City of Kingston

2024 Asset Management Plan

Executive Summary and Introduction

Volume 1
Infrastructure, Transportation, Transit, & Emergency Services

Volume 2
Corporate Services & Parking Operations

Volume 3
Community Services

Volume 4
Parks, Parkland, & Trails

Volume 5
Police, Libraries, City Real Estate & Environment

KINGSTON

Land Acknowledgement

The City of Kingston acknowledges that we are on the traditional homeland of the Anishinaabe, Haudenosaunee and the Huron-Wendat, and thanks these nations for their care and stewardship over this shared land. Today, the City is committed to working with Indigenous Peoples and all residents to pursue a united path of reconciliation.

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Acronyms and Abbreviations

An abbreviation and an acronym are both shortened versions of something else. Both can often be represented as a series of letters.

AEC	Age Equivalent Correction
AMP	Asset Management Plan
AODA	Accessibility for Ontarians with Disabilities Act
CLP	Climate Leadership Plan
DC	Development Charges
EUL	Expected Useful Life
IIDEA	Indigenization, Inclusion, Diversity, Equity and Accessibility
IS&T	Information Systems and Technology
ISO	International Standards Organization
LOS	Level of Service
OCM	Organizational Change Management
SOLI	State of Local Infrastructure

Executive Summary

The City of Kingston (City) was amalgamated in 1998 and today serves a total population of approximately 154,100 persons, including the permanent population and post-secondary student population not captured by the Census. It is uniquely situated between Toronto, Ottawa, and Montreal with easy access to all three by Highway 401 which runs through the City. With its location along the shores of Lake Ontario, at the mouth of the Cataraqui River, and the start end of the St. Lawrence River, Kingston is surrounded by natural beauty that enhances life for its residents.

Over time, the City has established asset management practices for the management of its infrastructure assets; however, more recent efforts have been made to formalize those practices within an Asset Management Framework. These improvements will result in improved decision-making abilities and sustainable financial practices.

In 2022, the City completed an Asset Management Plan (AMP) for Transportation and Stormwater assets, and in early 2024, one was also completed for Corporate Facilities. Moreover, Utilities Kingston generated the **Water and Wastewater Utilities Asset Management Plans**, which were approved by council in October 2021 (Report Number 21-234), and two additional AMPs, the **Natural Gas Distribution System Asset Management Plan**, and the **Water Heater Asset Management Plan**, in early 2024 (Report Number 24-171).

Moving beyond core assets, this project includes the other infrastructure assets owned by the City to meet Phase 3 of the **Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure.** The asset categories included in the scope of this AMP represent 21 service areas, which were organized into five service groups presented in the following five volumes of the AMP:

- Volume 1 – Infrastructure, Transportation, Transit, & Emergency Services;
- Volume 2 – Corporate Services & Parking Operations;
- Volume 3 – Community Services;
- Volume 4 – Parks, Parkland, & Trails; and,

- Volume 5 – Police, Libraries, City Real Estate & Environment.

The Executive Summary and Introduction has been published as a separate and overarching document for this project. The five volumes of the AMP outline the City's assets and strategies based on the information available at the time of writing the report. Assets will continue to deteriorate over time, requiring additional investments aimed at improving their conditions and extending their useful lives. These measures are essential to ensuring that the infrastructure remains "fit for purpose" in delivering the services.

Regulatory Alignment

Asset management for municipalities is defined in a regulation: **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure**. This regulation builds on an earlier document called "Building Together: Guide for Municipal Asset Management Plans (2012)" and aligns with the international standard ISO55000. The regulation establishes the following four phases of compliance:

Phase 1 - 2019

- A strategic asset management policy.

Phase 2 - 2022

- All core assets to be covered in the asset management plan with current Level of Service (LOS). Core assets include water, wastewater, stormwater, roads and bridges/culverts.

Phase 3 - 2024

- All assets owned by the municipality to be covered in the AMP with current LOS. Non-core assets include buildings, fleet and equipment as well as green infrastructure assets.

Phase 4 - 2025

- Proposed LOS and the lifecycle management and financial strategy for 10-year period to achieve the proposed LOS.

The series of AMPs (Volumes 1 through 5) plus the Facilities AMP address the Phase 3 requirements for all other asset categories except for natural assets. This is the first iteration of an AMP for these service areas. Future updates will need to include green infrastructure assets (i.e., natural assets) owned by the City and further assessment on infrastructure vulnerability to the impacts of climate change.

In the following sub-sections of the Executive Summary the combined highlights from each of the service areas are presented. For more details on each service area, refer to the volume and section of the AMP.

Scope of Assets

The service areas and associated asset classes within the scope of each AMP volume are presented in **Table E-1.**

Table E-1: The Service Area and Asset Classes included in the Scope

Volume – Section	Service Area	Asset Classes
1-2	Transit	On-Street Infrastructure, Concrete Pads, IT & Other Support Equipment, and Benches
1-3	Traffic Control & Safety	Guide Rails, Signs, Streetlights, and Traffic Signals
1-4	Structures	Sidewalks, Wildlife Mitigation Infrastructure, and Minor Culverts (< 3 metre)
1-5	Urban Forestry	Tree Canopy
1-6	Fire & Emergency Services	Facilities, Fleet, and Equipment
1-7	Solid Waste	Disposal, Diversion, and Environmental Control Systems
1-8	Airport Operations	Facilities, Airport Site, Runway, Runway Lighting, IT Software, and Other Equipment
2-2	Corporate Fleet	Vehicles and Fleet Equipment
2-3	Information Systems & Technology (IS&T)	IT Infrastructure, End User Devices, Applications & Software, and Video Camera Systems

Volume – Section	Service Area	Asset Classes
2-4	Parking Equipment, Lots, & Structures	Surface Lots, Parking Structures, Equipment, and Information & Technology
3-2	Heritage Services	Outdoor Collection, Civic Collection, General Heritage Collection, Memorandum of Understanding Collection, Pumphouse Collection, and MacLachlan Woodworking Museum Collection
3-3	Arts & Culture Services	Grand Theatre (Functional Capital) and Tett Centre (Functional Capital)
3-4	Residential Long-Term Care	Facility Equipment, Information Technology (IT), and Resident Direct Care Equipment
3-5	Indoor Recreation & Marinas	Aquatics – Pool & Equipment, Arenas & Equipment, Boat Launches, Community Centre, Crawford Wharf, Fitness Centre & Equipment, and Marinas
4-2	Parks Linear	Fencing, Multi-Use Recreational Trails, Park Land, Pathways, and Shoreline Protection & Seawalls
4-3	Park Amenities	Community Gardens, Multi-Use Courts, Off-Leash Dog Parks, Playgrounds & Equipment, Skateparks, Splash Pads, Sports Fields, and Tennis, Pickleball Courts
4-4	Park Facilities	Maintenance Buildings, Parks (site) Lighting, Picnic Shelters, Plumbing Systems, and Washrooms
4-5	Cemeteries	Land and Structures
5-2	Police Services	Facilities, Fleet Assets, Specialized Equipment, and Information Technology & Telecommunications
5-3	Library Services	Facilities, Fleet Assets, Collections, Custodial Equipment, Other Equipment, Automated Materials Handling, Furniture, Shelving, and Information Technology
5-4	City Real Estate & Environment	Housing & Social Services, Other City-Owned Land Assets, and Environmental Remediation Infrastructure

State of Local Infrastructure

The State of the Local Infrastructure (SOLI) presents the current condition of assets owned and maintained by the City. These assets enable the delivery of various services to residents, community visitors, and staff.

Asset Inventory and Valuation

Table E-2 combines the count and total replacement cost per service area. The estimated total replacement cost (2023) for the 21 service areas is **$1.629 billion** with a total asset count of **661,420**.

Table E-2 Notes

[1] The total replacement cost (2023) for these service areas includes the replacement cost of associated facilities, as listed in the Facilities AMP (2023).

[2] Only one cemetery remains in active operation (Pine Grove Cemetery), the remaining five are inactive.

[3] Inflated from the City of Kingston Parks Asset Management Plan (GHD, 2009).

[4] There is no available replacement cost or valuation data for these assets.

[5] Refer to the City's Facilities AMP (2023).

Table E-2: Asset Inventory Summary Organized by Largest to Smallest Replacement Cost (2023)

Volume – Chapter	Service Area	Asset Count	Total Replacement Cost (2023)
1-4	Structures	11,218	$482.8 M
4-2	Parks Linear	623	$232.4 M
2-2	Corporate Fleet	946	$185.1 M
1-3	Traffic Control & Safety	43,946	$119.4 M
1-6	Kingston Fire & Rescue	168	$118.1 M[1]
4-3	Park Amenities	304	$97.74 M
5-2	Police Services	133	$91.35 M[1]
5-3	Library Services	338,422	$85.07 M[1]
3-4	Residential Long-Term Care	1,057	$76.36 M[1]
1-8	Airport Operations	41	$58.79 M[1]
1-5	Urban Forestry	40,972	$24.58 M
3-5	Indoor Recreation & Marinas	500	$14.56 M
2-4	Parking Equipment, Lots, & Structures	470	$14.09 M
2-3	Information Systems & Technology (IS&T)	2,799	$13.23 M

Volume – Chapter	Service Area	Asset Count	Total Replacement Cost (2023)
1-2	Transit	756	$7.910 M
5-4	City Real Estate & Environment	40	$4.174 M
1-7	Solid Waste	203,833	$2.857 M
4-5	Cemeteries	6[2]	$0.112 M[3]
3-2	Heritage Services	13,195	Unknown[4]
3-3	Arts & Culture Services	1,991	Unknown[4]
4-4	Park Facilities	[5]	[5]
Not Applicable (N/A)	**N/A**	**661,420**	**$1.629 B**

Asset Age and Condition Summary

Based on the condition assessment of all assets in this AMP, assets in Very Poor condition have an estimated replacement cost of **$530 million**, representing approximately 40% of the overall asset portfolio. The condition ranking of approximately 92% of the assets in the AMP was established based on their age and expected useful life, a reasonable approach in the absence of current condition information. However, this estimation can overstate the need to replace assets and not reflect the maintenance efforts to extend useful life of assets.

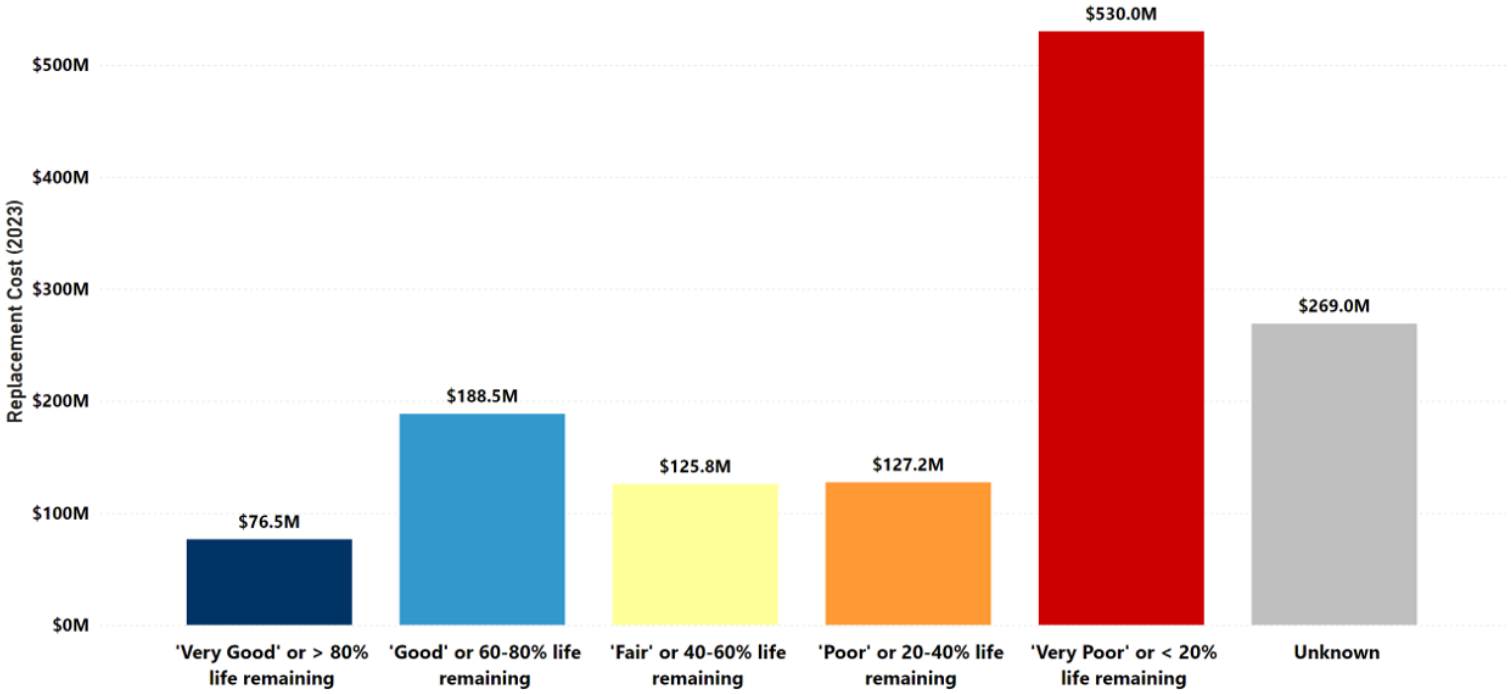
The estimated replacement cost for assets whose condition is identified as “unknown” due to gaps in age records and condition assessment history is **$269 million**. Key asset classes that this has impacted include minor culverts (< 3 metres [m]), streetlights, multi-use recreational trails, parkland, and library collections. The City’s planned efforts to refine age and condition data will enhance the accuracy of forecasted expenditures and future asset management planning.

An overall condition summary for all assets by replacement cost (in 2023 dollars) is shown in **Figure E-1**.

Figure E-1 Notes

[1] This summary figure excludes replacement costs attributed to facilities associated with Kingston Fire & Rescue, Police Services, Library Services, Residential Long-Term Care, and Airport Operations.

Figure E-1: Condition Summary for All Assets by 2023 Replacement Cost



The expected useful life range, average remaining useful life, and the average condition per service area is summarized in **Table E-3**.

Table E-3 Notes

[1] Refer to the City's Facilities AMP (2023)

Table E-3: Expected Useful Life, Remaining Useful Life, and Average Condition

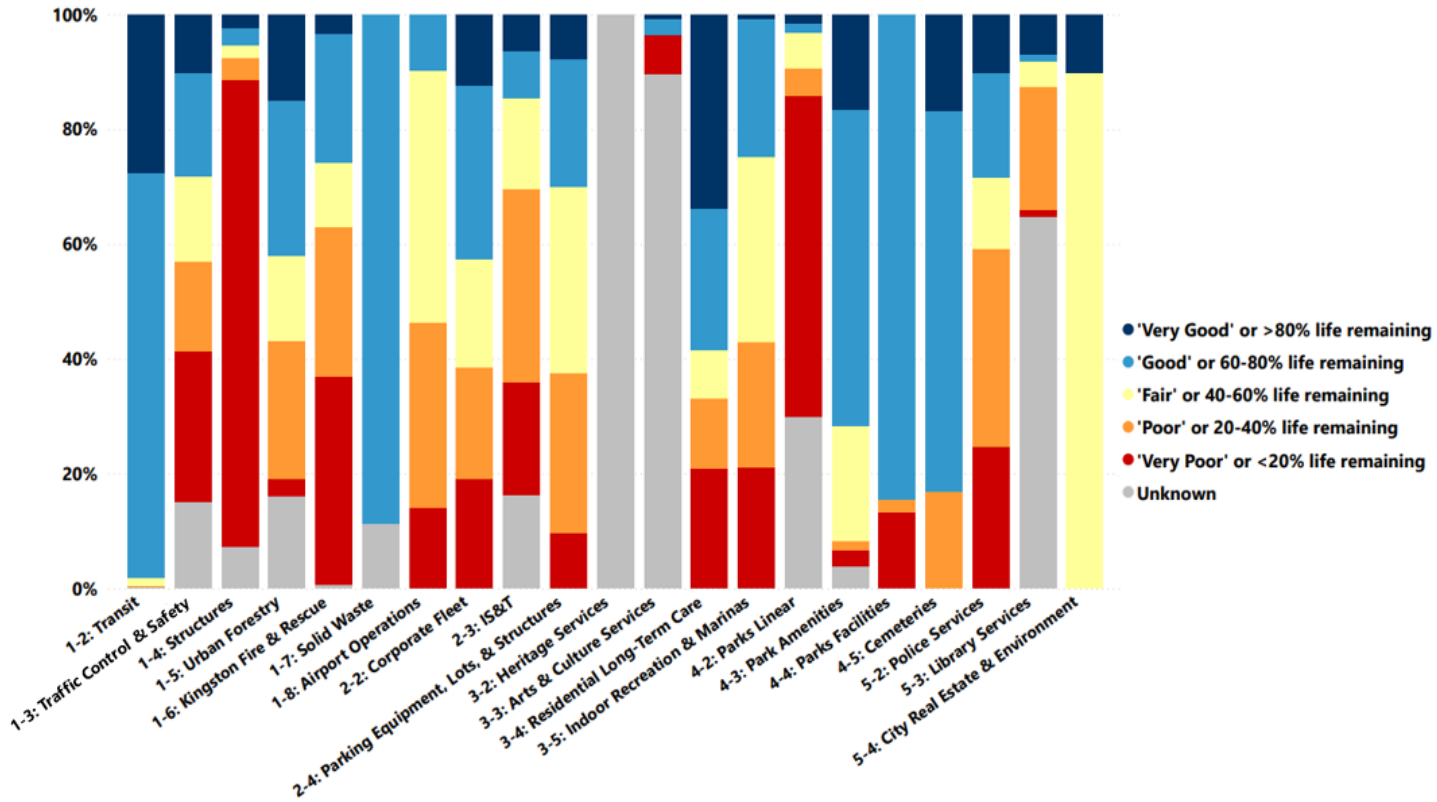
Volume – Chapter	Service Area	Expected Useful Life (Years)	Average Remaining Useful Life (Years)	Average Condition
1-2	Transit	10 to 25	10	Good
1-3	Traffic Control & Safety	12 to 50	7	Poor
1-4	Structures	15 to 50	6	Poor
1-5	Urban Forestry	50	27	Fair
1-6	Kingston Fire & Rescue	10 to 20	4	Poor
1-7	Solid Waste	5 to 15	5	Good
1-8	Airport Operations	10 to 25	8	Fair
2-2	Corporate Fleet	10 to 15	7	Fair
2-3	Information Systems & Technology (IS&T)	5 to 10	2	Poor
2-4	Parking Equipment, Lots, & Structures	3 to 50	13	Fair
3-2	Heritage Services	Indefinite	Indefinite	Unknown
3-3	Arts & Culture Services	10	3	Poor
3-4	Residential Long-Term Care	10 to 15	8	Good
3-5	Indoor Recreation & Marinas	10 to 50	8	Fair
4-2	Parks Linear	20 to 200	5	Poor
4-3	Park Amenities	10 to 30	14	Good
4-4	Park Facilities	[1]	[1]	[1]
4-5	Cemeteries	1000	665	Good
5-2	Police Services	10 to 15	3	Poor
5-3	Library Services	7 to 15	12	Very Good
5-4	City Real Estate & Environment	20 to 30	13	Good

A condition summary by 2023 replacement cost is presented by service area in **Figure E-2**. Assets in Very Poor condition, or less than 20% remaining service life, are presented at the bottom of the stacked bar graph.

Figure E-2 Notes

[1] The replacement costs for assets pertaining to Arts and Culture Services could not be determined at the time of the AMP. As a result, the condition summary for Arts and Culture Services is shown by count.

Figure E-2: Condition Summary by Service Area and 2023 Replacement Cost



Data Sources and Confidence

Data confidence can be estimated based on the confidence level of various qualifiers and can be presented on a scale from 0% (low) to 100% (high), as shown in **Table E-4**. The qualifiers chosen for evaluation are specifically targeted for estimating overall confidence of condition reporting within the SOLI.

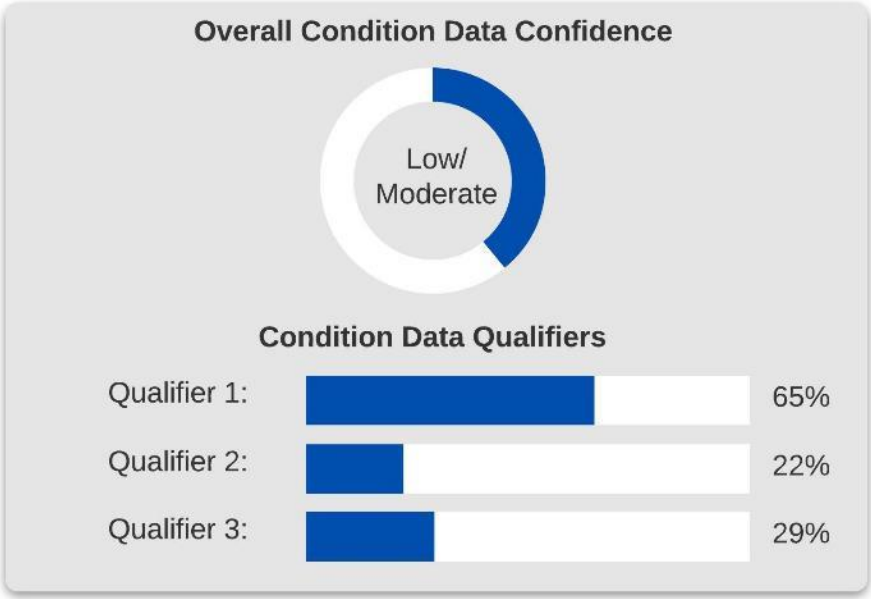
Table E-4: Data Confidence Scale

Confidence Level	Low	Low/ Moderate	Moderate	Moderate/ High	High
Average of Qualifiers	0% to 29%	20% to 39%	40% to 59%	60% to 79%	80% to 100%

Assuming the data source is reliable, the following qualifiers were considered to estimate data confidence regarding the data utilized in the creation of this SOLI report:

- **Qualifier 1**: The percentage of assets in the asset inventory where construction, installation, or acquisition years are documented (65%);
- **Qualifier 2**: The percentage of assets in the asset inventory that have condition assessment data documented (22%); and,
- **Qualifier 3**: The percentage of the estimated overall replacement value, in 2023 dollars, attributed to assets in the asset inventory with documented condition assessment data (i.e., condition is not solely age-based) (29%).

Figure E-3: SOLI Report Data Confidence - All Assets



As summarized in **Figure E-3**, the overall asset condition data confidence for all assets is estimated as Low/Moderate. A summary of the overall data sources and confidence for all service areas is shown in **Table E-5**.

Table E-5 Notes

[1] Refer to the City's Facilities AMP (2023).

Table E-5: Summary of SOLI Report Data Confidence

Report (Volume – Chapter)	Service Area	Qualifier 1	Qualifier 2	Qualifier 3	Condition Data Confidence
1-8	Airport Operations	78%	86%	99%	High
4-3	Park Amenities	66%	96%	99%	High
3-5	Indoor Recreation & Marinas	58%	90%	97%	High
1-5	Urban Forestry	55%	79%	79%	Moderate/High
1-2	Transit	99%	32%	43%	Moderate
2-4	Parking Equipment, Lots, & Structures	61%	20%	73%	Moderate
2-3	Information Systems & Technology (IS&T)	80%	11%	40%	Moderate
3-4	Residential Long-Term Care	100%	2%	3%	Low/Moderate
4-5	Cemeteries	100%	0%	0%	Low/Moderate
5-2	Police Services	100%	0%	0%	Low/Moderate
2-2	Corporate Fleet	99%	0%	0%	Low/Moderate
5-4	City Real Estate & Environment	95%	0%	0%	Low/Moderate
1-4	Structures	93%	0%	0%	Low/Moderate
1-3	Traffic Control & Safety	50%	29%	9%	Low/Moderate
1-6	Kingston Fire & Rescue	87%	0%	0%	Low/Moderate
4-2	Parks Linear	57%	0%	0%	Low
5-3	Library Services	1%	1%	31%	Low
3-2	Heritage Services	12%	0%	0%	Low
3-3	Arts & Culture Services	10%	0%	0%	Low
1-7	Solid Waste	<1%	0%	0%	Low
4-4	Park Facilities	[1]	[1]	[1]	[1]

Levels of Service

Asset management is about the services that the City provides to its end-user or customer. The questions typically asked when assessing Levels of Service (LOS) include: What services do you provide to residents? Are these services meeting their needs, falling below expectations, or exceeding expectations?

LOS is the combination of indicators that reflect the social and economic goals of the City and link an asset's performance to its target performance goals. For this AMP, LOS was described in two perspectives:

- Community Level of Service: intended to be customer-focused, provide a qualitative description (what service do residents receive and care about); and
- Technical Level of Service: based on the physical characteristics of an asset (what the asset can deliver and what is required to meet regulations) and how the asset is currently performing.

LOS is the combination of parameters that reflect the social, political, environmental, and economic outcomes that the municipality delivers (FCM, 2018). The LOS Framework includes one or more parameters that are most relevant for the service area.

Table E-6 summarizes the City's current community and technical Level of Service parameters for each service area.

Table E-6 Notes

[1]There are no current Level of Service performance measures for this service.

[2]Refer to the City's Facilities AMP (2023) for Level of Service information pertaining to this service area.

Table E-6: Summary of Community and Technical LOS Parameters per Service Area

Report (Volume – Chapter)	Service Area	Community LOS	Technical LOS
1-2	Transit	• Accessibility • Availability	• Quality
1-3	Traffic Control & Safety	• Safety	• Quality • Safety
1-4	Structures	• Environmental Acceptability	• Quality
1-5	Urban Forestry	• Capacity	• Quality
1-6	Kingston Fire & Rescue	• Capacity	• Quality
1-7	Solid Waste[1]		
1-8	Airport Operations	• Reliability • Suitability	• Quality
2-2	Corporate Fleet	• Quality • Environmental Acceptability	• Quality
2-3	Information Systems & Technology (IS&T)	• Reliability	• Quality
2-4	Parking Equipment, Lots, & Structures	• Availability	• Quality
3-2	Heritage Services	• Community Satisfaction	• Quality
3-3	Arts & Culture Services	• Customer Satisfaction	• Quality
3-4	Residential Long-Term Care	• Capacity	• Quality
3-5	Indoor Recreation & Marinas	• Customer Satisfaction	• Quality
4-2	Parks Linear	• Quality	• Capacity
4-3	Park Amenities	• Quality	• Safety

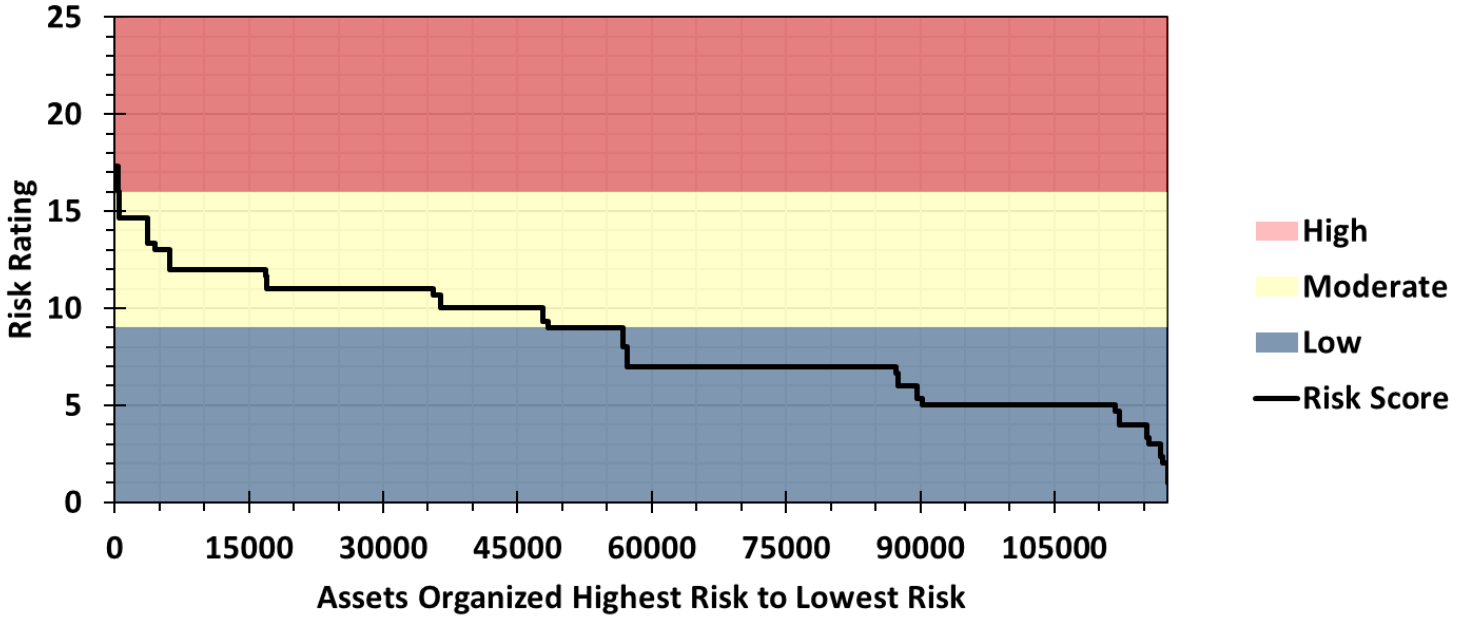
Report (Volume – Chapter)	Service Area	Community LOS	Technical LOS
4-4	Park Facilities[2]		
4-5	Cemeteries	• Availability • Quality	• Availability • Quality
5-2	Police Services	• Quality • Reliability	
5-3	Library Services	• Capacity • Availability	• Quality
5-4	City Real Estate & Environment		• Environmental Acceptability

Risk Assessment

Risk in asset management is a key component to assist in making informed decisions on assets. Although risk often focuses on the performance of the infrastructure itself, it is important to also consider how the overall system operates and identify potential barriers to achieving the LOS.

The Risk profile of all service areas is displayed in **Figure E-4**. Of the assets tracked within the asset inventory, approximately 0.5% are classified as High risk, 41% are classified as Moderate risk, and the remaining 58.5% of assets are Low risk.

Figure E-4: Risk Profile - All Assets



For further information on the risk approach, methodology, and analysis, refer to **Section 1.6.3** of the Introduction.

Asset Management Strategy

A core objective in asset management is to proactively extend the useful life of assets where possible, by ensuring existing deterioration is well understood and properly addressed through timely maintenance, rehabilitation, and replacement activities. The provision of reliable infrastructure is crucial for ensuring that the City can continue to deliver reliable services to its current residents. As the City's existing assets age, significant reinvestment will be required for the replacement of deteriorated assets to ensure service delivery. It is important to note that forecasting in most of the lifecycle models within this AMP rely heavily on age and expected useful life (EUL) to determine renewal or replacement needs in the absence of asset condition data.

A summary of the 10-year annual average capital reinvestment needs per service area is shown in **Table E-7** and **Figure E-5.** The project average annual capital reinvestment required for all assets within the AMP over the next decade is estimated to be **$77.56 million** per year.

Table E-7 Notes

[1] At the time of preparing this AMP, no condition assessment data could be leveraged for Sidewalks and Minor Culverts (< 3 m) and forecasted reinvestment has been derived primarily based on age and expected useful life. Many of these assets are documented to pre-date 1950 which hints at potential inaccuracies within the age data. It is recommended that the City further refines their data for Sidewalks and Minor Culverts (< 3 m) including the collection of condition assessment data to be considered in subsequent iterations of the AMP. Refinement of age and condition data by the City will assist at refining forecasted expenditures in the years to come.

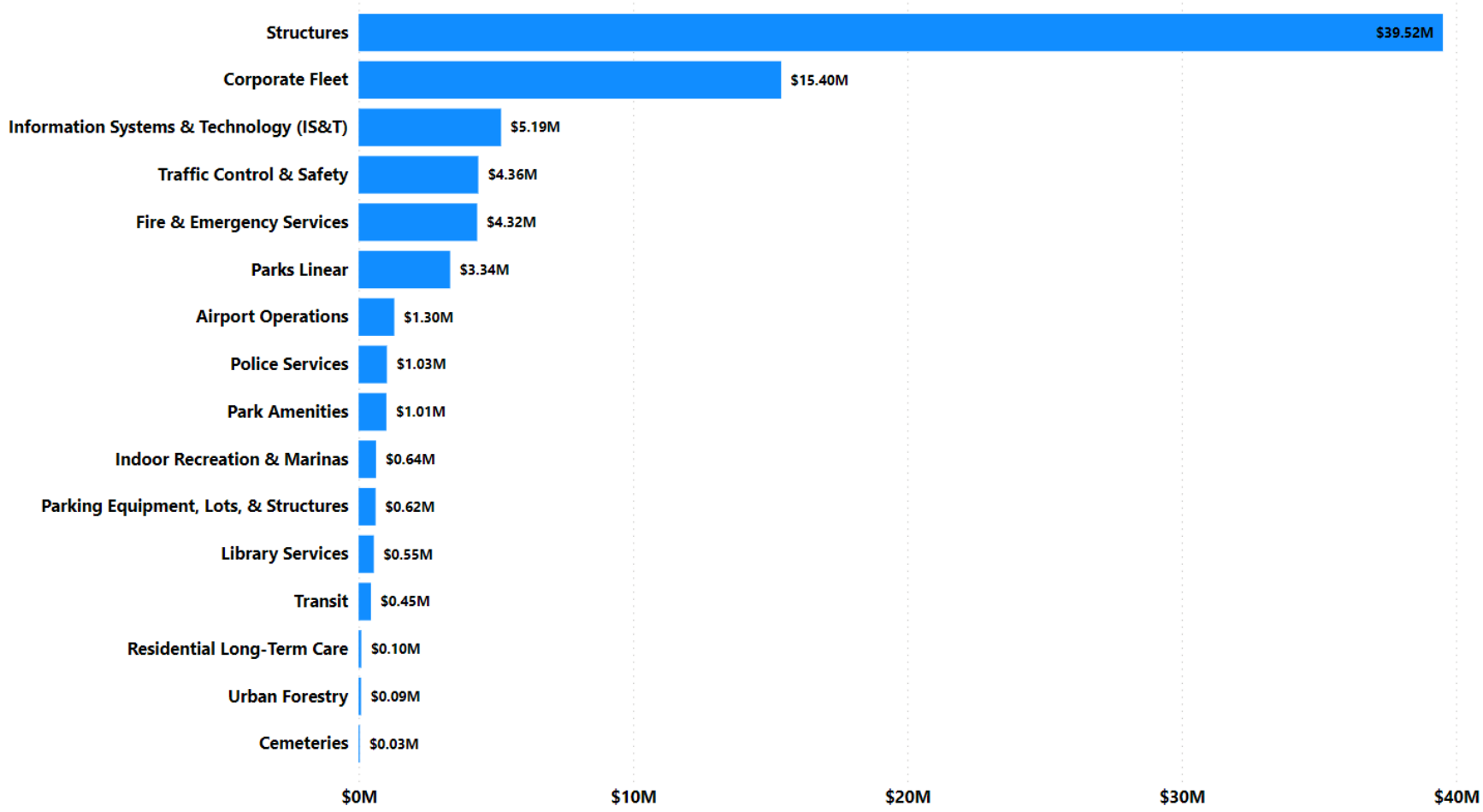
[2] Asset replacement forecasts could not be developed for this service area at this time due to significant asset data gaps.

[3] Refer to the City's Facilities AMP (2023).

Table E-7: Summary of 10-Year Capital Reinvestment Needs per Service Area

Volume – Chapter	Service Area	10-Year Annual Average
1-4	Structures	$39.52 M[1]
2-2	Corporate Fleet	$15.40 M
2-3	Information Systems & Technology (IS&T)	$5.190 M
1-3	Traffic Control & Safety	$4.360 M
1-6	Kingston Fire & Rescue	$4.320 M
4-2	Parks Linear	$3.340 M
1-8	Airport Operations	$1.300 M
5-2	Police Services	$1.030 M
3-5	Indoor Recreation & Marinas	$0.636 M
4-3	Park Amenities	$0.632 M
2-4	Parking Equipment, Lots, & Structures	$0.620 M
5-3	Library Services	$0.552 M
1-2	Transit	$0.450 M
3-4	Residential Long-Term Care	$0.095 M
1-5	Urban Forestry	$0.087 M
4-5	Cemeteries	$0.030 M
1-7	Solid Waste	[2]
3-2	Heritage Services	[2]
3-3	Arts & Culture Services	[2]
4-4	Park Facilities	[3]
5-4	City Real Estate & Environment	[2]
N/A	**N/A**	**$77.56 M**

Figure E-5: Summary of 10-Year Capital Reinvestment Needs per Service Area



Note: The 10-year annual average reinvestment needs for Solid Waste, Heritage Services, Arts & Culture Services, and City Real Estate & Environment could not be developed at this time due to significant data gaps. Reinvestment for Parks Facilities is detailed in the City's Facilities AMP (2023). Consequently, these service areas have been excluded from the figure.

Roadmap with Next Steps

Asset management is a continuous improvement activity and completion of this AMP is a first iteration of documentation of the assets within the 21 service areas. The City will continue to regularly review and update asset data and asset management documentation. O. Reg. 588/17 requires that all municipalities update their asset management plans for July 1, 2025, to include proposed levels of service and financing strategies to achieve the proposed levels of service.

The final section in the Introduction presents the Roadmap with Next Steps. This section presents the upcoming regulatory requirements and recommendations to prepare for future updates, with 12 general recommendations, and specific recommendations for each volume.

Acknowledgements

A project of this breadth and scope could not be completed without significant contributions from a large team of individuals from across the organization. The project team would like to express appreciation to City staff and Council for their cooperation and input to this AMP. We acknowledge their commitment and flexibility to contribute to this important document representing 21 service areas and the infrastructure assets that deliver those important services to the community.

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- Brandon Forest, Director of Business, Real Estate, and Environment
- Saru Bajwa, Land Development Manager
- Brodie Richmond, Manager Environmental Operations and Programs
- Rachel Mcgeachie, Project Manager Housing and Homelessness

About this Report

Dillon Consulting Limited (Dillon) was retained by the City of Kingston (City) to help generate their first Asset Management Plan for 21 service areas to meet the requirements of **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure,** as amended by O. Reg. 193/21. The core consulting team for the project is presented below.

Consulting Team

- Darla Campbell, Project Manager
- Liza Guilbeau, Project Coordinator
- Taylor McNeill, Asset Management Coordinator
- Austen Underhill, Data Lead
- Megan Gallie, Asset Analyst

1.0 Introduction

The City of Kingston (City) was amalgamated in 1998 and today serves a total population of approximately 154,100 persons, including the permanent population and post-secondary student population not captured by the Census. It is uniquely situated between Toronto, Ottawa, and Montreal with easy access to all three by Highway 401 which runs through the City. With its location along the shores of Lake Ontario, at the mouth of the Cataraqui River, and the start end of the St. Lawrence River, Kingston is surrounded by natural beauty that enhances life for its residents.

Introduction

Kingston's economy is centered on public institutions and establishments including Queens University, the Royal Military College of Canada, St. Lawrence College, as well as healthcare, correctional, and military facilities. The City has played a unique role in the history of Canada, including a brief stint as the Nation's first capital. Today you can see this reflected in its historical downtown and monuments.

Over time, the City has established asset management practices for the management of its infrastructure assets; however, more recent efforts have been made to formalize those practices within an Asset Management Framework. These improvements will result in improved decision-making abilities and sustainable financial practices.

Kingston's Asset Management Framework already includes the Strategic Asset Management Policy, accepted by Council in 2019, Report #19-091. This policy is intended to define the City's expectations, key principles, and governance framework for the practice of asset management at the City. The policy, along with other documents related to asset management are all developed to be in alignment with the City's Strategic Plan, as well as other important planning documents.

As per the most recent strategic plan, the City has established priorities for the current term, up until 2026. All these priorities are in some way supported by the City's infrastructure, thus improvements to the management of that infrastructure will support the achievement of these priorities.

In 2022, the City completed an Asset Management Plan (AMP) for Transportation and Stormwater assets, and in early 2024, one was also completed for Corporate Facilities. Moreover, Utilities Kingston generated the **Water and Wastewater Utilities Asset Management Plans**, which were approved by council in October 2021 (Report Number 21-234), and two additional AMPs, the **Natural Gas Distribution System Asset Management Plan**, and the **Water Heater Asset Management Plan**, in early 2024 (Report Number 24-171).

Moving beyond core assets, this project includes the other infrastructure assets owned by the City to meet Phase 3 of the **Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure.** The 21 service areas, were organized into five service groups, and are presented in the following five volumes of the AMP:

- Volume 1 – Infrastructure, Transportation, Transit, & Emergency Services;
- Volume 2 – Corporate Services & Parking Operations;
- Volume 3 – Community Services;
- Volume 4 – Parks, Parkland, & Trails; and
- Volume 5 – Police, Libraries, City Real Estate & Environment.

The five volumes of the AMP outline the City's assets and strategies based on the information available at the time of writing the volumes. Assets will continue to deteriorate over time, requiring additional investments aimed at improving their conditions and extending their useful lives. These measures are essential to ensuring that the infrastructure remains "fit for purpose" in delivering critical municipal services.

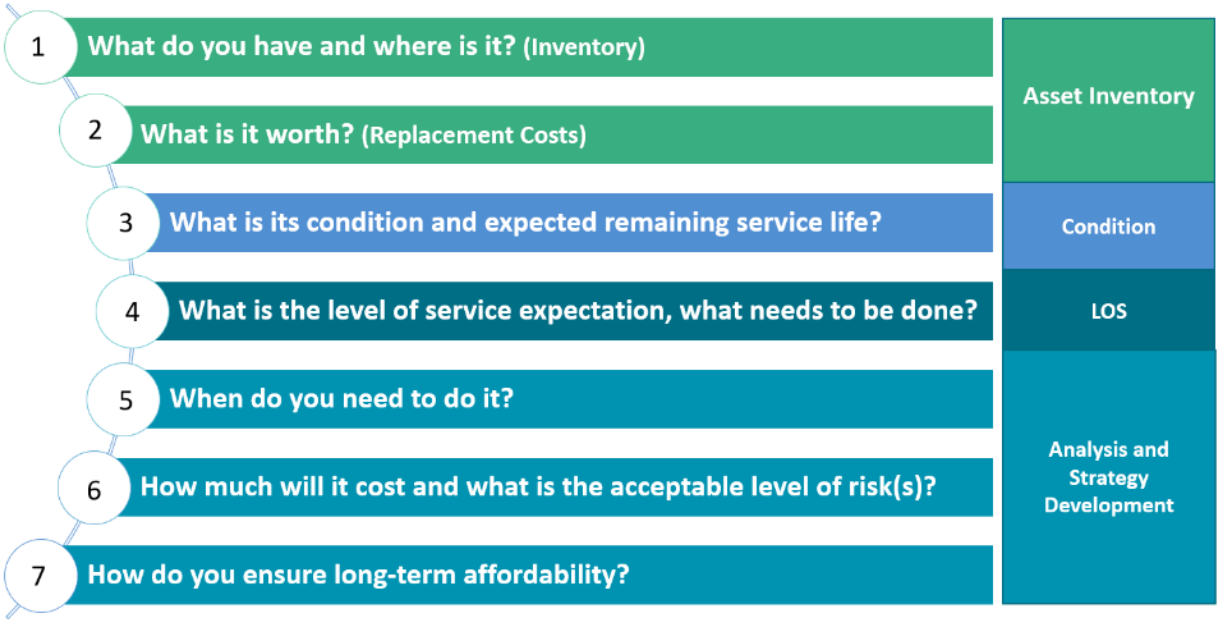
The introduction presents key asset management concepts including alignment with strategic plan, policy, and regulation. It identifies the scope of assets included in the volumes and provides an overview of the sections for each service area which include: the State of the Local Infrastructure, Levels of Service, Risk Assessment, and the Asset Management Strategy. The introduction also presents a section on Growth and a Roadmap with Next Steps outlined.

1.1 Asset Management

Asset management is a coordinated activity of an organization to realize value from assets, where the realization of value normally involves balancing costs, risks, opportunities, and performance benefits (as defined in ISO 55000). Asset management is a process used in decision-making. It helps us care for the infrastructure that delivers valuable services to our community in a way that considers the service needs of our community, manages risks and opportunities, and uses resources wisely (as defined by the Federation of Canadian Municipalities).

Value from services is delivered to the community through the performance of the assets. It is the performance that delivers value which requires a balancing of cost and risk. The essential questions in asset management, as presented in **Figure 1-1**, demonstrate the overall process of asset management from establishing the asset inventory, to asset condition, to levels of service, and the strategies to deliver the service.

Figure 1-1: Essential Questions in Asset Management

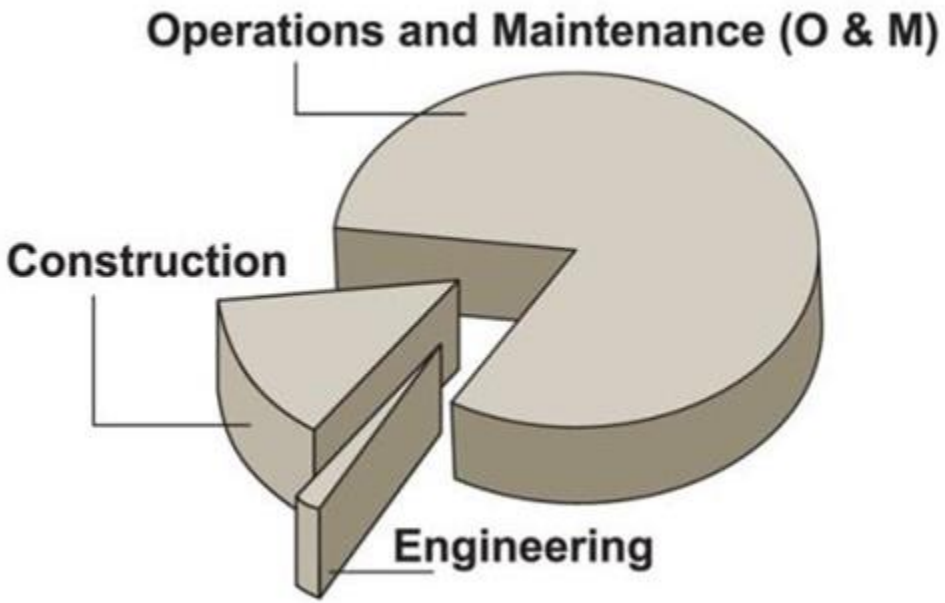


This AMP, the City's first-generation AMP for all other assets (i.e., outside core assets), helps to establish an asset inventory (Questions 1 and 2), estimate asset condition and estimate asset expected remaining useful life (Question 3), document current levels of service (Question 4), and inform when assets are expected to be due for replacement along with the estimated cost (Questions 5 and Part of Question 6).

Asset management is a process of deriving the best possible decisions regarding the creation, maintenance, renewal, rehabilitation, disposal, expansion, and procurement of infrastructure assets. The objective of asset management is to maximize the benefits of the assets, minimize risk and provide satisfactory levels of service to the public in a sustainable manner. It considers risks related to the lifecycle of the assets and requires a multi-disciplinary team of planning, finance, engineering, technology, maintenance, and operations.

Asset management considers the full lifecycle of the infrastructure, not just the initial cost for designing and constructing the asset (20%), but the ongoing operations and maintenance costs (80%), see **Figure 1-2**.

Figure 1-2: Lifecycle Costs (InfraGuide 2005)



The provision of reliable infrastructure is essential to deliver services to the community and accommodate growth in an environmentally, socially, and economically sustainable manner.

To ensure that the City can provide reliable infrastructure to meet the needs of residents both now and in the future, it has developed and implemented an AMP. The purpose of the plan is to identify the technical and financial needs of assets well in advance of a major asset renewal or replacement, enabling the City to strategically plan for these major projects and investments should the timing of the needs coincide.

1.2 Scope of Assets

The service areas within the scope of each AMP volume are presented in **Table 1-1.**

Table 1-1: Assets within the Scope of the AMP

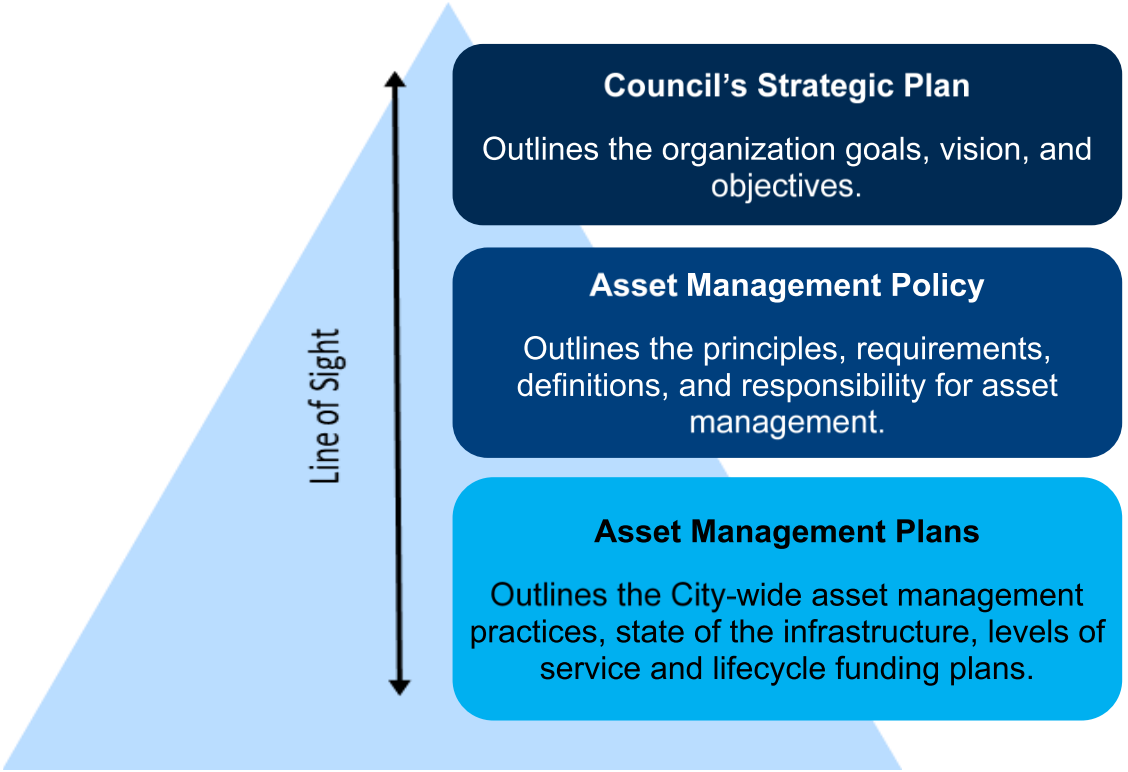
Volume	Service Areas
1 - Infrastructure, Transportation, Transit, & Emergency Services	• Transit • Traffic Control & Safety • Structures • Urban Forestry • Kingston Fire & Rescue • Solid Waste • Airport Operations
2 - Corporate Services & Parking Operations	• Corporate Fleet • Information Systems & Technology • Parking Equipment, Lots & Structures
3 - Community Services	• Heritage Services • Arts & Culture Services • Residential Long-Term Care • Indoor Recreation & Marinas
4 - Parks, Parkland, & Trails	• Park Linear • Park Amenities • Park Facilities • Cemeteries
5 - Police, Libraries, City Real Estate & Environment	• Library Services • Police Services • City Real Estate & Environment

1.3 Alignment with Strategic Plan, Policy, and Regulation

1.3.1 Alignment with the City's Vision, Mission, Values and Strategic Priorities

A fundamental concept of asset management is to provide a clear line of sight between the organizational objectives, asset management objectives and any related asset management activities. When determining the purpose and desired outcomes of asset management for the City, it is crucial to consider the City's broad goals and overall strategic direction. See **Figure 1-3** for line of sight from the Strategic Plan through Policy to Asset Management Plans.

Figure 1-3: Line of Sight between Strategic Objectives and Asset Management Plans



Introduction

The City's Vision, Mission, and Values statements define what the City strives to provide for its citizens and the methods it intends to utilize. In June of 2024, these statements were recently updated after feedback and collaboration from Council and City employees from across the corporation. The City redefined its path with a clear Vision, inspiring Mission, and updated core Values as outlined below.

- **Vision**: Vibrant. Sustainable. Inclusive. Elevating our communities, together.
- **Mission:** We embrace innovation, foster collaboration, respect the environment, and provide exceptional services that reflect the needs of a diverse community.

- **Values:**
  - **Belonging:** We create an accessible and inclusive environment where every individual is accepted and valued for their diverse perspectives and identities.
  - **Collaboration**: We build strong relationships with each other, residents, businesses, community organizations and other partners to achieve our shared goals.
  - **Accountability:** We work with integrity to ensure transparency and responsiveness in meeting the needs and concerns of the community.
  - **Innovation**: We strive to find creative solutions and new opportunities to improve our services and operations.

In May of 2023, Council approved the **2023 to 2026 Strategic Plan** with the following five pillars:

1. Support Housing Affordability
2. Lead Environmental Stewardship and Climate Action
3. Build an Active and Connected Community
4. Foster a Caring and Inclusive Community
5. Drive Inclusive Economic Growth

In addition, Council has identified Foundational Principles that will help to build the City's organizational resilience, capacity, and culture to deliver on the City's Strategic priorities. These include:

- Invest in the organization's capacity.
- Invest in the process improvement.
- Maintain financial sustainability.
- Advance Indigenization, Inclusion, Diversity, Equity and Accessibility (IIDEA) in the corporation.
- Continue to advance community partnerships and advocacy with other levels of government.

1.3.2 Alignment with the Asset Management Policy

The City's Asset Management Policy (19-091) has defined key principles and a governance framework to be used in support of the City's organizational goals as they apply to the asset management system. These are presented in **Table 1-2**.

Table 1-2: Key Asset Management Principles

Principle	Definition
Holistic	Take a comprehensive approach that looks at the "big picture" (i.e. the combined implications of managing all aspects rather than a compartmental approach). This includes the functional interdependencies and contributions of assets within asset systems and the different management of assets across all lifecycle phases.
Systematic	Take a methodical approach (i.e. formal, repeatable, and consistent) to the management of assets.
Systemic	Make asset investment decisions in an asset system context, not just to optimize the individual asset itself.
Risk-based	Manage asset risk associated with attaining levels of service and focusing resources, expenditures, and priorities based on risk and associated cost/benefit.
Optimal	Make asset investment decisions based on trade-offs between competing factors of service levels (including asset performance), risk and cost.

Principle	Definition
Sustainable	Take a long-term, lifecycle-based approach in estimating asset investment and activities, thus developing effective asset management strategies for the long term.
Integrated	Coordinate the above principles to ensure the delivery of justified services and well-defined outcomes.
Aligned	Ensure that the asset management system complements the strategic objectives of the City, as well as other key business systems, legislation, and regulation.

The policy, along with other documents related to asset management are all developed to be in alignment with the City's Strategic Plan, as well as other important planning documents.

1.3.3 Regulatory Alignment

Asset management for municipalities is defined in a regulation: **O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure**. This regulation builds on an earlier document called "Building Together: Guide for Municipal Asset Management Plans (2012)" and aligns with the international standard ISO55000. The regulation establishes the following four phases of compliance:

Phase 1 - 2019

- A strategic asset management policy.

Phase 2 - 2022

- All core assets to be covered in the asset management plan with current Level of Service (LOS). Core assets include water, wastewater, stormwater, roads and bridges/culverts.

Phase 3 - 2024

- All assets owned by the municipality to be covered in the AMP with current LOS. Non-core assets include buildings, fleet and equipment as well as green infrastructure assets.

Phase 4 - 2025

- Proposed LOS and the lifecycle management and financial strategy for 10-year period to achieve the proposed LOS.

The series of AMPs (Volumes 1 through 5) plus the Facilities AMP address the Phase 3 requirements for all other asset categories except for natural assets. This is the first iteration of an AMP for these service areas. Future updates will need to include green infrastructure assets (i.e., natural assets) owned by the City and further assessment on infrastructure vulnerability to the impacts of climate change.

Inclusive of all other assets owned by the City, the AMP volumes identify the required investments to maintain service delivery for the next 10 years. The plan should be updated on an ongoing basis with the availability of new information, and the regulation requires annual reporting to Council on the progress (and barriers) to implementing the AMP.

1.4 Governance and Relationship to Other Planning Documents

In support of aligning asset management with other planning initiatives at the City, it is necessary to integrate this plan and any future iterations with other planning documents. **Table 1-3** summarizes some of these key planning documents.

Table 1-3: Key Planning Documents

Key Planning Document	Purpose
Kingston's Strategic Plan	The document sets the strategic vision and priorities for the current Council term.
Official Plan	This plan outlines the land-use planning goals and policies for physical development, protection of natural and cultural heritage, resource management, and necessary supporting infrastructure.
Climate Leadership Plan (CLP)	Updated in 2021, this plan is an integrated corporate and community change management strategy which outlines the impacts of ongoing initiatives, objectives, and actions to chart a path of achieving the City's target of carbon neutrality by 2040.
Emergency Management Plan	The plan assigns responsibilities and guides the actions of key officials in the event of an emergency.
Utilities Kingston Asset Management Plans	Provides an overview of the state of the infrastructure, levels of service, lifecycle management strategies and financial strategies for water, wastewater assets, as well as other assets operated by Utilities Kingston.
Multi-year Accessibility Plan	Outlines the strategies in place to prevent and remove barriers and meet the requirements under the Accessibility for Ontarians with Disabilities Act (AODA) and the Integrated Accessibility Standards Regulation. Applies to Customer Service, Employment, Transportation, Information and Communication and Design of Public Spaces.

Key Planning Document	Purpose
Multi-year Capital Plan	The plan outlines and guides the 15-year capital expenditures for infrastructure replacement and renewal (including other capital priorities).
Multi-year Financial Plan	The plan shows the 4-year operating budget to fund day-to-day operations.
Development Charges Study	The DC Study identifies the growth driven infrastructure investments that will be required to accommodate a larger population served.
Corporate Plans	The Corporate plans recommend the preferred long-term strategies for the infrastructure or programs. The City currently has plans for and incorporates updates as required in the following: Integrated Mobility Plan (formally Transportation Master Plan), Transit Service Plan, Waterfront Master Plan, Parks and Recreation Master Plan, Urban Forest Management Plan, 10-Year Municipal Housing and Homelessness Plan, Community Safety and Well-being Plan, Public Art Master Plan.

1.5 Growth

In 2023, the City completed a “Population, Housing & Employment Projections” study. The study was conducted to provide a basis for the City’s long-range land use, transportation, infrastructure, and capital expenditure planning. The study is completed every five years based on updated Statistics Canada Census data. Within this study, the City identified three growth scenarios (low, medium and high) spanning a period of 30 years (up to the year 2051, using 2021 Census data).

The growth scenarios for population, housing, and employment are summarized in **Table 1-4** below.

Table 1-4: Growth Scenarios (Low, Medium, High)

Scenario	Permanent Population	Total Population (permanent & students)	Permanent Housing (number of units)	Total households (permanent & students)	Employment (number of jobs)
Existing (2021)	136,600	154,100	57,800	62,900	71,900
Low Growth (2051)	186,600	210,500	80,800	88,200	107,800
Medium Growth (2051)	197,000	220,900	84,800	92,200	113,900
High Growth (2051)	207,400	231,300	88,500	95,900	119,900

In December 2023, the medium growth scenario was adopted by Council and therefore the recommended growth forecast scenario to be used by the City. The forecasted growth in 5-year intervals in shown in **Table 1-5.**

Table 1-5: Forecasted Growth in 5-Year intervals for Medium Growth Scenario

Year	Permanent Population	Total Population (permanent & students)	Permanent Housing (number of units)	Total households (permanent & students)	Employment (number of jobs)
2021	136,300	154,100	57,800	62,900	71,900
2026	148,000	166,800	63,000	68,600	85,900
2031	158,900	178,400	67,800	73,600	92,700
2036	169,900	189,500	72,600	78,500	98,800
2041	179,600	200,700	77,000	83,300	104,500
2046	188,800	211,200	80,900	87,800	109,300

As a community grows, so does the need for infrastructure assets to deliver services to the expanding community. New assets and assets that require expanded capacity to serve a growing population will be identified in Master Plans and reflected in the Development Charges study.

Asset management focuses on maintaining assets already owned by the City. From that perspective, the impact of growth is addressed in the AMP for each of the service categories. For example, from higher usage of assets and more wear and tear that could reduce the useful life of assets.

As the City continues to grow, it is imperative to strike a balance between addressing the maintenance and enhancement of existing infrastructure and strategically planning for the development of new infrastructure. This approach ensures sustainable growth while meeting the evolving needs of the community.

1.6 Overview of the AMP

For each service area, the information is presented in a consistent manner in the following sub-sections:

- State of the Local Infrastructure;
- Levels of Service;

- Risk Assessment; and
- Asset Management Strategy.

The methodology and approach for each of these sub-sections are described below.

1.6.1 State of the Local Infrastructure

The State of the Local Infrastructure (SOLI) presents the current condition of assets owned and maintained by the City. These assets enable the delivery of various services to residents, community visitors and staff. The SOLI sets out the following information as established in the regulation:

- A summary of the assets in the service category;
- The estimated replacement cost in 2023 dollars of the assets in the service category;
- The average age of the assets in the service category;
- The information available on the condition of the assets in the service category;
- The available expected useful life and remaining useful life for all assets; and
- A description of the City's approach to assessing the condition of the assets in the service category, based on recognized and generally accepted practices where appropriate.

1.6.1.1 Asset Hierarchy

Asset management relies on asset data to make informed decisions. For the City, assets encompass a variety of services and organizing asset information requires as a first step, the development of an asset hierarchy. The asset hierarchy provides a **line of sight** for which asset classes and sub-classes belong to each service before identifying each individual asset.

Asset data serves as the foundation of the asset hierarchy and ultimately allows the City to make informed evidence-based decisions about their assets. By implementing robust asset data management practices, the City will be able to understand both the current and future needs of their assets through the intentional collection of meaningful attributes such as age, condition, construction material, and replacement value. The levels for the City's asset hierarchy are presented in **Table 1-6**.

Table 1-6: Asset Hierarchy Overview with an Example

Level	Level Name	Description	Example
1	Asset Group	Assets have been divided into five (5) groups.	Group 2: Corporate Services & Parking Operations
2	Service Area	Service provided to City staff or the community.	Corporate Fleet
3	Asset Class	Individual functional units within the Service Area.	Vehicles
4	Asset Sub-Class	Additional classification of assets within each asset class as applicable	Light Duty

1.6.1.2 Asset Condition

To standardize the methodology for evaluating and reporting on the condition of the assets, a condition rating for each asset was organized and assigned using a 5-scale rating system which is based on the Canadian Infrastructure Report Card (2019) produced by the Canadian Network of Asset Managers and several other Canadian Associations. **Table 1-7** outlines the rating system which ranges from 1 (Very Good) to 5 (Very Poor).

Table 1-7: Condition Rating System

Condition Rating	Condition Grade	Remaining Useful Life	Description
1	Very Good	more than 80%	Physically sound, performing as intended and resembles "like-new" condition.
2	Good	60% - 80%	Physically sound and performing as intended. Needs to be re-inspected in the medium term.
3	Fair	40% - 60%	Showing deterioration, with some elements physically deficient. Early stages of decay are becoming evident.
4	Poor	20% - 40%	Major portion of asset is physically deficient. It is not functioning properly due to significant deterioration and is a candidate for replacement in the short term.
5	Very Poor	less than 20%	Asset is physically unsound. There is a high probability it will fail, or it already has. Immediate replacement is required.
N/A	Unknown	N/A	No or limited data to estimate the condition of the asset.

Where the condition is reported as "unknown", this indicates a data gap that the City will focus on filling in subsequent iterations of the AMPs.

The asset information was compiled into the asset inventory, which was used to report on the condition ratings for the assets. A hybrid approach was used, considering: 1) the age of the asset; 2) expected useful life (EUL); and 3) the last known condition rating assigned to the asset. **It is important to note that if condition assessment information was not available, a straight-line asset deterioration was assumed to calculate the condition ratings based on remaining useful life, as outlined in Table 1-7. Due to existing data gaps, this method was employed to evaluate the condition of approximately 92% of the assets in this AMP.**

Straight-line deterioration is a concept derived from the more commonly known accounting calculation referred to as “Straight-Line Depreciation”. This principle assumes a uniform rate of reduction in an asset’s value from the asset’s purchase price down to its value at the end of its useful life. In this case, the concept is applied to an asset’s physical condition deteriorating over time. Straight-line deterioration is a common practice in asset management used to forecast asset replacement schedules based on historical information, in the absence of a recent visual condition assessment.

For assets where a last-known condition was recorded, age-equivalent corrections were used to determine an appropriate condition rating assuming straight-line deterioration, but also considering the last known condition. As part of this calculation, each asset or asset element’s EUL was extrapolated along the condition rating scale and an upper limit, lower limit, and mid-point were generated for each condition grade centered on the remaining useful life of the asset and in alignment with **Table 1-7** above. To establish the age equivalent correction (AEC) for an asset considering last known condition, the following equation was applied:

$$\text{AEC} = \text{Mid Point of the Last Known Condition Rating (Years)} - \text{Years Since Last Known Condition}$$

1.6.2 Levels of Service

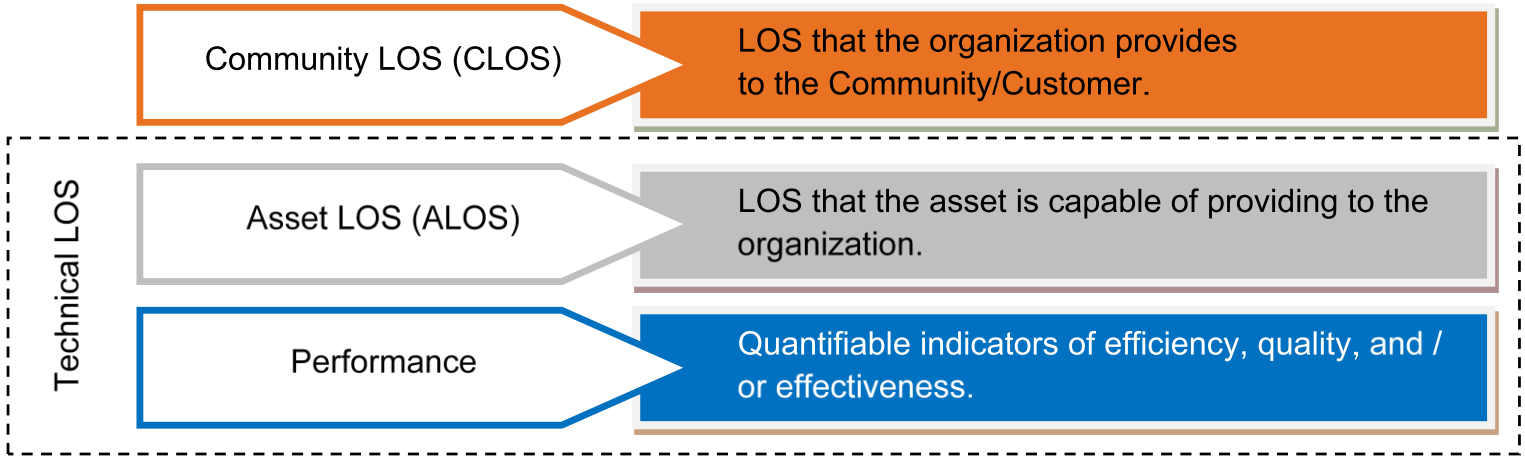
Asset management focuses on the critical municipal services that the City provides to its end-user or customer. The questions typically asked when assessing Levels of Service (LOS) include: What services do you provide to residents? Are these services meeting their needs, falling below expectations, or exceeding expectations?

LOS is the combination of indicators that reflect the social and economic goals of the City and link an asset’s performance to its target performance goals. For this AMP, LOS was described in two perspectives:

- **Community Level of Service:** intended to be customer-focused, provide a qualitative description (what service do residents receive and care about); and
- **Technical Level of Service:** based on the physical characteristics of an asset (what the asset can deliver and what is required to meet regulations) and how the asset is currently performing.

Figure 1-4 presents the Community and Technical LOS definitions.

Figure 1-4: Levels of Service Definitions



1.6.2.1 Developing the LOS Framework

LOS is the combination of parameters that reflect the social, political, environmental, and economic outcomes that the municipality delivers (FCM, 2018). The ten LOS parameters established in ISO55000 to define service levels are shown in **Figure 1-5**. The LOS Framework includes one or more parameter that is most relevant for the service area.

Figure 1-5: LOS Parameters (ISO 55000)

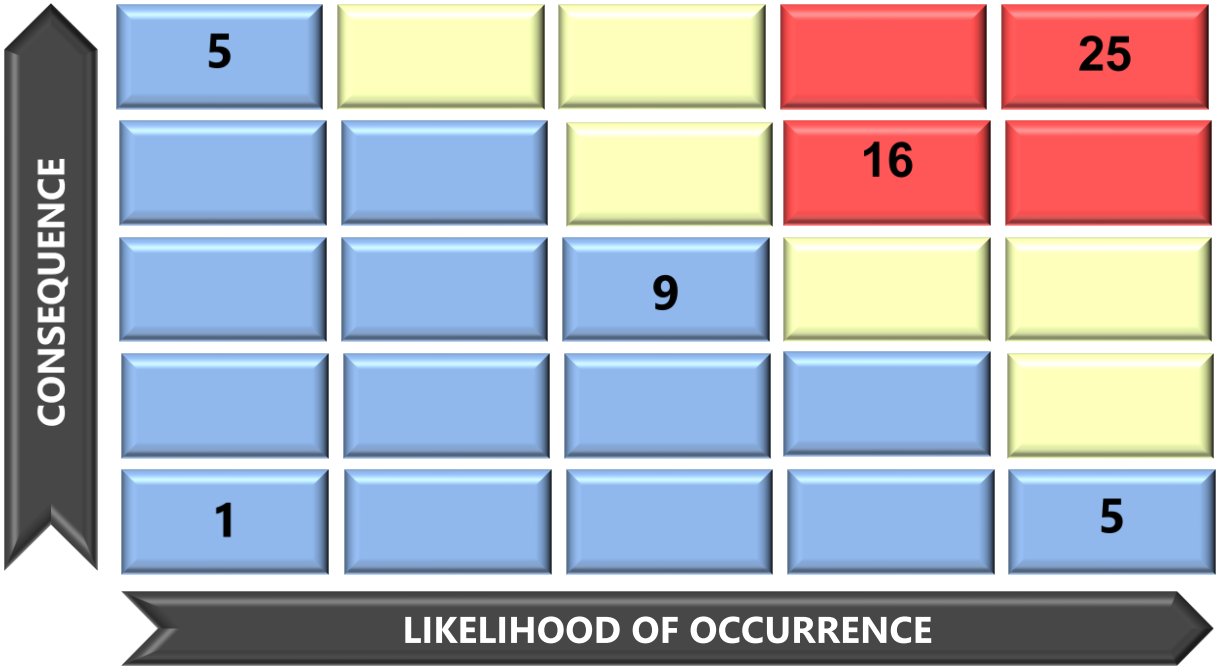
The LOS Framework was developed through a series of workshops with City staff.

1.6.3 Risk Assessment

Risk in asset management is a key component to assist in making informed decisions on assets. Although risk often focuses on the performance of the infrastructure itself, it is important to also consider how the overall system operates and identify potential barriers to achieving the LOS.

The assets with the highest risk rating help identify the priorities for the City. As part of assessing risk, this methodology considers the factors that increase the likelihood of a hazard occurring (or non-delivery of service) and the consequence. **Figure 1-6** presents a risk “heat map” plotting likelihood and consequence in a 5 by 5 matrix with a maximum risk score of 25.

Figure 1-6: Risk Matrix



High risks are shown in the red zone (risk rating 16 to 25), moderate risks are shown in the yellow zone (risk ratings of 10 to 15) and low risks are in blue zone (risk ratings of 1 to 9).

The approach and methodology to risk assessment is presented in the following sections. A risk profile organizing the assets from the highest risk to the lowest risk is presented in the corresponding section for each asset service area.

1.6.3.1 Risk Methodology & Approach

Risk is the likelihood and magnitude of a negative scenario (hazard) occurring that limits the ability of the asset to deliver the service. Risk is the consideration of asset failure and the consequence of the failure.

RISK = LIKELIHOOD OF OCCURRENCE x CONSEQUENCE

The consequence considers the severity of the impact, vulnerability of the asset, and exposure to the negative scenario. Applying the methodology of a score of 1 to 5 for the likelihood of occurrence and the consequence, the maximum risk rating is 25 (high).

Calculation of Likelihood

The factors that contribute to the likelihood of occurrence (failure) include:

- A – Condition of the asset;
- B – Performance (reliability); and
- C – Vulnerability to climate change.

Table 1-8 provides a description of these factors.

Table 1-8: Likelihood Factors

Factors	Low (1)	Low/ Moderate (2)	Moderate (3)	Moderate/ High (4)	High (5)
A – Condition	Very Good	Good	Fair	Poor	Very Poor
B – Performance	Always Reliable	N/A	Usually Reliable	N/A	Not Reliable
C – Climate Change	No or limited impact, quick recovery, or mitigation in place 0-1 Interactions	Limited impact, or mitigation in place 2 Interactions	Limited impact with slower recovery; mitigation plan not in place 3 Interactions	Moderate impact; no or limited mitigation plan 4 Interactions	High impact; no or limited mitigation plan 5-6 Interactions

By separating condition and performance as two separate factors, there is an opportunity to consider assets in poor condition that may still be performing well, compared to those that are not performing, as well as good condition assets that may not be reliable. The climate change factor brings into consideration assets that are vulnerable to climate change scenarios such as intense rainfall, increased temperatures, extreme weather, and drought.

Therefore, the likelihood of failure is (A + B + C)/3. This is the average of the factors, assuming they are equally weighted.

Calculation of Consequence

The question to consider when calculating consequence is: What increases the impact of non-delivery of services (or failure of the asset)?

The factors that contribute to the consequence rating include:

- D – Impact or severity; and
- E – Importance of the asset in delivering service.

Both impact and importance contribute to the consequence and will be multiplied by the likelihood of occurrence. The two ratings are added together for a maximum consequence score of 5. Consequence will be D + E. See **Table 1-9** for the description of consequence factors.

Table 1-9: Consequence Factors

Factors	Low	Moderate	High
D – Impact	Low or no impact (0)	Moderate impact (1)	High impact (2)
E – Importance of the asset in delivering service	Low importance (1)	Moderate importance (2)	High importance (3)

Introduction

The impact and importance ratings were established in consultation with city staff. The most important assets for delivering service were identified, as well as moderate and low importance. How the importance rankings were applied in each asset category is presented for each asset category.

Calculation of Risk

The risk calculation for each of the assets is determined as follows.

RISK = LIKELIHOOD OF OCCURRENCE X CONSEQUENCE

RISK = (A + B + C)/3 X (D + E)

Where:

A = Condition

B = Performance

C = Climate Change

D = Impact

E = Importance of the Asset

Climate Change

Climate change is one of the most complex challenges facing municipalities. Ontario has experienced a significant number of recent extreme weather events and its adverse impacts such as flooding, ice storms, power outages, and infrastructure damage. It is expected that patterns such as rising average temperatures, shifting historical precipitation patterns with increased intensity, duration and frequency of storm events and periods of drought, increasing windstorms, and fluctuations in lake levels are anticipated to continue and AMPs must consider the impact of climate change on delivering services in the City.

In the Risk workshop, staff considered the following climate hazards and identified low, moderate, or high vulnerability for each asset category:

- Mean Annual Temperature;
- Number of Hot Days (> 25 Celsius [C]);
- Heavy Snow Events;
- Heavy Rain Events;
- Extreme Weather Events; and
- Occurrence and Magnitude of Flooding.

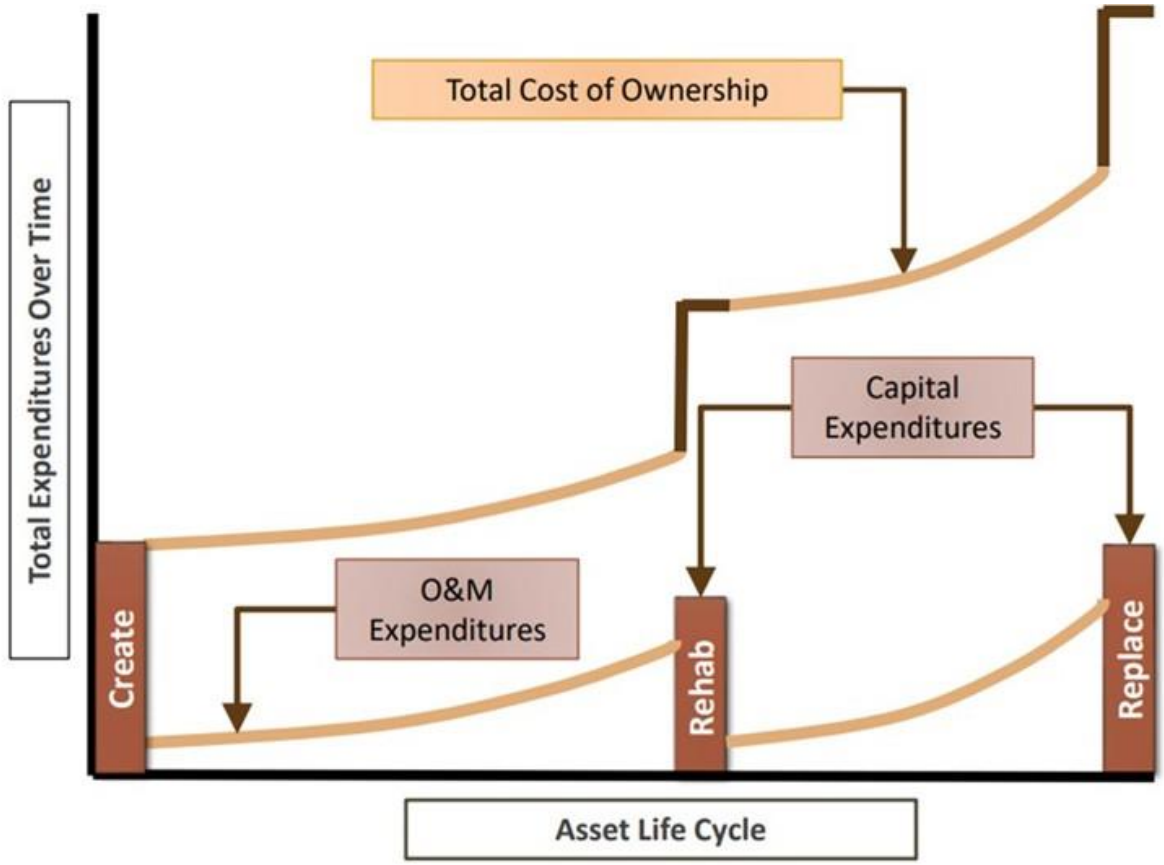
This information was applied to the “C” factor in the likelihood of failure calculation.

1.6.4 Asset Management Strategy

A core objective in asset management is to proactively extend the useful life of assets where possible, by ensuring existing deterioration is well understood and properly addressed through timely maintenance, rehabilitation, and replacement activities. The provision of reliable infrastructure is crucial for ensuring that the City can continue to deliver reliable services to the community. As the City’s existing assets age, significant reinvestment will be required for the replacement of deteriorated assets to ensure appropriate service delivery.

Figure 1-7 depicts the full lifecycle of an infrastructure asset and demonstrates the cumulative cost of ownership which increases throughout the asset’s service life and amounts to far more than the initial investment. An infrastructure asset’s lifecycle begins in the planning and design phase, where the need for the new asset is identified and a strategic plan is created. This is followed by the first asset-related expenditure which is the initial investment to construct or create the asset. Once the asset has been created, the asset enters the operational phase, requiring regular maintenance to keep it functional. Over time, as deterioration increases, capital reinvestment is required to extend the useful life of the asset and prolong service delivery through rehabilitation. After rehabilitation, the asset re-enters the operational phase, accumulating additional costs associated with operations and maintenance before reaching the end of its useful life and requiring replacement.

Figure 1-7: Cumulative Cost of Asset Ownership (AMONTario)



The lifecycle activities include activities that can be undertaken over an asset's useful life. These activities, under O. Reg. 588/17, are defined to include constructing, maintaining, renewing, operating, and decommissioning of assets and all engineering and design work associated with these activities. Further, the **Building Together – Guide for Municipal Asset Management Plans (Municipality of Infrastructure)** categorizes lifecycle activities into the following categories: non-infrastructure solutions, maintenance, renewal/rehabilitation, replacement, disposal, and expansion activities. Lifecycle activities have been identified for each of the asset categories within this AMP.

Lifecycle modeling allows the City to understand the future reinvestment needs of existing assets by generating a theoretical asset replacement forecast that considers available asset inventory data. The age, EUL, replacement cost, condition, and risk score of each asset can be leveraged within the lifecycle model to proactively plan for reinvestment over a period of interest to maintain or increase LOS. Asset replacement forecasts within this AMP estimate the required 10-year reinvestment for assets within each asset class, based on available asset inventory data.

The Asset Management Strategy is presented in two parts, first, on lifecycle activities and second on funding those lifecycle activities.

1.6.5 Roadmap with Next Steps

1.6.5.1 Next Steps – Regulatory Compliance

Proposed Levels of Service: Establish proposed Levels of Service and a financing strategy to deliver the proposed Levels of Service, as described in section 6 of the regulation, required by July 1, 2025.

Green Infrastructure Assets and Climate: The inclusion of green infrastructure assets (e.g., natural assets) owned by the City and consideration of vulnerabilities caused by climate change on the performance of all infrastructure.

Strategic Asset Management Policy: Review and, if necessary, update the Strategic Asset Management Policy every five years.

Annual Review of Progress: As required by O. Reg. 588/17, municipalities will conduct an annual review and report to their Councils at least once per year on the current progress of asset management in the Municipality and any barriers to aligning operations with the AMP and a strategy to address any barriers.

Full Update of AMP: A full update of the AMP will be required at least every 5 years after the plan is completed under section 6.

1.6.5.2 Next Steps – Recommendations to Prepare for Future Update

This section focuses on recommendations identified through the development of the AMP volumes. These recommendations are based on experience with limited or outdated data, gaps or barriers to reporting on levels of service and performance, or the desire to apply global best practices to advance asset management at the City. The recommendations have been summarized in tables by general recommendation and specific recommendations for each of the volumes.

Table 1-10: General Recommendations

Item	Type	Recommendation
GR - 1	Asset Data	Continue to update the asset inventory on a regular basis as new assets are added and end-of-life assets are disposed of.
GR - 2	Asset Data	Develop an overall plan for condition assessments, including a standardized process for updating condition information, the appropriate frequency for gathering new condition information and a review of software platform(s) used to store and consolidate that data (technology review).
GR - 3	Asset Data	Update risk scores as new condition information becomes available and as other changes in the inventory or performance occur (e.g., new climate hazards).
GR - 4	Asset Data	Incorporate risk in the prioritization of capital projects and adjust the risk score when the capital project is completed.
GR - 5	Performance	Review the Level of Service framework and seek opportunities to improve.
GR - 6	Performance	Monitor the performance of assets on a regular basis and generate a dashboard for regular reporting.
GR - 7	Performance	Review the Risk framework and look for opportunities to improve it.
GR - 8	Organizational Development	Incorporate asset management training and awareness into staff professional development and training programs.
GR - 9	Organizational Development	Expand Asset Management Steering Committee to include additional representatives and establish “Terms of Reference”.
GR - 10	Organizational Development	Develop and implement a Change Management and Communication Plan with consideration of the governance of the asset management program.
GR-11	Organizational Development	Conduct a review of technology and business practices that support asset management at the City. Develop a roadmap for implementation.
GR -12	Organizational Development	Network and share ideas and best practices with other municipal peers on asset management processes and data governance.

Table 1-11: Volume 1 – Infrastructure, Transportation, Transit, & Emergency Services

Item	Type	Recommendation
V1 - 1	Asset Data	No data was available for concrete pads and benches associated with transit shelters and transit stations, or assets associated with transit locations administered through service agreements between the City and third-party property owners, including a park and ride location and bus terminals.
V1 - 2	Asset Data	Significant data gaps were present in the available data for Minor Culverts (< 3 m), impacting the ability to estimate replacement costing. The City should further refine their data for culverts, including the collection of construction materials and sizing attributes.
V1 - 3	Asset Data	No condition assessment data could be leveraged for Sidewalks and Minor Culverts (< 3 m) and forecasted reinvestment has been derived primarily based on age and expected useful life.
V1 - 4	Asset Data	Develop a formal asset inventory of Solid Waste assets to better inform future AMP iterations.
V1 - 5	Asset Data	At the time of the report, no data was available for certain Information & Technology assets. This is currently being compiled to be updated in the 2025 update.
V1 - 6	Asset Data	Complete updates to Kingston Fire & Rescue fleet and maintenance data including setting up appropriate class codes within M5 system and incorporating maintenance data on light duty fleet assets.
V1 - 7	Asset Data	Integrate Traffic Signal, Streetlight, and Transit Shelter asset information in Cartegraph Asset Management System.
V1 - 8	Performance	Increase transit services to rural areas throughout Kingston and expand the services to more evenings and holidays.
V1 - 9	Performance	Continuous upgrades at transfer points and bus stop infrastructure to ensure users have a safe and comfortable waiting location.

Item	Type	Recommendation
V1 - 10	Performance	Include additional park and ride lots to allow users to park their vehicles and use public transportation.
V1 - 11	Performance	Incorporate transit priority measures to improve transit travel time.
V1 - 12	Performance	Enhance transit technology to allow for real-time bus arrival, automatic passenger counting, automatic vehicle location, etc.
V1 - 13	Performance	Segregate streetlight and traffic signal service calls to split out those during extreme weather events.

Table 1-12: Volume 2 – Corporate Services & Parking Operations

Item	Type	Recommendation
V2 - 1	Asset Data	Further develop the asset inventories for Video Camera Systems (Information Systems and Technology Service Category) and Information and Technology assets (Parking Equipment) as there was currently no data available for these asset classes. This is currently being compiled to be updated in the 2025 update.
V2 - 2	Asset Data	Develop an overarching data management plan for Information System Technology to track costing for maintaining and managing the data the City currently owns.
V2 - 3	Asset Data	Develop a strategy for software management for each asset service area to ensure that all software being used by the City can be effectively observed and the full extent of the software assets and costs associated with each asset category can be tracked under one central system.
V2 - 4	Asset Data	Continue the migration of all Corporate Wide-Fleet assets to the Asset Works (Fleet Focus M5) Enterprise Fleet Management Information System. This will allow the timely tracking of maintenance activities and ensure replacement and maintenance schedules are being met.

Item	Type	Recommendation
V2 - 5	Asset Data	All fleet asset Expected Useful Lives (EUL) should be re-examined over the course of the next 5-year update period, especially as new fleet technologies evolve, including advancements in zero-emission vehicles.
V2 - 6	Asset Data	To increase the fleet asset condition data confidence rating and to supplement existing mandatory provincial safety and preventative maintenance inspections, an additional condition matrix is recommended to be implemented.
V2 - 7	Asset Data	Establish and develop an Asset Data Management Strategy to help standardize the collection and reporting of asset and condition information.
V2 - 8	Performance	Expand the collection of performance data to be able to track and report how the assets are performing and to assist the City in establishing targets for proposed LOS.

Table 1-13: Volume 3 – Community Services

Item	Type	Recommendation
V3 - 1	Asset Data	Investigate whether Proficio can be configured to summarize asset condition data for all assets (Civic collection and Public Art) within an asset class in tabular format to better inform future AMPs.
V3 - 2	Asset Data	No data was available at the time of this report for Crawford Wharf assets. The City should further develop an inventory of assets comprising the asset class to be considered in subsequent iterations of this AMP.
V3 - 3	Asset Data	Integration of ice plant condition assessment results into future capital planning.
V3 - 4	Asset Data	Complete Marina Infrastructure Assessment for the Portsmouth Olympic Harbour.

Table 1-14: Volume 4 – Parks, Parkland, & Trails

Item	Type	Recommendation
V4 - 1	Asset Data	No data was available for the Fencing asset class.
V4 - 2	Asset Data	It is recommended that a condition assessment is completed for Park Land and Shoreline Protection & Seawalls assets.
V4 - 3	Asset Data	No data was available for the Community Gardens asset class. This asset class is not included in this AMP. It is recommended that the City further develops an inventory of these asset classes to be considered in subsequent iterations of this AMP.
V4 - 4	Asset Data	No data was available for Structures located at cemeteries. The City should further develop an inventory of these asset classes to be considered in subsequent iterations of this AMP.

Table 1-15: Volume 5 – Police, Libraries, City Real Estate & Environment

Item	Type	Recommendation
V5 - 1	Asset Data	No data was available for two asset classes for Kingston Police: Specialized Equipment and Information Technology & Telecommunications. The City should further develop an inventory of these asset classes to be considered in subsequent iterations of this AMP.
V5 - 2	Asset Data	For Kingston Police, continue the migration of Fleet asset registry and maintenance-related work order data to the Asset Works (Fleet Focus M5) Enterprise Fleet Management Information System. This will allow the timely tracking of maintenance activities and ensure replacement and maintenance schedules are being met.

Item	Type	Recommendation
V5 - 3	Asset Data	Data for Library Collections assets was limited to high-level summaries of pooled assets. As a result, the condition of these assets and the required reinvestment could not be determined. In the 2025 update, the team at KFPL will work to provide additional reporting from the Integrated Library System (ILS) used to track collection assets.
V5 - 4	Asset Data	Adopt asset register tool to track other equipment and information technology assets for KFPL.