and activities essential to sustaining or improving service levels while optimizing asset performance and cost-effectiveness.

Table 8-1: Selected Scenario for each Asset Class and Associated 10-year Costs (Proposed LOS)

Asset Class	Rehab, Replacement & Renewal Expenditures	Operations & Maintenance Expenditures*
Selected (Proposed) Service Levels		
Storm Sewer Conveyance System	*Maintain Current LOS*	*Maintain Current LOS*
Stormwater Ponds	*Maintain Current LOS*	*Maintain Current LOS*
Water Quality Units	*Maintain Current LOS*	*Maintain Current LOS*
Culverts	*Maintain Current LOS*	*Target LOS*
Ditches	*Maintain Current LOS*	*Target LOS*
Low Impact Development	*Maintain Current LOS*	*Target LOS*
Watercourses	*Maintain Current LOS*	*Target LOS*
Related Expenditures		
Renewal Rehabilitation and Replacement Costs	$14.6M/yr	

Asset Class	Rehab, Replacement & Renewal Expenditures	Operations & Maintenance Expenditures*
Operations and Maintenance	$7.1M/yr	
Additional Natural Asset (Lake and Wetlands) Lifecycle Needs - not funded through the stormwater charge)	$3.1M/yr	
Total 10-year Costs	***$24.8M/yr***	

**Future Growth (identified in the lifecycle strategy) and climate change need projections (identified in the lifecycle strategy) have been factored into the forecasted proposed O&M expenditures.*

7.2 Stormwater Charge

The City of Brampton has implemented a dedicated stormwater charge to sustainably fund the maintenance and enhancement of its stormwater drainage system. This initiative ensures that properties contributing more runoff bear a proportionate share of the associated costs, promoting equity and environmental responsibility.

Purpose and Benefits:

The implementation of the stormwater charge addresses several critical objectives:

- Equitable Funding: By linking charges to the amount of runoff a property generates, the system ensures that those contributing more to stormwater runoff pay a fair share of the management costs.
- Sustainable Infrastructure Maintenance: Dedicated funding facilitates proactive maintenance and timely upgrades to the stormwater system, enhancing its capacity to manage increasing runoff due to urbanization and climate change.
- Flood Mitigation and Environmental Protection: Effective stormwater management reduces the risk of flooding, erosion, and water pollution, thereby protecting properties and natural ecosystems within Brampton.

Calculation of the Stormwater Charge:

The stormwater charge is determined based on the amount of hard surface area on a property, as these surfaces significantly contribute to stormwater runoff. The calculation varies by property type:

- Single-Family Residential Properties: Properties are categorized into five tiers based on rooftop area, serving as an indicator of total impervious surfaces. Each tier corresponds to a specific billing unit, reflecting the property's contribution to runoff.
- Multi-Family Residential and Non-Residential Properties: For these properties, the total impervious area is measured directly. The stormwater charge is calculated by dividing this area by the standard billing unit (234 square meters) and multiplying by the annual rate.

Annual Revenue and Allocation:

The stormwater charge funds collected by the City are allocated as follows:

- Pipe Reserve (50%): Reserved for future repairs and replacements of storm sewer infrastructure as components reach the end of their service life or encounter failures.
- Projects & Programs (45%): Supports immediate stormwater management initiatives, including inspection and maintenance programs aimed at ensuring system efficiency and resilience.
- Administration (5%): Covers program administration costs, such as engineering, Geographic Information Systems (GIS), data management, customer service, and billing support from the Region of Peel.

In current day, the revenue collected from the stormwater charge is expected to increase year over year based on growth in household billing units (projected to be 2.2% per annum). The stormwater charge is also expected to increase by an inflation factor of 3.4%, however, due to asset management reporting projections being in current day dollars this adjustment has been excluded. The **total annual revenue collected from the stormwater charge (excluding inflation) is projected to be $30.0 million dollars/year from 2025-2034.**

7.3 Other Funding Sources

Growth Funding

In addition to the stormwater charge, the City also relies on development charges (DCs) to fund the capital costs associated with growth-related infrastructure. This includes the expansion of stormwater systems—

such as new storm sewers, culverts, and stormwater management facilities—required to support new developments. In accordance with provincial legislation and the City's Development Charges By-law, growth-related infrastructure is considered fully funded through DC revenues, ensuring that the cost of accommodating new residents and businesses is not borne by existing taxpayers or ratepayers.

Other Funding Sources

In addition to revenue generated through the stormwater charge, the City of Brampton's stormwater management program is further supported through external grant funding and collaboration with local conservation authorities. Grants from senior levels of government and environmental funding bodies provide critical supplementary resources that enable the City to undertake larger capital projects, pilot innovative technologies, and enhance the environmental performance of its infrastructure beyond what the base funding can support.

Partnerships with local conservation authorities, such as the Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC), also play a vital role in delivering stormwater-related initiatives. These organizations contribute technical expertise, co-funding, and in-kind support for projects focused on natural asset restoration, flood mitigation, erosion control, and water quality improvement. This multi-source funding approach not only strengthens the financial sustainability of the stormwater program but also ensures a more integrated and ecologically responsible approach to watershed and infrastructure management.

7.4 Overall Lifecycle Needs and Infrastructure Gap

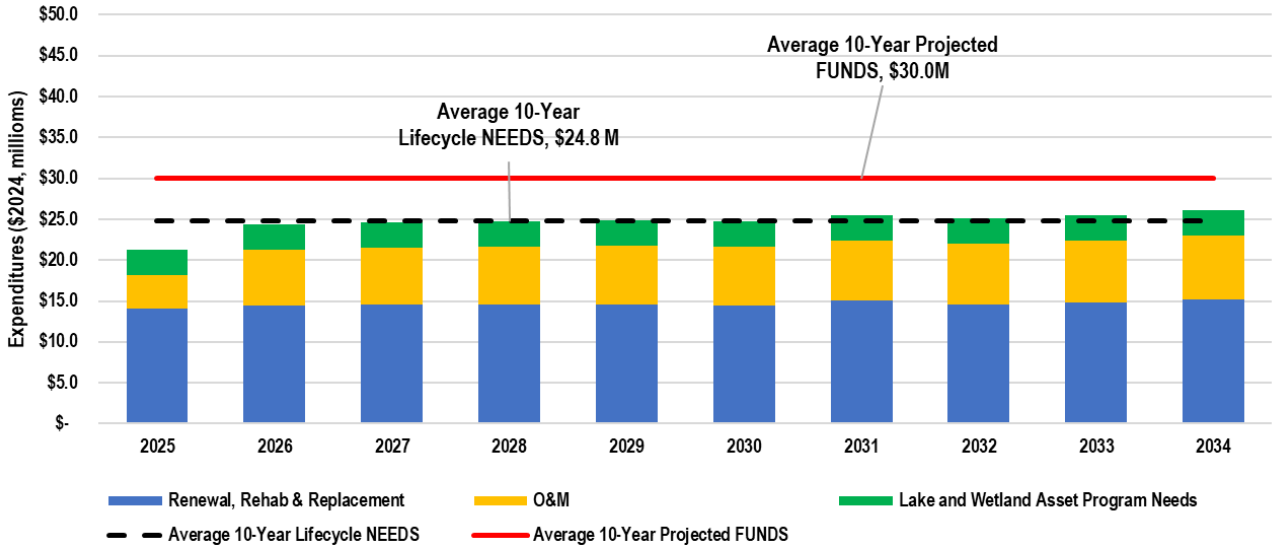
Based on scenario analysis done within this AM Plan, the City has selected a proposed service level that outlines the level of service it aims to achieve across its infrastructure portfolio over the next 10 years (2025-2034). This scenario is intended to reflect a realistic, financially informed target for service delivery, balancing the need for sustainable infrastructure with fiscal responsibility and community expectations.

Under this selected scenario:

- the City's 10-year full lifecycle investment need—which includes the cost of maintaining, renewing, and replacing assets to meet these service levels—is estimated at **$24.8 million/year.**
- the average available revenue collected from the stormwater charge over the same 10-year period is projected at **$30.0 million/year**, based on current forecasts. The City's stormwater charge will cover the short-term needs, with the remaining funds required to be put into a reserve to support long-term needs.

Figure 7-2 below shows a breakdown of full lifecycle costs for each year in comparison to the 10-year average projected revenues.

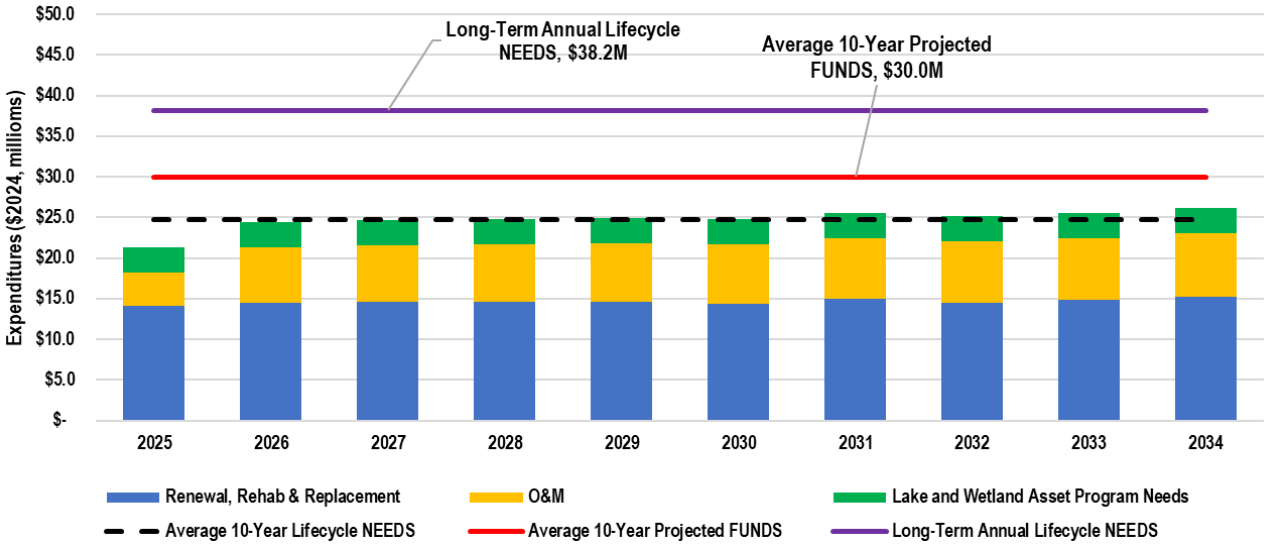
Figure 7-2: 10-Year Full Lifecycle Needs – Proposed Levels of Service[5]



While the current stormwater charge is projected to adequately support the City's short-term lifecycle needs over the next ten years, Figure 7-3 illustrates that long-term funding pressures remain. The estimated long-term annual lifecycle needs are $38.2 million, reflecting broader asset renewal, rehabilitation requirements that extend beyond the current forecast window.

[5] No Stormwater charge is allocated for the first round of investment associated with growth, but it should be allocated for the lifecycle activities associated with the new built assets like maintenance and rehabs and pond cleaning for example.

Figure E-6: Long-Term Full Lifecycle Needs – Proposed Levels of Service



To ensure ongoing sustainability of the stormwater program, additional contributions to reserves or supplemental funding mechanisms may be required to address needs that are not fully captured within the 10-year planning horizon. This is particularly important to meet service levels and manage aging infrastructure in the decades ahead.

7.5 Comparison of Current and Proposed Levels of Service

The table below compares the estimated annual costs required to achieve maintain current levels of service, achieve proposed levels of service, and account for long-term needs for stormwater infrastructure across key lifecycle activities.

Table 8-2: Stormwater Lifecycle Needs Comparison

Lifecycle Activity	Maintain LOS Cost ($M/yr)	Proposed LOS Cost ($M/yr)	Long-Term Needs Cost ($M/yr)
Renewal, Rehab & Replacement	$14.6 M/yr	$14.6 M/yr	$28 M/yr
Operations & Maintenance	$4.1 M/yr	$7.1 M/yr	$7.1 M/yr

Lifecycle Activity	Maintain LOS Cost ($M/yr)	Proposed LOS Cost ($M/yr)	Long-Term Needs Cost ($M/yr)
Natural Assets	*Funded externally (i.e. grants)*	$3.1M/yr	$3.1 M/yr
Total Costs	**$18.7 M/yr**	**$24.8 M/yr**	**$38.2 M/yr**
Revenues	**$30.0 M/yr**	**$30.0 M/yr**	**$30.0 M/yr**
Remaining Balance for Reserve	**$11.3 M/yr**	**$5.2 M/yr**	**($8.2 M/yr)**

7.6 Risk to Not Meeting Selected LOS

Failure to meet the needs outlined in this AM Plan poses several significant risks that could impact on the City's infrastructure, financial sustainability, and overall service delivery. Key risks include:

- **Increased Demand for Maintenance** – Insufficient investment in lifecycle management strategies may lead to a higher demand for reactive maintenance. This can result in increased operational costs, unplanned repairs, and disruptions to stormwater services.
- **Growing Renewal Backlog and Higher Long-Term Costs** – Deferred capital investments will contribute to an increasing backlog of infrastructure renewal needs. Over time, the deterioration of assets will require more extensive and costly rehabilitation efforts (e.g., replacement versus rehabilitation), placing a greater financial burden on the City in the future.
- **Safety, Compliance, and Financial Risks** – Aging infrastructure without timely renewal increases safety hazards for the public and workforce. Additionally, non-compliance with regulatory standards may expose the City to legal and reputational risks, while deteriorating conditions could lead to higher insurance liabilities and financial losses.
- **Future Renewal Needs Due to Growth-Related Assets** – As the City continues to expand, new infrastructure assets will require ongoing maintenance and future renewal. Without a sustainable funding

strategy, these assets may not be adequately maintained, exacerbating long-term financial and operational challenges.

Addressing these risks through proactive asset management planning and strategic investment is essential to ensuring a reliable, safe, and efficient stormwater network for residents and businesses.

7.7 Affordability of the Proposed Levels of Service

To effectively address the longer term needs for the stormwater portfolio, a balanced approach that combines revenue enhancement, strategic debt management, and cost-reduction measures is essential. The following strategies outline a comprehensive plan to ensure financial sustainability while maintaining and optimizing infrastructure assets:

1. Lifecycle and Information Management

Efficiently managing expenditures is crucial for closing the infrastructure gap without compromising service quality:

- **Deferring Renewals Based on Risk Exposure**: Prioritizing critical infrastructure projects while deferring lower-risk renewals can optimize available resources. Maintenance strategies should be adjusted to mitigate risks associated with aging assets, such as increasing inspections and preventative maintenance.
- **Adjusting Service Levels as Appropriate:** Evaluating and potentially reducing service levels, where feasible, can help align expenditures with available funding while minimizing the impact on residents.
- **Minimizing the Size of the Asset Portfolio:** Rationalizing underutilized assets and optimizing the asset portfolio can reduce long-term operating and renewal costs, ensuring that investments are focused on essential infrastructure.
- **Implementing Non-Infrastructure Solutions:** Management strategies, policies, and operational efficiencies can improve asset performance without significant capital investment. For example, data-driven decision-making and predictive maintenance models can extend asset life and reduce costs.
- **Improved Data Quality:** As the City advances its asset management practices, enhancing data quality will enable more accurate assessments of asset condition. Currently, some assets are assessed on an age-based approach that does not necessarily reflect the true condition of the asset. Strengthening lifecycle cost data will support evidence-based decision-making and help achieve the lowest lifecycle cost through prioritization of repair and replacement activities.

2. Increasing Revenues

One of the primary ways to close the infrastructure funding gap is by generating additional revenue sources:

- **Increase or Maintain Stormwater Charge:** Incremental increases in the stormwater charge can provide a dedicated revenue stream for infrastructure renewal and rehabilitation projects, reducing reliance on debt and external funding.
- **Leverage Grants and Other Revenue Sources:** Actively seeking federal and provincial grants, as well as alternative funding sources such as public-private partnerships, can help supplement capital investments and ease the financial burden on the City.

3. Debt Capacity and Reserve Management

Strategic use of debt financing and reserves can help balance long-term infrastructure investments:

- **Debt Management/Financing:** Issuing debentures allows the municipality to spread infrastructure costs over the lifecycle of assets, ensuring equitable cost distribution across taxpayers.
- **Reserve Management:** Strengthening and maintaining dedicated reserve funds for capital projects can provide financial stability and ensure funding availability for critical infrastructure needs.

Monitoring & Improvement Plan

8. Monitoring and Improvement Plan

Development of AM Plans is an iterative process that includes improving processes, data, and staff skills over time. This section identifies opportunities for improvements to the City's asset management practices, to be considered before completion of the next iteration of this AM Plan (projected to be in 2030).

8.1 Improvement Plan

Improvement initiatives have been identified that will enhance the effectiveness of the City's asset management program. The following table provides recommended improvement initiatives with associated priorities and timelines.

Table 8-1: Improvement Plan

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
State of Local Infrastructure	Capture inventory information for stormwater infrastructure not reported in the AM Plan such as: • Erosion control infrastructure • Flood protection infrastructure	Improved data for future SOLI reporting	Medium	Medium	These assets were not reported in their entirety in this iteration of the AM Plan due to lack of data and information.
	Regularly update the asset register, asset condition, and state of good repair needs	Improved data for future SOLI reporting	Medium	High	To be updated based on inspection and Condition Assessment programs which include: • CCTV network assessment (continued) • Pond condition assessments • Erosion studies • Visual asset inspection programs • Other.
	Capture condition information for all wetlands and lakes in Brampton	Improved data for future SOLI reporting	Medium	Medium	To be undertaken as part of the update to the City's Natural Heritage and Environmental Management Strategy. As Conservation Authorities regulate wetlands, the City should consult with them on any information that they have.
	Leverage asset register and condition information/guidance from local conservation authorities.	Improved data for future SOLI reporting	Medium	Medium	CVC will be updating the RoP/GTA life cycle costing database in 2025. That will include updated costs for several wetland types and stream restoration. CVC will also be finalizing the Natural Asset Inventory and Condition Assessment Guidance in 2025.
Levels of Service	Align AMP and structure of budgeting process	Easier to determine lifecycle costs specific to TLOS measures	Medium	Medium	Adjusting the budget process following the release of this AMP will require effort from all departments to ensure delineation of different lifecycle activities, resulting in more accurate cost estimations for achieving LOS targets.

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
	Incorporate updated IDF curve and modelling information to report on resiliency to 5-year and 10-year storms.	Improved understanding of impacts from 5-yer and 10-year storms	Medium	Medium	Reporting on this service level is mandated by O.Reg. 588/17.
	More clearly delineate costs related to achieving PLOS	Support for active decision making rather than reporting of decisions already made	Medium	Medium	Support for active decision making rather than reporting of decisions already made.
Risk Management Strategy	Incorporate risk into investment decision making	Ensuring the right projects are done at the right time based in constrained funding environments.	Medium	Medium	Transition towards risk-based condition assessment and evaluation. The City is recommended to improve their quantification of capacity and function risk by exploring the usage of metrics which can define these performances such as modelling capacity and compliance.
Climate Change Integration	Further develop mitigation and adaptation strategies into asset management	Further understanding of climate change risks on City's delivery of services and support informed prioritization of strategies.	Short	High	While the risks have been discussed in the Climate Change chapter, the Stormwater Service Area is tasked to conduct more comprehensive vulnerability assessments and climate risk evaluations to understand future adaptation strategies and costs.
	Improve understanding and awareness of how SW assets and Natural Assets specifically are critical to handling impacts of CC such as increased intensity of the storms	Improved reporting on O.Reg 588/17 LOS measures related to resiliency to 5-year and 100-year events	Medium	Medium	
Governance	Identify internal resource needs (operational and renewal impacts) to deliver recommended AM Plan capital growth projects	Better insight and coordinated effort at the service area level to sustain future assets	Short	High	This initiative will have to be coordinated with the City's Finance department.
	Further refinement of asset interdependencies	Capitalize on efficiencies across	Long	High	While some progress has been actualized, a longer timeframe is required to further refine asset interdependencies.

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
		service areas and asset types			
	Improved knowledge transfer through robust asset management processes and systems	Better insight and coordinated effort at the service area level to better inform future iterations of this report	Long	Medium	Longer timeframe is required to be receive larger buy-in from staff.
	Build capacity of staff through hiring practices and training	Staff is more knowledgeable throughout on existing and future asset management practices – will create efficiencies and limit knowledge gap.	Long	Medium	Requires longer timeframe before capacity of staff is significantly expanded.
Asset Information	Continue to improve work order management system and processes	More informed decision making at the departmental level	Medium	Medium	While some progress has been actualized, a longer timeframe is required to completely achieve work management objectives.
	Develop a financial decision support tool to support the entire portfolio of stormwater assets	Financial efficiencies achieved across the organization	Medium	Low	Currently there is no advanced analytic support for stormwater assets.
Lifecycle Management Strategy	Refine AM Plan growth and upgrade projections	More accurate needs projects for growth and upgrade.	Short	High	A growth rate of 2.2% was assumed to represent the growth of assets paid for by developers, however this can be further refined with further growth modelling/projections.
	Identify retrofit facilities to increase water quality control within City	Identify the number of SWM Facilities required to increase water quality of the City to current standards	Medium	Medium	
	Full integration of Lifecycle Management Strategy with the RMS and LOS frameworks	Fully developed LOS and RMS frameworks based on LMS to inform decision making	Medium	Medium	Full integration of LMS with RMS and LOS not yet achieved – target for future AMP iterations.

Area of Improvement	Action	Outcome	Timeline	Priority	Comments
	Incorporate thermal retrofit needs into 10-year lifecycle needs	A more accurate reflection of the 10-year needs for stormwater ponds	Medium	High	A capital plan will be developed following pond condition assessments to identify priority retrofits over a 10-year period.
Financing Strategy	Continue to monitor and benchmark infrastructure gap with other municipalities	Benchmarking against comparators is not expected to be possible until the 2025 PLOS deadline for all municipalities.	Short	Medium	While project coordination has improved, ongoing efforts are necessary to maximize efficiency.
	Continue to align with Long-Term Financial Master plan and Budget	Determination of reasonability of current reinvestment rates and allows for new targets to be developed to meet current or planned LOS	Medium	Medium	It is important for the City to show cost of asset lifecycle during budgeting process (planning for future reserves).

Note, any asset class specific improvements are outlined in the asset class appendix and categorized into the following improvement areas:

• Data Enhancement & Governance;

• Process Optimization; and

• Technology & Tools.

8.2 Monitoring Plan

The AM Plan is to be updated at least every five years, reporting on the City's updated asset portfolio, associated value, age, and condition. The update will also provide the 10-year forecast on service levels, costs of the associated lifecycle strategies and an assessment of any funding shortfalls.

As per O.Reg. 588/17, the City will conduct an annual review of its asset management progress in implementing this AM Plan and will discuss strategies to address any factors impeding its implementation.

The effectiveness of this AM Plan can be measured in the following ways:

- The degree to which the required forecast costs identified in this AM Plan are incorporated into the long-term financial plan;
- The degree to which the City's 1–5-year detailed capital programs, budgets, business plans and corporate structures consider the information provided within the AM Plan;
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Planning documents and associated plans; and
- The Asset Renewal Funding Ratio achieving the City's target once determined (this target is often 90% to 100%).

8.3 Closing Remarks

In summary, this Stormwater AM Plan represents a significant milestone in the City of Brampton's ongoing commitment to responsible infrastructure stewardship and regulatory compliance.

The Plan meets and exceeds the requirements of O.Reg. 588/17, aligning with industry best practices and international standards, while also laying the foundation for ongoing improvements in asset performance, risk management, and financial sustainability.

The AM Plan emphasizes the importance of strategic financing, lifecycle optimization, and continuous monitoring. It also prepares the City to adapt to future developments, including growth-related asset additions and the potential organizational changes stemming from the Transition Board's work on regional governance.

Looking ahead, the City will continue to refine and update this AM Plan to ensure it remains responsive to

emerging risks, regulatory changes, community expectations, and operational realities. Through disciplined implementation, transparent reporting, and alignment with strategic objectives, Brampton is well-positioned to deliver a safe, reliable, and efficient stormwater system for its residents and businesses—today and into the future.

Appendix

A

Asset Management Maturity Framework Scale

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Understanding and Defining Requirements					
Analysing the Strategic Direction	The organization demonstrates an awareness of its external and internal strategic environment (evident in responses to interview questions).	A high-level, informal strategic analysis has been carried out to determine major trends (strategic issues) influencing the delivery of AM, and the results documented. Strategic organizational planning may be in place but not integrated with asset management.	Governance and leadership expectations of the AM System are expressed through an approved and AM Policy and AM Objectives. The AM policy and objectives cover all aspects of the asset lifecycle. The AM policy and objectives are being actively applied. The AM Objectives are aligned to organizational objectives.	As for Core, plus: The AM Policy and Objectives have been developed with demonstrable consideration of the implications of: · Analysis of the strategic context (internal, external, customer environment) analysed. · Analysis of the asset portfolio to determine fitness-for-purpose (current and future).	As for Intermediate, plus: Achievements against AM Objectives and delivery of the AM Policy are regularly monitored and reported. Regular environmental scans are in place to identify strategic changes implicating the AM System and required changes are managed through SAMP and AMP review processes.
LOS Framework	The organization recognises the benefits of defining levels of service, but they are not yet documented or quantified (evident in responses to interview questions).	Customer Groups defined and requirements informally understood. Some key performance measures have been defined for the activity.	Customer groups needs or expectations are analysed and documented. Level of service statements cover a range of service attributes are: · aligned with the organizational service planning and performance management processes · periodically measured and reviewed Level of service and cost relationship understood · aligned and integrated with performance measures. Level of service and cost relationship understood and described in the AMP.	As for Core, plus: Service level options (with associated risks and costs) have been presented to executive and governance teams to support level of service decisions. Levels of service are integral to decision making and business planning, with evidence that AM strategies and decision frameworks are aligned to the levels of service framework. Asset (technical) performance measures are aligned to service (customer) performance measures.	As for Intermediate, plus: A customer and stakeholder communications plan is in place outlining processes for engaging with customers and stakeholders, with evidence the plan is implemented. Key customers and stakeholders are presented with, and consulted on, significant service levels and options, with key outcomes documented in the AMP.
Demand Forecasting & Management	Future demand requirements generally understood but are not well documented (evident in responses to interview questions).	Demand forecast trends based on knowledgeable staff. Demand drivers are understood and described. Demand management strategies are being developed. Some basic demand information is being collected and monitored.	Demand forecasts are based on relevant primary demand factors (e.g. population growth) and extrapolation of historic demand trends. Demand forecasts are presented in the AMP with supporting assumptions. Risk associated with demand change are broadly understood and documented in the AMP. Strategies to manage demand (demand management strategies, asset-responses) are documented in the AMP. Demand management is considered in investment evaluations.	Demand forecasts are based on analysis of historic demand trends and all material demand factors. A range of demand scenarios is developed (e.g. high/medium/low) and presented in the AMP with supporting assumptions. Strategies to manage demand (demand management strategies, asset-responses) are documented in the AMP with supporting evidence that costs and benefits have been evaluated in determining the best strategy. Demand management is considered in all strategy and capital project decisions.	As for Intermediate, plus: Risk assessment carried out for different demand scenarios with mitigation actions identified and evaluated in determining the appropriate demand forecast scenario for AM planning. Sensitivity testing is carried out to determine confidence levels in demand forecasting scenarios. Demand risks are included in organizational risk registers.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Understanding and Defining Requirements					
Asset Condition & Performance	The need for condition and performance information is understood but is not quantified or documented.	Condition and performance information is based on knowledgeable staff and is described in the AM Plan. Some asset condition and performance data is collected but is not well-linked to defined levels of service and performance measures.	Adequate data and information is collected to report current performance against levels of service. A condition and performance monitoring process is documented and followed for critical assets. Condition and performance information is suitable to be used to plan and prioritise short term maintenance and renewals. Performance results are reviewed to identify areas failing to achieve targets.	A condition and performance monitoring strategy and programme is developed for all assets, with consideration of factors such as asset criticality, inherent risk, lifecycle and demand. Condition and performance information is routinely captured and updated in line with the programme. Future condition and performance information is modelled to assess whether levels of service can be met in the long term. Performance results are regularly evaluated to determine appropriate responses.	The condition and performance assessment strategy is implemented and audited with a 5+year data history.
The Strategic AMP	The organization is aware of the concept of, and benefits of, a SAMP and AM System (evident in responses to interview questions).	The AM System is broadly understood in terms of the assets and functions covered. A process for the establishing the AM System has commenced (though these aspects may not be documented in a 'SAMP').	The scope of the AM System is defined. The links between organizational and AM objectives are defined. The process for establishing and maintaining the AM System is developed (e.g. the AM Improvement Plan). Strategic issues have been identified and options developed. The above aspects are documented in the SAMP or equivalent document. SAMP input from relevant teams and stakeholders (internal and external) occurs.	As for Core, plus: The relationships and processes between the AM System and other parts of the organization are defined in the SAMP or equivalent document. Strategic issues and options have been analysed and prioritised and a long-term strategy has been developed. There is evidence that the SAMP is widely communicated and is actively used to support decision making . A regular SAMP review and approvals process is in place.	A SAMP is in place, with content as per ISO 55002. Formal review, audit and approvals processes are documented with evidence of implementation.
Developing Asset Management Lifecycle Strategies					
Managing Risk & Resilience	Risk management is identified as a future improvement (evident in responses to interview questions).	High level organizational risks are identified and reported to management. Critical services and assets are understood and considered by staff involved in maintenance / renewal decisions (evident in responses to interview questions).	An organizational risk management policy, framework and process is in place. An asset criticality framework has been developed and critical assets are recorded in the AIMS. Activity risks are identified in the risk register and regularly updated and monitored. Management strategies for highest risks and most critical assets are developed and documented (in the AMP, risk management plan or similar). The approach to managing asset network resilience is described in the AMP or other supporting document.	As for core, plus: A resilience strategy has been developed (may be part of the SAMP or AMP) and is being implemented. Systematic risk analysis and resilience considerations are incorporated into major decisions. The risk register is regularly updated, actions monitored and reported to management. Risk is managed, prioritised and escalated consistently across the organization.	Asset risks are assessed for multiple failure modes. An ongoing programme of asset network and organizational resilience assessments are completed with improvements identified and actively progressed. Risk and resilience levels are quantified for the organization and risk mitigation options to close identified gaps are evaluated. Risk and resilience are integrated into all aspects of decision making.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Developing Asset Management Lifecycle Strategies					
Operational Planning	Operational processes based on historical practices but there is awareness of opportunities to improve and optimise operational activities.	Operating plans are available for critical operational areas. Operational scheduling is largely based on historic practices with adjustments to planned and unplanned maintenance frequencies based on experienced staff and contractor knowledge. Operations organizational structure in place and roles assigned.	Operating plans are available for all operational areas. Incident and emergency management plans are in place. Operational support requirements have been reviewed against good practice and are in place, including consideration of critical spares requirements. Trends in planned and unplanned maintenance and renewal activities are analysed and trade-offs considered in determining optimal maintenance and renewal frequencies.	As for core, plus: Operational objectives and intervention levels defined (aligned to AM Objectives) and results analysed to drive improvements. A formal and regularly reviewed operational planning process is in place. Incident and emergency management plans are regularly tested. Optimal planned and unplanned maintenance and renewals programmes are established with analysis of operating cost, asset condition/ performance, risk and asset criticality.	Decision frameworks (e.g. multi-criteria analysis, benefit-cost analysis) are used to prioritise and optimise expenditure across planned and unplanned maintenance and renewals programmes. Continual review and improvement can be demonstrated for all operational processes. Reviews are undertaken after significant events and recommendations are implemented.
Capital Works Planning	Capital investment projects are identified during annual budget process. There is awareness of the need for longer-term capital budgeting (evidenced in interviews).	There is a schedule of proposed capital projects and renewal programmes based on historical costs and staff judgement of future requirements. Renewals strategies are verbalised in interviews but are not well documented. CAPEX projects and programmes justified in AMP (high level) and supporting CAPEX database (detail).	Projects have been collated from a wide range of sources (e.g. through reviews of asset performance, growth, risk management and renewal analysis) and are collated into a project register. Projects are tracked (in a project register or similar) through capital planning stages. Short term capital projects are fully scoped (including options analysis) and cost-estimated. Renewals programme is based on age and limited condition data. The CAPEX programme is prioritised, based on agreed decision criteria, to rank the relative importance of capital projects and programmes.	As for core, plus: A capital delivery / options evaluation framework is in place and used consistently across the organization. Formal options analysis and business case development has been completed for major projects in the next three years. Long term major capital projects are conceptually identified and broad cost estimates are available. A formal prioritisation framework is routinely applied to all capital projects and programmes (utilising a multi-criteria or benefit-cost approach).	As for intermediate, plus: Formal options analysis and business case development has been completed for significant major projects beyond 3 years. Long-term capital investment programmes are derived from advanced decision techniques such as predictive renewal and network modelling which evaluate level of service and cost scenarios.
Asset Financial Planning & Management	Financial planning of asset related expenditure is largely an annual budget process, but there is intention to develop longer term forecasts (evident in interviews).	Financial planning of asset related expenditure is largely an annual budget process, but there is intention to develop longer term forecasts (evident in interviews).	Depreciated replacement cost valuations aligned to asset information used in renewal forecasts. Asset expenditure categories are suitable to enable AM costing / forecasting analysis. Asset-related financial forecasts are aligned to operational and capital planning and forecasting processes. Consequential OPEX for all new assets is included in OPEX forecasts. Asset and corporate long-term financial planning processes are aligned. Funding strategies are developed and documented.	As for core, plus: Long term asset funding options are regularly reviewed and evaluated with consideration of distribution of benefits (user pays), practicality, financial prudence and intergenerational equity. Major expenditure proposals incorporate whole of life costing.	As for Intermediate, plus:As for intermediate, plus: Advanced financial modelling includes sensitivity testing of assumptions, demonstrable whole of life costing and cost analysis for level of service options. A decision framework enables budgets, projects and programmes to be optimised across all activity areas. Formal risk-based sensitivity analysis of financial forecast scenarios is carried out. Asset and financial data and reporting are fully integrated or regularly reconciled.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Developing Asset Management Lifecycle Strategies					
AM Plans (for the Asset Portfolio & Assets)	Stated intention to develop AMPs (evident in responses to interview questions).	A portfolio AMP contains basic information on assets, service levels, planned works and financial forecasts and future improvements. The AMP may not cover all asset types or services, may only have a short term focus, may be developed in isolation from organizational planning, or may not be otherwise sufficiently mature for the organization.	Portfolio AMPs contain core content including asset information, levels of service, demand and lifecycle strategies linking to financial forecasts with key assumptions stated. AMPs are aligned with corporate long-term strategic and financial plans and objectives and are signed off by managers. AMP input from relevant teams and stakeholders. Internal and external reviews occur. AMPs are updated in accordance with the AM Policy / SAMP.	As for core, plus: The Portfolio AMP is supported by Asset Class AMPs, where appropriate. AMPs include confidence levels, detailed significant assumptions and associated risks. AMPs are fully integrated with corporate long-term financial planning process and iterations are formally managed. AMPs are periodically updated, discussed and approved by governance and leaders.	As for intermediate, plus: AMPs are managed as a 'live' document and updated when significant changes signalled. Formal review, audit and approvals processes are documented with evidence of implementation.
Asset Management Enablers					
AM People & Leaders	The organization recognises the benefits of an asset management function within the organization, but has yet to implement a structure to support it (evident in responses to interview questions).	AM functions are carried out by small groups, but AM is not embedded or coordinated across the organization.	Regular ongoing AM coordination processes established (e.g. a cross-divisional committee) which support an integrated and consistent approach across the organization. Position descriptions incorporate the main AM roles and training is made available suitable to those roles. Visible ownership and support of AM by governance and leadership and awareness of AM purpose across most of the organization (evident through interviews).	As for core, plus: Leadership is involved in AM coordination (e.g. membership on a regular AM Steering Group or separate AM Governance coordination group). An internal AM communications and training plan is in place and being implemented. Roles reflect AM System competency requirements (defined in SAMP or equivalent document) and are defined in all relevant position descriptions. Demonstrable alignment between AM objectives, team and individual responsibilities.	As for core, plus: Leadership is involved in AM coordination (e.g. membership on a regular AM Steering Group or separate AM Governance coordination group). An internal AM communications and training plan is in place and being implemented. Roles reflect AM System competency requirements (defined in SAMP or equivalent document) and are defined in all relevant position descriptions. Demonstrable alignment between AM objectives, team and individual responsibilities.
Asset Data & Information	Asset information is not available. Awareness of need for asset information (evident in responses to interview questions).	Basic physical asset information recorded (e.g. location, size, type), but may be based on broad assumptions or not complete.	Sufficient information to complete depreciated replacement cost valuation (physical attributes, replacement cost and asset age/life) and to manage operational requirements for assets. Asset hierarchy, identification and attribute standards documented and implemented. Metadata held as appropriate. A formal information needs analysis has been undertaken and an Information Strategy and data improvement plan developed. Knowledge of asset criticality and risk supports the regularity of data collection and updating.	As for core, plus: A reliable register of physical, financial and risk attributes recorded. The Information strategy and data improvement programme are being actively monitored and reported. The use of asset information in asset management planning and decision making is reviewed for effectiveness. Documented, systematic and audited data collection process in place based on a formal information needs analysis.	As for intermediate, plus: All asset data is accurate, consistent and reliable and is used to inform both short term and long-term decision making. Information on work history type and cost recorded at an appropriate asset or component level to enable analysis. Systematic and fully optimised data collection programme with supporting metadata.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Asset Management Enablers					
AIMS	Intention to develop an electronic asset register / AIMS (evident in responses to interview questions). A financial fixed asset register may be in place but only captures accounting data.	Asset register capable of recording all core asset attributes – capacity, type, size, material, etc. Asset information reports can be manually generated for AM Plan input. Simple asset database in use (such as spreadsheet or Access database).	Industry-recognised AIMS or asset register system enables hierarchical asset capture and reporting to component level. AIMS enables live tracking of customer requests linked to maintenance tasks. AIMS provides basic AM reporting capability - condition / performance, renewal forecasts, valuations. The AIMS meets most user requirements (functionality, reporting, usability).	Financial, asset and customer service systems are integrated or able to be fully reconciled (to provide a 'single source of truth' for all data). An information systems strategy for asset related systems is implemented and regularly reviewed. AIMS has spatial mapping capability or interface. AIMS captures remote, 'live' data from operators. More automated analysis and reporting on a wider range of information. AIMS provides renewal modelling capabilities using factors such as age, condition, criticality and performance.	All advanced AM functions are available, including asset risk assessment, predictive maintenance and renewal modelling for different level of service scenarios. Availability of 3D models to enable visual integration with data (e.g.: BIM/Digital Twin)
AM Process Management	Awareness of need to formalise systems and processes (evident in responses to interview questions).	Simple AM process documentation in place for service-critical AM activities, covers operation, maintenance and renewal activities.	Critical AM processes are identified, documented, monitored and subject to review. There is evidence that these critical AM processes are followed in practice. AM process interfaces with other teams and organisations, are defined and managed.	As for core, plus: All AM processes have been identified and prioritised. AM Process documentation implemented in accordance with the AM System to appropriate level of detail, depending on process criticality (including business process mapping or similar). All internal management systems and cross-departmental processes are aligned and managed.	As for intermediate, plus: AM processes are regularly reviewed and audited and improvements implemented. ISO certification of processes to multiple standards for large asset intensive organisations. AM System has been assessed and meets the requirements of ISO 55001. Strong integration of all management systems and cross-departmental processes within the organisation.
Outsourcing & Procurement	Procurement and service delivery practices are informal. Organisation is aware of different service delivery options (evident in responses to interview questions).	Service delivery and procurement practices clearly documented (internal and external), generally following historic approaches.	Procurement strategy/policy in place. Internal service level agreements (SLA) with the primary internal service providers, and contracts for the primary external service providers, are in place. Contract and SLA performance specifications are aligned to levels of service. Procurement and contract performance management processes are in place and regularly reviewed.	As for core, plus: Risks, benefits and costs of various outsourcing and lease/buy options considered in determining the service delivery approach. Suitably qualified roles manage procurement and contract management processes. Procurement and contract management processes are regularly audited and improvements identified.	All potential service delivery mechanisms reviewed and formal analysis carried out to identify best delivery mechanism.

Section	MATURITY LEVEL				
	Aware 0-20	Basic 21-40	Core 41-60	Intermediate 61-80	Advanced 81-100
Asset Management Enablers					
Continual Improvement	Recognition of the need for AM improvement process, evident in responses to review questions.	Improvement actions identified and allocated to appropriate staff and progress monitored.	Current and future AM maturity assessed (gap analysis) and used to identify improvement actions. Appropriate maturity has been defined for each AM function. Identified improvement actions collated from the maturity assessment and other relevant studies and have been prioritised with input from relevant staff and management. Improvement plans identify timeframes, deliverables, resources and responsibilities and are monitored by the AM team. Improvement plans are monitored.	As for core, plus: Formal periodic monitoring of the AM improvement plan is in place with reporting to appropriate levels of the organisation, at frequencies specified in the SAMP or AMP. Major improvement actions are managed within the organisation's project management framework. Evidence of effective change management practices support AM Improvement Plan implementation. A formal audit and review framework is established.	A regular cycle of audit and maturity assessment is undertaken with actions fed back into improvement planning. KPIs for monitoring the effectiveness of AM improvement plan outcomes are reported.

Appendix

B

Maturity Assessment Findings

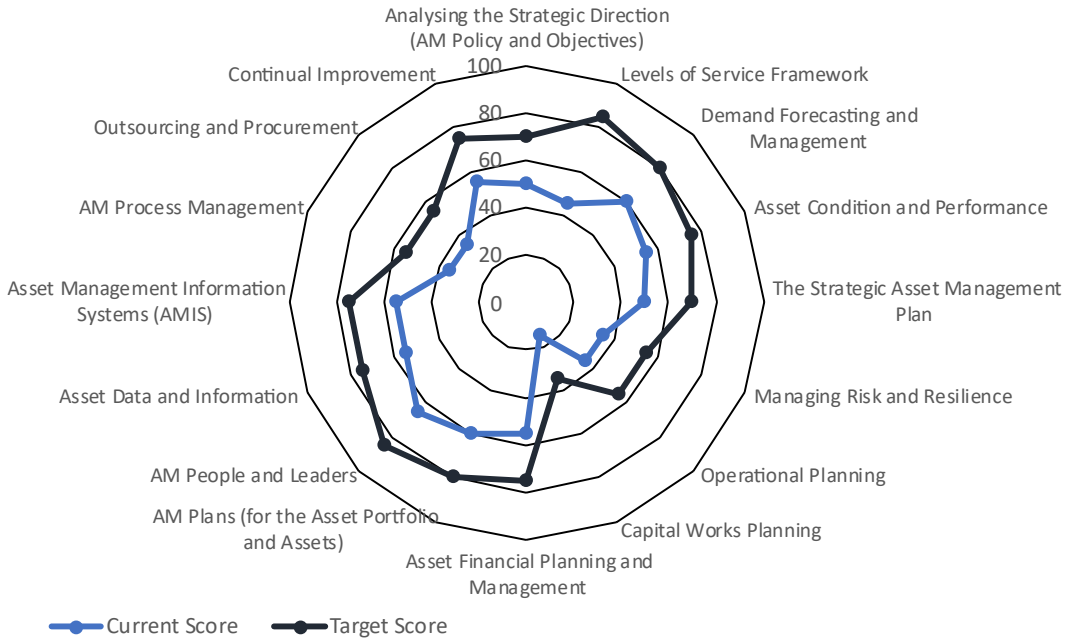
A.1 – Maturity Assessment – Stormwater Sewer System

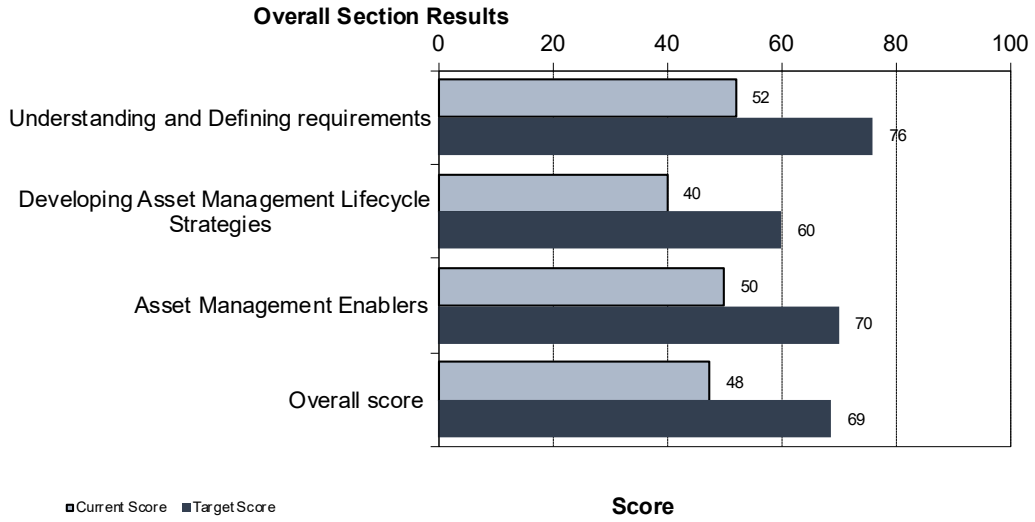
48 Pre-Project Score

69 Target Score

Activities to Achieve Target Score in Future

- Implement the condition assessment program using a risk-based approach to prioritize CCTV inspections and other diagnostic tools, ensuring consistent and timely data collection.
- Establish formal lifecycle strategies (e.g., renewal triggers, rehabilitation intervals, decommissioning criteria) based on asset performance, criticality, and cost optimization.
- Integrate storm sewer asset data into long-term financial models to forecast funding needs and align renewal planning with capital budgeting processes.
- Formalize cross-departmental workflows to improve coordination between engineering, operations, and finance teams in the planning, maintenance, and reporting of storm sewer assets.





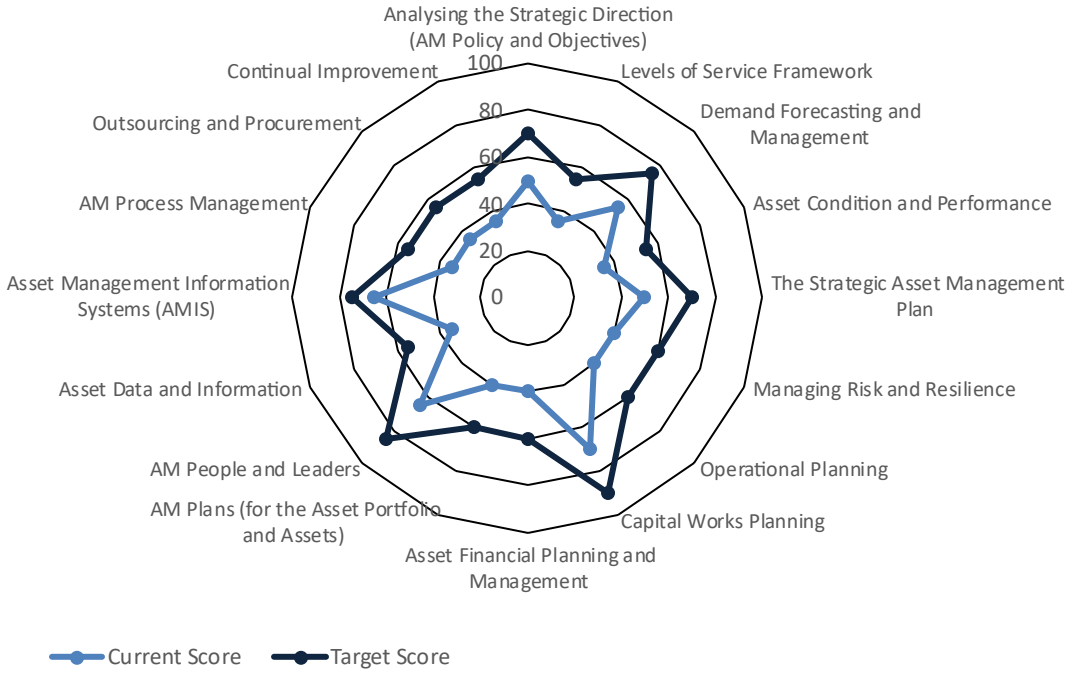
A.1 – Maturity Assessment – Natural Assets

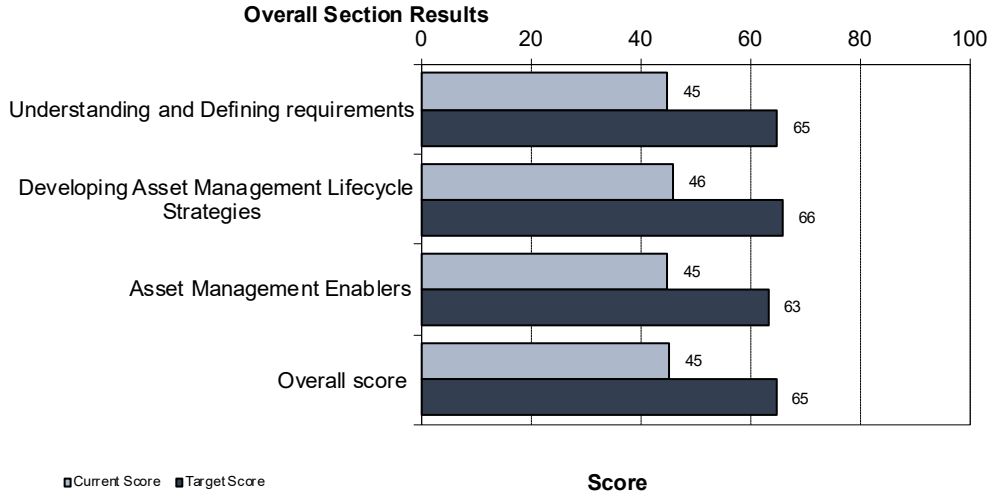
45 Pre-Project Score

65 Target Score

Activities to Achieve Target Score in Future

- Develop a structured asset inventory that includes spatial boundaries, ecological attributes, and functional classifications to support consistent asset tracking and reporting.
- Establish condition assessment protocols tailored to natural assets, such as biological health indicators, sediment buildup, erosion extent, and vegetation coverage, supported by partnerships with conservation authorities.
- Implement governance and monitoring frameworks that involve internal departments and external partners to ensure shared accountability and adaptive management of these complex asset types.

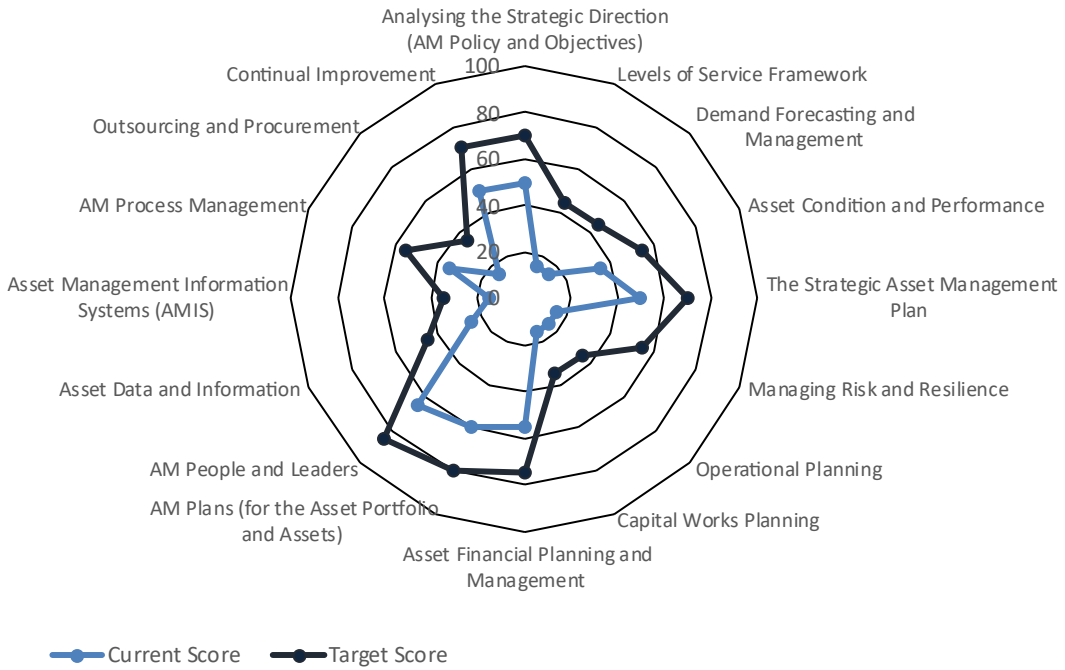




A.1 – Maturity Assessment – Ditches

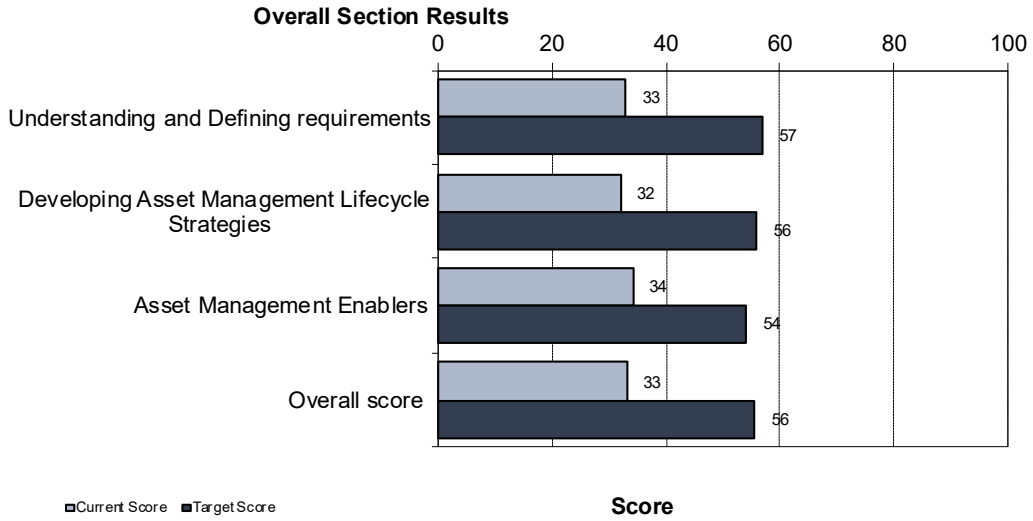
33 Pre-Project Score

56 Target Score



Activities to Achieve Target Score in Future

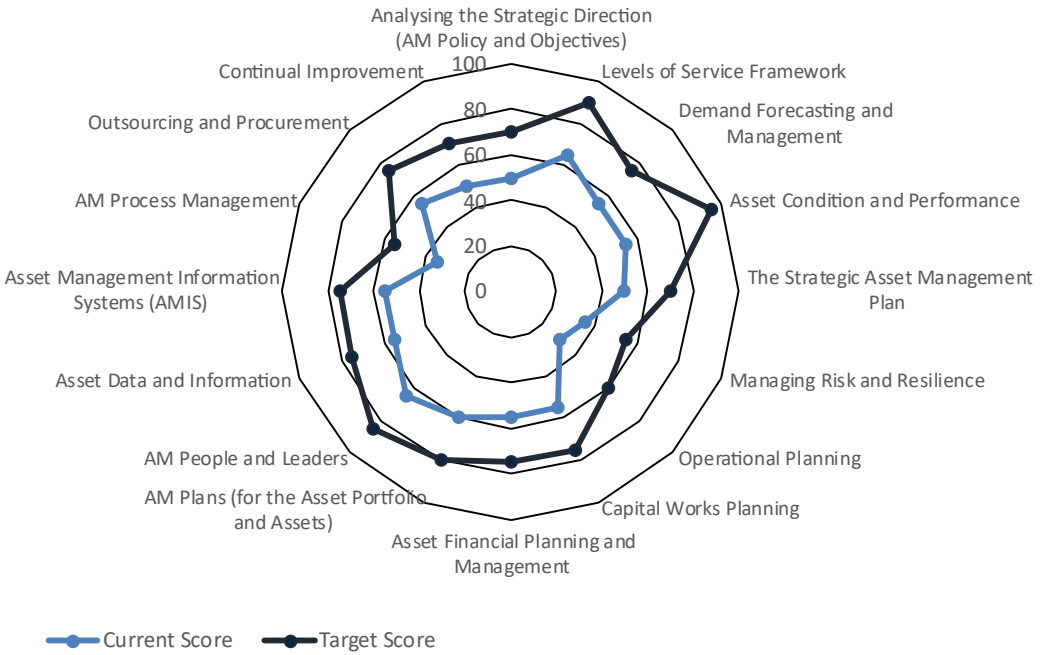
- Establish a condition assessment and inspection program using visual ratings, hydraulic performance indicators, and erosion monitoring to support maintenance prioritization.
- Define service levels and performance metrics for ditch functionality—e.g., drainage effectiveness, vegetation control, erosion control, and maintenance response time.
- Create formal maintenance and lifecycle strategies, including routine clearing, regrading frequencies, and triggers for rehabilitation or upgrade in coordination with road or culvert work.
- Incorporate ditch needs into capital and operating forecasts, ensuring budget allocations are in place for both reactive maintenance and planned improvements.



A.1 – Maturity Assessment – Ponds

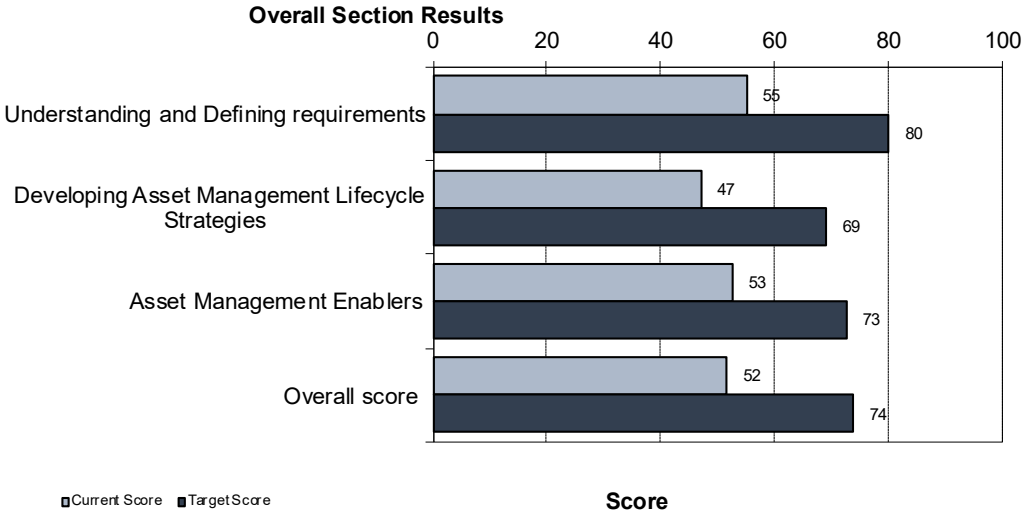
52 Pre-Project Score

74 Target Score



Activities to Achieve Target Score in Future

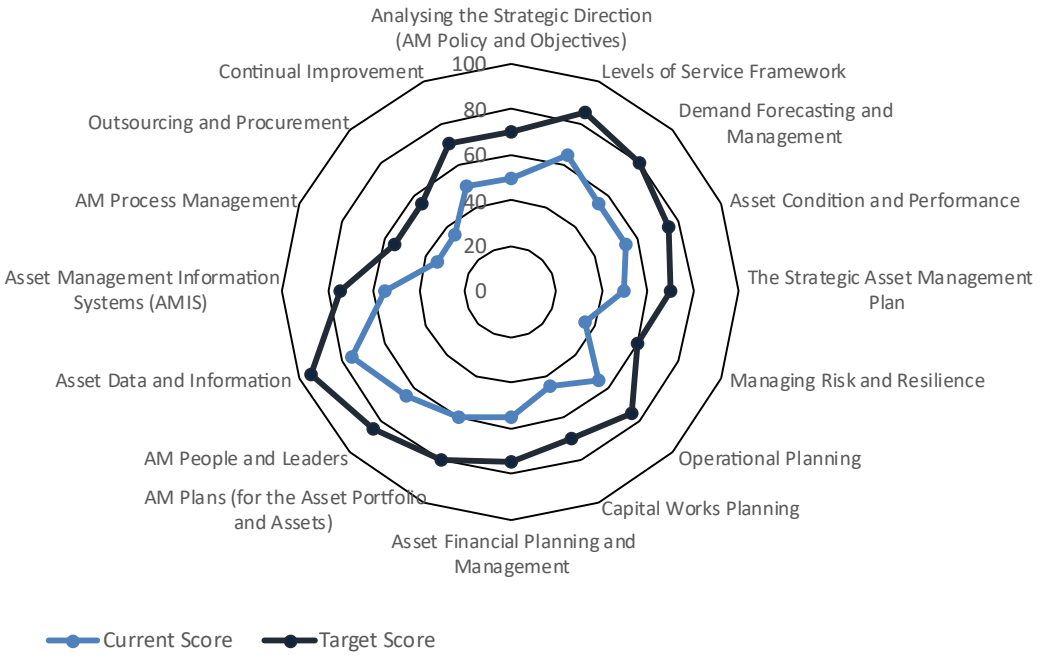
- Continue to implement a structured inspection and condition assessment program, using visual inspections, sediment surveys, and hydraulic performance evaluations on a defined cycle (e.g., every 5 years).
- Develop lifecycle management strategies for routine maintenance (e.g., vegetation control, debris removal), periodic sediment removal, and major rehabilitation or retrofit planning.
- Integrate stormwater pond needs into long-term financial planning, ensuring predictable funding for both ongoing maintenance and future capital interventions (e.g., retrofits to meet updated stormwater standards)
- Coordinate with environmental and planning departments to align pond management with broader goals such as flood mitigation, ecological enhancement, and community amenity space improvements.



A.1 – Maturity Assessment – WQUs

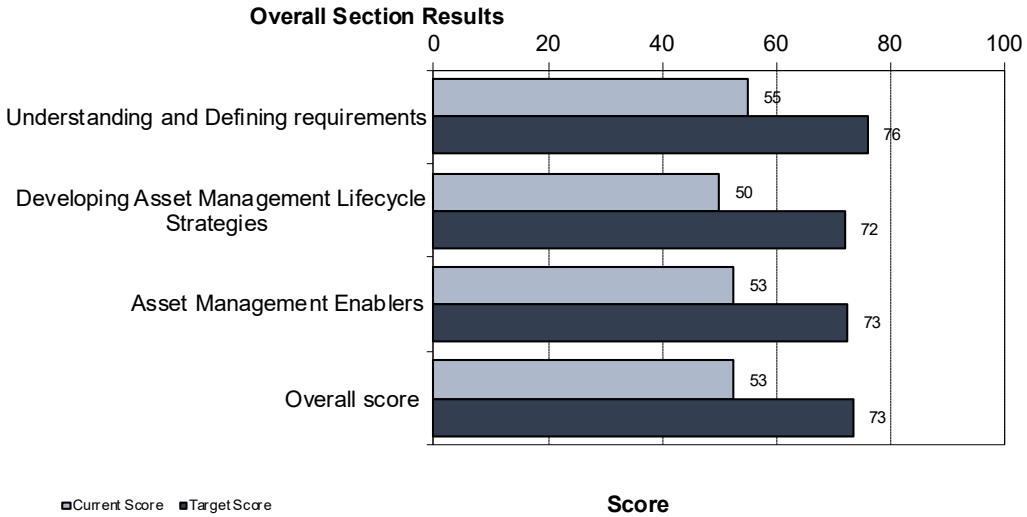
53 Pre-Project Score

73 Target Score



Activities to Achieve Target Score in Future

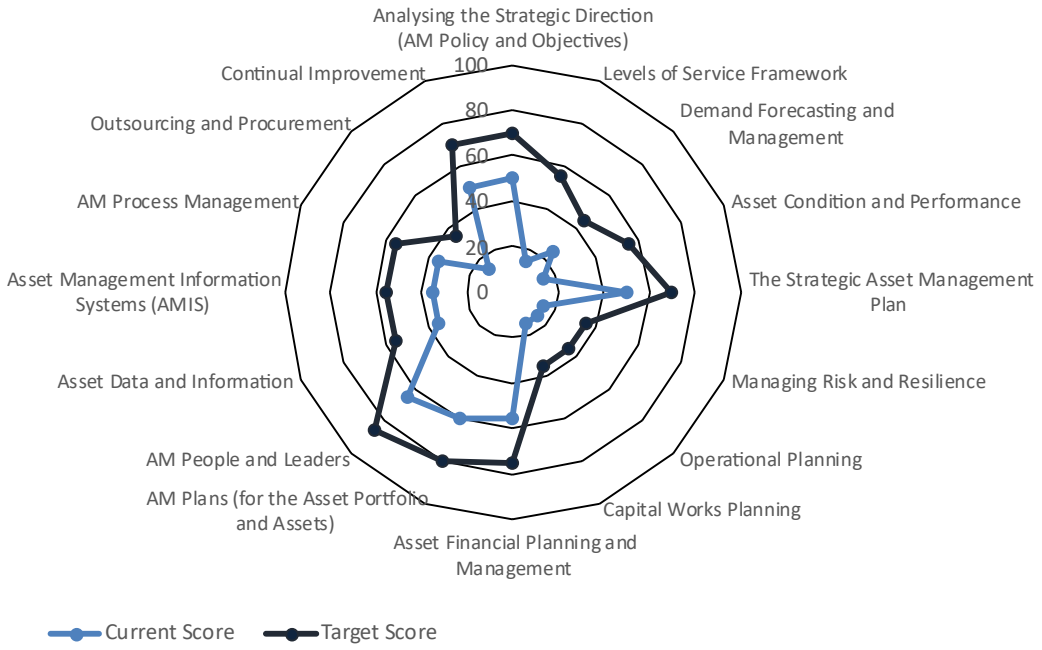
- Implement a scheduled inspection and maintenance program based on manufacturer recommendations and operational performance, including sediment/debris removal, component checks, and flow assessments.
- Define service levels and performance indicators, such as pollutant removal efficiency, maintenance frequency, and operational uptime, to track effectiveness and compliance.
- Incorporate water quality units into financial forecasts, including both operating budgets for routine servicing and capital planning for long-term upgrades or system replacements.
- Standardize procurement and installation guidelines to ensure consistency in asset performance, ease of maintenance, and compatibility with existing inspection programs.



A.1 – Maturity Assessment – LIDs

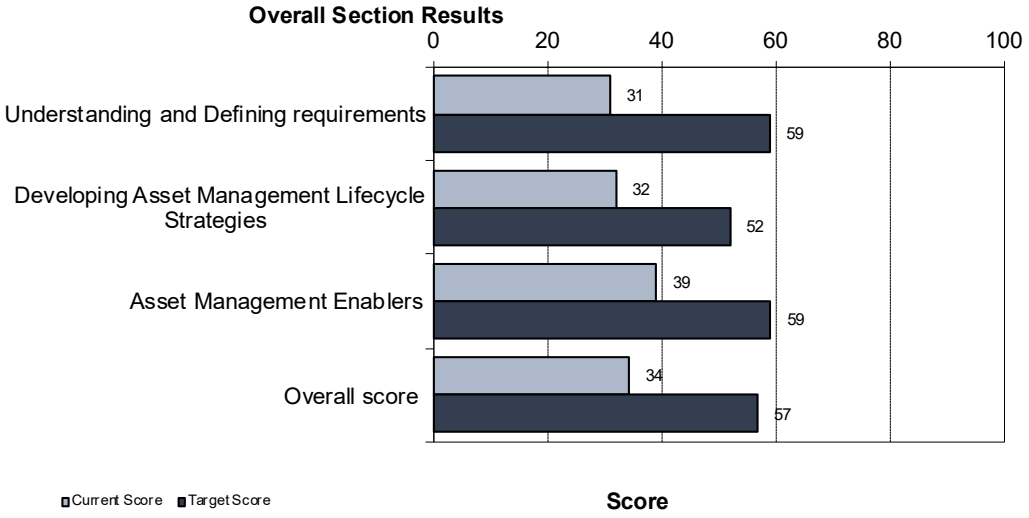
34 Pre-Project Score

57 Target Score



Activities to Achieve Target Score in Future

- Establish maintenance and inspection protocols tailored to each LID type, including vegetation management, infiltration performance checks, sediment removal, and seasonal functionality assessments.
- Establish maintenance and inspection protocols tailored to each LID type, including vegetation management, infiltration performance checks, sediment removal, and seasonal functionality assessments.
- Create lifecycle strategies for routine care, component renewal (e.g., filter media or plantings), and eventual retrofitting, with guidance based on best practices and observed performance over time.
- Incorporate LID maintenance and renewal needs into long-term budgets, ensuring adequate funding streams for both pilot installations and scaled implementation programs.

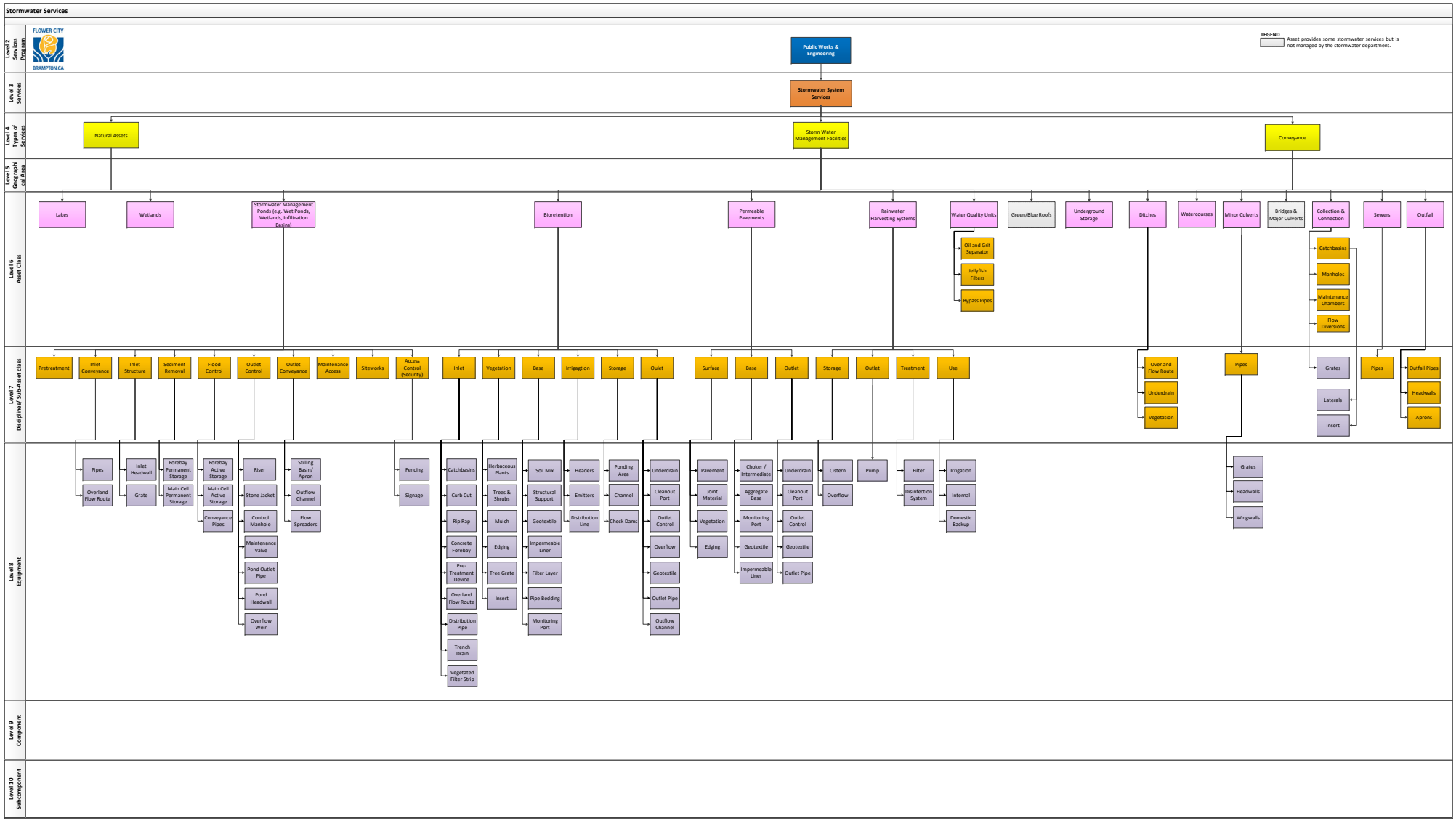


Appendix

C

Asset Hierarchy

Stormwater Services



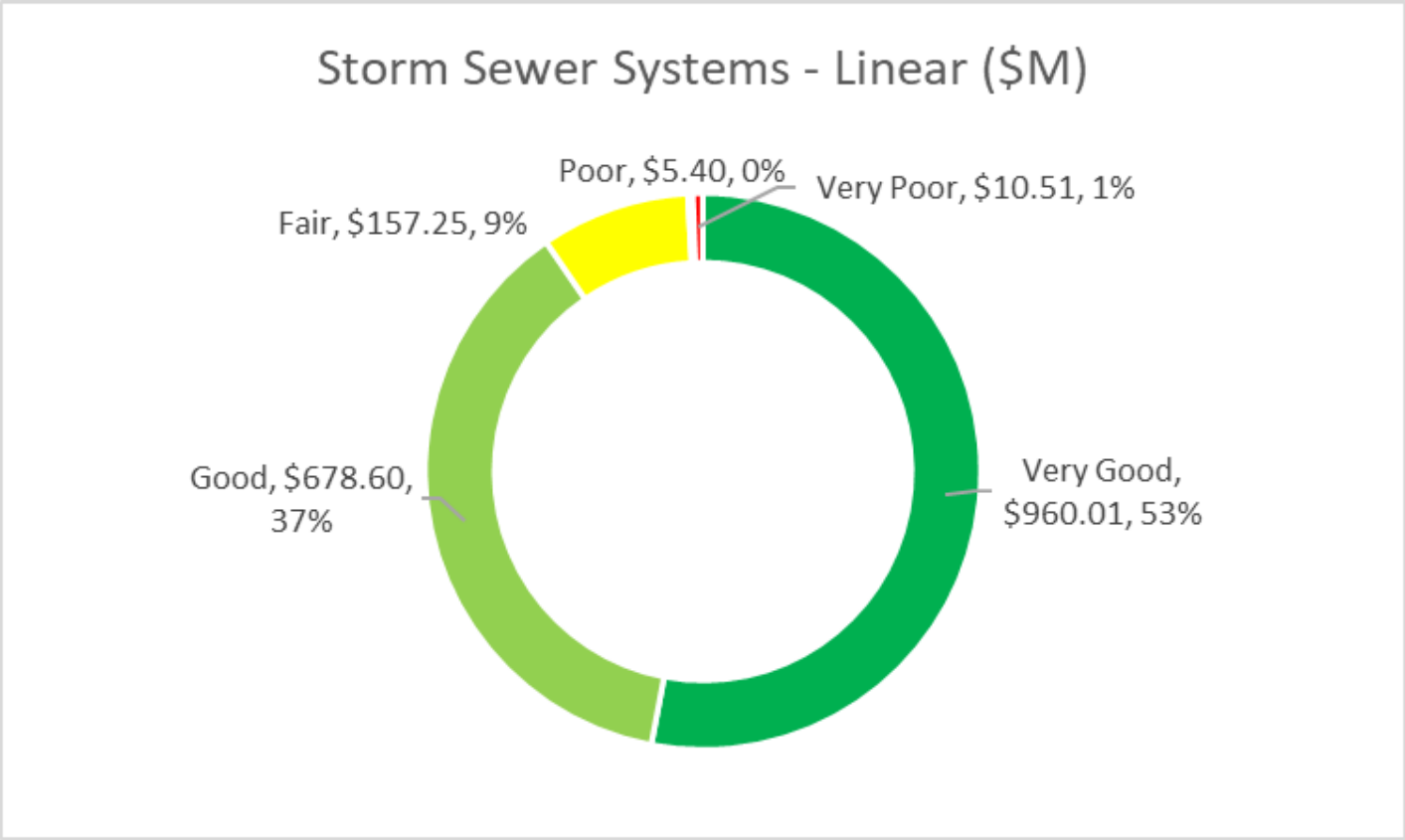
Appendix

D Asset Class Report Cards

Stormwater Sewer Systems – Linear

State of Local Infrastructure Summary

Includes: Storm Sewer Pipes, Catchbasin or Ditch-Inlet Leads and Foundation & Roof Drain Collectors



Assets in Very Poor Condition

- $10.51 million dollars of Gravity Line Sewers

Stormwater Sewer Systems – Linear

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

- Insignificant (Green) – Accept risk, no risk treatment required.
- Low (Light Green) – May be acceptable but monitoring of assets may be required.
- Medium (Yellow) – Requires some consideration by management with necessary risk management and monitoring adopted as needed.
- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Likelihood of Failure	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	$0.0	$1.2	$9.3	$0.0	$0.0
Likely	$0.0	$0.0	$5.4	$0.0	$0.0
Possible	$0.0	$19.3	$138.0	$0.0	$0.0
Unlikely	$0.0	$87.1	$591.5	$0.0	$0.0
Rare	$0.0	$142.2	$817.8	$0.0	$0.0

Risk Exposure Ratings	
Extreme	$0.0
High	$9.3
Medium	$144.6
Low	$1,515.7
Insignificant	$142.2
Total	**$1,811.8**

Risk Treatment

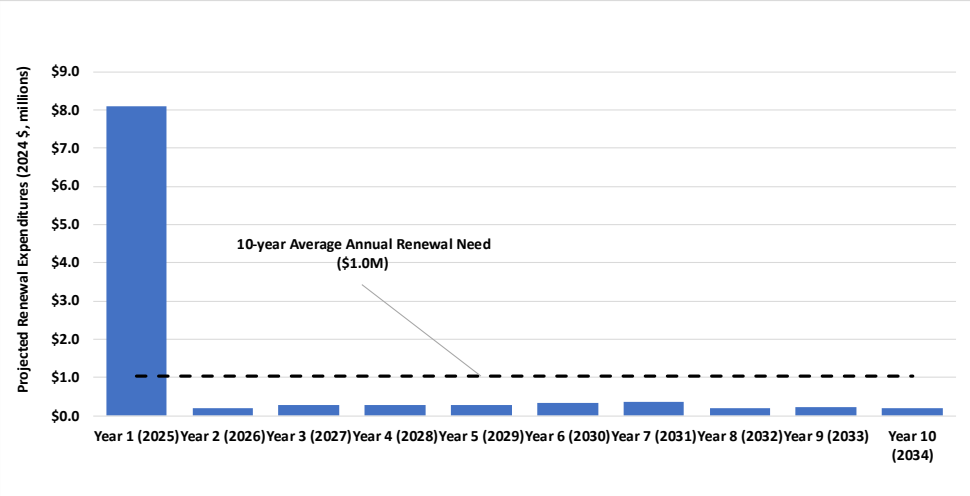
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High risk category. That said, there is a high proportion of assets which are assessed as High or Moderate risk.
- The analysis indicates that some assets within the High or Moderate risk category possess a high likelihood of failure, despite the consequence of failure being moderate. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

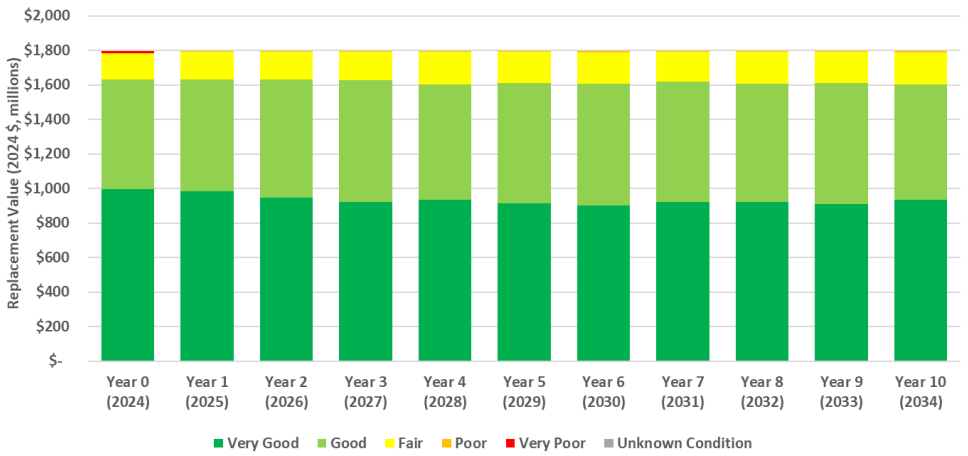
Stormwater Sewer Systems – Linear

Lifecycle Management Needs Summary

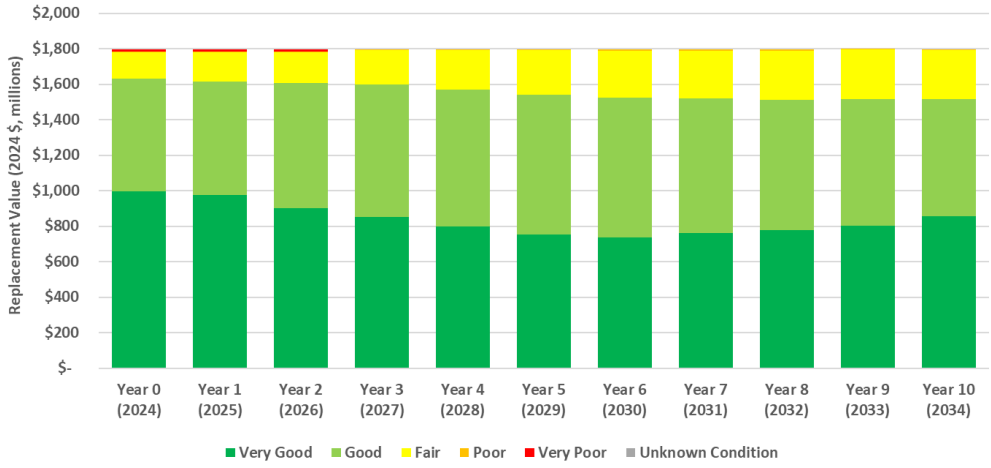
Maintain Current LOS – Renewal Needs



Maintain Current LOS – Condition Forecast



Allocated Funding – Condition Forecast



Stormwater Sewer Systems – Linear

Monitoring and Improvement Plan

Data Enhancement & Governance

- Improve completeness of attribute data such as material, diameter, install year, and connectivity.
- Continue CCTV Program and integration of scores into GIS Layer
- Establish consistent data governance practices for updates following construction or rehabilitation projects.
- Align pipe segment inventory with master plans and capital project records.

Process Optimization

Integrate risk assessment processes with linear asset renewal prioritization models.

- Formalize inspection and cleaning frequency based on asset criticality and performance targets.

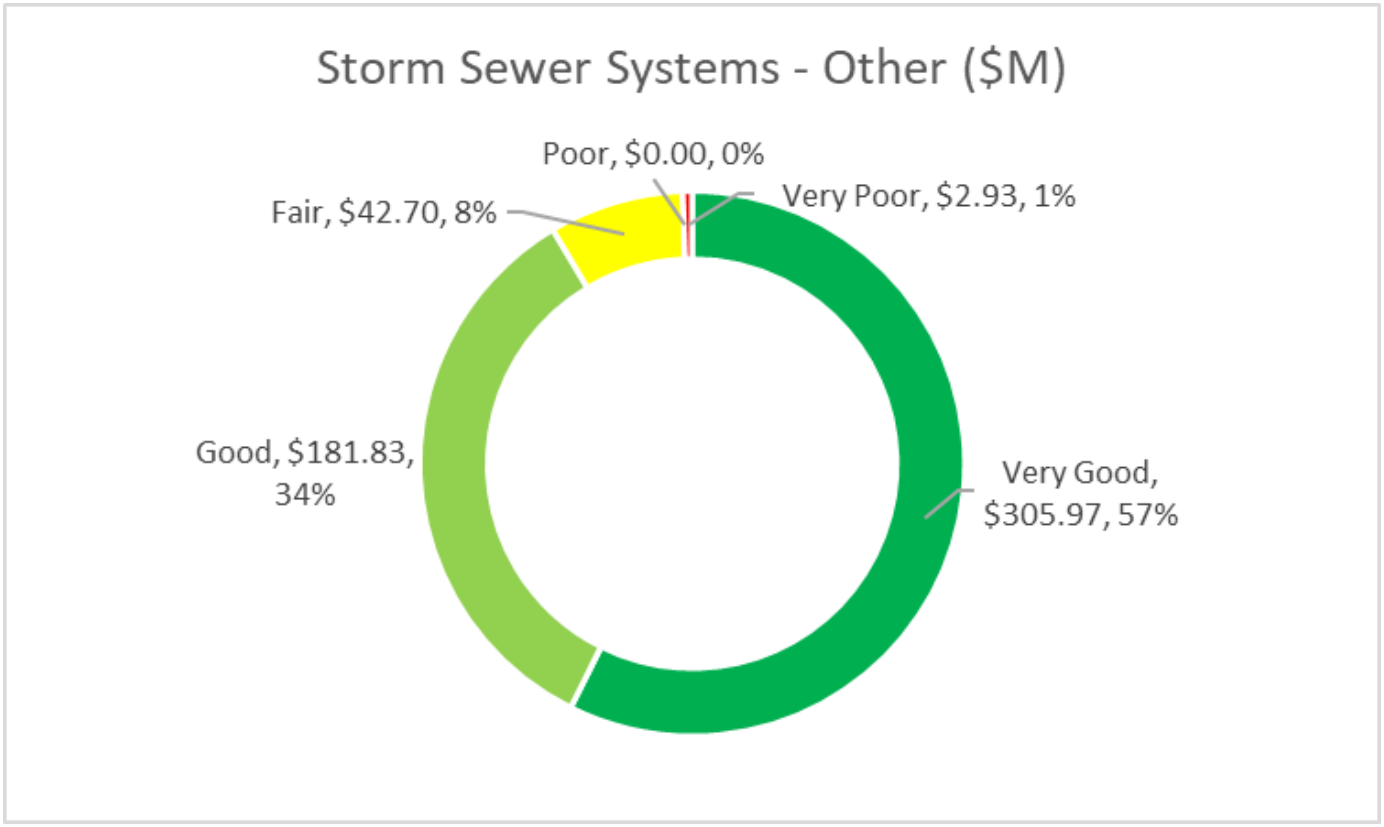
Technology & Tools

- Leverage GIS-based network modeling to simulate capacity and support capital planning.
- Use decision support systems (DSS) to plan renewal and replacement cycles under various funding scenarios.
- Incorporate pipe deterioration curves into lifecycle forecasting models

Stormwater Sewer Systems – Other

State of Local Infrastructure Summary

Includes: Regular Manholes, FDC and CB Manholes, Catchbasins and Outfalls



Assets in Very Poor Condition

- $1.6 million dollars – Manholes
- $1.0 million dollars – Catchbasins
- $0.3 million dollars - Outfalls

Stormwater Sewer Systems – Other

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

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- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Likelihood of Failure	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	$0.0	$2.6	$0.3	$0.0	$0.0
Likely	$0.0	$0.0	$0.0	$0.0	$0.0
Possible	$0.0	$40.9	$1.8	$0.0	$0.0
Unlikely	$0.0	$177.2	$4.7	$0.0	$0.0
Rare	$0.0	$292.6	$13.4	$0.0	$0.0

Consequence of Failure

Risk Exposure Ratings	
Extreme	$0.0
High	$0.3
Medium	$4.4
Low	$236.2
Insignificant	$292.6
Total	**$533.4**

Risk Treatment

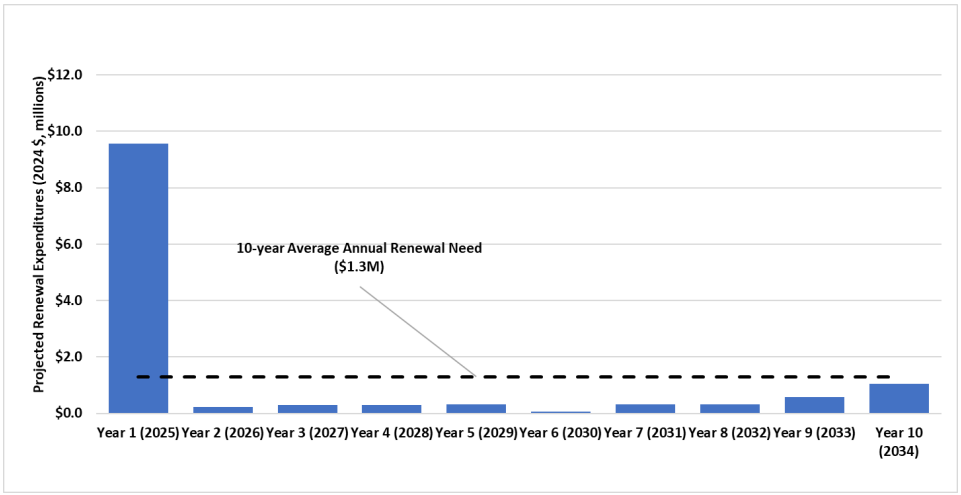
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High risk category. That said, there is a high proportion of assets which are assessed as High or Moderate risk.
- The analysis indicates that some assets within the High or Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

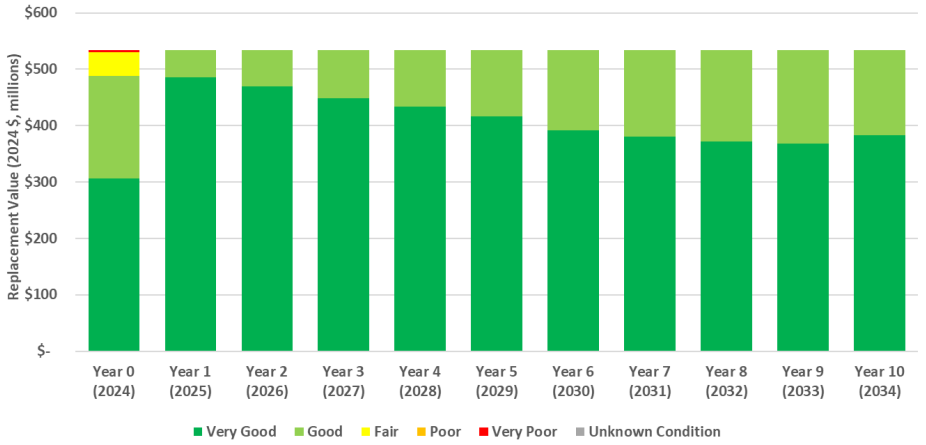
Stormwater Sewer Systems – Other

Lifecycle Management Needs Summary

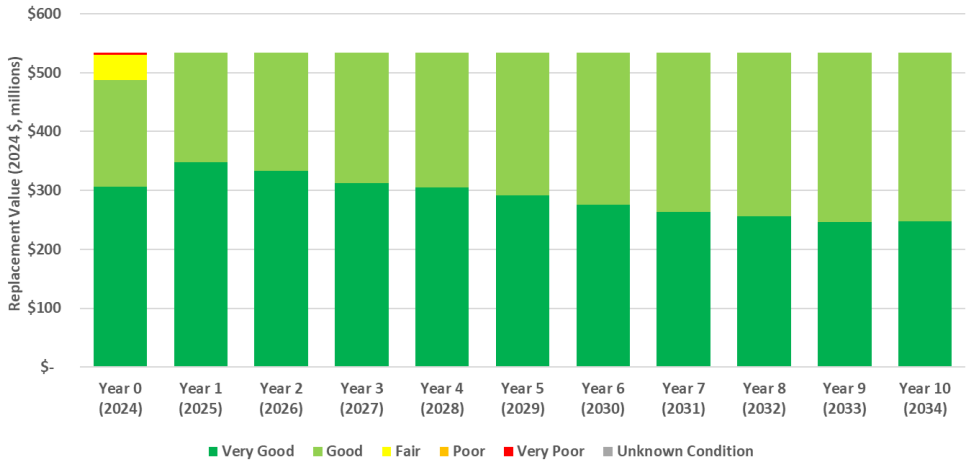
Maintain Current LOS – Renewal Needs



Maintain Current LOS – Condition Forecast



Allocated Funding – Condition Forecast



Stormwater Sewer Systems – Other

Plan Improvement & Monitoring

Data Enhancement & Governance

- Implement QA/QC processes for new asset capture from construction and field surveys.
- Tag critical or high-risk structures (e.g., outfalls near sensitive areas) for tracking.

Process Optimization

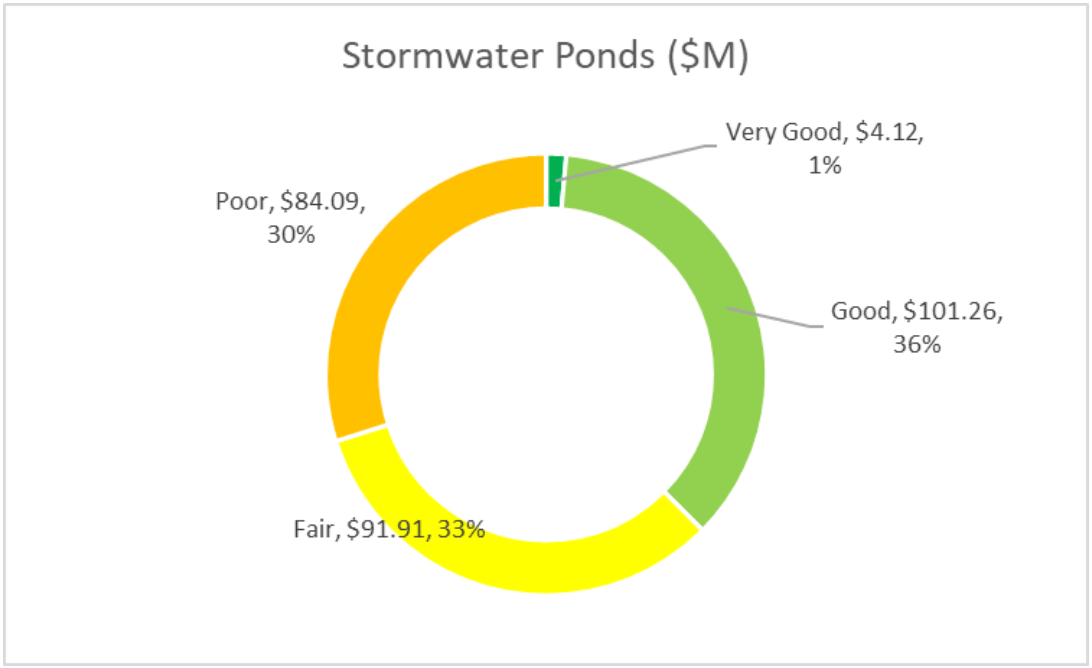
- Develop risk-based inspection and cleaning protocols, particularly for catchbasins and outfalls.
- Define level of service targets (e.g., % of structures cleaned per year).
- Improve alignment of inspection data with work order tracking to close the loop on service requests.

Technology & Tools

- Implement mobile tools for field inspection and work order completion.
- Use data analytics to identify hotspots for debris accumulation or repeated maintenance needs.
- Integrate structure data with hydraulic modeling tools to simulate system-wide effects.

Stormwater Ponds

State of Local Infrastructure Summary



Assets in Very Poor Condition

- No assets identified in Very Poor condition

Stormwater Ponds

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

- Insignificant (Green) – Accept risk, no risk treatment required.
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- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

	Likelihood of Failure	Insignificant	Minor	Moderate	Major	Catastrophic
5	Certain	$0.0	$0.0	$0.0	$0.0	$0.0
4	Likely	$0.0	$0.0	$0.0	$84.1	$0.0
3	Possible	$0.0	$0.0	$0.0	$91.9	$0.0
2	Unlikely	$0.0	$0.0	$0.0	$101.3	$0.0
1	Rare	$0.0	$0.0	$0.0	$4.1	$0.0

Consequence of Failure

Risk Exposure Ratings	
Extreme	$0.0
High	$84.1
Medium	$193.2
Low	$4.1
Insignificant	$0.0
Total	**$281.4**

Risk Treatment

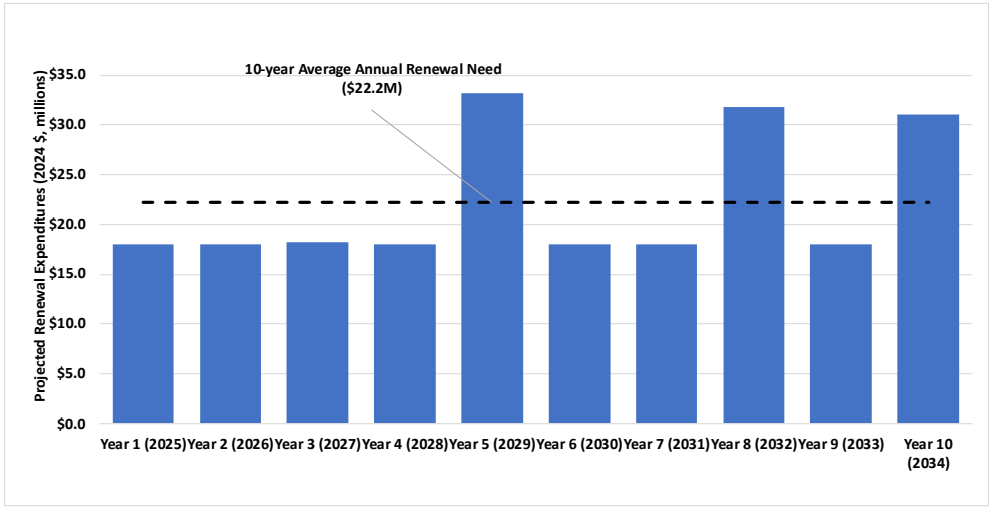
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High risk category. That said, there is a high proportion of assets which are assessed as High or Moderate risk.
- The analysis indicates that some assets within the High or Moderate risk category have a high consequence of failure even with a fair condition score.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

Stormwater Ponds

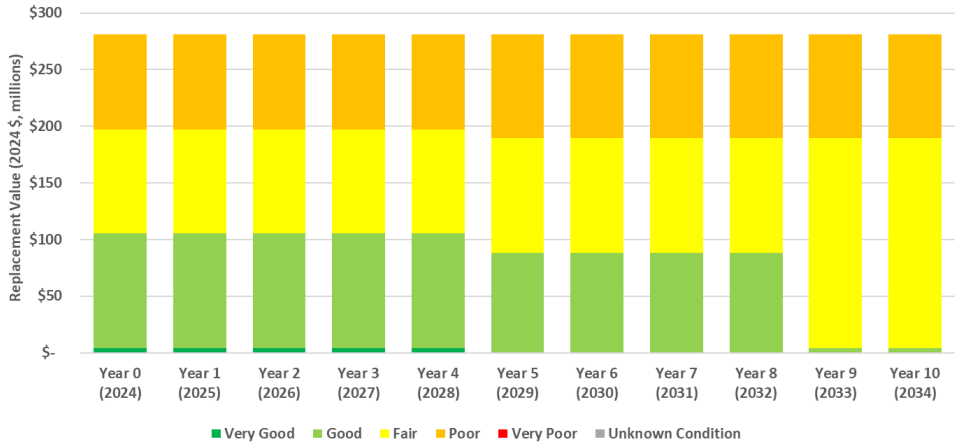
Lifecycle Management Needs Summary

Maintain Current LOS – Renewal Needs



Maintain Current LOS – Condition Forecast

Allocated Funding – Condition Forecast



Stormwater Ponds

Plan Improvement and Monitoring

Data Enhancement & Governance

- Continue to consolidate pond inventory including function (quality, quantity, hybrid), ownership, and design characteristics.
- Complete bathymetric surveys to assess sediment accumulation and storage capacity.
- Track maintenance history and compliance with design standards.

Process Optimization

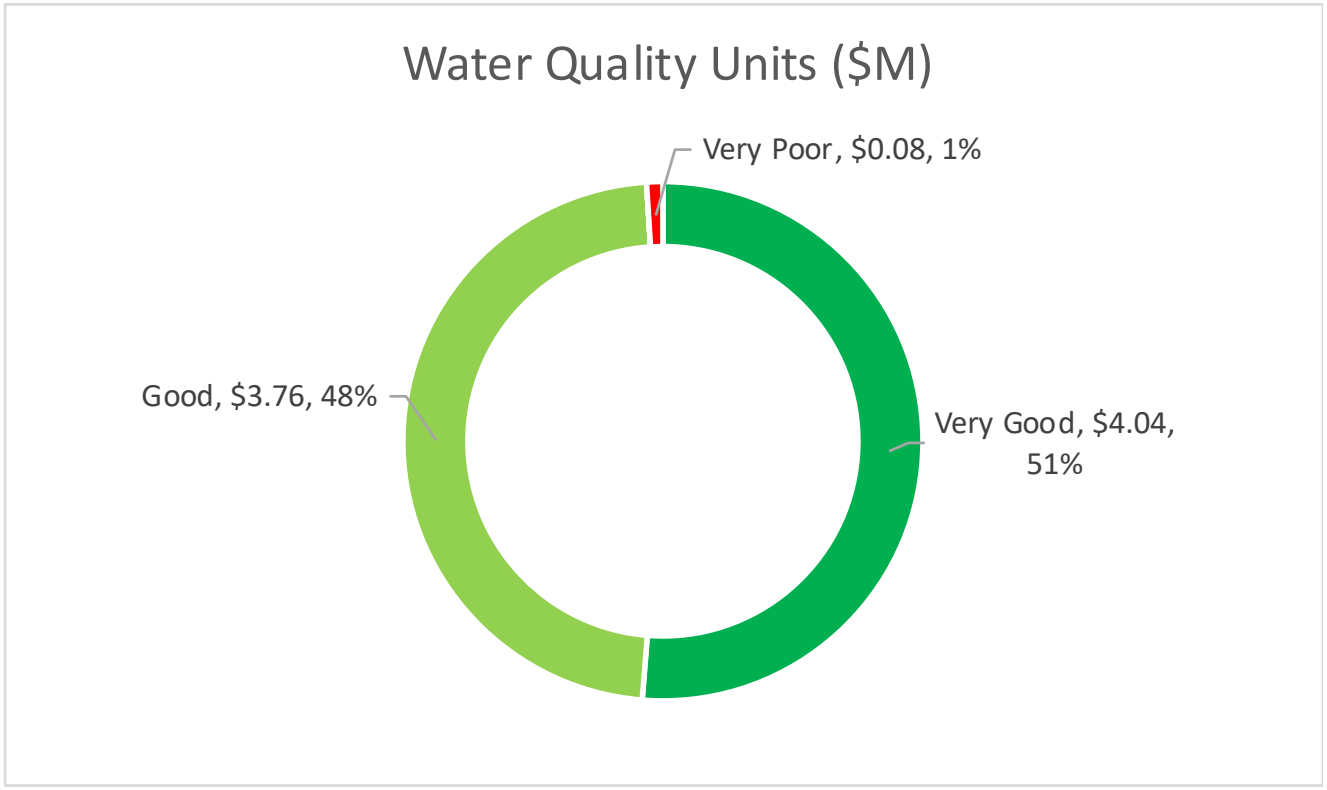
- Establish sediment monitoring and dredging cycles based on design performance thresholds.
- Develop pond prioritization framework based on water quality function and environmental sensitivity.
- Integrate stormwater pond maintenance into long-term funding models.

Technology & Tools

- Use remote sensing (e.g., drone, LiDAR) to monitor vegetation, erosion, and sedimentation.
- Implement pond performance modeling to assess pollutant removal efficiency.
- Adopt asset management software modules that link inspection, design, and maintenance records.

Water Quality Units

State of Local Infrastructure Summary



Assets in Very Poor Condition

- 2 water quality units identified in very poor condition based on assessment
-

Water Quality Units

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

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- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Likelihood of Failure	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	$0.0	$0.1	$0.0	$0.0	$0.0
Likely	$0.0	$0.0	$0.0	$0.0	$0.0
Possible	$0.0	$0.0	$0.0	$0.0	$0.0
Unlikely	$0.0	$3.8	$0.0	$0.0	$0.0
Rare	$0.0	$4.0	$0.0	$0.0	$0.0

Consequence of Failure

Risk Exposure Ratings	
Extreme	$0.0
High	$0.0
Medium	$0.1
Low	$3.8
Insignificant	$4.0
Total	$7.9

Risk Treatment

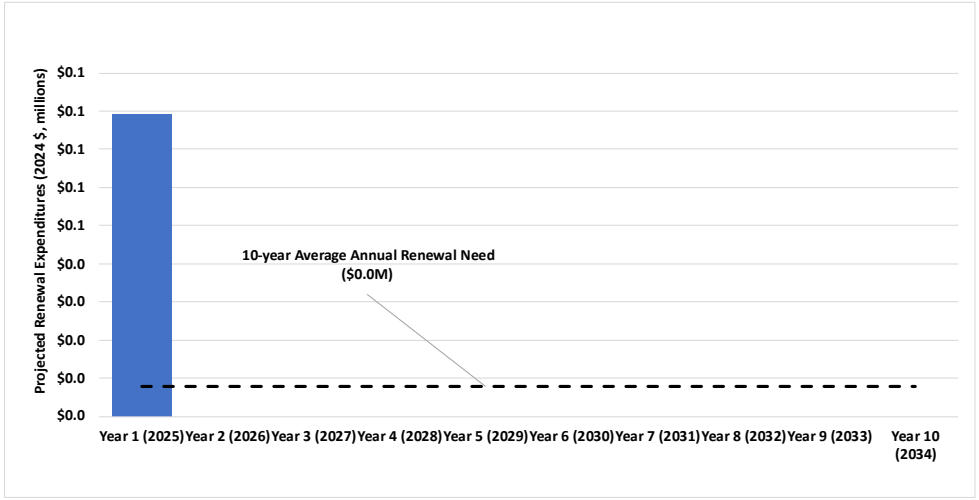
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High or High risk category. That said, there is a proportion of assets which are assessed as Moderate risk.
- The analysis indicates that some assets within the Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

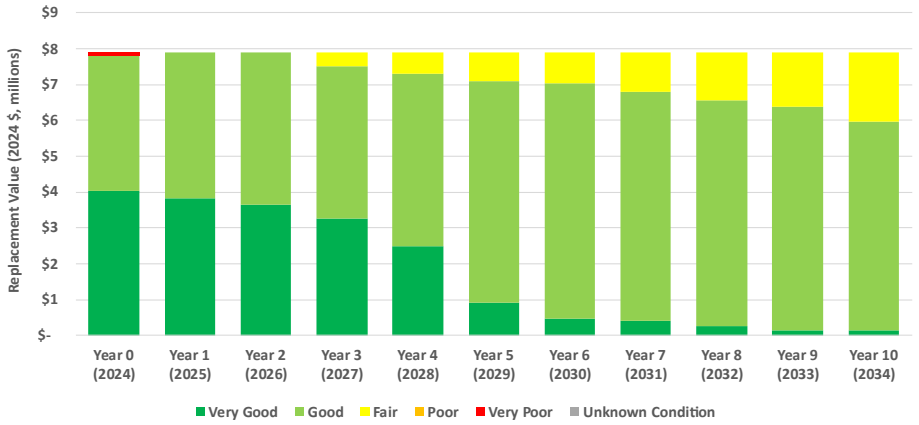
Water Quality Units

Lifecycle Management Needs Summary

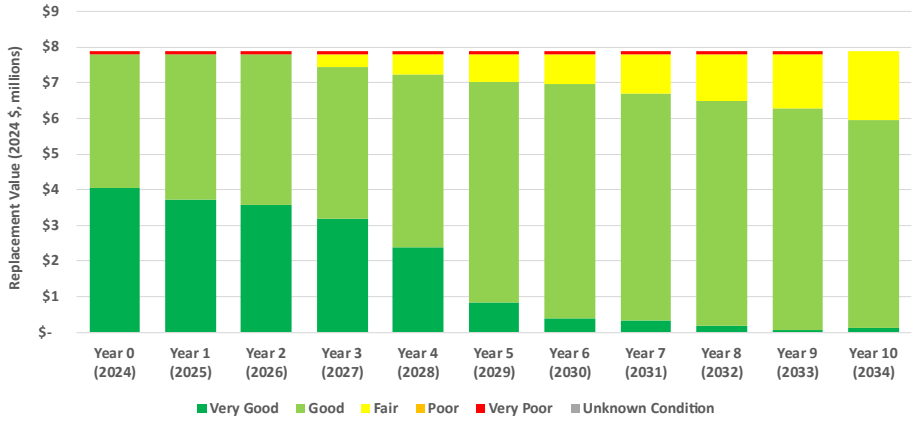
Maintain Current LOS – Renewal Needs



Maintain Current LOS – Condition Forecast



Allocated Funding – Condition Forecast



Water Quality Units

Lifecycle Management Needs Summary

Data Enhancement & Governance

- Complete an inventory of all water quality units, including type, make/model, treatment function, install year, location, and ownership.
- Establish governance protocols for capturing asset additions and updates post-construction or as-built reviews.
- Link maintenance and inspection records to individual units to support performance tracking and regulatory compliance.

Process Optimization

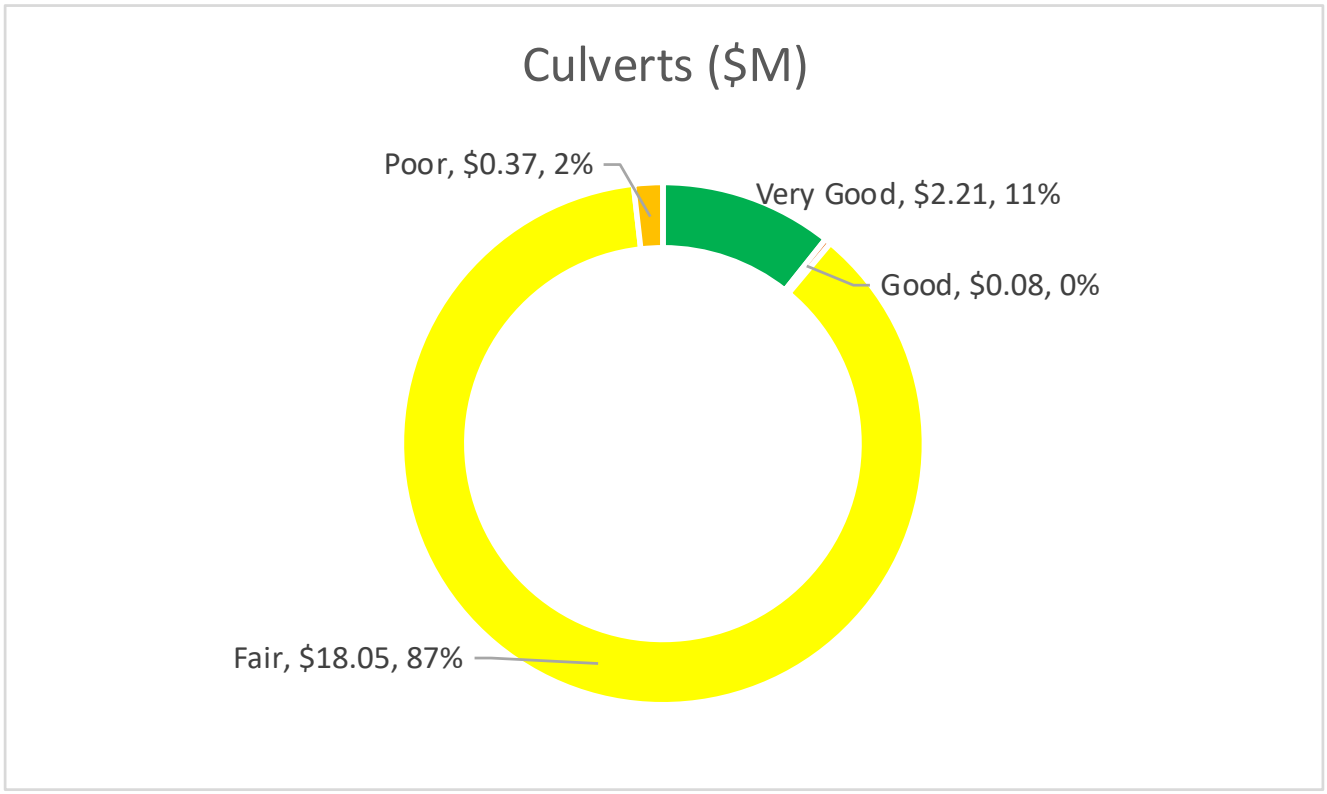
- Develop inspection and maintenance schedules based on unit type, pollutant load, and design flow capacity.
- Implement a risk-based prioritization framework that considers catchment size, proximity to sensitive receiving environments, and historical maintenance frequency.
- Integrate water quality units into broader O&M planning for stormwater system performance and compliance with environmental targets.
- Establish roles and responsibilities for units installed by developers or under private ownership with municipal service agreements.

Technology & Tools

- Utilize field inspection apps with customizable forms tailored to each water quality unit type.
- Incorporate unit performance data into asset management systems for lifecycle tracking and service level monitoring.
- Use GIS tools to map unit locations and upstream drainage areas to assess pollutant loading and maintenance impact.

Culverts

State of Local Infrastructure Summary



Assets in Very Poor Condition

- No assets are in Very Poor condition

Culverts

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

- Insignificant (Green) – Accept risk, no risk treatment required.
- Low (Light Green) – May be acceptable but monitoring of assets may be required.
- Medium (Yellow) – Requires some consideration by management with necessary risk management and monitoring adopted as needed.
- High (Orange) – Requires consideration by management, risk management and monitoring are required.
- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Likelihood of Failure	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	$0.0	$0.0	$0.0	$0.0	$0.0
Likely	$0.0	$0.0	$0.4	$0.0	$0.0
Possible	$0.0	$0.0	$18.1	$0.0	$0.0
Unlikely	$0.0	$0.0	$0.1	$0.0	$0.0
Rare	$0.0	$0.0	$2.2	$0.0	$0.0

Consequence of Failure

Risk Exposure Ratings	
Extreme	$0.0
High	$0.0
Medium	$18.4
Low	$2.3
Insignificant	$0.0
Total	**$20.7**

Risk Treatment

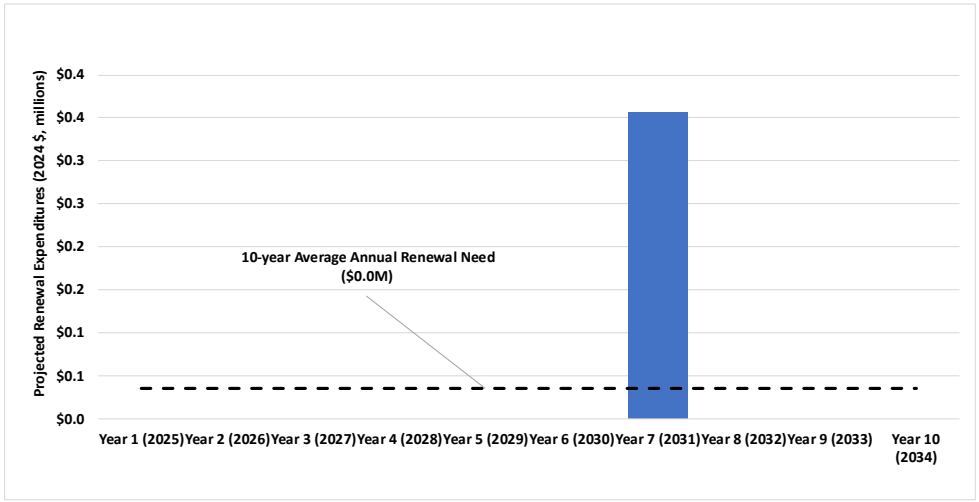
Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High or High risk category. That said, there is a proportion of assets which are assessed as Moderate risk.
- The analysis indicates that some assets within the Moderate risk category possess a high likelihood of failure, despite the consequence of failure being fairly low. The high likelihood of failure is due to assets being in Poor condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

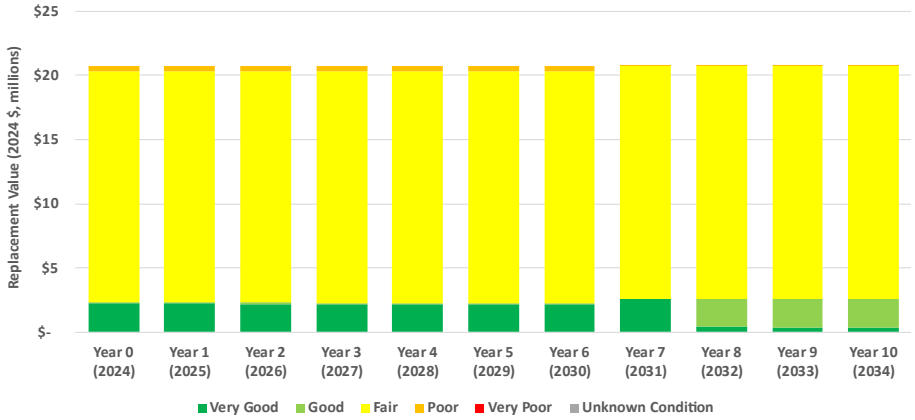
Culverts

Lifecycle Management Needs Summary

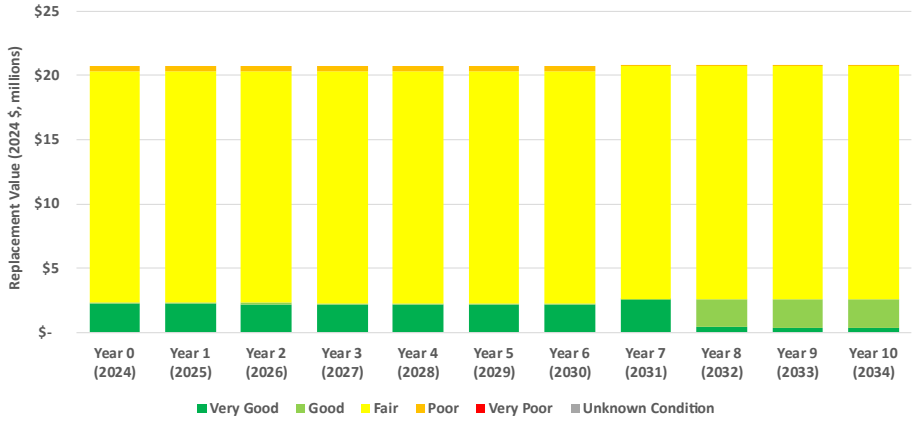
Maintain Current LOS – Renewal Needs



Maintain Current LOS – Condition Forecast



Allocated Funding – Condition Forecast



Culverts

Monitoring and Improvement Plan

Data Enhancement & Governance

- Confirm completeness of culvert inventory, including location, dimensions, and material.
- Establish governance protocols for data updates after capital or emergency repairs.

Process Optimization

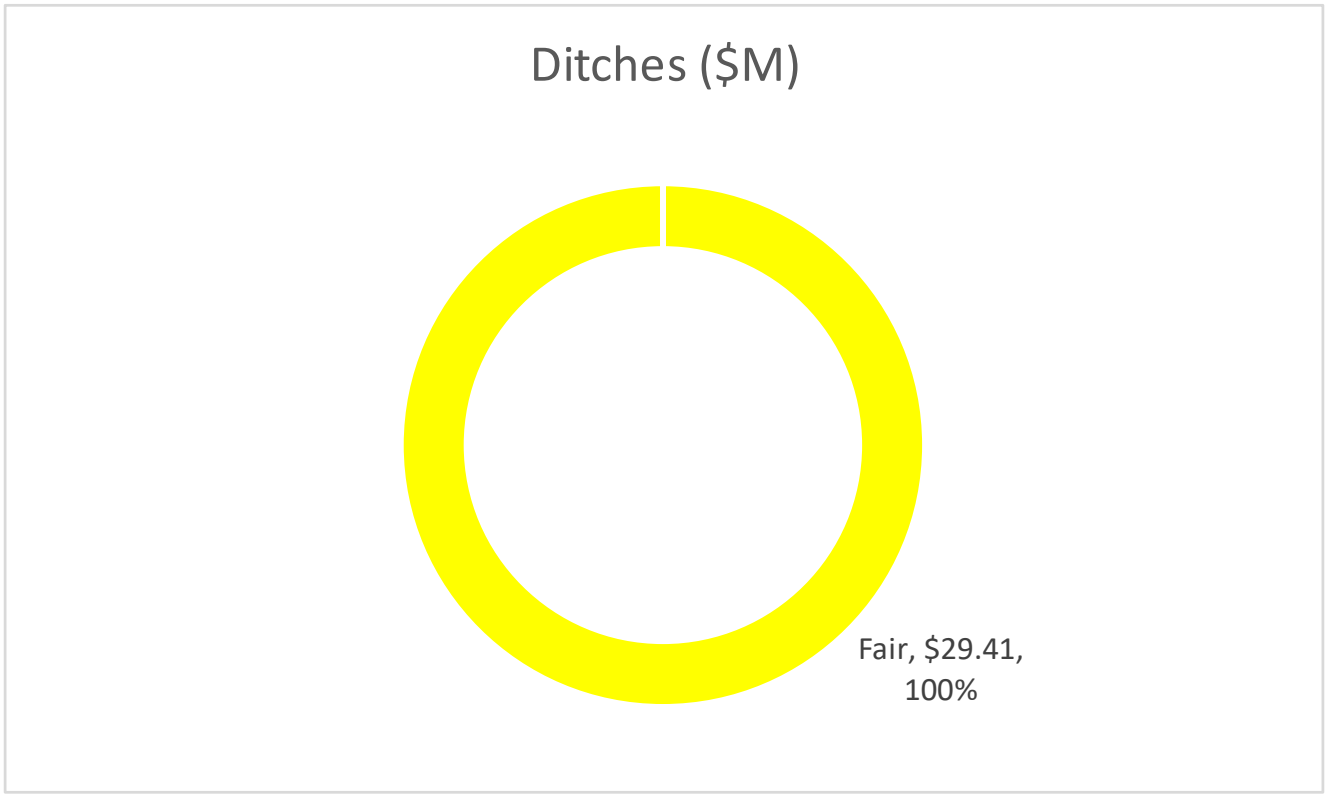
- Develop culvert-specific condition assessment program, using both visual inspections and structural assessments.
- Prioritize culvert replacements based on size, criticality (e.g., under major roads), and flood risk.
- Integrate culvert renewal planning with road resurfacing and reconstruction projects.

Technology & Tools

- Apply deterioration models to estimate remaining life and renewal timing.
- Use field inspection apps with image capture and geotagging to monitor culvert condition.
- Implement GIS dashboard for culvert risk mapping and prioritization.

Ditches

State of Local Infrastructure Summary



Assets in Very Poor Condition

- No assets are in Very Poor condition

Ditches

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

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- Extreme (Red) – Requires extensive management input, risk mitigation to reduce to an acceptable level is essential.

Risk Evaluation

Risk exposure in year 2024 $, millions

Likelihood of Failure	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	$0.0	$0.0	$0.0	$0.0	$0.0
Likely	$0.0	$0.0	$0.0	$0.0	$0.0
Possible	$0.0	$0.0	$29.4	$0.0	$0.0
Unlikely	$0.0	$0.0	$0.0	$0.0	$0.0
Rare	$0.0	$0.0	$0.0	$0.0	$0.0

Consequence of Failure

Risk Exposure Ratings	
Extreme	$0.0
High	$0.0
Medium	$29.4
Low	$0.0
Insignificant	$0.0
Total	**$29.4**

Risk Treatment

Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High or High risk category. That said, there is a proportion of assets which are assessed as Moderate risk.
- The analysis indicates that some assets within the Moderate risk category possess a possible likelihood of failure and a moderate consequence of failure. The likelihood of failure is due to assets being in Fair condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

Ditches

Plan Improvement and Monitoring

Data Enhancement & Governance

- Inventory ditch segments with geometry, flow direction, adjacent land use, and connectivity.
- Incorporate ditch classifications (e.g., roadside, rural swale, municipal drain).
- Record known drainage issues and past interventions.

Process Optimization

- Define service levels for clearing, regrading, and vegetative control.
- Integrate ditches into stormwater conveyance capacity assessments.
- Coordinate maintenance schedules with roads and capital works teams.

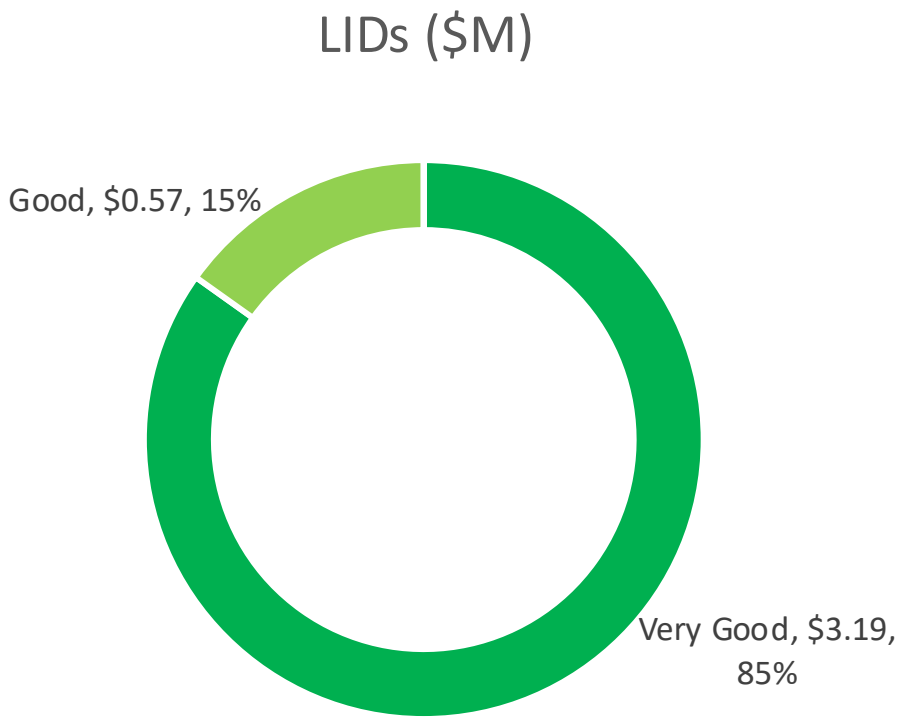
Technology & Tools

- Utilize GIS layers to track ditch networks and integrate with watershed planning tools.
- Apply hydraulic modeling tools to assess flow capacity and identify upgrades.
- Use tablets with spatial data for inspection and maintenance documentation.

LIDs

State of Local Infrastructure Summary

Includes: Bioretention, Cooling Trench, Infiltration Trench, Stormwater Tree Trench, Detention Chamber, Stormwater Harvesting Chamber and Infiltration Chamber



Assets in Very Poor Condition

- No assets are in Very Poor condition

LIDs

Risk Management Summary

Risk Identification

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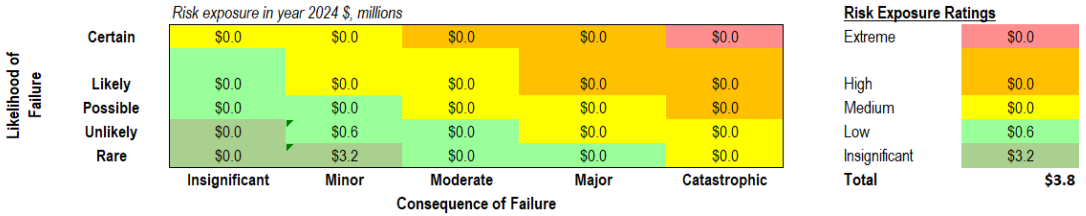
Risk Evaluation



Risk Treatment

Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High, High, or Moderate risk category.
- This indicates that there is low risk for these assets to the City. The City should monitor these asset and if the condition deteriorates where the likelihood of failure increases, mitigation measures could be employed.

LIDs

Plan Improvement and Monitoring

Data Enhancement & Governance

- Inventory remaining LID assets (e.g., bioswales, rain gardens, permeable pavers) including design specifications and location.
- Record ownership and maintenance responsibility (City vs. developer vs. community).
- Track LID asset performance metrics and lifecycle stage.

Process Optimization

- Define maintenance protocols and inspection triggers specific to each LID type.
- Integrate LID maintenance into stormwater O&M workflows.
- Standardize documentation and hand-off process for developer-constructed LID assets.

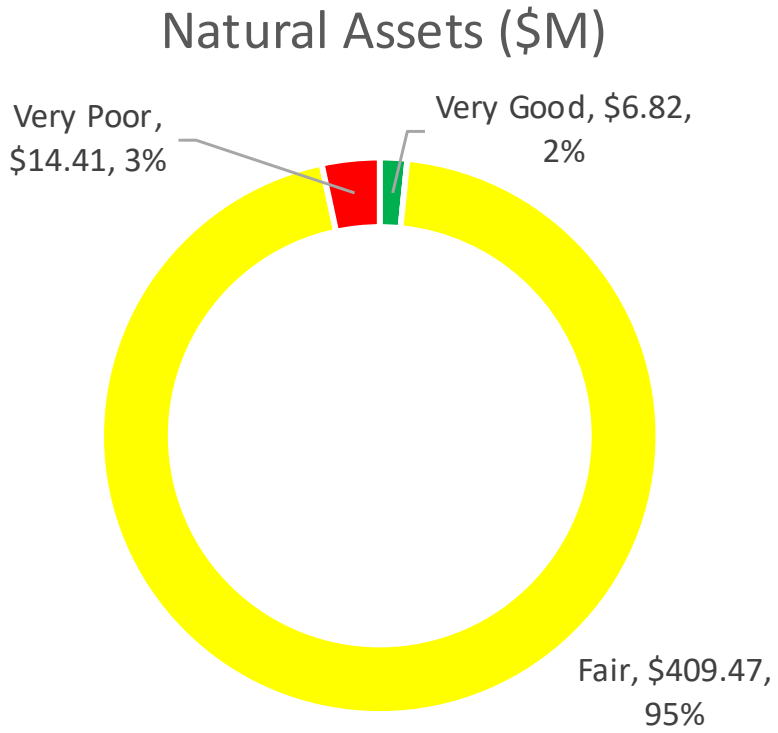
Technology & Tools

- Implement asset management systems that support LID-specific attributes and inspections.
- Use remote monitoring (e.g., soil moisture sensors) to support proactive maintenance.
- Integrate LID features into GIS and hydraulic modeling tools to simulate overall system performance.

Natural Assets

State of Local Infrastructure Summary

Includes: Lakes, Wetlands and Watercourses



Assets in Very Poor Condition

- Two lakes in Very Poor condition – Professors Lakes and Donelly Lake

Natural Assets

Risk Management Summary

Risk Identification

The methodology is discussed in detail in the Risk Management section of the report is applied consistently across all service areas. The table below provides a summary of a guide that can be used to interpret the results of the risk analysis.

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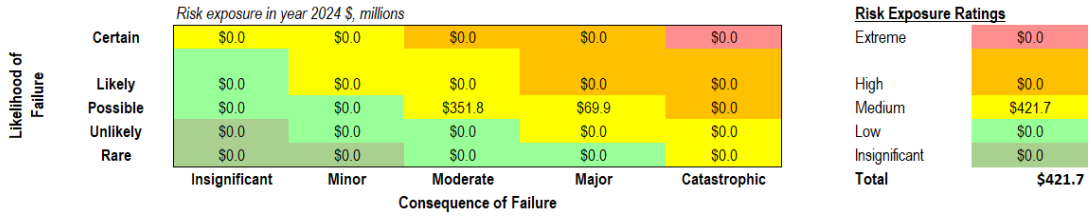
Risk Evaluation



Risk Treatment

Through detailed analysis of the Risk Assessment, the results show:

- The risk map indicates that there are no assets which fall into the Very High or High risk category. That said, all assets are assessed as Moderate risk.
- The analysis indicates that the assets within the Moderate risk category possess a possible likelihood of failure and moderate consequence of failure. The possible likelihood of failure is due to assets being in Fair condition.
- If the nature of the service changes and the consequence of failure increases, these assets will begin to create “High” risk to the City. No further strategies are required to manage this risk at this time.

Natural Assets

Plan Improvement and Monitoring

Data Enhancement & Governance

- Identify and map natural stormwater assets, including their ecological function and service area.
- Align inventory with conservation authority datasets and ecosystem mapping.
- Develop a classification system for tracking asset health and ecosystem services.

Process Optimization

- Develop condition and health monitoring programs (e.g., vegetation health, erosion rates).
- Integrate natural asset services (e.g., flood mitigation, water quality treatment) into lifecycle cost-benefit analysis.
- Coordinate cross-departmental stewardship efforts and land use planning.

Technology & Tools

- Use remote sensing and drone-based surveys to monitor wetland and riparian zone changes.
- Develop natural asset valuation models that inform capital and operational planning.
- Implement dashboards for natural asset performance reporting and risk tracking.