Asset Management Plan

Comprehensive Citywide AMP

City of Belleville

June 27, 2022

→ The Power of Commitment

Contents

Appendices

1. Executive Summary

This Corporate Asset Management Plan (AMP) documents the assets in the City of Belleville's (the City's) inventory, the level of service they provide, the risks associated with delivering these services, the lifecycle activities required to ensure the asset remain in safe and operable condition and the financial costs associated with performing these activities. This AMP is intended to be a 'living document' that should be periodically reviewed and updated. It has been developed in accordance with the Ontario Regulation (O.Reg) 588/17 'Asset Management Planning for Municipal Infrastructure' and includes elements of best practice from other standards including the International Standard ISO 55000 series for Asset Management.

1.1 State of Infrastructure

The AMP describes the replacement value, physical condition, and relative age of the City's asset portfolio, organized by asset category. The assets that the City owns have a total replacement value of approximately **$2.3 billion,** as shown graphically below, organized by asset category.

The following graph summarizes the replacement value and the distribution of physical condition of the City's asset portfolio, organized by the asset groups that comprise the service area. The City's assets are in **GOOD** condition, with over **77.8%** percent of the City's assets in fair or better condition, which is referred to as a "state of good repair".

Total Asset Valuation (2020$)
$2.3 billion

Average Asset Condition (2020)
GOOD

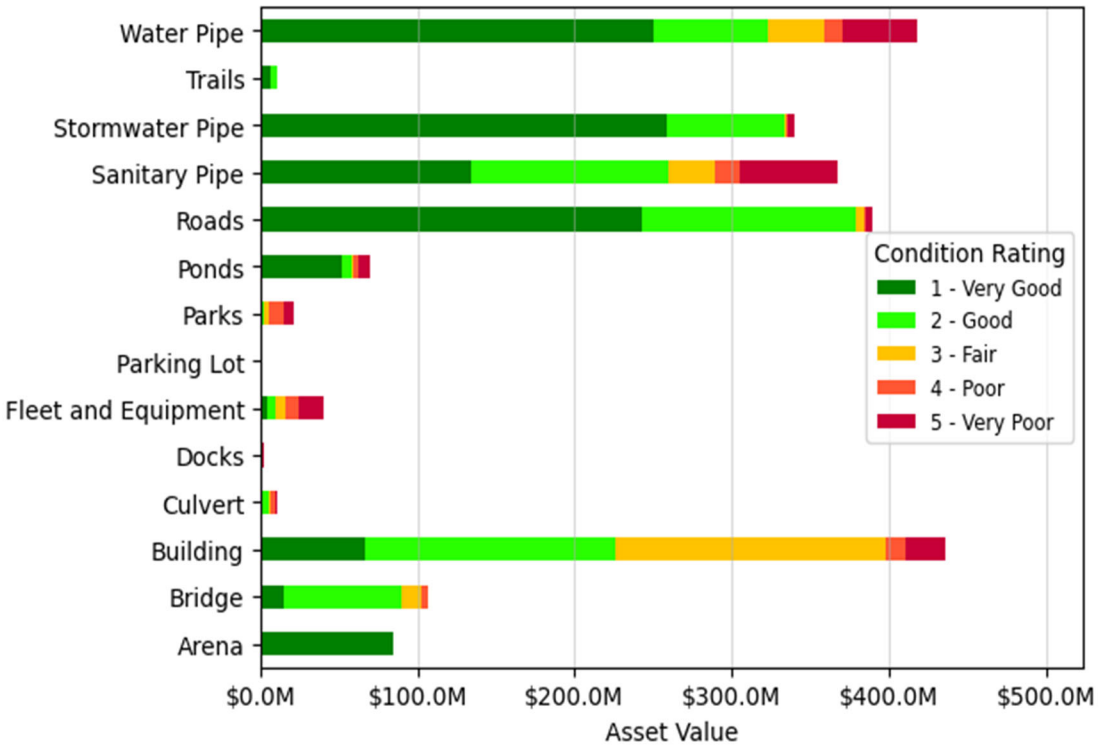


Figure 1.1 Condition by Asset Class

Nonetheless, approximately **$234.7 million** worth of the City's assets, or **10.1 percent** of the portfolio's value, are shown in poor or extremely poor physical condition and are approaching "end of life". The City aims to deliver the required performance at the best possible cost over an asset's life cycle within an acceptable level of risk. For an asset that poses a low to moderate risk to performance, the lowest-cost decision is often to replace it at the end of its useful life, known as a "run to failure" management strategy. The City evaluates the physical condition with criticality to identify the assets that are approaching end of life and are critical to essential service delivery. The City also develops risk mitigation plans for these critical assets and includes them in 10-year capital renewal programs and budget forecasts and maintenance plans and budgets.

1.2 Level of Service

In January 2018, the Province of Ontario enacted Ontario Regulation 588/17 'Asset Management Planning for Municipal Infrastructure' under the Infrastructure for Jobs and Prosperity Act, 2015. The regulation requires municipalities to develop an Asset Management Plan based on Current Levels of Service by July 1st, 2022, for core assets, which include roads, bridges, culverts, and pipes. This requirement extends to all other municipal infrastructure by July 1st, 2024. By July 1st, 2025, a more advanced Asset Management Plan (Proposed Levels of Service) is required for all assets.

The Asset Management Plan provides the measures for existing performance on current customer and technical levels of service for the City's services in accordance with the O.Reg. 588/17 requirements. The following table provides the technical metrics

Table 1.1 Core Assets Community Level or Service

Asset Type	Service Attribute	Technical Levels of Service	2020 Performance
Water	Scope	Percentage of properties connected to the municipal water system.	76%
		Percentage of properties where fire flow is available.	99%
	Reliability	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.	0.004
		The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.	6.67
Wastewater	Scope	Percentage of properties connected to the municipal wastewater system.	75%
	Reliability	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.	5
		The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	15.83
		The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	12
Stormwater	Scope	Percentage of properties in municipality resilient to a 100-year storm.	94.6%
		Percentage of the municipal stormwater management system resilient to a 5-year storm.	99.5%
Roads	Scope	Number of lane-kilometres of each of arterial roads, collector roads	Arterial: 0.22

Asset Type	Service Attribute	Technical Levels of Service	2020 Performance
		and local roads as a proportion of square kilometres of land area of the municipality.	Collection: 0.46 Local: 1.09
	Quality	For paved roads in the municipality, the average pavement condition index value.	83
Bridges & Culverts	Scope	Percentage of bridges in the municipality with loading or dimensional restrictions.	None
	Quality	For bridges in the municipality, the average bridge condition index value.	74.1
		For structural culverts in the municipality, the average bridge condition index value.	67.5

1.3 Demand

Asset management helps the City manage change and business transformation challenges for services. These challenges are recognized in the form of demand drivers. Services are delivered to the residents of City based upon the requirements and defined capacities, available funding, and allocated resources. The levels of service (LOS) provided is intended to meet the demands for services. Therefore, understanding changes in demand placed on services is advantageous in the planning of affordable, sustainable, and desirable community services.

This AMP summarizes the changes in demand, key drivers, their impacts, and strategies to manage the demand:

– **Demand Drivers** – challenges, trends and drivers which may affect current services.
– **Demand Impact or Forecast** – outlines the impact of the demand drivers and forecasts the changes to the City's assets.
– **Demand Management Strategies** - sets out the City's lifecycle management strategies (maintenance and renewal strategies), or additional infrastructure in response to the demand.
– **Emerging Drivers** – Those challenges, trends and drivers which may affect current services in the future (next 10 years)

1.4 Asset Lifecycle Strategies

Asset Lifecycle Strategies summarizes the asset management strategies (i.e., planned actions) that will enable the assets to provide the required levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost. These actions or activities include:

1. Expansion (Growth and Upgrade)
2. Operations
3. Maintenance
4. Renewal (Rehabilitation and Replacement)
5. Disposal

Each of these asset management activities has an inherent cost associated with performing the work. The cumulative cost of all the activities required throughout an asset's lifecycle is referred to as the asset's lifecycle cost. A visual representation of a theoretical asset's lifecycle and the accumulative lifecycle cost or cost of ownership is shown in Figure 1.2

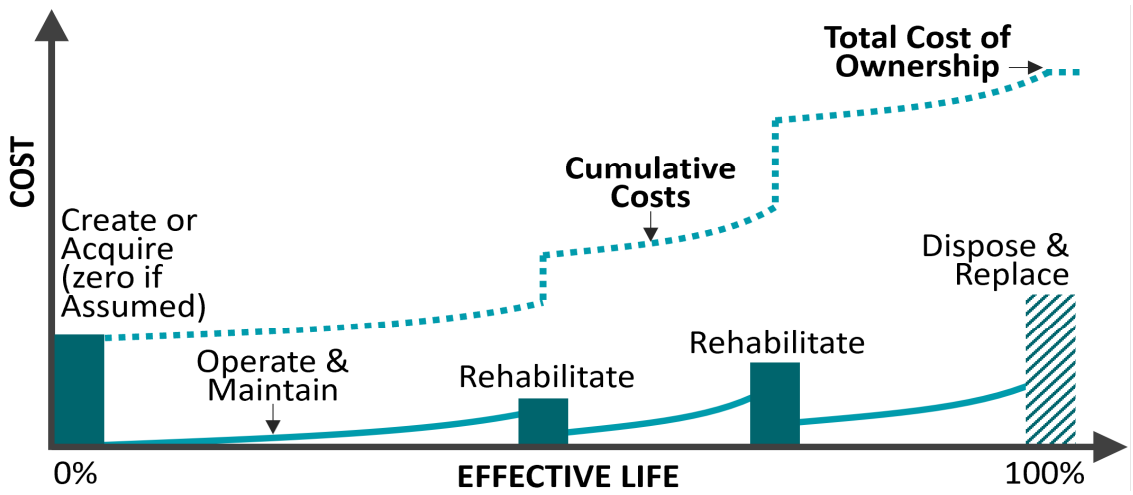


Figure 1.2 Illustrative example asset's lifecycle and the accumulative lifecycle cost

A key objective is to effectively deliver the Levels of Service at the lowest lifecycle cost while managing the risk and maximizing the useful life of the asset. The following sections summarize the strategies and activities which the City undertakes to achieve the lowest lifecycle cost.

1.5 Risk

The Management of Risk is a critical component of the City's asset management principle, to meet service levels and manage risk while minimizing lifecycle costs. Risk events are incidents that may compromise the delivery of the City's strategic objectives and services.

The Summary of the City's asset portfolio (Technical Level) has been developed in Table 1.2. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020-dollar value, corresponding to the risk of failure score:

- Extreme (red),
- High (orange),
- Moderate (yellow),
- Low (green), and
- Insignificant (grey).

Table 1.2 Overview of City's Asset Portfolio Risk Summary

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0 M	$27.55 M	$123.7 M	$21.95 M	$0 M
	P4	$0 M	$14.08 M	$43.98 M	$13.63 M	$0 M
	P3	$0.13 M	$13.69 M	$85.17 M	$20.43 M	$150 M
	P2	$0 M	$13.13 M	$514.83 M	$137.72 M	$0 M

	P1	$0.51 M	$117.8 M	$721.44 M	$273.45 M	$3.35 M

Assets falling in the higher risk categories are an investment priority for the City (have a high consequence of failure and highest probability of failure).

1.6 Financial Strategy

To be effective, asset management practices should be integrated with financial planning and budgeting. Financial management principles for asset intensive organizations include recognizing the consumption of asset service potential, categorizing expenditure by lifecycle activity, allocating costs to assets as far as practical, preparing long term forecasts, cost-effective financing, and effective reporting of financial performance.

Table 8.4 summarizes the annual 'need' associated with achieving the current Level of Service.

Table 1.3 Current Total 'Need'

Service Area	Capital Growth & Upgrade Program (2020 $M)	Projected Renewal Investment Need (2020 $M)	Maintenance (2020 M$)	Operations (2020 M$)	Total (2020 M$)
Community Facilities	0.0	0.1	0.5	1.5	2.1
Environmental Services	17.9	36.9	2.8	6.7	64.3
Protective Services	1.8	0.9	0.4	0.9	4.0
Recreation, Culture & Community Services Department	3.6	2.7	0.8	7.3	14.4
Transportation & Operational Services	10.7	4.7	3.0	5.2	25.6
Total	**34.0**	**47.3**	**7.5**	**21.6**	**110.4**

All asset management programs are supported by a combination of revenue sources. During budget development, estimates are made with respect to program expenditure requirements, which are then offset by anticipated federal/provincial subsidies and user fee revenues. The Finance Department provided a forecast of the average funding, which has been developed using historical funding. The summary of the funding sources is presented in Table 8.6.

Table 1.4 Summary of Forecast Funding

Revenue Type	Funding Source	Funding (2020 M$)	Percentage of Total Funding
Capital Expenditure	Taxation	5.6	7.8%
	Water Rates	5.7	7.9%
	Wastewater Rates	5.4	7.5%
	Parking Rates	0.2	0.3%
	Reserve Funds	8.7	12.1%
	Debt	8.1	11.3%
	Donations	0.5	0.7%

Revenue Type	Funding Source	Funding (2020 M$)	Percentage of Total Funding
	Fed / Prov Grants	8.7	12.1%
Operational Expenditure	Taxation	19.6	27.2%
	User Rates	9.5	13.2%
Total		**72.0**	

Removing the contributions of the reserve funding and debt, which are used as cashflow management tools and don't represent financially sustainable City revenue, the annual forecast revenue is **$55.2 M**.

The budget provided to undertake these needed activities and any gaps between the spending budget and needs is referred to as the 'Infrastructure Gap'. The City has defined asset lifecycle activities specific to each asset type and has forecast that the lifecycle activities needed to maintain the current level of service will cost the City **$110.4 M** per year, which indicates an infrastructure gap of **$55.2 M** as outlined in the following table.

Table 1.5 Summary of Infrastructure Gap

	Lifecycle Activity	Planned Budget (2020 $M) (1)	Infrastructure Need (2020 $M) (2)	infrastructure Gap (2020 $M) (1-2)	Funding Ratio
Capital	Growth Upgrade	8.3	34	-25.7*	0.2
	Renewal	17.8	47.3	-29.5	0.4
Operations	Operations	21.6	21.6	0.0	1
	Maintenance	7.5	7.5	0.0	1
Total		**55.2**	**110.4**	**-55.2**	**0.50**

* It is acknowledged that the City expects a percentage of this growth to be paid for by developers either through direct construction or through development charges. The amount which is expected to be contributed by other is $50.8M

The Asset Funding Ratio is an important financial performance indicator as it reports the percentage (%) of funding projected to be available to undertake the lifecycle activities forecast over the next ten years against a target of 1.0. To close the financial 'gap' there are numerous methods available. For example, the City may choose to increase or decrease the needed infrastructure investment for a time due to factors such as the age of the infrastructure, accumulated backlog of work, risk tolerance, and available infrastructure renewal funding. However, eventually, asset operations, maintenance and renewal must be undertaken to avoid accumulation of large backlogs of work overtime and manage associated risk to service delivery. These options are discussed in detail in Section 8.5.

This analysis is limited to consideration of the financial need. However, an escalation of other resources (i.e., staffing level), may also be necessary to ensure effective asset management of the growing infrastructure over the next 10 years.

1.7 Improvement

This 2020 Asset Management Plan complies with Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure, Current Levels of Service (due by July 1, 2022). It is important to note that achieving compliance is not a singular event. It requires regular monitoring, maintenance and adjustment of the system to ensure compliance. Additionally, the requirements for future AMPs will

increase as the Ontario Regulation 588/17 requires the incorporation of the Proposed Levels of Service by July 1, 2025.

Although the system is operational and foundational elements of Asset Management have been implemented (including elements of the Proposed Level of Service), it is acknowledged that additional improvements to the system are required. The effectiveness of the AMP can be measured in the following ways:

- Independent assessment of the current Asset Management program maturity against the desired target
- The degree to which the required projected expenditures identified in this asset management plan is incorporated into the long-term financial plan
- The degree to which 1–5 year detailed works programs, budgets, business plans and corporate structures consider the ‘global’ work program trends provided by the AMP
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Plan and associated plans
- The Asset Renewal Funding Ratio achieving the target of 1.0.

Details of the implementation activities required to achieve this are summarized in Section 9.

2. Introduction

The City of Belleville is located on the north shore of the Bay of Quinte. It is the largest urban centre in a much larger market area known as the Quinte Region. The City of Belleville covers over 82 square kilometers and comprises of an urban downtown core surrounded by rural housing and farmlands.

The City of Belleville is responsible for providing a range of services to its community. A significant proportion of these service are delivered through the creation, maintenance and operation of infrastructure (i.e., roads, bridges, water and sanitation).

This Corporate Asset Management Plan (AMP) documents the assets in the city's inventory, the level of service they provide, the risks associated with delivering these services, the lifecycle activities required to ensure the asset remain in safe and operable condition and the financial costs associated with performing these activities. This AMP is intended to be a 'living document' which is periodically reviewed and updated. It has been developed in accordance with the Ontario Regulation O.Reg 588/17 'Asset Management Planning for Municipal Infrastructure' and includes elements of best practice from other standards including the International Standard ISO 55000 series for Asset Management.

2.1 Asset Management Scope

The City of Belleville delivers asset management service through a Service Areas, which are broken down by the services they provide. The Service Areas covered within this asset management plan and the assets they 'own' are summarised in Table 2.1.

Table 2.1 Asset Management Asset Inventory

Service Area	Asset Classes	
Community Facilities	– Building	
Environmental Service (Water, Wastewater and Stormwater services)	– Building – Stormwater Pipe (Core Asset) – Sanitary Pipe (Core Asset) – Water Pipe (Core Asset)	– Stormwater Ponds – Equipment – Fleet
Transportation & Operational Services	– Bridge – Culvert – Roads	– Equipment – Fleet – Building
Fire & Emergency Services (Fire, Police)	– Equipment – Fleet	– Building
Recreation, Culture & Community Services Department (Parks, Sports Arenas, Community Centers)	– Arena – Harbour – Parks	– Equipment – Fleet – Building

This AMP has been developed with a specific focused of detailing the asset management practice for 'Core Assets', in accordance O.Reg 588/17, in order to achieve compliance with the July 2022 deadline. The City also manages other assets which have been included in this plan however have some elements of the asset management lifecycle which requires improvements. These will be addressed in future iterations of the plan and as the City's AM maturity evolves. Those assets which required additional attention in future iterations of the plan include:

- Sidewalks,
- Traffic signals,
- Street lighting
- Signage
- Trees,
- Trails
- Ancillaries (Hardware, SCADA, communication equipment and software, furniture, radios)

Under the City's commitment to continual improvement, these assets will be developed further in future iterations of the Asset Management Plan, as described in the City's Monitoring and Improvement Plan (Section 9).

2.2 Legislated Requirements for Asset Management Plans

The City of Belleville, along with its peers, face challenges in continuing to maintain and renew ageing infrastructure under current funding/resource levels and structures. This challenge has become increasingly more difficult due to rapid growth, public demands for high levels of service, increased exposure to liability and risk, and downloaded responsibilities. While the City of Belleville has a long history of implementing advanced asset management practices that incorporate asset renewal, enhanced operation and maintenance practices, policies, and programs, there is now a legislative and regulatory requirement for the development of formal asset management plans.

In January 2018, the Province of Ontario enacted **Ontario Regulation 588/17** 'Asset Management Planning for Municipal Infrastructure' under the Infrastructure for Jobs and Prosperity Act, 2015. The regulation requires municipalities to develop complete asset management system. However, as an effective asset management system can not be developed and implemented 'overnight' the regulation requires that municipalities develop this system by key deadlines. The deadlines, high-level expectation of scope completed, and the City of Belleville's progress to date is presented in Figure 2.1

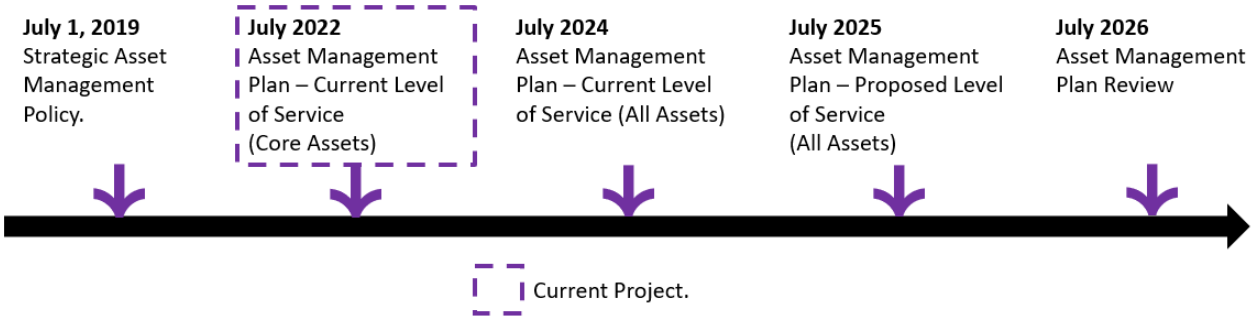


Figure 2.1 O.Reg 588/17 Regulatory Timeline

Other legislative and regulatory requirements for Asset Management Plans include the following:

Table 2.2 Applicable Legislation

Legislation	Application
Province of Ontario Infrastructure for Jobs and Prosperity Act	The Infrastructure for Jobs & Prosperity Act (IJPA), 2015 was proclaimed on May 1, 2016. The purpose of this Act is to establish mechanisms to encourage principled, evidence-based, and strategic long-term infrastructure planning that supports job creation and training opportunities, economic growth and protection of the environment, and incorporate design excellence into infrastructure planning. The Act sets out principles which the province and all broader public sector entities (including Municipalities) should consider when making decisions respecting infrastructure. The Act also stipulates that the province and all broader public sector entities prepare infrastructure asset management plans.
Province of Ontario Municipal Infrastructure Strategy	In August 2012, the Province of Ontario initiated the Municipal Infrastructure Strategy. This initiative focuses on asset management planning for municipalities. Any Ontario municipality or local service board seeking provincial capital funding in the future must submit a detailed asset management plan as part of the grant application process.
Province of Ontario Development Charges Act	The Development Charges Act (DCA) regulations require detailed asset management plans to support Transit DC By-laws. Less detailed Asset Management Plans that demonstrate that the assets included in the background study are financially feasible over their full lifecycle are also required for all other DC eligible services.
Federal Gas Tax Funding	In April 2014, the City entered into a ten-year municipal funding agreement with the Association of Municipalities of Ontario (AMO) for the transfer of Federal Gas Tax funds. The agreement stipulates that the City must develop and implement an Asset Management Plan prior to December 31, 2016. The definition of “Asset Management Plan” as prescribed by the agreement is as follows: “Asset Management Plan” means a strategic document that states how a group of assets are to be managed over a period of time. The plan describes the characteristics and condition of infrastructure assets, the levels of service expected from them, planned actions to ensure the assets are providing the expected level of service, and financing strategies to implement the planned actions. The plan may use any appropriate format, as long as it includes the information and analysis required to be in a plan as described in Ontario’s Building Together: Guide for Asset Management Plans. Future outcomes reporting to be developed and implemented by AMO will require the City to provide a report to AMO demonstrating that Asset Management Plans are being used to guide infrastructure planning and investment decisions and how gas tax funds are being used to address priority projects.

2.3 This Asset Management Plan

This AM Plan is a planning document that is used to provide a rational framework for managing the City of Belleville’s assets. It has been developed to meet Ontario Regulation 588/17 requirements, specifically for ‘core assets’, and closely follow the Province’s Building Together: Guide for Asset Management Plans to ensure that it meets the requirements for funding applications. It outlines the asset activities for each service area and provides a guide to understanding key items such as:

– Alignment with the City’s strategic goals
– The value and condition of City’s asset portfolio
– Levels of service and performance measures
– Management techniques to assist in making long term funding decisions
– Lifecycle activities to operate, maintain, renew, develop and dispose of assets
– Budget forecasts for growth and renewal to sustain the City’s asset portfolio

This AM Plan contains consolidated information that is currently available for the City's assets to provide a 10 year forecast that considers the full lifecycle of each asset type. This AM Plan is a written representation of proposed risk reduction programs and strategies for the City's assets based on understanding of customer requirements, regulatory compliance, and the ability of the assets to meet current levels of service.

This AM Plan identifies future costs and assists in predicting future challenges that may hinder service delivery. This creates opportunities for the City's asset managers and operators to remove physical and financial barriers before they negatively impact levels of service.

The relationship of AM Plans to other City documents and plans is illustrated in the figure below.

Figure 2.2 AM Planning in the Broader Organizational Context

The AM Plan is a living document that will continue to reflect the evolution of asset management practices within the City over time. It is intended that continuous improvements to the asset management practices undertaken by the City, including implementation of the Asset Management System, will contribute to improvements in the production of future iterations of this AM Plan. The AM plan will be updated by 2025 to meet the Ontario Regulation 588/17 requirements.

The AM Plan is organized to meet the requirements of Ontario Regulation 588/17 (Current Levels of Service) and the province's "Guide for Municipal Asset Management Plans". The contents of this AM Plan follow the recommended elements of a detailed AM Plan:

– **Executive Summary:** Summary of AM Plan

- **1 - Introduction:** Outlines scope, background information, relationship to other City documents and plans, and applicable legislation
- **2 - State of Local Infrastructure:** Summarizes the asset hierarchy, inventory, valuation, age distribution, and condition
- **3 - Levels of Service:** Defines levels of service through performance indicators and targets, and outlines current performance. Describes external trends or issues that may affect expected levels of service
- **4 - Asset Management Strategy:** Summarizes the asset management strategies (i.e., planned actions) that will enable the assets to provide the required levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost
- **5 – Expenditure Forecasts and Financing Plan:** Summarizes the financial planning and budgeting associated with asset management planning
- **6 – Monitoring and Improvement Plan:** Summarizes next steps to meet Ontario Regulation 588/17 requirements and other asset management improvement recommendations.

3. State of Local Infrastructure

3.1 Overview

This section of the AM Plan is focused on answering the following questions:

– What do we own?
– What is it worth?
– What condition is it in?
– What is the average age?

This section of the plan summarises the “City level” overview of the State of Local Infrastructure (SOLI) for the City of Belleville’s asset inventory. Similar details viewed from a Service Area level are provided in Appendix A.

Total Asset Valuation (2020$)
$2.3 billion

Average Asset Condition (2020)
GOOD

3.2 Asset Inventory and Valuation

The assets that the City owns have a total replacement value of approximately **$2.3 billion,** as shown graphically below, organized by asset category.

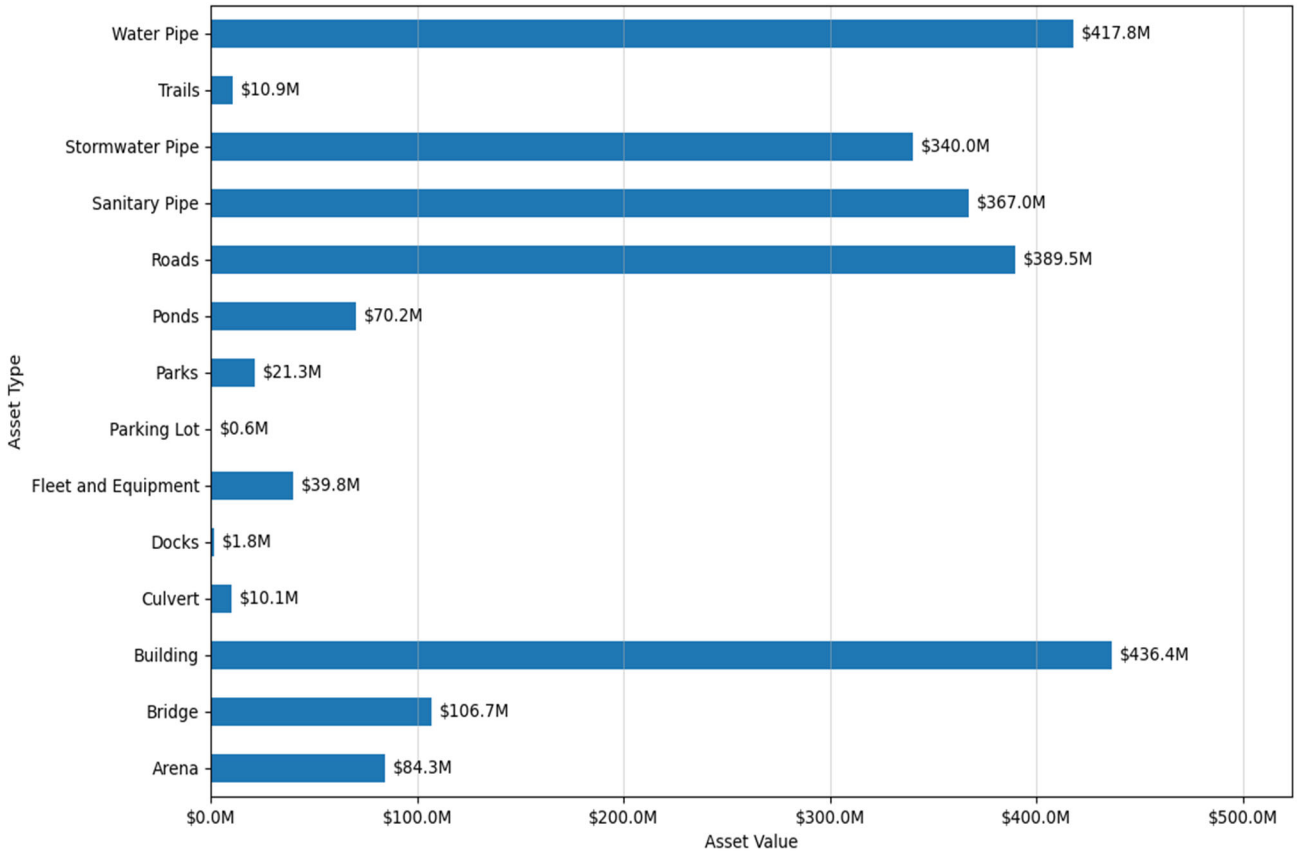


Figure 3.1 Asset Valuation, by Asset Category

Detailed asset values are shown in Table 3.1 below.

Table 3.1 Asset Inventory and Valuation, by Asset Sub-Category

Asset Category	Quantity	Unit	Replacement Value (2020 $M)
Arena	4	Each	84.3
Bridge	23,511.3	m2	106.7
Building	83	Each	436.4
Culvert	2,628.8	m2	10.1
Fleet and Equipment	358	Each	39.8
Docks	16	Each	1.8
Parking Lot	7	Each	0.6
Parks	81	Each	21.3
Ponds	175,449	m3	70.2
Roads	442.1	Linear.km	389.5
Sanitary Pipe	196.8	Linear.km	367.0
Stormwater Pipe	160.3	Linear.km	340.0
Trails	5	Each	10.9
Water Pipe	261.6	Linear.km	417.8
Total			**2,296.4**

The City uses a number of methods to estimate replacement costs needed for infrastructure renewal planning:

- **Local price indices:** This is the most accurate method. The City has collected and analysed recent asset acquisition data at the asset sub-category level of the asset hierarchy.
- **Subject matter expertise estimates:** Where local indices are not available, independent cost estimates provided by Subject Matter Experts (SMEs) have provided for asset replacement these values may be used.
- **Published price indices:** the City uses published indices which, although appropriate and standardized, may not be as relevant to City assets as local indices.
- **Accounting estimates:** When assets cannot be estimated against either of the above indices, the City uses accounting methodology based on historic cost and inflationary effects to determine replacement value.

The City of Belleville, defines replacement cost as the total cost required to acquire, install and commission an asset. Where these are estimates are historical, they have been brought to 2020 dollars using a fixed 2% annual increased (based on an average Consumer Price Index (CPI))

3.3 Asset Condition

In this AM Plan, the term “condition” refers to the degree of physical deterioration of an asset or asset element. “Performance” is a more general term that typically describes an asset’s ability to achieve levels of service, and can refer to: (i) the state of physical condition, (ii) the capacity relative to demand, and/or (iii) the ability to perform intended functions. Levels of Service are discussed in Section 3.

To enable comparison of conditions 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 the public and council can compare across asset groups. For this purpose, the City uses an industry standard general condition grading system in line with the International Infrastructure Management Manual (IIMM), summarized in Table 3.2 below.

Table 3.2 Condition Rating Scale

	Rating	Condition Criteria
State of Good Repair	Very Good	Asset is physically sound and is performing its function as originally intended. Required maintenance costs are well within standards and norms. Typically, asset is new or recently rehabilitated.
	Good	Asset is physically sound and is performing its function as originally intended. Required maintenance costs are within acceptable standards and norms but are increasing. Typically, asset has been used for some time but is still within early to mid-stage of its expected life.
	Fair	Asset is showing signs of deterioration and is performing at a lower level than originally intended. Some components of the asset are becoming physically deficient and component replacement may be necessary. Maintenance requirements and costs are continuing to increase. Typically, asset has been used for a long time and is within the middle to later stage of its expected life.
End of Life	Poor	Asset is showing significant signs of deterioration and is performing to a much lower level than originally intended. A major portion of the asset is physically deficient. Required maintenance costs exceed acceptable standards and norms. Typically, asset is approaching the end of its expected life.
	Very Poor	Asset is physically unsound and/or not performing as originally intended. Asset has higher probability of failure or failure is imminent. Maintenance costs are unacceptable and rehabilitation is not cost effective. Replacement / major refurbishment is required.

An ongoing condition assessment program evaluates current physical condition and performance, determines rate of deterioration over time, enables forecasts of future condition, and informs the most beneficial type and timing of treatment. Condition assessment methods and rating systems have become relatively standard for many assets but vary depending on the type of asset. The City conducts detailed inspections on more critical assets while visual assessments may be performed for less critical assets, at an appropriate frequency for the asset group. For those assets with no condition data or where condition is hidden (e.g. underground assets), condition is estimated based on asset age compared to the expected service life. The City selects the most appropriate method to determine current physical condition based on an assessment of the benefits and costs. Condition assessments are performed on various rating scales depending on the asset class and nature of assessment. A summary of rating scales used and their conversion to the Very Good to Very Poor scale is summarized Table 3.3.

Table 3.3 Condition Assessment Scale Mapping to 5-Point Rating

Grade (Rating: 1 to 5)	Pavement Quality Index (PCI)	Bridge Condition Index (BCI)	Storm Water Ponds (design vs remaining volume)	Water, Sanitary and Storm Pipe Useful Life*	Estimated Remaining Value*	Estimated Remaining Useful Life*
Very Good (1)	>=80 to 100	90 to <100	>=90%	>99%	>=80%	>=80%
Good (2)	<80	70 to <90	80%	>90, <=99%	>60 to 80%	60 to 80%
Fair (3)	<70	60 to <70	70%	>75, <=90%	>40 to 60%	40 to 60%
Poor (4)	<60	50 to <60	60 to 70%	>50, <=75%	>20 to 40%	20 to 40%
Very Poor (5)	<50	0 to <50	<60%	<=50%	<20%	<20%

*Asset information proxy for condition

The available asset information has been collected and collated from various data sources (GIS, financial databases, independent condition assessment reports). Where condition was not explicitly available from these sources, for example buried pipework, proxies to estimate this information has been made to allow the analysis to be undertaken. These proxies include using remaining financial value and remaining life (the comparison of useful life to current life).

The following graph summarizes the replacement value and the distribution of physical condition of the City's asset portfolio, organized by the asset class. The City's assets are generally in **GOOD** condition, with over **77.8%** percent of the City's assets in fair or better condition, which is referred to as a "state of good repair".

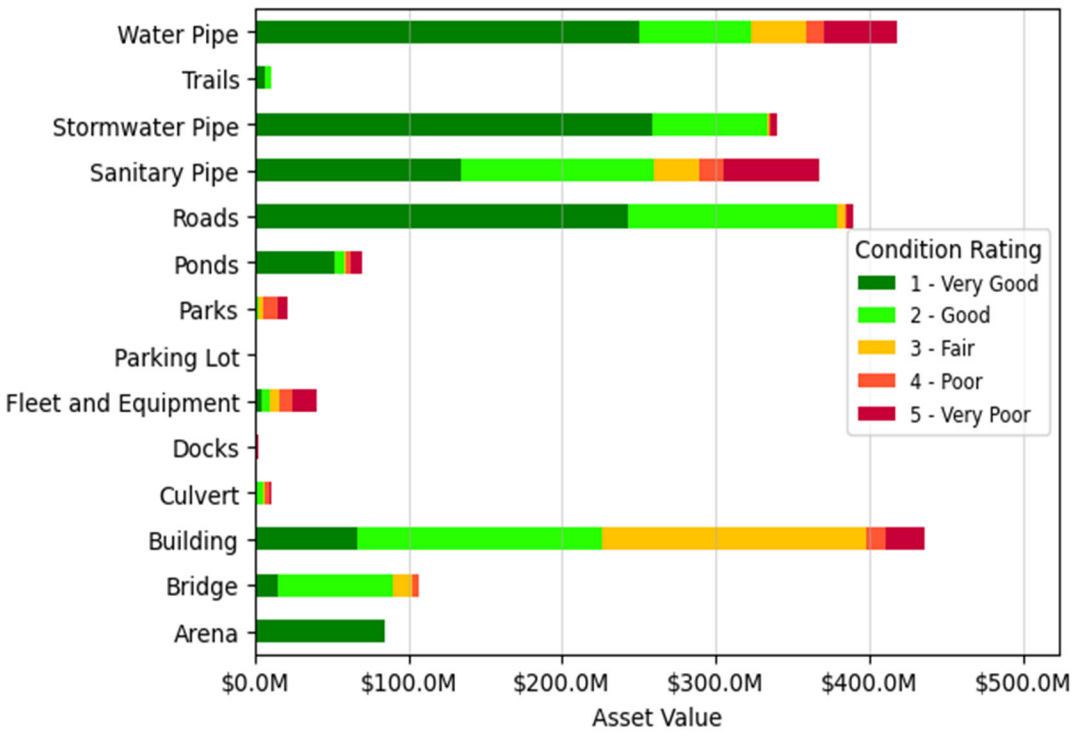


Figure 3.2 Condition by Asset Class

Nonetheless, approximately **$234.7 million** worth of the City's assets, or **10.1 percent** of the portfolio's value, are shown in poor or very poor physical condition and are approaching "end of life". The City aims to deliver the required performance at the best possible cost over an asset's life cycle within an acceptable level of risk. For an asset that poses a low to moderate risk to performance, the lowest-cost decision is often to replace it at the end of its useful life, known as a "run to failure" management strategy. The City evaluates the physical condition with criticality to identify the assets that are approaching end of life and are critical to essential service delivery. The City also develops risk mitigation plans for these critical assets and includes them in 10-year capital renewal programs and budget forecasts and maintenance plans and budgets.

3.4 Average Age

The following figure summarizes, weighted by replacement value, the average age of the City's assets, and the estimated average service life. Overall, the City's assets are currently just under half of their expected service lives. It is important to note that some historical data gaps exist pertaining to the installation year of some assets, resulting in them not being included in the age analysis. The City is proactively looking to fill these data gaps to improve the maturity of future iterations of the AM Plan.

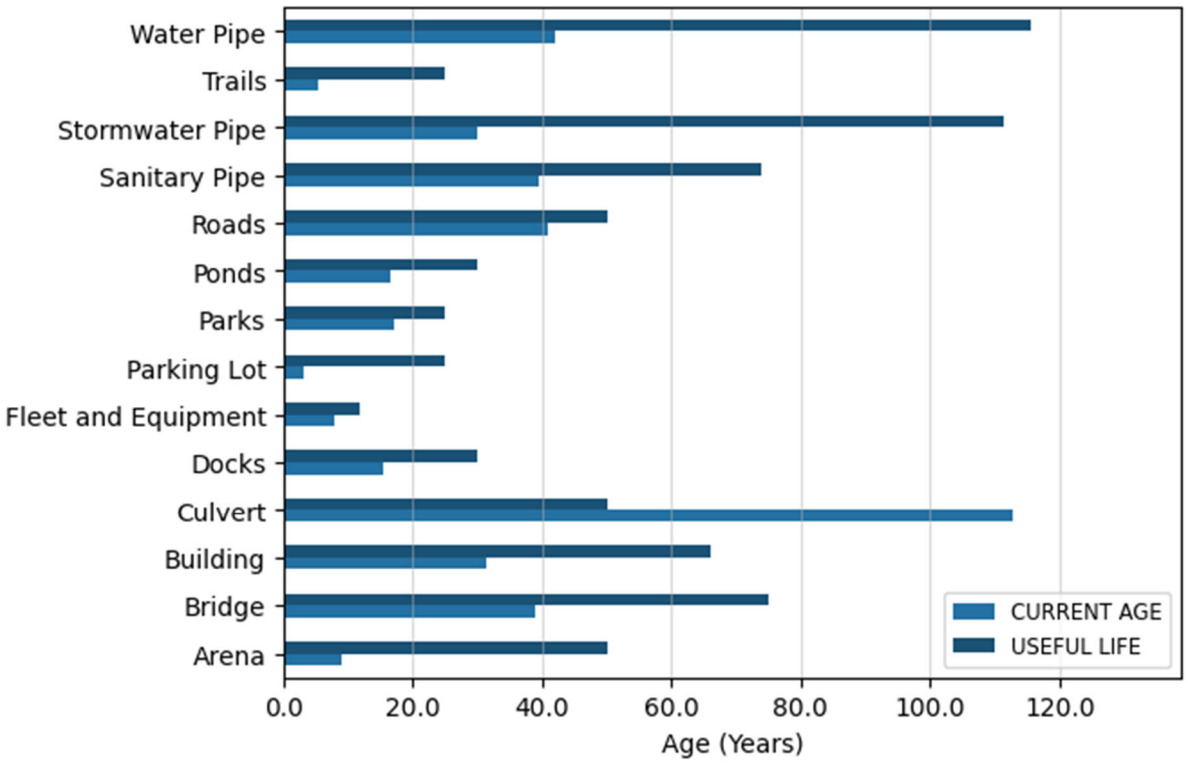


Figure 3.3 Asset Age and Useful Life by Asset Subtype

3.5 State of Infrastructure Summary by Service Area

Appendix A provides information on replacement value, condition, and average age for assets classes within each of the Service Area, including assumptions. The background information and reports upon which the State of Local Infrastructure section is based are derived from City's Asset Information Systems including geospatial and financial systems.

4. Levels of Service

4.1 Overview

Level of Service (LOS) is a means for capturing and realizing value from the City of Belleville's assets through the delivery of services to its community and stakeholders. The measure and evaluation of asset performance is critical to the efforts of sustaining the assets' services over time. The fundamental principle of performance measurement is the agreement on high-level objectives or outcomes. These help the design of the LOS framework, which includes the selection of key performance indicators. The LOS framework that links performance indicators, to service levels, to objectives must take on a top-down hierarchy approach. The City of Belleville needs to develop a performance measurement framework with assets intended to contribute to the LOS. This is achieved by reviewing:

- Corporate Levels of Service
- Legislated Levels of Service
- Customer or Community Levels of Service
- Technical or Asset Level of Service

An illustration of the overall guiding framework is shown in Figure 4.1.

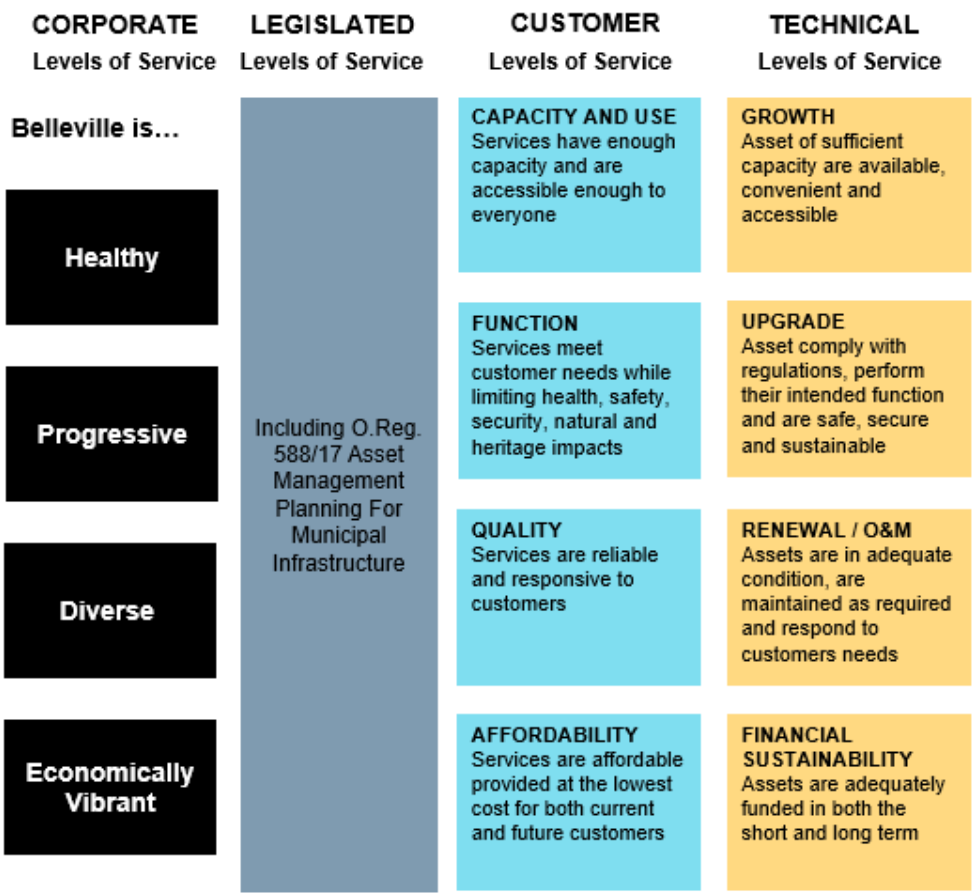


Figure 4.1 Level of Service Framework

4.1.1 Corporate Levels of Service

The City of Belleville's vision is to be a healthy, progressive, diverse, and economically vibrant community that invests in its future in a financially sustainable and environmentally responsible manner. This vision is to guide Belleville over the next 10 years, as set out in the *City of Bellville Strategic Plan (2012-2032).* The Strategic plan sets out seven aspects of this vision, summarised in Table 4.1.

Table 4.1 City of Belleville Vision Summary

Aspect	Description
Health	Foster a community that is safe for its citizens. Provide facilities, programs, and opportunities to enhance the well-being of the City's citizens.
Progressiveness	Forward thinking in approach and actions. Look towards the future and plan for meeting the needs of the community by being entrepreneurial, investing and creating opportunities in pursuit of the City's vision.
Diversity	Embrace the multicultural makeup of the community. Welcome visitors and celebrate the beauty of varied cultures. Citizens and visitors will have opportunities to experience the City's heritage and cultural diversity.
Economically Vibrancy	Pursue a broad base of industry, business, and services to help ensure stability and growth for the community in varying economic times and to ensure a prosperous future.
Investment in the Future	Invest in infrastructure to meet current needs and provide for future growth.
Financial Sustainability	Develop infrastructure, facilities, programs, and services that are financially responsible, beneficial, and sustainable over the long-term, considering all related costs.
Environmental Responsibility	Be stewards of the environment to ensure that the City will be an attractive and healthy place to live and visit. The industrial and recreational activities will both respect the environment

The vision is key to the development of strategic directions to achieve the desired LOS as the drive the development of the Community and Technical Level of Service. All LOS are aligned to the vision outlined by the City Council, to ensure that their vision is achieved.

4.1.2 Legislative Levels of Service

Legislated requirements are those define the laws, regulation, or other standards, by which the City is obligated to provide services. Legislative requirements are a significant business driver for most municipal services and the applicable legislative requirements are listed in the appendices for each service area (Appendix A).

Municipal governments in Ontario and their service areas must comply with government regulations, including Ontario Regulation *O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure*, filed on December 27, 2017, under the Infrastructure for Jobs and Prosperity Act, 2015, S.O. 2015, c. 15.

4.1.3 Customer or Community Levels of Service

In setting customer performance measures, the focus is on measuring how the customer receives the service and ensuring that the City is providing customer value in accordance with the City's vision and standards. These may be qualitative or quantitative measures.

Ontario Regulation 588/17 refers to Customer LOS as "Community LOS" and outlines these LOS as qualitative descriptions. In this AM Plan, the following Ontario Regulation 588/17 Community LOS for core assets are used as the Customer LOS, and similar qualitative descriptions are developed for non-core assets. The Customer LOS, mandated by the O. Reg are provided summarized in Table 4.2.

Table 4.2 Core Assets Community Level or Service

Asset Type	Service Attribute	Community Levels of Service
Water	Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.
		Description, which may include maps, of the user groups or areas of the municipality that have fire flow.
	Reliability	Description of boil water advisories and service interruptions.
Wastewater	Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system
	Reliability	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes.
		Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.
Stormwater	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.
Roads	Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity.
	Quality	Description or images that illustrate the different levels of road class pavement condition.
Bridges & Culverts	Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).
	Quality	Description or images of the condition of bridges and how this would affect use of the bridges.
		Description or images of the condition of culverts and how this would affect use of the culverts.

4.1.4 Technical or Asset Levels of Service

Technical LOS translate customer expectations and legislative requirements into technical objectives, performance measures, and targets. Technical levels of service relate to the allocation of resources to service activities that the organization undertakes to best achieve the desired community outcomes and demonstrate effective organizational performance. These activities are grouped into the following four categories:

1. Growth,
2. Upgrade,
3. Renewal / O&M
4. Financial Sustainability

Similar to Customer LOS, Ontario Regulation 588/17 outlines specific Technical LOS for core assets. In this AM Plan, current performance against the following Ontario Regulation 588/17 Technical LOS for core assets are provided in the appendices (Appendix A), as are similar qualitative descriptions for non-core assets and additional measures for core assets.

Table 4.3 Core Asset Technical Level of Service

Asset Type	Service Attribute	Technical Levels of Service	2020 Performance
Water	Scope	Percentage of properties connected to the municipal water system.	77%
		Percentage of properties where fire flow is available.	76%
	Reliability	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.	0.004
		The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.	6.67
Wastewater	Scope	Percentage of properties connected to the municipal wastewater system.	75%
	Reliability	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.	5
		The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	15.8
		The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	12
Stormwater	Scope	Percentage of properties in municipality resilient to a 100-year storm.	94.6%*
		Percentage of the municipal stormwater management system resilient to a 5-year storm.	99%*
Roads	Scope	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.	Arterial: 0.22 Collection: 0.46 Local: 1.09
	Quality	For paved roads in the municipality, the average pavement condition index value.	83
Bridges & Culverts	Scope	Percentage of bridges in the municipality with loading or dimensional restrictions.	None
	Quality	For bridges in the municipality, the average bridge condition index value.	74.1
		For structural culverts in the municipality, the average bridge condition index value.	67.5

*Based on mapped property intersection with available floodplain data
**Based on limited study of hydraulic needs of trunk mains network.

Performance indicators and targets are commonly used to describe, quantify, and communicate the services that customers expect to receive and relate the expected LOS to the cost required to provide the services.

4.2 LOS Summary by Service Area

Establishing LOS indicators and targets is an iterative process. The subject matters experts within the City's Service Area have nominated target for the level of service based on balancing public (community) expectations, the City's objectives, risk, and affordability. These are expected to require further refinement over time with additional consideration of the public expectations against constraints such as financial considerations, resourcing, and affordability to continue to refine the actual target. Only after these constraints have been considered will it be determined whether public expectations can be delivered as expected in accordance with the City's target.

The Appendix A provides information on legislated, customer, and technical LOS for each service area.

A summary of the LOS indicators by Service Area are shown in Figure 4.2.

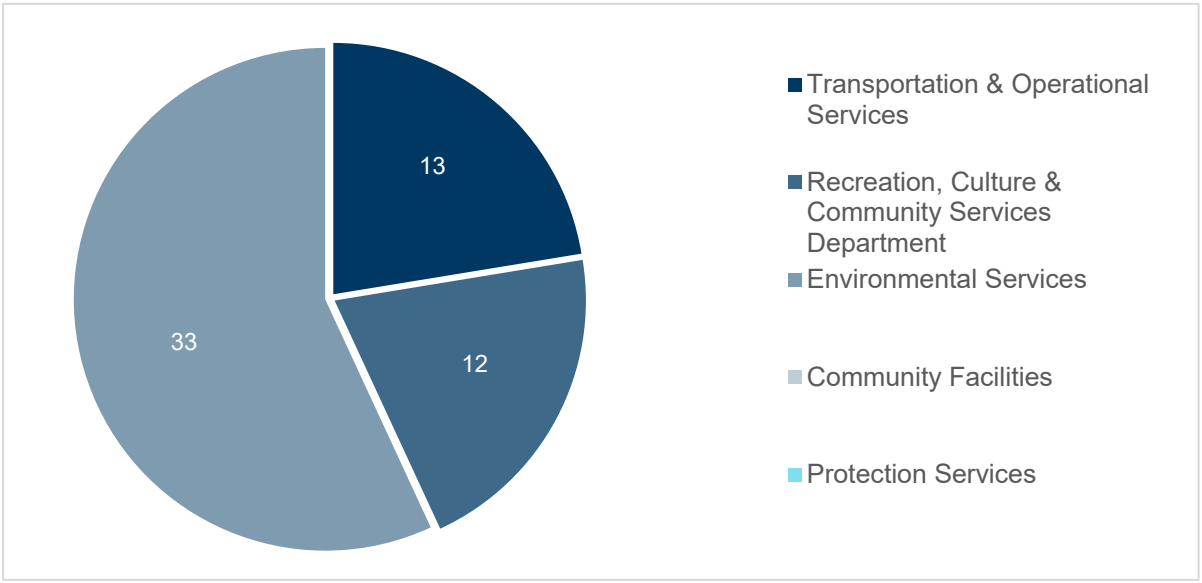


Figure 4.2 Summary of the LOS indicators by Service Area

5. Asset Management Strategy – Demand

Services are delivered to the residents of Belleville based upon the requirements and defined capacities, available funding, and allocated resources. The Level of Service (LOS) provided is intended to meet the demands for services. Therefore, understanding changes in demand placed on services is advantageous in the planning of affordable, sustainable, and desirable community services.

External trends and demand drivers may affect LOS or the City's ability to meet the proposed LOS in the future. This chapter discusses the:

– **Demand Drivers** – challenges, trends and drivers which may affect current services,
– **Demand Impact or Forecast** – outlines the impact of the demand drivers and forecasts the changes to the City's assets.
– **Demand Management Strategies** - sets out the City's lifecycle management strategies (maintenance and renewal strategies), or additional infrastructure in response to the changes on demand.

5.1 Demand Drivers

Demand drivers can create positive or negative service needs and/or can enable or constrain the City's ability to efficiently deliver services to its communities. For example, the availability of land for development may be a constraint to the types of solutions available to manage growth in the urban centre, but in semi rural areas this restriction is less likely to exist.

5.1.1 Population Growth

Changes to the population at the City of Belleville is expected be highly influential on the demand for the City's services and hence the need for the City's infrastructure assets.

The City of Belleville has historically had modest population growth. Between 1991 and 2016, increasing from 44,900 to 50,700 over the period. During this time, average annual growth ranged between 0.1% and 1.2%.[1] Additionally it is reported that Belleville's population is forecast to increase from 51,900 in 2016 to 58,300 by 2041, which represents an increase of 6,400 over the period. Belleville's population growth is expected to average 0.5% per annum over the 25-year period, comparable to the trend observed over the 1991 to 2016 period. [2]

In recent years this has accelerated dramatically, particularly during the Covid-19 pandemic. During the period of period of 2019 to 2020, based on the most recent statistics available form Statistics Canada indicated that Belleville was the 10th fastest growing area in Canada during the, with a population growth rate of 1.6% for the period[3]. It is expected that the pandemic related growth is transitory, and the growth rate will return to the average projected value of 0.5%. This should be monitored to ensure that growth in investment in community service and asset investment is kept in line with the City's growth.

Increase in population is likely to result in the following:

– Faster deterioration of assets due to increase usage
– Increased need for additional assets or capacity
– Increase costs (O&M)

1 2018 Municipal Comprehensive Review of Urban Serviced Area, April 11, 2019.
2 2018 Municipal Comprehensive Review of Urban Serviced Area, April 11, 2019.
3 Statistics Canada - https://www150.statcan.gc.ca/n1/daily-quotidien/210114/cg-a001-eng.htm

– Increase demand for Active Transportation.

5.1.2 Urbanisation

In response to the population growth there is a corresponding increase in urban growth. Belleville has historically undergone a steady urbanisation of its downtown core and surrounding areas. This is likely to continue with townhouses and apartments expected to constitute approximately 45% of the total housing composition by 2031, as shown in Figure 5.1.

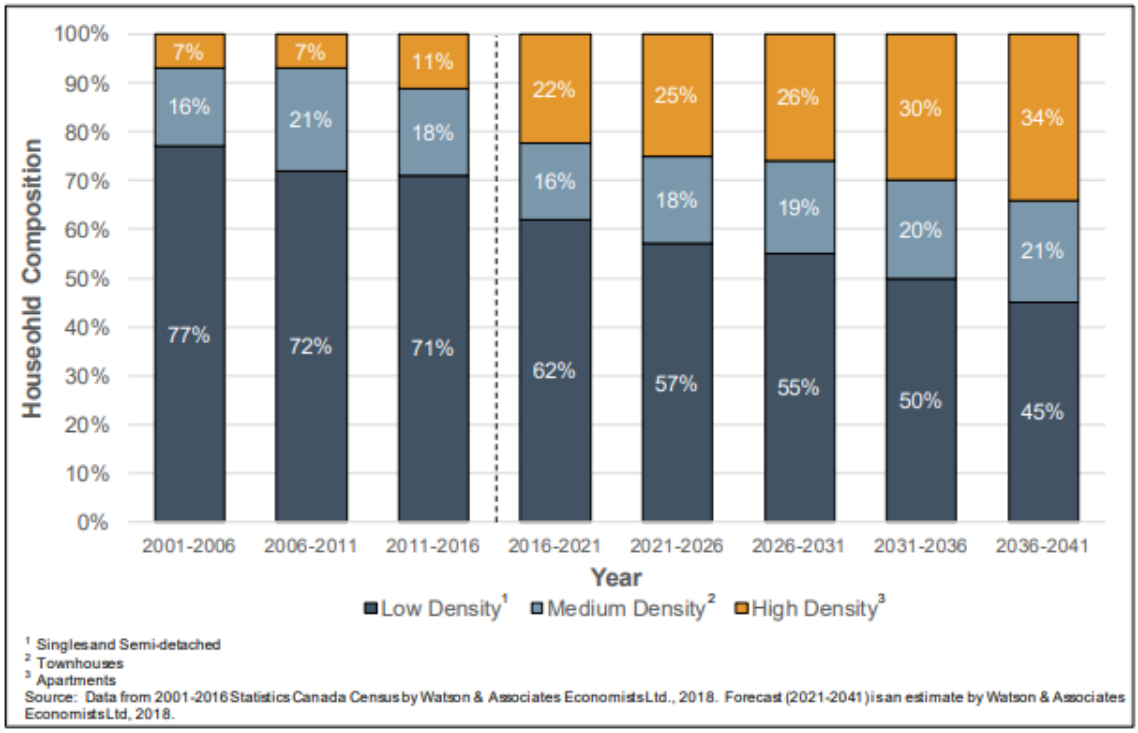


Figure 5.1 Forecast Households by Type[4]

This growth is expected to primary occur in the City Center and the Loyalist Secondary Plan Central Zone which is expected to account for 38% of housing supply opportunities within the Urban Serviced Area[5].

In addition to the expected increase in population density within the core, there is also expected to be continued growth pressures north of Highway 401 and the future Northeast Industrial Park[6]. The demand within the entire Highway 401 corridor is likely to be affected by Ministry of Transportation plans to construct an additional entry/exit ramp to provide dedicated heavy traffic access.

As the City demand for residential and commercial services increases, particularly in these key areas, it is expected that demand for City provided services and infrastructure is expected to continue to grow or be upgraded.

5.1.3 Sustainable Carbon Strategies

There is a growing demand from the City and its communities to achieve more sustainable carbon strategies. This demand is created through the need to address Climate Change and the associated

4 2018 Municipal Comprehensive Review of Urban Serviced Area, April 11, 2019.
5 2018 Municipal Comprehensive Review of Urban Serviced Area, April 11, 2019.
6 2018 Municipal Comprehensive Review of Urban Serviced Area, April 11, 2019.

Green House Gas (GHG) emissions as well as maintaining important livability metrics (such as air quality).

The City of Belleville recently released its *2019 Energy Conservation and Demand Management Plan*. Within this it sets out targets to:

– Reduce energy intensity in City facilities by 5% by 2024 compared to our revised base year (2018).
– Enhance our culture of conservation through training and outreach
– Create a comprehensive corporate energy management policy
– Expand our monitoring and tracking program
– Deliver energy cost savings through the identification and implementation of processes, programs and projects that will reduce energy consumption.

Belleville has already implemented major reforms and received notable industry recognition including being identified as leaders in energy conservation in 2015 and 2017 by Save on Energy and Veridian Connections (now Elexicon Energy).

However, the Energy Conservation and Demand Management Plan acknowledge the need to continue to improve. It identifies the additional upgrade or adjustment needs in the City's current infrastructure over the next 5 years. These included:

– LED replacements (street lighting, buildings, facilities)
– Occupancy Sensors
– Heating Ventilation and Air Conditioning (HVAC) replacement and upgrades
– Building system controls
– Building envelope/windows upgrade and replacements

Although these are the primary initiatives have been specifically identified the individual departments are optimistically exploring ways to continue to reduce their impact on the environment.

5.1.4 Climate Change and Resilience

Belleville City Council has officially declared a climate emergency in the city in 2021. The city has records showing that the average annual temperature has warmed by 1.8°C over the past 100 years, consistent with temperature changes observed elsewhere in Canada[7]. According to Quinte Conservation, precipitation events also appear to be greater and more intense including more winter rain storms and extreme weather events.

As a result of these changes, it is expected that demands on the City's infrastructure will be affected as follows:

– New infrastructure assets should be prioritised, planned, designed, built and operated to account for the climate changes that may occur over their lifetimes.
– Existing infrastructure may need to be upgraded, retrofitted, or managed differently, given climate change.
– Additional infrastructure, such as stormwater ponds, may need to be constructed to address the physical impacts of climate change. This additional infrastructure can include traditional infrastructure, such engineered solutions, as well as natural infrastructure, such as wetlands and other nature-based solutions.

[7] https://www.belleville.ca/en/home-and-property/energy-and-climate.aspx

5.2 Demand Management Strategies

Current asset lifecycle strategies which can typically be employed include:

- **Non-asset solutions** such as education, demand reduction and balancing the usage
- **Asset expansion or enhancement** needs that increase service potential, performance capability or capacity as are typically outlined in the Master Plans,
- **Asset renewal requirements** including rehabilitation, disposal and replacement, typically based on condition assessment programs, and
- **Maintenance and operations** needs based on analysis of known historical and forecasted future costs.

5.2.1 Non-Asset Solutions

Non asset solutions which are being considered at the City include:

- Continuing to manage demand through education and demand reduction and other demand management programs.
- Balancing use by actively managing assets from higher use to lower use.
- Energy conservation and demand management initiatives such as process optimization and education.
- Integrating the planning of infrastructure renewal across asset classes (e.g., scheduling road and buried infrastructure replacements at the same time) and with local municipalities and other agencies.
- Working with the cities and townships to optimize infrastructure management (e.g. data sharing agreements, and coordinated capital projects).

5.2.2 Asset Expansion or Enhancement

This level of population growth, urbanisation and climate change will place pressure on the capacity of existing infrastructure and create demand for new infrastructure. Based on the expected average annual population growth outlined above, the City's asset portfolio could be assumed to grow by a comparable amount, approximately 0.5% annually from now until 2031, as described in section 5.1.1. This growth will likely be achieved through a combination of expansion activities and enhancement activities.

Expansion activities are those works that create a new asset that did not previously exist or increase the capacity of an existing asset. Enhancement or upgrade works improve an existing asset beyond its existing function and may result from legislative, social or environmental needs. Assets may also be acquired at no cost (i.e. subdivision acceptances).

The City determines its recommended expansion (growth) and upgrade program through the master planning process. This process develops needs based on an assessment of demand against capacity and future trends in regulatory requirements, customer expectations, desired levels of service, other business drivers, and availability of enabling technologies. The City updates master plans periodically and incorporates the results into renewal, operations and maintenance planning, and the budgeting process.

The following master plans are complete, underway or planned for the near future:

- Belleville Wet Weather and Wastewater Servicing Master Plan 2019
- City of Belleville Transportation Master Plan
- City of Belleville Parkland and Recreation Master Plan
- Energy Conservation and Demand Management Plan
- Road Needs Study

5.2.3 Asset Renewal Requirements

Asset renewal requirements are currently based on the strategies outlined in Section 6. Increased demand does not inherently change the frequency of refurbishment activities or reduce the service life achieved by the asset. However, it may increase the asset's utilisation. The renewal requirements will continue to be monitored as part of the current asset management practices.

5.2.4 Maintenance and Operations

Asset operations and maintenance requirements are currently based on the strategies outlined in Section 6. The level of portfolio growth will also place significant pressure on the capacity of existing operations and maintenance. Consequential operational expenditure is the operations and maintenance cost associated with new assets. For most assets, a good estimate of the consequential operational expenditure required to operate and maintain the new assets is simply the existing operations and maintenance cost multiplied by the growth factor. Based on the expected average annual population growth outlined above, the City's operations and maintenance activities and associated costs could be assumed to grow by approximately 0.5% from now until 2031 based on the estimated population growth.

6. Asset Lifecycle Strategies

6.1 Introduction

This Section describes the strategies and practices undertaken by the City of Belleville to actively manage the City's asset portfolio throughout the asset's lifecycle. These are categorized into six different activities, depending on the impact the action has on the asset. These include:

1. Asset Acquisition and Upgrade,
2. Operations,
3. Maintenance,
4. Rehabilitation and Replacement (collectively referred to as asset renewal)
5. Asset Disposal.

Each of these asset management activities has an inherent cost associated with performing the work and the accumulative cost of all activities required throughout an asset's lifecycle is referred to as the asset's lifecycle cost. A visual representation of a theoretical asset's lifecycle and the accumulative lifecycle cost or cost of ownership is shown in Figure 6.1

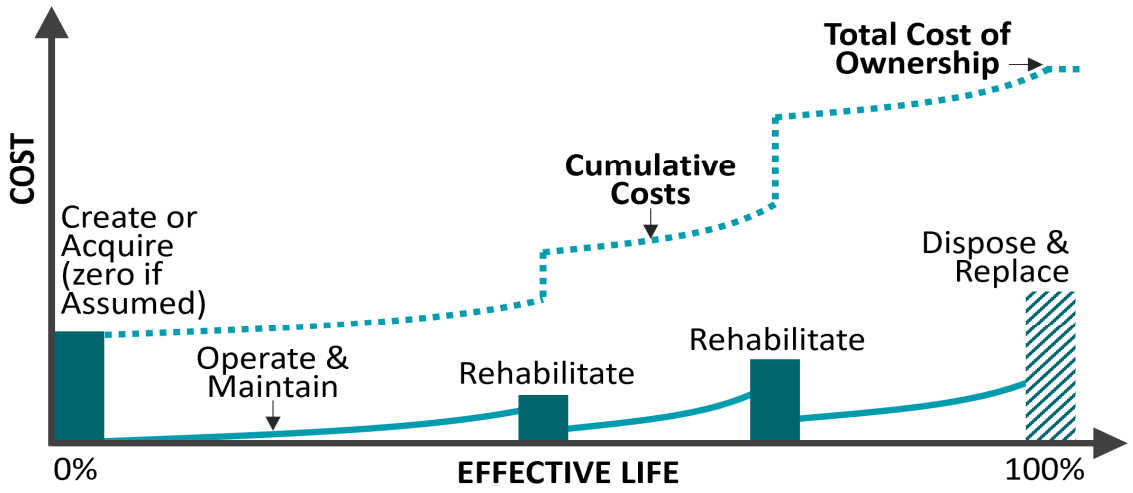


Figure 6.1: Illustrative example asset's lifecycle and the accumulative lifecycle cost

A key objective of the City of Belleville is to effectively manage their assets to achieve the lowest lifecycle cost while maximizing the effective assets' life. The following sections summarizes the strategies and actives which the City of Belleville undertakes to achieve this.

6.2 Asset Acquisition and Upgrade

The City acquires or expands inventory in two distinct ways: through the identification and planning by the City of Belleville or through acquisition of new assets created by developers.

Engineering and Development Services is the department, within the City, that is responsible for supporting the City of Belleville and identifying future projects which are required to manage the demand for services. These projects are typically identified and recorded in the related master planning documents.

The other primary mechanism through which the City acquires assets, is through asset ownership transfers from private developers. When the city approves a new land area for development or changes the zoning, private companies can apply to develop the land. As part of this development, this usually includes the construction of new public infrastructure assets (i.e., roads, water and sewage pipework, etc.) to support these developments. These are built by the developers based on their needs for the development area and standards set up by the City. Once the development is completed the ownership of assets is then typically transferred to the City to continue to operate and maintain.

Most City assets are acquired through these two methods which are both primarily managed by the Engineering & Development Services. This group provides the oversight for the procurement, management, quality control and release of the contractor at completion of the project. Once the asset has been created and the associated warranty periods have expired, the Engineering & Development Services transfers the completed asset or land area to the respective Service Area who then assume responsibility for the continued management and maintenance of the asset(s).

6.3 Asset Operations

Asset operations activities are those regular activities (and costs) which are required to support delivery of service to the City's customers. For municipalities this is governed by the applicable local and provincial standards to ensure that consistent minimum service levels are provided or the City's own internal standards, whichever is more stringent.

The Service Area's operations personnel are primarily responsible for completing operational activities. However, some external contracts are in place to enable additional resources to be deployed to support time sensitive activities or activities where special equipment or services are required. All of the costs are attributed to the specific Service Area's operational budgets.

The specific operational activities conducted by each Service Area are summarised in Appendix A.

6.4 Asset Maintenance

When a City asset experiences a defect, which affects its LOS (capacity, function, or quality), the activity that is required to restore it to its original operational condition is defined as maintenance. Maintenance is usually triggered based on findings of a physical inspection, customer complaints, or adverse weather event (snow or storm event).

For most Service Area, maintenance activities are managed in house by a project manager. In-house staff will complete these activities if possible. Some activities are completed by a contractor with the contracts set up through the procurement process on an annual basis. The City has an ambition to have all activities logged and tracked in the in-house management system (such as Worktech or similar) however this is still a work in progress.

Once a work order is created, it is assigned to 'in house' maintenance crews or an external contractor which is administrated using existing maintenance contracts. The maintenance work order is also assigned an expected completion time/date to ensure that maintenance tasks are prioritised appropriately. Priority and projected completion time/date is assigned based on asset class and sub asset category. If this is a safety issue this is usually governed by the LOS requirements in accordance with the Ontario Regulations for Minimum Maintenance Standards (MMS).

Once a corrective maintenance work order is complete, it is closed. Details captured as part of work order completion include task completed, contractor or internal staff responsible for the work, payment processing details, finance codes and equipment and staff utilised to complete the works.

6.5 Asset Renewal

All assets physically deteriorate at different rates. When an asset degrades to where the ability to deliver the required LOS is affected, the asset is required to be refurbished or replaced. Asset condition is a measured assessment of an asset's current position on the asset "decay" or deterioration curve. Many assets deteriorate slowly at first however this increase as it approaches the end of its useful life. This typical lifecycle pattern is illustrated in Figure 6.2 which shows the relationship between the condition and effective life (i.e., age).

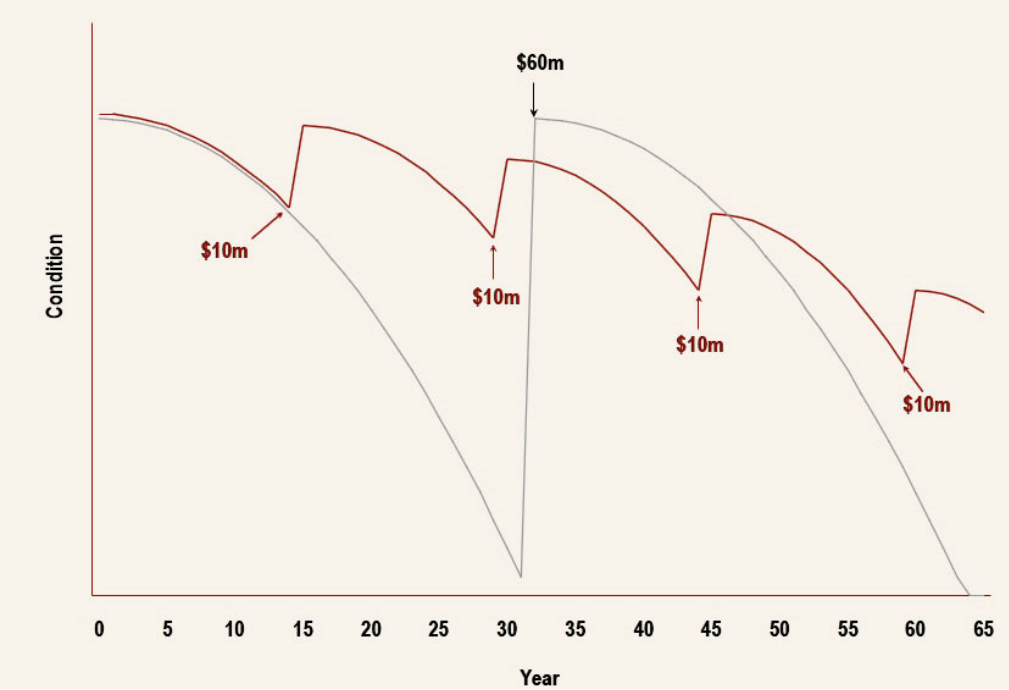


Figure 6.2 Typical Asset Decay Curve[8]

A key observation is that it is far more cost effective to maintain and rehabilitate assets before they reach a condition where the only option is costly reconstruction. For assets where preventive maintenance and rehabilitation activities are technically feasible, understanding the asset's current condition and place on the asset decay curve enables forecasts of future condition and determination of optimal treatment type and timing – key aspects of lowest lifecycle cost renewal decision-making. In some instances, the City invests in condition assessments to gain the critical knowledge needed to determine the lowest lifecycle strategies. The scope of City's current condition assessment programs is being expanded, to support asset management decisions making, particularly for buried assets.

The rehabilitation and replacement schedules for core City of Belleville assets used to develop this Plan are summarized in Appendix A.

The current renewal strategy is applied constantly across the asset portfolio with limited adjustment, at the individual asset level. The strategy applied does not reflect other parameters such as criticality, utilisation and redundancy, condition, or performance. This is primarily because of the City of Belleville's rapid growth in the last 20 years. This growth means that a notable portion of the City Assets have not yet required replacement or any major maintenance. As such the institutional knowledge about what factors

[8] *Infrastructure Ontario - Building together – Guide for municipal asset management plans*

may accelerate an individual asset's deterioration are still being developed. The City is aware of this and is actively testing and monitoring its strategy to enable future refinement.

When major refurbishment or asset replacements are identified, renewals for core assets (roads and bridges, pipes) are often coordinated with internal departments and other stakeholders (Quinte West, local landowner, neighboring regions or indigenous communities).

These projects are usually centrally managed by Engineering and Development Services who coordinate the various needs of the Service Area. Although project funding is allocated separately, by Service Area, for projects in the same area, project coordination is essential to maximize customer value. This communication is essential to ensure that refurbishment or replacement projects do not conflict with planned activities, by other stakeholders. A common example, is to schedule road refurbishment activities after the water/wastewater/stormwater works have been conducted, situated under the roadway. This is typically managed through consultation with stakeholders during annual planning periods.

6.6 Asset Disposal Plan

The City of Belleville will recommend asset disposal where, in the broadest terms, assets have ceased to meet the service performance requirements and the required maintenance, or measures to rehabilitate, or modify the assets are less beneficial than disposal and replacement options. Obsolescence is a potential trigger for recommending asset disposal and replacement. This is usually determined by the City's subject matter expert who submits a request to council for endorsement of the disposal of this asset. This endorsement is usually linked to permission to acquire a new asset.

For those assets which it is possible to auction, primarily equipment and vehicles, are sold and all funds recovered go into the capital reserve account. The vehicles and equipment are not traded in.

7. Asset Management Strategy – Risk

7.1 Introduction

The City of Belleville does not currently have an endorsed Enterprise Risk Management framework. The framework proposed below has been deployed to the assets covered under this section of the asset management plan however is still required to be expanded to other assets within the organisation. This will ultimately enable standardized understanding, management and monitoring of key risks across the City, at an organizational level. This is an area of improvement which will continue to be developed.

7.2 Risk Framework

7.2.1 General

The proposed corporate frameworks adopted, by the City of Belleville, have been developed and will be implemented in accordance with National Standard of Canada and International Standards, specifically CSA-ISO 31000. The City of Belleville's ERM process is described as having five key components which directly align with the ISO31000 standard. These are:

1. Establish the context
2. Risk Assessment
3. Risk Treatment
4. Communication and Consultation
5. Monitoring and Review

It should be noted that this process is intended to be applied to all types of risks whether they are large or small, positive, or negative.

7.2.2 Consequence

The consequence is defined as an outcome of an event affecting (city, department, or asset) objectives. Consequences can be expressed qualitatively or quantitatively. It can be certain or uncertain and can have positive or negative effects on the objectives.

The consequence of failure is determined based on the degree to which a risk event would impact the following five considerations:

- **Health & Safety** impact considerations such as ability to meet health and safety related regulatory requirements and degree and extent of injury, from negligible injuries to multiple loss of life.
- **Social impact** is the degree of social interest, ranging from no community concern to international media coverage.
- **Service** delivery considerations such as the lack of sufficient service capacity to meet demand or loss of existing service, expressed as degree and duration of impact from minimal localized short-term disruption of non-essential service to widespread and long-term disruption of essential service.
- **Financial** impact considerations such as damages to the City or private property and infrastructure, loss of revenue, and fines.
- **Environmental** impact considerations such as the extent of damage to the environment and the time within which the impact would be reversible.

The scoring of the Consequence, for each of the categories, is determined based on comparison with descriptions in Table 7.1.

Table 7.1 Consequence Matrix

	Consequence of Failure (CoF)				
	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 epidemic
Social	Event only of interest to individuals. No community concerns.	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.
Social Impact	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.	Severe damage of local importance. Prosecution probably. 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.

The overall consequence of failure for each class of the City's assets is determined by assigning the maximum consequence score across the five impacts (health & safety, social, service, environment, and economic).

7.2.3 Likelihood

The Likelihood of a risk event is the probability of its occurrence. It may be determined objectively or subjectively and measured qualitatively or quantitatively. It can also be expressed as the probability or a frequency over a given period. The scoring of the Likelihood is described in Table 7.2.

Table 7.2 Likelihood Matrix

Probability of Failure (PoF)	Title	Probability	Description	Condition
P1	Rare	< 0.05	Event could occur very infrequently or only in exceptional circumstances, but is not expected	Very Good
P2	Unlikely	>= 0.05 & < 0.3	Event could occur infrequently	Good
P3	Moderate	>= 0.3 & < 0.7	Event should occur at some time	Fair
P4	Probable	>= 0.7 & < 0.9	Event will probably occur regularly or in most circumstances	Poor
P5	Almost Certain	>= 0.9	Event is expected to occur very frequently or in most circumstances	Very Poor

7.2.4 Risk Map

A graphic representation of the magnitude of risk, or combination of risks, is expressed in terms as the product of the consequences and the likelihood of the risk. The Risk Map utilised is shown in Table 7.3.

Table 7.3 Risk Map

		Consequence				
		C1	C2	C3	C4	C5
Likelihood	P5	Low (5)	Medium (10)	High (15)	High (20)	Extreme (25)
	P4	Low (4)	Medium (8)	Medium (12)	High (16)	High (20)
	P3	Low (3)	Low (6)	Medium (9)	Medium (12)	High (15)
	P2	Insignificant (2)	Low (4)	Low (6)	Medium (8)	Medium (10)
	P1	Insignificant (1)	Insignificant (2)	Low (3)	Low (4)	Low (5)

The risk level and the required response is summarised as follows:

- **Insignificant** – No action required
- **Low** – May be acceptable but monitoring may be required
- **Medium** – Requires consideration by management with necessary risk management and monitoring adopted, as required
- **High** – Requires consideration by management. Risk management and monitoring is required
- **Extreme** – Requires extensive management input. Risk mitigation to reduce to an acceptable level is essential

7.3 Asset Level Risk

Risk assessment associated with the City's assets is essential to meet service levels and to manage risk, while minimizing life cycle costs. Risk events, such as an asset failure, may compromise the delivery of the City's strategic objectives and Levels of Service (LOS). The risk assessment was determined for each of the LOS "Customer Attributes":

- Capacity and Availability
- Functionality; and
- Quality.

The process of assessing and evaluating the risk associated with the City's assets, allows a systematic process with which to identify high risk assets that can then be prioritized for Asset Management activities.

7.3.1 Criticality or Consequence of Failure

All assets are scored in accordance with Table 7.1 and hence an asset consequence of failure is determined based on the degree to which a potential asset failure impacts the health and safety of its customers, creates services disruption, causes social disruption, the impact on the City's financial position and the environment. The following tables provide a summary of the impact, for each asset category, on each customer LOS attributes. The consequence matrix for each asset is provided in the Appendix A.

The City of Belleville has historically utilised individual subject matter experts' experience to assess the criticality and prioritise investment. The formalised risk framework establishes a documented understanding of the consequence of asset failure and enables effective management of assets – the "right" management strategy (e.g., do nothing, proactive maintenance, rehabilitate, replace). The degree to which an asset's failure can affect the City's ability to achieve its objectives is also referred to as its criticality.

Asset criticality reflects the importance of an asset to the City's objectives or, in technical terms, the potential consequences of the asset failing to provide the required LOS. The higher the criticality of an asset, the lower the City's risk tolerance for that asset. Conversely, the City will tolerate greater risk in relation to less critical assets.

7.3.2 Likelihood or Probability of Failure

Understanding the probability of asset failure further enables effective management of assets – the "right" management strategy for every asset should depend on its criticality to achieve the City's objectives and then on the likelihood of a failure that would trigger the impact. To enable this all assets were scored in accordance with Table 7.2.

For the Quality LOS the likelihood or probability of failure is determined based on the individual assts' condition ratings developed in the State of Local Infrastructure (SOLI). The general approach is based on the principle that assets in poorer condition are more likely to fail. This is illustrated by mapping the 5 -point condition rating scale to the Probability of Failure score as shown in the Figure 7.1. It should be noted that this has been applied to a generic deterioration curve for illustrative purposes.

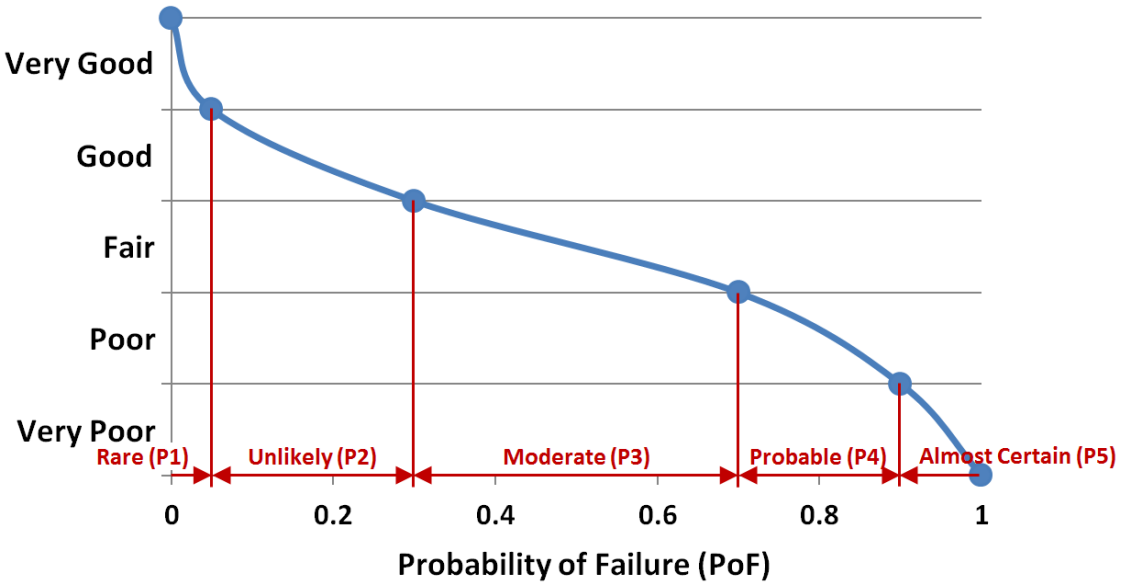


Figure 7.1 Condition Rating to Probability of Failure (PoF) Graph

7.3.3 Risk Maps

Risk is evaluated by multiplying the Consequence of Failure of the asset and the Probability of Failure. A risk map for the City's asset portfolio has been developed in Table 7.4. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020$M, corresponding to the risk of failure score:

- Extreme (red),
- High (orange),
- Moderate (yellow),
- Low (green), and
- Insignificant (grey).

Table 7.4 Overview of Asset Portfolio Risk Summary (2020 $M)

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0 M	$27.55 M	$123.7 M	$21.95 M	$0 M
	P4	$0 M	$14.08 M	$43.98 M	$13.63 M	$0 M
	P3	$0.13 M	$13.69 M	$85.17 M	$20.43 M	$150 M
	P2	$0 M	$13.13 M	$514.83 M	$137.72 M	$0 M
	P1	$0.51 M	$117.8 M	$721.44 M	$273.45 M	$3.35 M

Further breakdown of the risk scoring associated with each Service Area is provided in Appendix A.

8. Financial Strategy

8.1 Introduction

Financial management in asset-intensive organizations is characterized by high asset values relative to the total organization value. Financial management principles for asset intensive organizations include recognizing the consumption of asset service potential, categorizing expenditure by lifecycle activity, allocating costs to assets as far as practical, preparing long term forecasts, cost-effective financing, and effective reporting of financial performance.

One of the City of Belleville strategic goals is “Financial sustainability”. This outlines a desire to *develop infrastructure, facilities, programs, and services that are financially responsible, beneficial, and sustainable over the long-term, considering all related costs*. This vision directly links to the need to actively manage the City’s infrastructure so that all generations are paying for these assets equitably.

This section integrates asset management planning with financial planning and budgeting. Allocating costs between lifecycle activities such as expansion (also known as growth), upgrade, renewal, operations and maintenance is not simple due to complexities of the infrastructure needs and multi-purpose solutions to meet those needs. This provides the City with the necessary understanding required to make sustainable financial investment decisions.

8.2 Expenditure Forecast

The forecast expenditure is the investment expected to be required to achieve the City’s Levels of Service based on the lifecycle activities identified for each asset category within the asset inventory. This section is broken down as follows:

– **Expansion and Upgrade Investment** – Investment required to create new assets or upgrade the asset to it is able to provide a greater level of service
– **Renewal Investment** - Investment required to replace or rehabilitate assets in order to reinstate the assets level of service
– **Operations and maintenance –** Investment in activities required to allow the asset to continue to deliver services to the community

8.2.1 Expansion and Upgrade Investment

This financial plan includes expansion and upgrade works up to l 2029. Expansion and upgrade plans align with the City’s Master Plans and Development Charge Background Study.

The following table summarizes the 10-year capital growth and upgrade program, the current replacement value (2020), the forecast replacement value in 2029, and the forecast Growth & Upgrade increase over the next 10 years.

Table 8.1 Growth and Expansion (2020 M$)

Service Area	Capital Growth & Upgrade Program (2020 $M) (1)	Current Replacement (2020 $M) (2)	Forecast Replacement in 2029 (2020 $M) (1+2)	Compound Annual Growth Rate (%)
Community Facilities	0.0	24.0	24.0	0.0%
Environmental Services	179.0	1537.4	1716.4	1.1%
Protective Services	17.5	44.3	61.8	3.4%
Recreation, Culture Community Services Department	36.5	141.1	177.6	2.3%
Transportation Operational Services	107.4	549.7	657.1	1.8%
Total	**340.4**	**2296.5**	**2637.0**	

The planned growth and upgrade investments indicate a need, across the Service Areas of **$340.4 M** over the next 10 years, or an average an annual investment of approximately **$34.0 M**.

It should be noted that an assumption, related to the expansion and upgrade, has been made that the assets created or upgraded will reflect the current ratio of the current asset inventory.

The City expects a percentage of growth to be paid for by developers either through direct construction or through development charges. The amount which is expected to be contributed by other sources is $50.8M. The remaining **$289.6M** will be funded by the city which represents and annual need of **$28.9M**.

8.2.2 Renewal Investments

The AMP forecasts long-term asset renewal needs for each service area based on current asset performance and the identified AM lifecycle strategies to effectively manage these assets. The annual average long-term (50-year) investment calculated within this AMP identifies the optimal level of annual investment required to maintain current levels of service. Based on current estimates[9] in the AMP, the level of annual optimal renewal investment is approximately **$47.3 M** per year or **$472.7 M total** over the period until 2030. The breakdown of rehabilitation and replacement is shown in Figure 8.1.

[9] 2020 forecasts

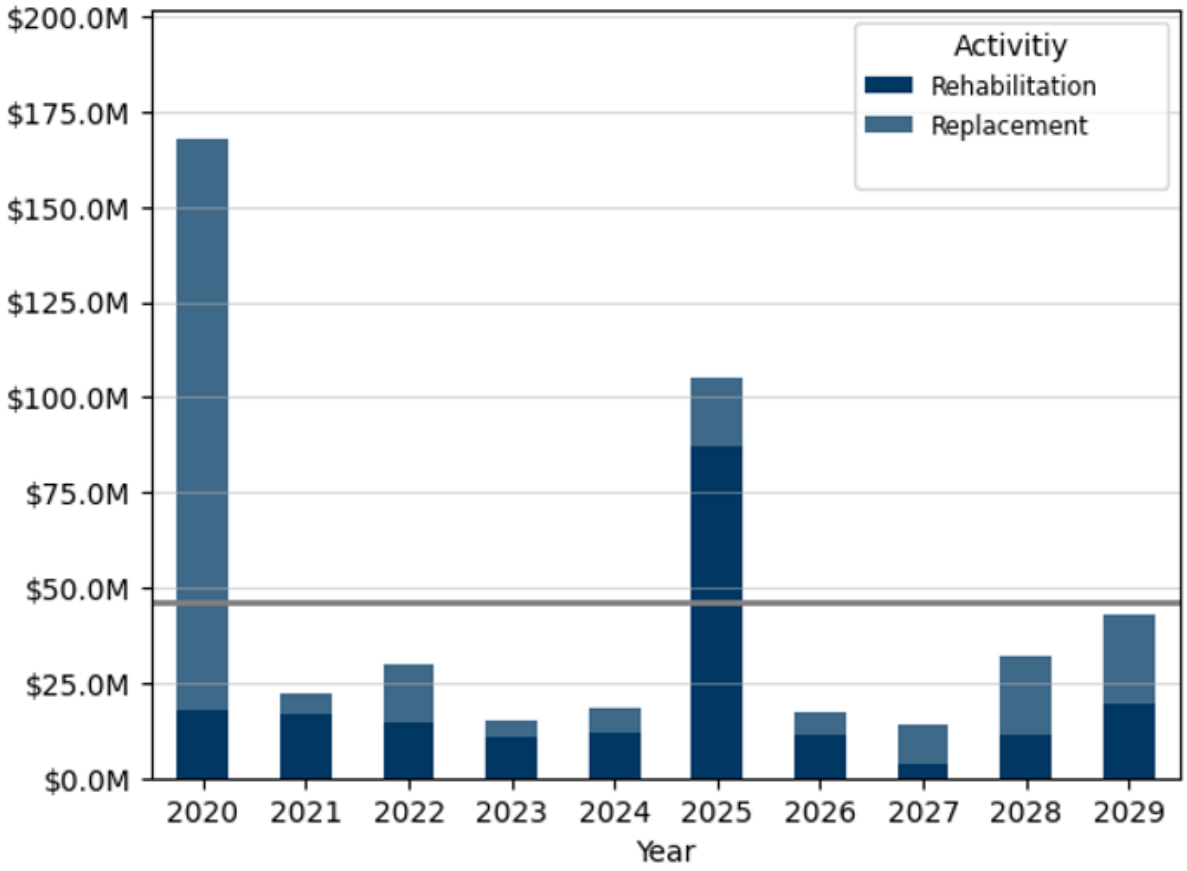


Figure 8.1 Summary of rehabilitation and replacement activities

Table 8.2 provides a summary of the current and expected renewal need for the current inventory. The table provides the:

- **Current level of investment**: based on current year budgeting
- **Projected level of investment need**: the projected 10-year average annual capital renewal forecast need determined by applying the asset renewal strategies to the current state of the infrastructure
- **Optimal Annual Reinvestment Rate (OARR):** the average annual capital renewal forecast needs that are determined by applying the asset renewal strategies over the lifecycle
- **Infrastructure surplus or (gap):** the difference between the current and optimal levels of investment
- **Asset Renewal Programming Ratio**: current investment per capital program as a percentage of optimal investment according to Asset Management need.

Table 8.2 Renewal Investments (2020 $M)

Service Area	Current Investment (2020 $M)	Projected Renewal Investment Need (2020 $M)	Optimal Annual Reinvestment Rate (OARR)	Funding Ratio
Community Facilities	0.3	0.1	0.3	1.01
Environmental Services	6.8	36.9	36.8	0.18
Protective Services	1.3	0.9	1.2	1.08
Recreation, Culture & Community Services Department	2.0	2.7	4.5	0.45
Transportation & Operational Services	16.0	6.7	12.5	1.28
Total	**26.4**	**47.3**	**55.3**	

The calculated funding ratio of 0.18 suggests that Environmental Services is potentially underfunded. The projected need also exceeds the Optimal Annual Reinvestment Rate (OARR) which suggests this service area has a renewal backlog.

It should be noted that the OARR level indicates what should be allocated to an asset (i.e., into a reserve) to meet future lifecycle management requirements. This investment would be required to meet future funding needs rather than rely on the future availability of total funding that is not guaranteed.

8.2.3 Operations and Maintenance Expenditures

To maintain the current levels of service, the City includes planned maintenance and operations works in its annual operating budget. The maintenance of infrastructure in good condition continues to be a priority. The following table outlines the average annual maintenance and operations budget based on the historical expenditure by asset category.

Table 8.3 Operations and Maintenance Investments ($M)

Service Area	Maintenance (2020 M$)	Operations (2020 M$)	Total (2020 M$)
Community Facilities	0.5	1.5	2.0
Environmental Services	2.8	6.7	9.5
Protective Services	0.4	0.9	1.3
Recreation, Culture & Community Services Department	0.8	7.3	8.1
Transportation & Operational Services	3	5.2	8.2
Total	**7.5**	**21.6**	**29.1**

The subtotal of operating costs from the above table, which represents the cost of operating and maintaining assets to deliver current levels of service, are in the range of **$29.1 million** annually.

8.2.4 Summary

Table 8.4 summarizes the annual 'need' associated with achieving the current Level of Service.

Table 8.4 Current Total 'Need'

Service Area	Capital Growth & Upgrade Program (2020 $M)	Projected Renewal Investment Need (2020 $M)	Maintenance (2020 M$)	Operations (2020 M$)	Total (2020 M$)
Community Facilities	0.0	0.1	0.5	1.5	2.1
Environmental Services	17.9	36.9	2.8	6.7	64.3
Protective Services	1.8	0.9	0.4	0.9	4.0
Recreation, Culture & Community Services Department	3.6	2.7	0.8	7.3	14.4
Transportation & Operational Services	10.7	6.7	3.0	5.2	25.6
Total	**34.0**	**47.3**	**7.5**	**21.6**	**110.4**

Figure 8.2 shows the complete needs, including operations, maintenance and renewal costs forecast over the next 10 years which is slated to, increase proportionately with growth and upgrade of the asset portfolio as outlined in Table 8.4. The annual need is expected to increase by **$22.3M** over the next 10 years to maintain the current Level of Services.

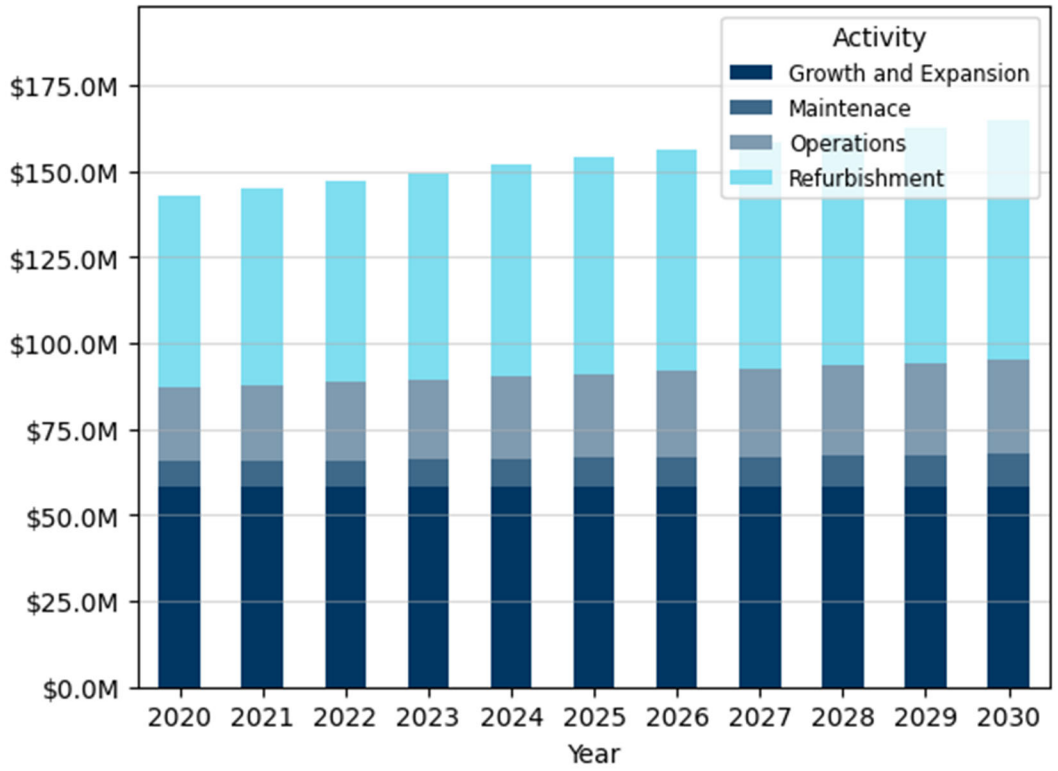


Figure 8.2 Summary of rehabilitation and replacement activities

8.3 Funding Forecast

8.3.1 Funding Sources

Through the annual budget process, capital and operational project information is gathered from each of the service areas, including investment needs, trends and priorities. This section is based on the current (2020) financial year data. A 10 year forecast capital and operational investment program (as required by the O.Reg588/17) has been estimated by averaging the historical budgets and extrapolating them over this period. The City receives funding from numerous sources financing as outlined in Table 8.5.

Table 8.5 Key Sources of Funding and Financing

Funding Source	Examples	Financing Use
Property taxes	NA	Operations, Maintenance, renewal (i.e., road renewal)
Development Charges	NA	Restricted to Growth or Upgrade Activities (no replacement activities)
Grants and subsidies	Investing in Canada, Provincial Fuel Tax, Canada Community-Building Fund (formerly Federal Fuel Tax)	External grants which usually come linked with some funding constraints
User rate	Water, Wastewater, parking	No restrictions on investment

Property taxes comprise the majority of the City's revenue. These are taxes collected from the City's residents and represent a proportion of the property assessment value. This revenue is used for both operational expenditure and capital expenditure.

User rates are those fees charged to the user of a particular utility or service based on the cost of delivering that service to the community. Not all services are set up as a user pays service, such as transportation assets. Conversely the City of Belleville Environmental Service Area including water and wastewater is completely funded by water and wastewater rates.

The City of Belleville has instituted development charges to pay for development-related infrastructure. The Development Charges Act (1997) provides the authority to impose these charges and provides strict limitations on their calculation. Development charges are generally based on the benefits principle. Increases in need for services necessitated by development are estimated and all or a portion of the net capital cost are recovered through the levy paid by the benefiting development. These are collected by the City from developers and are held in designated DC reserve funds and used to fund a portion of growth-related infrastructure as prescribed by the City's DC Bylaw. Projections relating to DC revenues are based on DC rates and the projected growth in residential and non-residential development.

Grants from the Province or the Federal government are predominately used to finance the capital program. Some grants are a result of stimulus or other one-time funding and may be more difficult to forecast. Most grants are included in the budget forecast when confirmed. One exception to this is the Federal and Provincial Gas Tax revenue. The City recognizes the Gas Tax revenue as a stable source of funding due to its historically consistent allocation, although it is acknowledged that this may not always remain the case. These contributions, which are distributed to municipalities based on population, are now indexed annually for inflation. Unlike Provincial Gas Tax funds, Canada Community-Building Funds may be applied to most services.

8.3.2 Financial Instruments

Although not a “source” of financing two other financial instruments are also common tools to support the management of infrastructure: Reserves and Debt.

Capital reserves are established as a source of saving or allocating funding for future capital programs. Through effective management of its reserve the City of Belleville manages an effective reserve of funding which it can use to support asset activities. Funding for these reserves is obtained annually through contributions from property tax supported and user rate budgets. The annual reserve contributions are based on forecasted financing requirements and provisions required to sustain reserve balances at appropriate levels to address infrastructure replacement costs in the future and inherent uncertainties in capital funding needs. Reserve contributions are evaluated annually to ensure adequate funds are raised to meet future capital requirements and to smooth out the impact on the annual operating budget. This practice can help to stabilize any annual fluctuations in funding requirements, plan for any major long-term infrastructure investments, and prevent sudden spikes in property taxes, rates, and debt levels.

Taxes and rates can also be supported by external debt. For equity purposes, debt is typically used for projects that provide benefits over a longer timeframe so that the burden of capital cost is distributed between the current taxpayer and future rate payers. Debt is governed in Ontario by regulation such as the Ontario Regulation 403/02 *Debt and Financial Obligation Limits* under the *municipal Act 2001.*

8.3.3 Asset Funding

All asset management programs are supported by a combination of revenue sources. During budget development, estimates are made with respect to program expenditure requirements, which are then offset by anticipated federal/provincial subsidies and user fee revenues. The Finance Department provided a forecast of funding, which has been developed using historical funding. The summary of the funding sources is presented in Table 8.6.

Table 8.6 Summary of Forecast Funding

Revenue Type	Funding Source	Funding (2020 M$)	Percentage of Total Funding
Capital Expenditure	Taxation	5.6	7.8%
	Water Rates	5.7	7.9%
	Wastewater Rates	5.4	7.5%
	Parking Rates	0.2	0.3%
	Reserve Funds	8.7	12.1%
	Debt	8.1	11.3%
	Donations	0.5	0.7%
	Fed / Prov Grants	8.7	12.1%
Operational Expenditure	Taxation	19.6	27.2%
	User Rates	9.5	13.2%
Total		**72.0**	

Removing the contributions of the reserve funding and debt, which are largely used as cashflow management tools and don’t represent financially sustainable City revenue, the annual forecast revenue is **$55.2 M**.

8.4 Financial Summary

The budget provided to undertake asset management activities and any gaps between the asset management needs is referred to as the 'Infrastructure Gap'. The City may choose to increase or decrease the needed asset management strategy investment amount for a time due to factors such as the age of the infrastructure, accumulated backlog of work, risk tolerance, and available infrastructure renewal funding. However, asset operations, maintenance and renewal must be undertaken to avoid accumulation of large backlogs of work overtime, and associated risk to service delivery.

The City has defined asset lifecycle activities specific to each asset type and has forecast that the lifecycle activities needed to maintain the current level of service will cost the City **$110.4 M** per year, which indicates an infrastructure gap of **$55.2 M** as outlined in the following table.

Table 8.7 Summary of Annual Infrastructure Gap

	Lifecycle Activity	Planned Budget (2020 $M) (1)	Infrastructure Need (2020 $M) (2)	infrastructure Gap (2020 $M) (1-2)	Funding Ratio
Capital	Growth Upgrade	8.3	34	-25.7	0.2
	Renewal	17.8	47.3	-29.5	0.4
Operations	Operations	21.6	21.6	0.0	1
	Maintenance	7.5	7.5	0.0	1
Total		**55.20**	**110.4**	**-55.2**	**0.50**

The average annual cost of the forecast "needs" exceeds the "funding", the City has an average annual infrastructure "gap" of **$55.2 M per year or a Funding Ratio of 0.5**.

The Asset Funding Ratio is an important financial performance indicator as it reports the percentage (%) of funding projected to be available to undertake the lifecycle activities forecast over the next ten years against a target of 1.0. To close the financial 'gap' there are numerous methods available.

8.5 Financial Sustainability Options

One of the key drivers of the Ontario Regulation 588/17 is to help ensure that all municipalities are actively managing finances to achieve "financial sustainability". Based on current calculation of the 'infrastructure gap' it is evident that the City has an infrastructure gap. Although this gap it exists it is very common across most municipalities.

It is the City's responsibility to ensure that the City's assets are managed sustainably and hence the City of Belleville shall actively manage this 'gap'. Typically, this is achieved through:

– Increasing revenue
– Accepting Increased Risk
– Accepting Lower Level of Service

It should be noted that there is no singular method for addressing the 'infrastructure gap'. Often this is an iterative process to balance cost, risk, and LOS, through consultation with the community, particularly in relation to 'willingness to pay' for services.

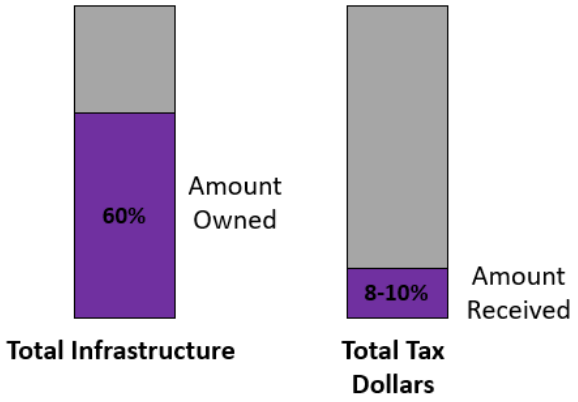
8.5.1 Option 1: Increase Funding

Increasing the revenue or funding available to support assets is one method of reducing the infrastructure gap. This could be achieved by increasing the tax base. Where assets are supported by “user pays” rates (such water and wastewater services) this might involve review of the current rates levels. This is not possible for all City infrastructure. Some communities also operate an “Infrastructure Levy” which is charged to all taxpayers to support those assets which are not covered by a “user pays” model (such as Transportation).

For example, if we consider the assets which are intended to be support by User Rates and their averaged annual need over the next 10 years, it is possible to determine if the rates are sufficient to solely support the asset base. Based on the infrastructure need, identified by SME’s and financial revenue historically generated, the water and wastewater rates do not currently achieve this. The Water and Wastewater User Rates would need to be increased by approximately 20% and 65%, respectively in order for these assets to be completely supported by User Rates.

Alternatively, the city has identified opportunities to continue to build on the existing relationships with these stakeholder to improve the coordination of asset activities with other stakeholders (such as the Region or its neighbors) to maximize the value created through joint capital expenditure programs.

Finally, another option would be to continue to lobby higher levels of government for a greater share of the collective taxation revenue. It is well documented by organizations such as the Federation of Canadian Municipalities (FCM) that local Governments have a disproportionate share of total infrastructure ownership (approximately 60%) compared to the total tax revenue received (between 8 - 10%).



Source: Federation of Canadian Municipalities (FCM)

Figure 8.3 Canadian Municipal Infrastructure Responsibility compared to Total Tax Revenue

8.5.2 Option 2: Increase Risk

Although not always desirable, it may be possible to accept a higher degree of asset risk at the City to help lower ongoing asset costs. The City’s leadership, in consultation with the SMEs, may select to adjust the risk threshold across the risk framework or for specific asset classes. An example of how this may be practically applied would be conduct less frequent inspections or maintenance of less critical assets (i.e. minor/small culverts which have less impact of city service). The lower consequence of failure assets which may be considered is shown visually in Table 8.8.

Table 8.8 Risk Matrix

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0 M	$27.55 M	$123.7 M	$21.95 M	$0 M
	P4	$0 M	$14.08 M	$43.98 M	$13.63 M	$0 M
	P3	$0.13 M	$13.69 M	$85.17 M	$20.43 M	$150 M
	P2	$0 M	$13.13 M	$514.83 M	$137.72 M	$0 M
	P1	$0.51 M	$117.8 M	$721.44 M	$273.45 M	$3.35 M

It should be noted that deferring work may result in a reduction of the City's ability to reliably achieve the desired service standards (higher complaints and reduced performance) and may increase the asset total lifecycle ownership cost.

8.5.3 Option 3: Accept Lower Level of Service

The City must balance public (community) expectations, the City's objectives, risk and affordability. If the City is not able to sustainably fund the current LOS it may be beneficial to seek opportunities for adjustment to service standards through public consultation. It is critical in this process to link consideration of the public expectations with understanding of constraints such as financing, resourcing, and affordability and the options for addressing these (higher taxes). Only after these constraints have been considered will it be possible to determine public expectations and willingness to pay for these services.

An example of this could be deferring projects that aim to increase road capacity through road widening. The deferment eliminates approximately $40.5M of total investment need (or an annual need of $4.05 M) of capital investment and the associated future infrastructure liability (O&M requirements). However, this option will likely increase risks from road usage exceeding the road capacity and may result in higher customer complaints.

9. Monitoring and Improvement Plan

9.1 Status of Asset Management Practices

The City of Belleville has initiated an Asset Management System. The asset management system includes processes and tools required to effectively manage the city's assets, in accordance with the necessary legislation and City policy. However, some aspects of the Asset Management System have only recently been deployed and operationalized. Additionally, the City has identified opportunities for improvement, beyond the requirements for compliance with the regulation. These improvements for advancing systematic maturity are expected to provide greater context, detail, and certainty to improve evidence-based asset management decisions.

9.1.1 Ontario Regulation 588/17

Developing an AMP is a process that includes improving data, processes, systems, staff skills, and organizational culture over time. This section provides an overview of the compliance of this 2020 AMP with Ontario Regulation 588/17 for "current levels of service" and the compliance with Regulation 588/17 for "proposed levels of service" by July 1, 2025. A summary of compliance with the O Reg is provided in Table 9.1.

Table 9.1 Status of O.Reg. 588/17 Compliance for AMPs

Plan Section	O.Reg. 588/17 Compliance Practices (Current LOS)		O.Reg. 588/17 Compliance Improvements (Proposed LOS)
State of Local Infrastructure	Yes	For each asset category, the 2020 AM plan provides a summary of the assets, the replacement cost of the assets, the average age of the assets, the condition of the assets, and the approach to assessing condition of assets.	Continue to improve knowledge of asset replacement costs and current condition of the assets based on asset criticality.
Levels of Service	Yes, extend to 'non-core'	For each asset category, the 2020 AM plan provides the current LOS being provided. For core assets, 2020 AM plan provides the qualitative community descriptions and technical metrics as required by O.Reg. 588/17, and the current performance.	For each asset category, provide the LOS that the City proposes to provide for the next 10 years and an explanation of why the proposed LOS are appropriate based on an assessment of: the options for the proposed LOS and the risks associated with those options to the long term sustainability of the City, how the proposed LOS differ from the current LOS, whether the proposed LOS are achievable, and the City's ability to afford the proposed LOS. For each asset category, provide the proposed performance for each year of the next 10-year period.
Asset Management Strategy	Yes, extend to 'non-core'	The 2022 AMP provides the population and employment forecasts as reported by Statistics Canada in most recent census. For each asset category, the 2020 AM plan provides the lifecycle activities that would need to be undertaken to maintain the current LOS for each of the next 10 years, based on risk and lowest lifecycle cost analyses.	For each asset category, provide the lifecycle activities that would need to be undertaken to provide the proposed LOS for each of the next 10 years, based on risk and lowest lifecycle cost analyses.
Expenditure Forecasts and Financing Plan	Yes, extend to 'non-core'	The 2020 AMP provides the estimated 10-year capital expenditures and significant operating costs required to maintain the current levels of service to accommodate projected increases in demand caused by growth as reported by Statistics Canada in most recent census. For each asset category, the 2020 AM plan provides the costs of providing the lifecycle activities that would need to be undertaken to maintain the current LOS for each of the next 10 years.	For each asset category, provide the lifecycle management financial strategy that sets out the following for the 10-year period: For each asset category, provide the costs of the lifecycle activities that would need to be undertaken to achieve the proposed LOS for each of the next 10 years, separated into capital expenditures and significant operating costs. Provide the annual funding projected to be available to undertake lifecycle activities and the options examined to maximize the funding projected to be available. For any funding shortfalls, identify which lifecycle activities will be funded and, for those not funded, the risks of not undertaking them.
Other	Yes	The 2020 AMP indicates how the background information and reports upon which the state of infrastructure section within AMP is based will be made available to the public.	Provide an overview of the risks associated with implementation of the AMP and any actions that would be proposed in response to those risks. An explanation of any other key assumptions underlying the plan that have not previously been explained.

9.2 Monitoring and Review Procedures

It is important that to note that achieving compliance is not a singular event. It requires regular monitoring, maintenance and adjustment of the system to ensure continuous compliance.

This AMP will be reviewed during City annual budget planning processes and amended to show any material changes in service levels and/or resources available to provide those services because of budget decisions.

The AMP will be updated at least every five years (as required by O. Reg 588/17) the to ensure it represents the current service level, asset values, projected operations, maintenance, capital renewal and replacement, capital upgrade/new and asset disposal expenditures and projected expenditure values incorporated into the long-term financial plan. Future iterations of the AMP will report on previous AMP progress, achievements and identify improvements to the AMP process if required.

9.3 Performance Measures

Although the system is operational and foundational elements of asset management have been implemented it is acknowledged that additional improvements to the system are required. The effectiveness of the asset management plan can be measured in the following ways:

- The degree to which the condition, financial and risk information is captured for all material assets.
- The degree to which the required projected expenditures identified in this asset management plan are incorporated into the long-term financial plan
- The degree to which 1-5 year detailed works programs, budgets, business plans and corporate structures consider the 'global' works program trends provided by the AMP
- The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Plan and associated plans
- The goal of financial sustainability is to achieve a Funding Ratio of 1.0. As the City continues to adjust an intermediate goal of reduced funding gap for each successive iteration of the AMP.

9.4 Identified Improvement Initiatives

As the City's AM maturity evolves the City has identified some opportunities for improvement of Asset Management practices and improvements associated with future iterations of the plan. These are noted below.

1. Assets which are included in this AMP but have some limitations on the analysis and hence require additional attention in future iterations of the plan include:

- Sidewalks,
- Traffic signals,
- Street lighting
- Signage
- Trees,
- Trails
- Ancillaries (Hardware, SCADA, communication equipment and software, furniture, radios)

2. The Current Level of Service (LOS) have been recently documented, moving forward they will need to be formally endorsed and adopted in the short term. Based on the performance, risk and cost associated with the metrics the City will need to inform LOS with additional consideration of the public expectations against constraints such as financial considerations, resourcing, and affordability to continue to refine the actual target. One method which has been proposed is to conduct a community engagement survey.
3. The City would like to formalise and standardise their Asset Management Strategies to ensure consistency across the City. The City also recognises the benefits of linking AM planning practices directly to long-term capital improvement plans to ensure these activities are connected into the budgeting process, AMP development and data management process. The harmonisation of the Asset Management processes with existing planning activities such as asset phasing and controlled growth

planning, has been identified as an opportunity for improvement. This linkage is expected to support sustainable asset growth investment.

4. The City has recently adopted the Risk framework as summarised in this plan. This Risk framework has been deployed to most assets within the remit of this AMP; however the future application of the Risk framework will be expanded to other assets not considered within this AMP to inform future AMP iterations.
5. The City has not historically been required to conduct renewal or replacement of some asset types. As such the institutional knowledge about what factors and failure modes may accelerate an individual asset's deterioration, types of life extension activities and costs of renewal/replacement are still being developed. The City will work to close this knowledge gap to enable greater confidence in the future.
6. Based on the adoption of more detailed Asset Management practices it may be necessary for the City to conduct investigations and or studies to help address the infrastructure or financial gaps, such as rates needs studies

Appendix A

Service Area Summaries

A-1 Transportation Operational Services

A-1-1 General

The Transportation Operational Services Service Area are responsible for all assets associated transportation and public transit assets. Although, owned by other (and hence not shown here) the Transportation Operational Services Service Area is responsible for providing internal service maintenance to the other Services Areas for the fleet assets across the organisation (excluding emergency services).

Total Asset Value:
549.8
(2020 $M)

No. of Asset Class:
5

Average Condition:
Good

A-1-2 Asset Inventory

The assets owned by the Transportation Operational Services Service Area, within the City of Belleville, are summarised in the Table A.1.

Table A.1 Summary of Transportation Operational Services Asset Inventory

Asset Class	Quantity	Units	Asset valuation (2020 $M)
Bridge	m2	23,511.3	106.7
Building	Each	13	22.7
Culvert	m2	2,628.8	10.1
Fleet and Equipment	Each	139	20.8
Roads	Linear.km	442.1	389.5
Total			**549.8**

The breakdown of the valuation of the assets inventory, is shown graphically Figure A.1

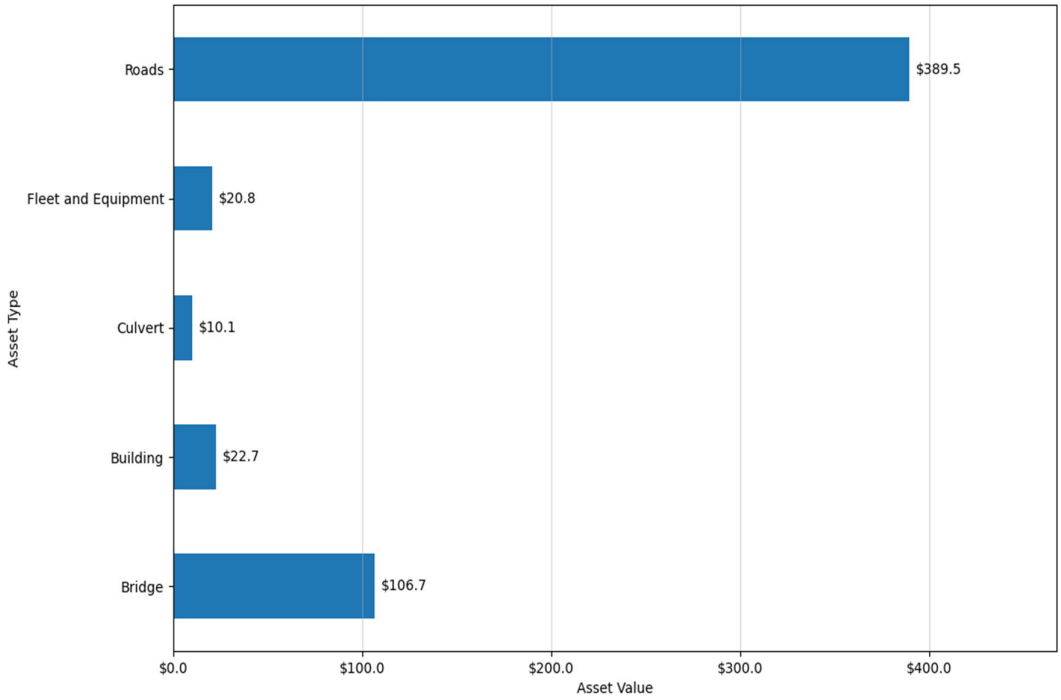


Figure A.1 Transportation Operational Services Asset Valuation Summary

A-1-3 State of Local infrastructure

A summary of the condition rating, ranging between 'Very Poor' and 'Very Good', of the complete asset owned by the Transportation Operational Services Service Area is shown in Figure A.2. The condition data collected for the Transportation Operational Services asset were taken from a combination of the 'Road's Needs Study', Ontario Structure Inspection Manual (OSIM) reports and available geospatial data. Financial value was also use in instance where no condition data was available.

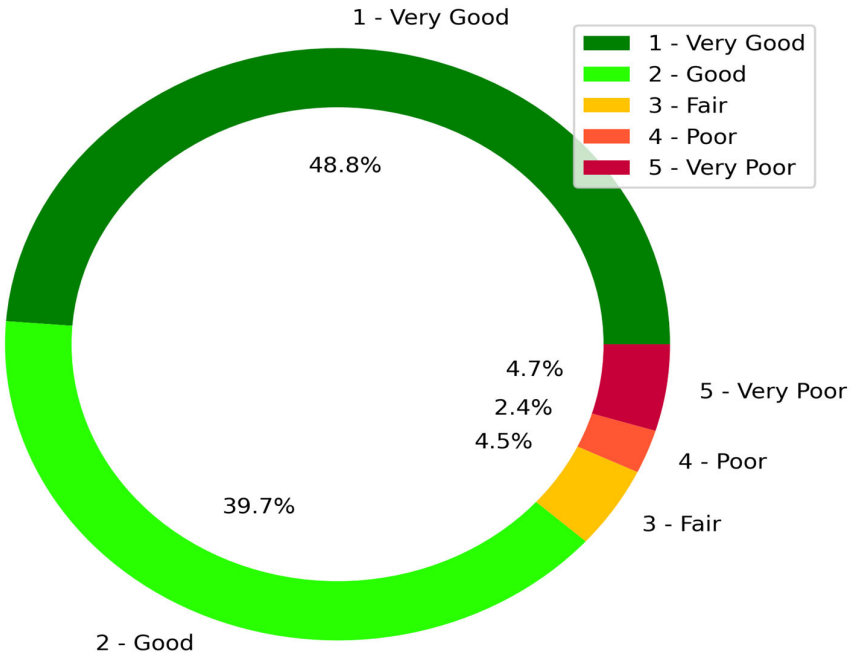


Figure A.2 Transportation Operational Services Asset Condition Summary

Further breakdown of the Transportation Operational Services, by asset class, is provided in Figure A.3.

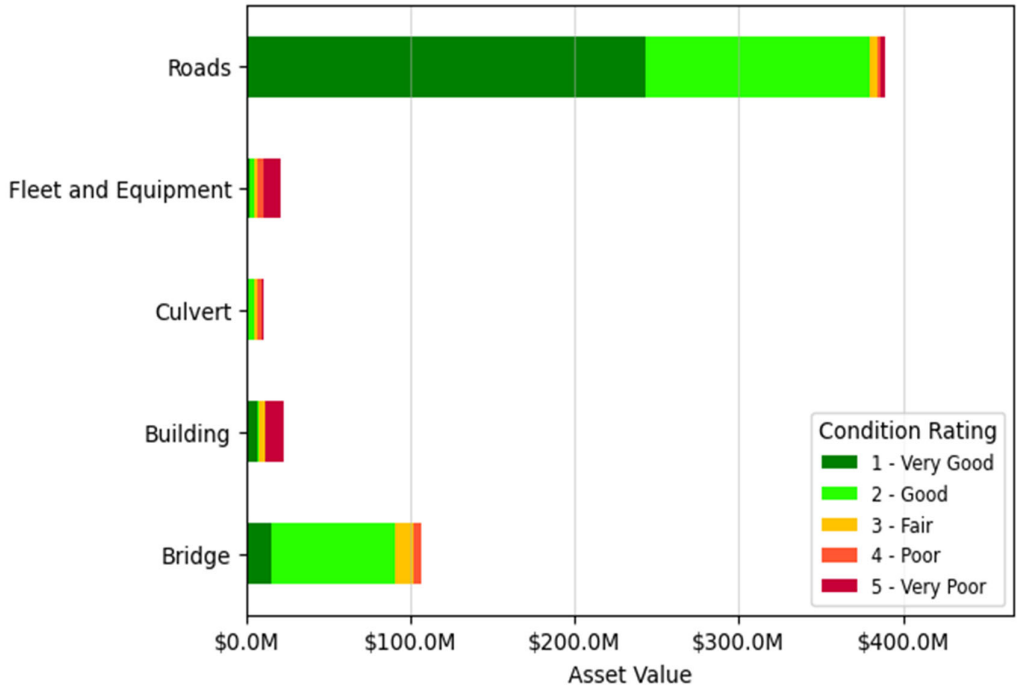


Figure A.3 Transportation Operational Services Asset Condition Summary by Asset Class

By contrast the average asset age, compared to the “useful life” is shown for the Transportation Operational Services Service Area in Figure A.4.

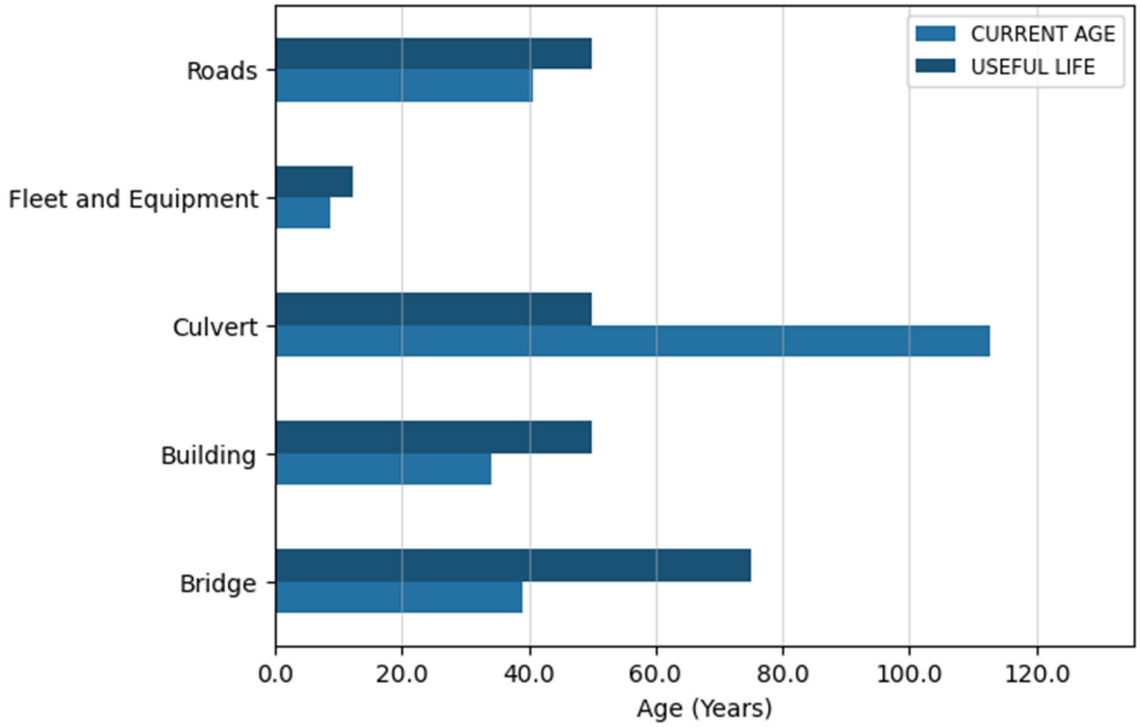


Figure A.4 Transportation Operational Services Average Asset Age Summary by Asset Class

The condition of the assets compared to the useful life indicates that the assets are currently being managed effectively with a small number of roads in poor condition. These roads were noted to be regional ‘local’ roads, as opposed to major arterial or collection road.

A-1-4 Level of Service

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

Table A.2 Summary of Transportation Operational Services Level of Service

Department	CLOS Category	Customer LOS	Perform-ance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Fleet and Equipment	Function	Safe, equitable, and sustainable transportation system	F	H	Upgrade	Fleet and Equipment	Ratio of Green Vehicle Fleet vs. Total Vehicle Fleet	0
Fleet and Equipment	Function	Safe, equitable, and sustainable transportation system	F	H	Upgrade	Fleet and Equipment	Quantity of electric charging stations	0
Fleet and Equipment	Quality	Assets kept in a good state of repair	P	H	Renewal, Operation and Maintenance	Fleet and Equipment	Ratio of fleet in fair or better condition	33%
Transportation	Capacity Use	Transportation network always provides convenient access to properties (O.Reg.588: description/maps of road network connectivity)	NA	H	Growth	Transportation	Quantity of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the City	0.22.
Transportation	Capacity Use	Transportation network always provides convenient	NA	H	Growth	Transportation	Quantity of lane-kilometres collector roads as a proportion of square kilometres of land area of the City	0.46

Department	CLOS Category	Customer LOS	Perform-ance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
		access to properties (O.Reg.588: description/maps of road network connectivity)						
Transportation	Capacity Use	Transportation network always provides convenient access to properties (O.Reg.588: description/maps of road network connectivity)	NA	H	Growth	Transportation	Quantity of lane-kilometres local roads as a proportion of square kilometres of land area of the City	1.09
Transportation	Quality	Assets kept in a good state of repair	G	H	Renewal, Operation and Maintenance	Transportation	For paved roads in the municipality, the average pavement condition index value	83
Transportation	Quality	Assets kept in a good state of repair	NA	H	Renewal, Operation and Maintenance	Transportation	For unpaved roads in the municipality, the average surface condition	0
Transportation	Quality	Bridges and culverts are accessible for designated users and modes of transport	G	H	Renewal, Operation and Maintenance	Transportation	Ratio of roadway bridges with loading or dimensional restriction (# with restriction / total #) (mandatory)	0
Transportation	Quality	Bridges and culverts are accessible for designated users and modes of transport	G	H	Renewal, Operation and Maintenance	Transportation	For bridges in the City, the average bridge condition index value, weighted on replacement value (mandatory)	74.1
Transportation	Quality	Bridges and culverts are	G	H	Renewal, Operation	Transportation	For structural culverts in the City, the average bridge	67.5

Department	CLOS Category	Customer LOS	Perform-ance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
		accessible for designated users and modes of transport			and Maintenance		condition index value, weighted on replacement value (mandatory)	
Transportation	Capacity Use	Safe access and use regardless of conditions	G	H	Growth	Transportation	Quantity of km per snow plow	67.86
Transportation	Function	Safe, equitable, and sustainable transportation system	VG	H	Upgrade	Transportation	Percentage of compliance with legislation	100 %

Customer LOS: Road Network Description and its Connectivity

The City manages an extensive network of City roads that serve a variety of purposes including local access, regional travel, and access to provincial highways. The City's Transportation Master Plan states that the city's road network is expected to provide Safe, equitable, and sustainable transportation system. A map of the City's is shown in Figure A.5.

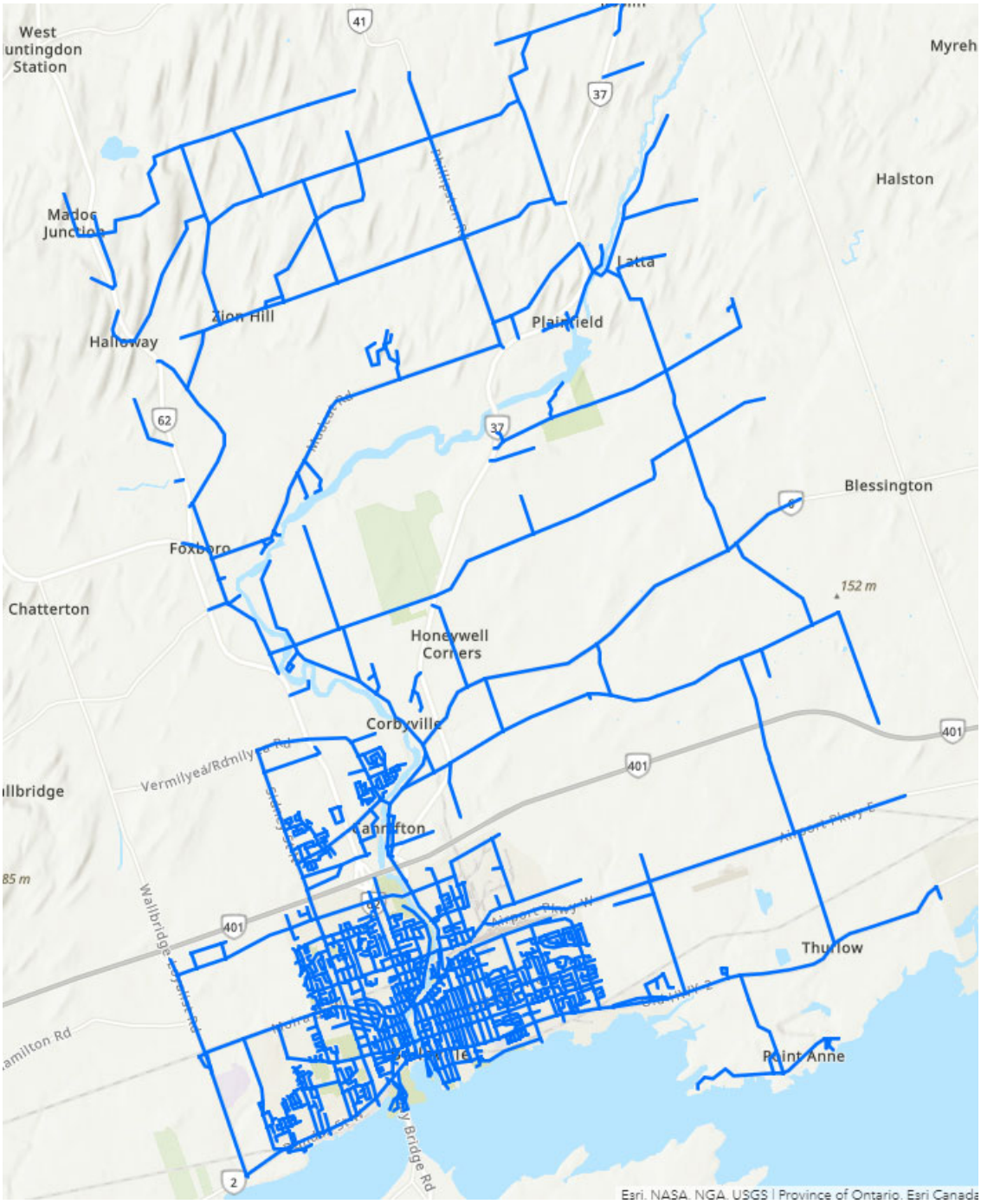


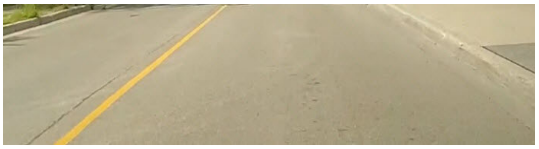
Figure A.5 Map of Road Network

Belleville serves as an approximate halfway point between Toronto and Ottawa along the Highway 401 corridor. Belleville's road network is made up of highways, arterial roads, collector roads and local roads, each serving an integral function in the road network. Higher order roads such as arterials are primarily intended to serve a mobility function, while lower order roads provide access to adjacent properties. These roads provide connections to and within neighborhoods, urban areas, the City Centre, commercial sites, and industrial lands.

Customer LOS: The different levels of road class pavement condition

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

Table A.3 Road Condition Grades

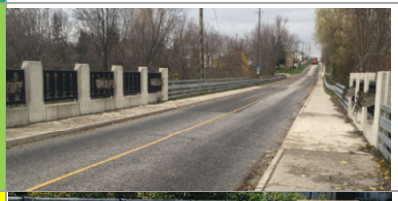
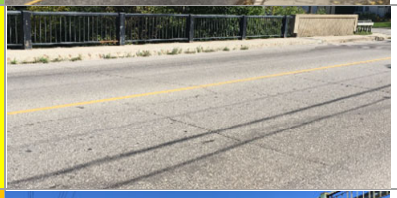
Condition Grade	Urban Road Example
Very Good (PCI = 90 to 100)	
Good (PCI = 80 to 89)	
Fair (PCI = 65 to 79)	
Poor (PCI = 55 to 64)	
Very Poor (PCI < 55)	

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

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

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

Table A.4 Bridge and Culvert Condition Grades

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

Condition Grade	Bridge Examples	Culvert Examples
Very Poor BCI = 0 to 50		

A-1-5 Risk Analysis

Risk is evaluated by multiplying the Consequence of Failure of the asset and the Probability of Failure. A risk map for the Transportation asset portfolio has been developed in Table A.5. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020$, corresponding to the risk of failure score:

- Extreme (red),
- High (orange),
- Moderate (yellow),
- Low (green), and
- Insignificant (grey).

Table A.5 Overview of Transportation Operational Services Asset Portfolio Risk Summary

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0M	$13.19M	$3.85M	$8.92M	$0M
	P4	$0M	$0.93M	$9.76M	$2.39M	$0M
	P3	$0M	$4.58M	$17.75M	$2.33M	$0M
	P2	$0M	$1.09M	$168.72M	$48.15M	$0M
	P1	$0M	$7.83M	$204.7M	$55.5M	$0M

Assets falling in the higher risk categories are those assets that are most critical to the Transportation Operational Services (have a high consequence of failure and highest probability of failure).

- Assets that appear in the extreme (red) zone are significant to the Transportation Operational Services and are performing poorly, and therefore need to be actively monitored and managed in a more comprehensive manner than other assets. This may include immediate inspection and stop gap measures (e.g., emergency plan in case of asset failure or emergency rehabilitation or replacement) to ensure that the asset does not fail.
- Assets that appear in the high (orange) and moderate (yellow) zones will also be actively managed depending on their criticality.
- Assets that appear in the low (green) and insignificant (grey) zone are generally acceptable without significant mitigation strategies being implemented, although monitoring may still occur in some form.

This assessment allows for the identification and prioritization of high-risk assets that require closer inspection (to verify if they truly are high risk), preventive maintenance activities, and short and medium-term capital renewal works, including possible transition out of service. The Transportation Operational Services has **no assets in the extreme risk category**. It currently has **$15.2M (2.7%) assets in the high risk (orange).**

A-1-6 Lifecycle Initiatives

Growth and Expansion

To maintain the current levels of service, the City of Belleville has planned expansion and upgrade works for each of the next 10 years. The following graph shows these planned growth and upgrade investments which average approximately **$10.73M** over the next ten years.

These activities are summarized in Table A.6.

Table A.6 Transportation Operational Services Planned Expansion and Upgrade

Asset	Project Description	Timeframe		Cost (2020 $M)
		Start	End	
Roads	Extend the Belleville East Arterial Road north to Highway 37	2026	2031	4.5
Roads	Avondale Road, Harder Drive to Dundas West	2021	-	4.4
Roads	Tracey-Sidney Intersection Improvements Bell/Sidney Intersection Improvements Sidney Street Widening, Tracey Street to Bell Boulevard	2021	-	7.7
Roads	Farnham Road, Maitland to Wims Way	2022	-	7.3
Roads	North Front Street (Bell Boulevard to College Street)	2030	-	7.6
Roads	Sidney Street north of Bridge St W (Second Northbound Lane)	2025	-	5.7
Roads	Sidney Street Widening (2 to 4 Lanes over Highway 401)	2025	-	12.7
Roads	Bell Boulevard Widening (Jenland Way to Wallbridge Loyalist)	2030	-	14.5
Roads	Bridge Street West / Marshall Road Upgrade from Rural to Urban cross-section	2025	-	2.1
Roads	Sidney Street / College Street West Intersection Improvements	2025	-	3.1
Roads	Bridge Street West / Sidney Street Intersection	2022	-	3.1
Roads	Tracey Street Reconstruction - upgrade to Urban standard	2025	-	5.2
Roads	On-Road Cycling Infrastructure	-	-	7.5
Roads	Major Crossings	-	-	7.5
Roads	Transportation Master Plan	2022	-	0.2

Asset	Project Description	Timeframe		Cost (2020 $M)
Roads	Infrastructure Phasing Strategy (Roads share)	2021	-	0.0
Roads	Additional Plow Truck	2021	-	0.4
Roads	Additional Sidewalk Plow	2021	-	0.2
Roads	Additional Vehicles and Equipment	-	-	0.1
Roads	Bell Boulevard Widening (Sidney Street to Jenland Way)	2021	-	13.5
Total				**107.3**

Operations

Asset operations activities are those regular activities (and costs) which are required to support delivery of service to the City's residents. Table A.7 summarizes the cost associated with delivery of Operations activities, within the Transportation Operational Services, by asset class. These costs have been determined through review of the 2020 financial information and assumed to be representative of the annual investment.

Table A.7 Transportation Operational Services Planned Current Operations Investment

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Operation (2020 $M)
Bridge	Physical Inspection of bridges in accordance with washing/flushing, grass cutting	23,511.0 m2	$0	0.008
Building	Electricity, insurance, heating	13 Each	$56,159	0.73
Culvert	Mowing, washing	2,629.0 m2	$73	0.19
Fleet and Equipment	Fuel, registration, prestart (visual), insurance	139.0 Each	$8,647	1.20
Roads	Road patrolling, winter control (operating, standby, sand, salt, brine), street sweeping and leaf vacuum service, line painting, Every 3 years roads needs survey (whole system) which is managed by external consultant (inputs to the road rehabilitation	442.1 Linear.km	$4,400	1.94
Total				**3.0**

Maintenance

When a Transportation Operational Services asset experiences a defect, which impacts its LOS (capacity, function, or quality), the activity that is required to restore it to its original operational condition is defined as maintenance. At the City, maintenance is usually triggered based on findings of a physical inspection or customer complaints. The current maintenance investment is summarized in Table A.8.

Table A.8 Transportation Operational Services Planned Current Maintenance Investment

Asset	Description of Activities	Units	Maintenance Cost per Asset Unit	Maintenance (2020 $M)
Bridge	Guardrail replacement, line paining, concrete repairs	23511.0 m2	$1.0	0.03

Asset	Description of Activities	Units	Maintenance Cost per Asset Unit	Maintenance (2020 $M)
Building	Generator maintenance, periodic servicing (annual) which is subcontracted.	106.0 Each	$1245.0	0.13
Culvert	Unblocking and removal of debris	2629.0 m2	$22.0	0.057
Fleet and Equipment	Regular maintenance works are conducted based on a usage (Hours/km), annual safety checks	139.0 Each	$9643.0	1.34
Roads	Potholes and sealing cracking (MMS), slurry seal, edging (shoulders), reclamite (spray on refresh the asphalt), spot treatment (trial).	442.1 Linear.km	$1,680	0.74
Total				**5.2**

Rehabilitation and Replacement

Based on the rehabilitation and refurbishment lifecycle triggers (frequency, costs, condition state, risk score) proposed by the Transportation Operational Services Subject Matter Experts (SME) the projected rehabilitation and replacement activities have been projected. The projected investment indicates that an average need of **$6.7M** per year in asset renewal (rehabilitations and replacements) is required or a total of **$66.6M** over the next 10 years. The projected timing and cost broken up by activity is shown in Figure A.6 with the same information displayed by asset class in Figure A.7

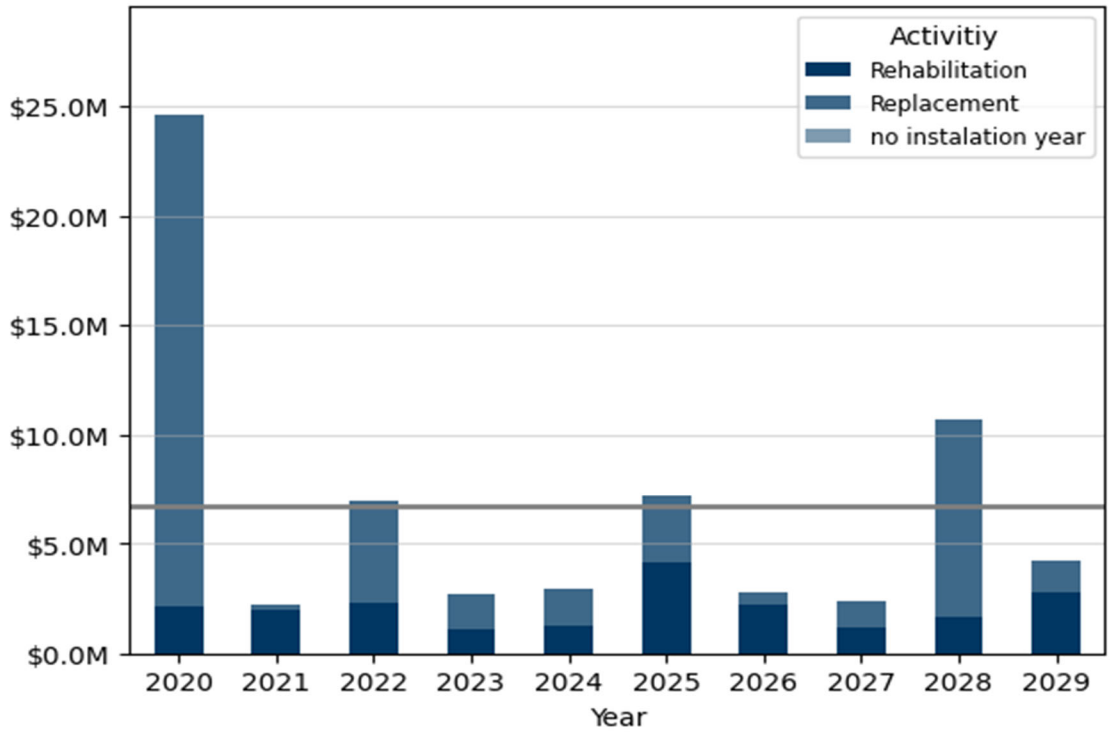


Figure A.6 Transportation Operational Services Forecast Renewal need by Activity

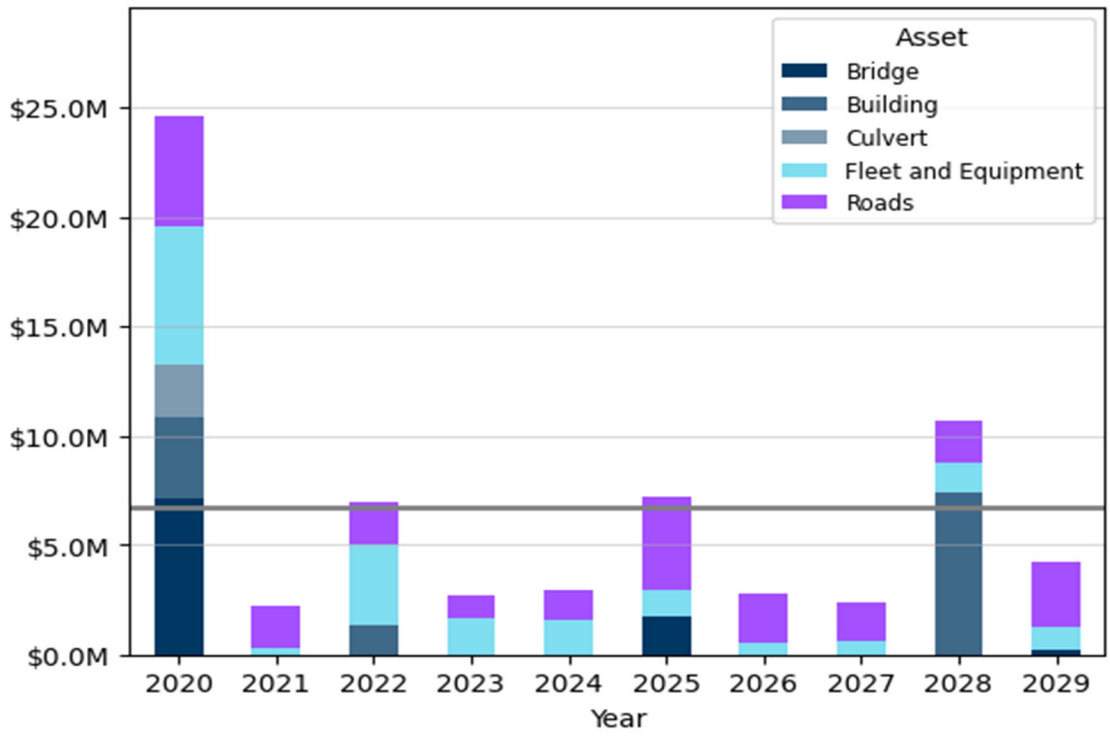


Figure A.7 Transportation Operational Services Forecast Renewal need by Asset Class

A-1-7 Identified Improvement Initiatives

The Transportation Operational Service Area has identified initiatives to improve the asset management program, some of which have been launched, while others are under development. Table A.9 summarizes the key improvements actions, outcome, timeline and priority. The timeline is broken into three categories:

– Short (1-2 years)
– Medium (3 – 5 years) and
– Long (greater than 5 years).

The owners and nominated leads for delivering each improvement action remain to be confirmed in most cases.

Table A.9 Transportation Operational Service Area Identified Improvement Initiatives

Area of Improvement	Action	Outcome	Priority	Timeline
Asset inventory	For those assets where the ownership or responsibility is in question (primarily bridges or road segments), this should be addressed. An example of this is the regional bridge located on the City's boundary.	A clear understanding of the Service Area's liability and responsibility will help in the delivery of the levels of service associated with the assets where ownership is overlapping.	High	Short
Asset Data	The service area has access to computerised management systems including Worktech and Arcgis. The service area has identified the need to better utilize these data management tools to ensure access to the most up to date information and help to reduce data silos.	Effectively managed asset information and ensure it is captured in corporate data management software packages. Note: Current GIS strategy underway and should provide benefit and support with understanding the gaps and how to address them.	High	Short
Level of service	Support the further development and refinement of the LOS.	Establish tools or systems to help support monitoring of LOS performance against the current standards.	High	Medium

A-2 Recreation, Culture & Community Services Department

A-2-1 General

The Recreation, Culture & Community Services Department are responsible for managing all assets associated green spaces, public and community parks and sporting facilities.

Total Asset Value:
141.1
(2020 $M)

No. of Asset Class:
6

Average Condition:
Good

A-2-2 Asset Inventory

The assets owned by the Recreation, Culture & Community Services Department Service Area, within the City of Belleville, are summarised in the Table A.10. The asset valuation provided for the Parks assets is the financial value associated with the conventional engineer infrastructure (playgrounds and furniture), as opposed to natural or 'green' asset such as shrubs and trees.

Table A.10 Summary of Recreation, Culture & Community Services Department Asset Inventory

Asset Class	Quantity	Units	Asset valuation (2020 $M)
Arena	Each	4	84.3
Building	Each	32	17.1
Fleet and Equipment	Each	96	5.5
Docks	Each	16	1.8
Parks	Each	81	21.3
Trails	Each	5	10.9
Total			**143.1**

The breakdown of the valuation of the assets inventory, is shown graphically in Figure A.8.

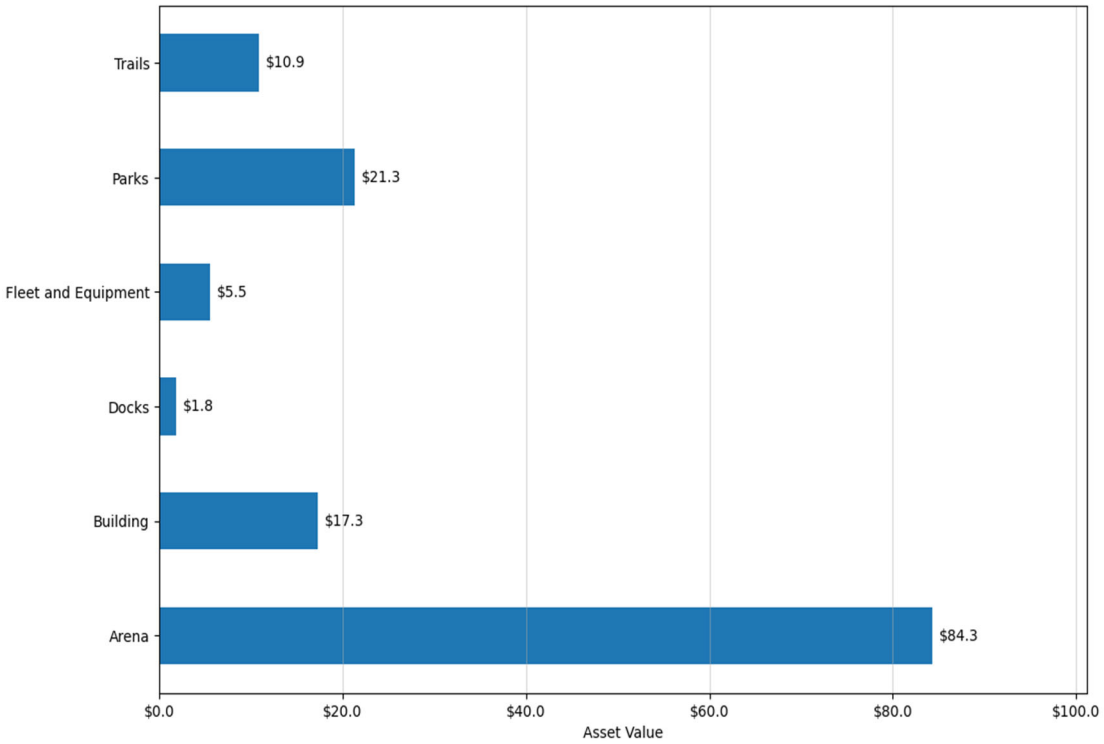


Figure A.8 *Recreation, Culture & Community Services Department Asset Valuation Summary*

A-2-3 State of Local infrastructure

A summary of the condition rating, ranging between 'Very Poor' and 'Very Good', of the complete asset owned by the Recreation, Culture & Community Services Department Service Area is shown in Figure A.9.

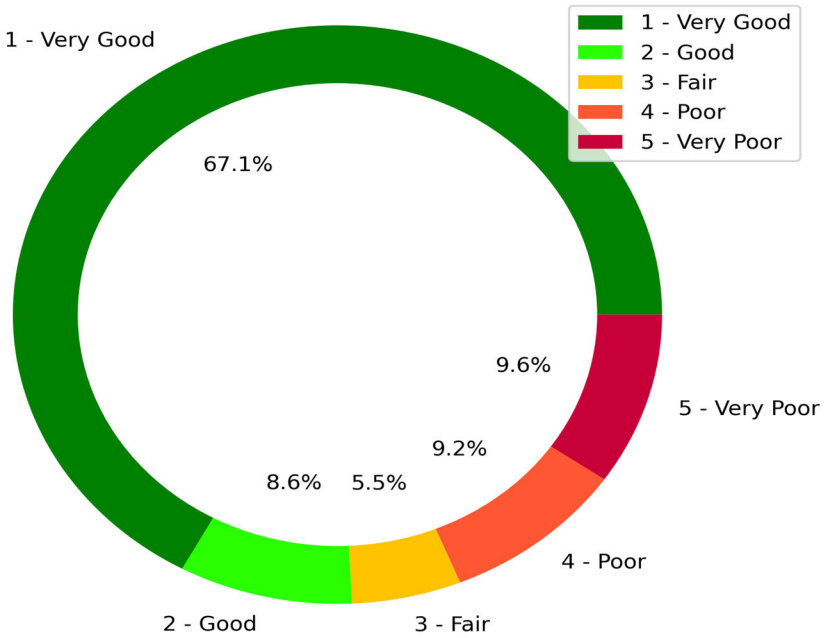


Figure A.9 Recreation, Culture & Community Services Department Asset Condition Summary

As is evident from the Figure A.9, the majority of the Recreation, Culture & Community Services Department assets are in a ‘Good’ or ‘Very Good’ condition. There is a percentage (18.8%) of asset are in ‘Poor’ and ‘Very Poor’ condition. The asset condition rating was primarily determined using a combination of remaining useful life and the financial depreciation.

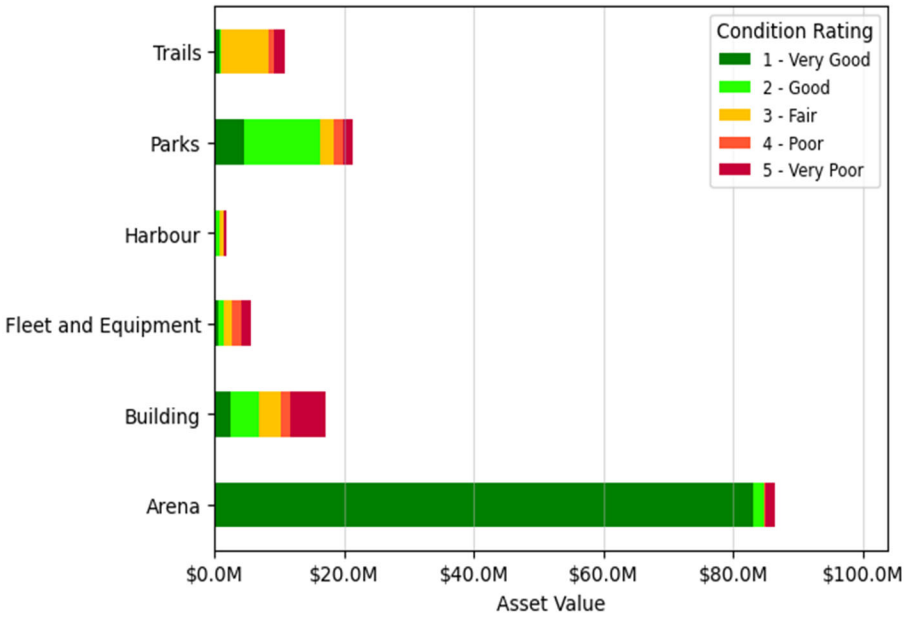


Figure A.10 Recreation, Culture & Community Services Department Asset Condition Summary by Asset Class

The majority of the ‘Poor’ and ‘Very Poor’ condition assets appear to be associated with the Parks, Fleet and Equipment assets. By contrast the average asset age, compared to the “useful life” is shown for the Recreation, Culture & Community Services Department Service Area in

Figure A.11.

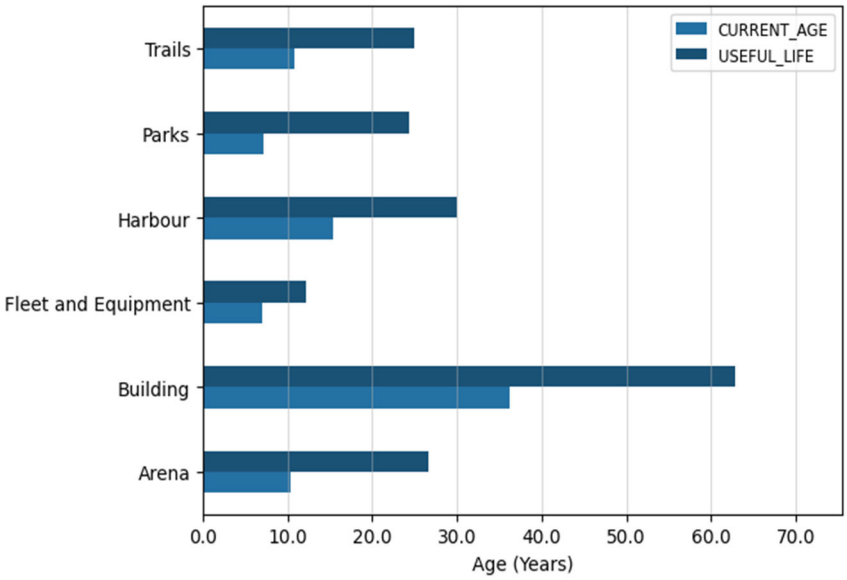


Figure A.11 Recreation, Culture & Community Services Department Average Asset Age Summary by Asset Class

A-2-4 Level of Service

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

Table A.11 Summary of Recreation, Culture & Community Services Department Level of Service

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of hectares of Parkland per 1000 residence	4.19
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of ice pad per 15,000 residence	3.5
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of arenas per registered participants	3.5
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of gymnasium per 36,000 residents	1.5
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of ball diamonds per 120 registered participants	12
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of rectangular fields 120 registered participants	26
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of tennis courts per 5,000 residents	2.0

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of pickleball court per 5,000 residents	0.0
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of splash pad per 2,500 children (age 0-9)	3.0
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of basketball court per 750-850 youth (age 10-19)	1
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Ratio of hectares per 1000 residents	3.8
Parks	Capacity Use	Provide access to recreational facilities for the whole community	G	H	Growth	Parks	Quantity of km of cycling routes	14.3

A-2-5 Risk Analysis

Risk is evaluated by multiplying the Consequence of Failure of the asset and the Probability of Failure. A risk map for the Recreation, Culture & Community Services Department's asset portfolio has been developed in Table A.11. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020$M, corresponding to the risk of failure score:

– Extreme (red),
– High (orange),
– Moderate (yellow),
– Low (green), and
– Insignificant (grey).

Table A.12 Overview of Recreation, Culture & Community Services Department Asset Portfolio Risk Summary

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0M	$12.51M	$0.56M	$0.54M	$0M
	P4	$0M	$12.76M	$0.0M	$0.2M	$0M
	P3	$0M	$6.98M	$0.0M	$0.73M	$0M
	P2	$0M	$11.38M	$0.0M	$0.83M	$0M
	P1	$0M	$94.32M	$0.0M	$0.34M	$0M

Assets falling in the higher risk categories are those assets that are most critical to the Recreation, Culture & Community Services Department (have a high consequence of failure and highest probability of failure).

– Assets that appear in the extreme (red) zone are significant to the Recreation, Culture & Community Services Department and are performing poorly, and therefore need to be actively monitored and managed in a more comprehensive manner than other assets. This may include immediate inspection and stop gap measures (e.g., emergency plan in case of asset failure or emergency rehabilitation or replacement) to ensure that the asset does not fail.
– Assets that appear in the high (orange) and moderate (yellow) zones will also be actively managed depending on their criticality.
– Assets that appear in the low (green) and insignificant (grey) zone are generally acceptable without significant mitigation strategies being implemented, although monitoring may still occur in some form.

This assessment allows for the identification and prioritization of high-risk assets that require closer inspection (to verify if they truly are high risk), preventive maintenance activities, and short and medium-term capital renewal works, including possible transition out of service. The Recreation, Culture & Community Services Department has **no assets in the extreme risk category**. It currently has **$1.3M (0.9%) assets in the high risk** (orange).

A-2-6 Lifecycle Initiatives

Growth and Expansion

To maintain the current levels of service, the City of Belleville has planned expansion and upgrade works which totals **$36.3 M or an average annual $3.6 M** for each of the next 10 years. These activities are summarized in Table A.13.

Table A.13 Summary of Recreation, Culture Community Services Department planned Growth and Expansion

Asset	Project Description	Timeframe		Cost (2020 $M)
		Start	End	
Trails	Off-Road Cycling/Multi-Purpose Trails	-	-	8.3
Parks	Splashpads	2023	2025	1.0
Parks	Emerging Sports	2023	2028	0.8
Parks	Outdoor Ice Rink at YMCA and Park Support Building	2023	2025	3.0
Arena	Basketball Courts	2023	2028	0.4
Arena	Pickleball Courts	2023	2025	0.8
Arena	Tennis Courts	2026	2028	1.5
Arena	Rectangular Fields	2023	2025	4.5
Arena	Ball Diamonds	2026	2028	1.0
Parks	Future Parks Development	2022	2032	5.2
Buildings	Building Conditions Assessment	2022	2025	0.1
Docks	Boat Launch	2023	2024	0.1
Parks	Off-Leash Dog Park	2022	-	0.1
Parks	Memorials	2022	-	0.1
Parks	Minor Structures	2023	2029	0.4
Buildings	Building Demolition and Replacements	2025	-	0.3
Parks	Skate / Scooter Park	2022	2024	0.4
Parks	Pump Track	2022	2025	0.4
Parks	Playgrounds (long-term)	2022	2023	1.4
Parks	Playgrounds	2020	2023	1.1
Parks	Running Track	2023	-	0.0
Arena	Sports Fields - Ball Diamonds	2022	2030	1.0
Arena	Sports Fields - Rectangular	2022	2025	1.2
Parks	Park Identification Signage	2022	2032	0.2
Parks	Tree Canopy Enhancement / Woodlot Management	2022	2028	0.1
Parks	Parking and Vehicular Access	2022	2032	1.7
Parks	Community Gardens	2022	2028	0.1
Study	Master Planning and Studies	2022.0	2028.0	1.1
Total				**36.3**

Operations

Asset operations activities are those regular activities (and costs) which are required to support delivery of service to the City's residents. Table A.14 summarizes the cost associated with delivery of Asset Operations by asset class. These costs have been determined through review of the 2020 financial information and assumed to be representative of the annual investment.

Asset	Description of Activities	Units	Maintenance Cost per Asset Unit	Maintenance (2020 $M)
Arena	Washing, grass cutting, sight lines, cleaning, electricity, insurance	4 Each	$101,120	0.40
Building	Electricity, insurance, heating	32 Each	$133,534	4.27
Fleet and Equipment	Fuel, registration, prestart (visual), insurance	96 Each	$2,166	0.20
Docks	Inspections, electricity	16 Each	$18,042	0.28
Parks	Washing, grass cutting, sight lines, cleaning, electricity, insurance	81 Each	$25,101	2.03
Trails	Physical trail inspection, tree maintenance	5 Each	$15,908	0.07
Total				**7.3**

Table A.14 Recreation, Culture Community Service Department Planned Current Operations Investment

Maintenance

When a Recreation, Culture & Community Services asset experiences a defect, which impacts its LOS (capacity, function, or quality), the activity that is required to restore it to its original operational condition is defined as maintenance. At the City, maintenance is usually triggered based on findings of a physical inspection or customer complaints.

Table A.15 Recreation, Culture Community Service Department Planned Current Maintenance Investment

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Operation (2020 $M)
Arena	General maintenance, line paining, stadium repairs	4 Each	$11,949	47,795
Building	General repair and maintenance	32 Each	$12,327	394,450
Fleet and Equipment	Regular maintenance works are conducted based on a usage (Hours/km), annual safety checks	96 Each	$2,291	219,917
Docks	Painting, safety rails repair, replacement decking	16 Each	$7,622	121,953
Parks	NA	81 Each	$0.0	0.0
Trails	Regrading of trails	5 Each	$11,913	59,566
Total				**0.8M**

Rehabilitation and Renewal

Based on the rehabilitation and refurbishment lifecycle proposed by the Recreation, Culture Community Services Department Subject Matter Experts (SME) the projected rehabilitation and replacement activities have been projected. The projected investment indicates that an average need of **$2.7M**.per year in asset renewal (rehabilitations and replacements) is required or a total of **$27.0M**. over the next 10 years. The projected timing and cost broken up by activity is shown in Figure A.12 with the same information displayed by asset class in Figure A.13.

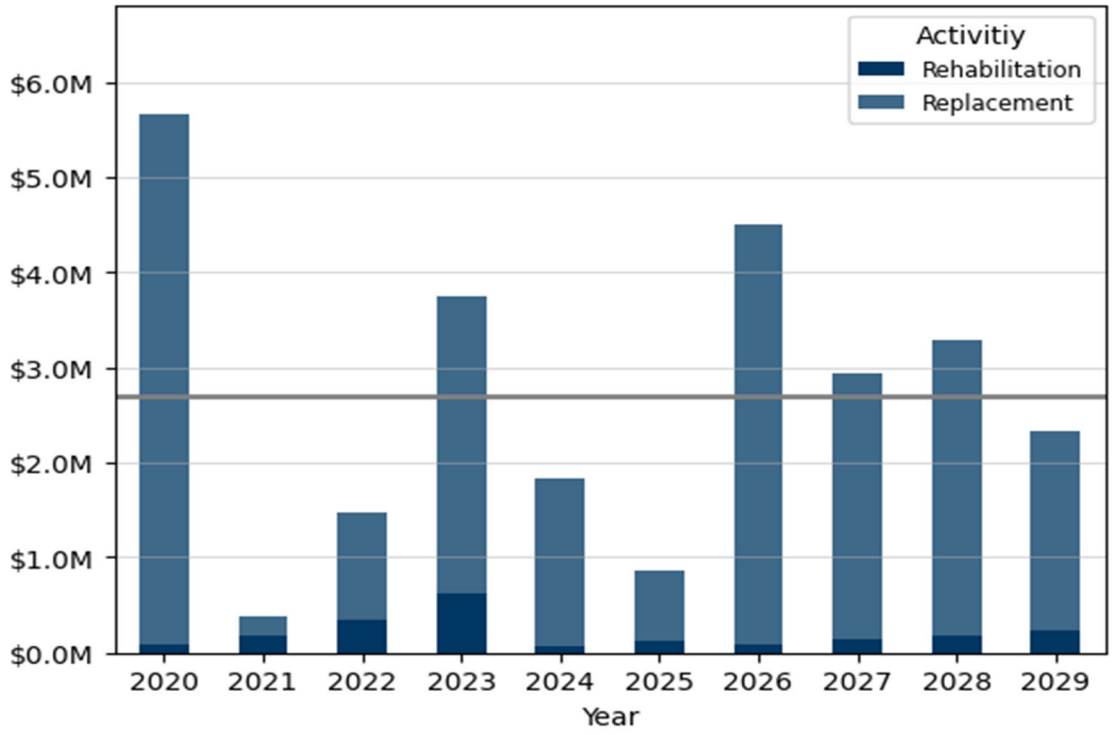


Figure A.12 *Recreation, Culture & Community Services Department Forecast Renewal need by Activity*

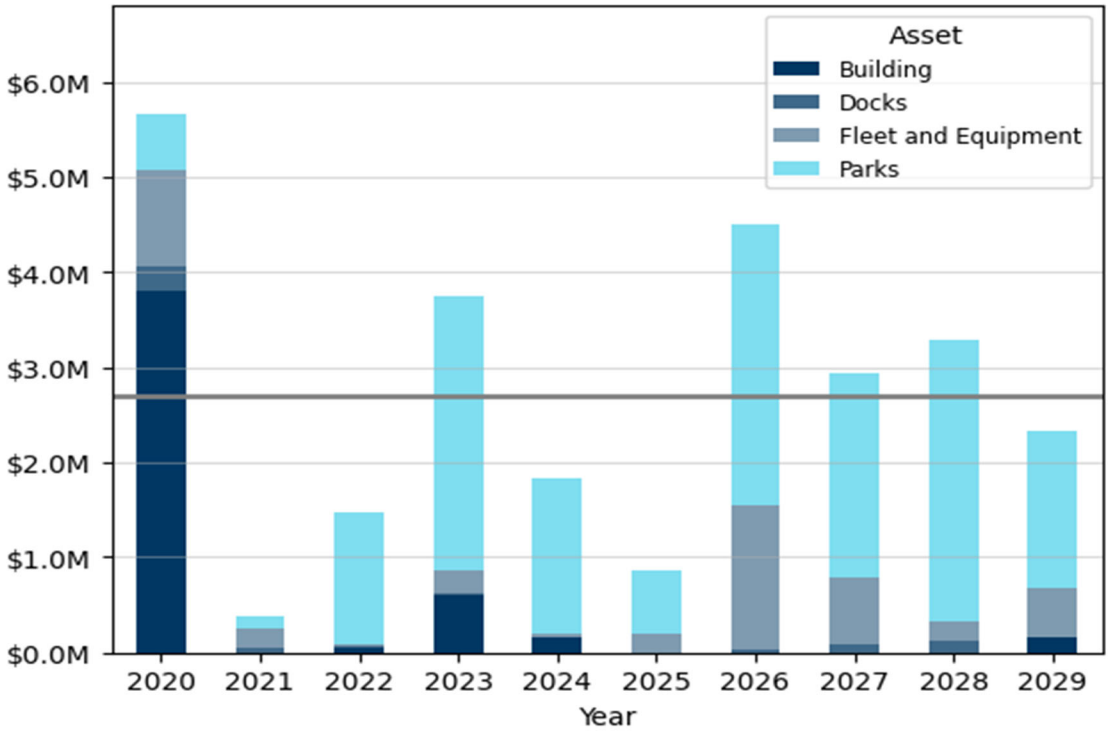


Figure A.13 Recreation, Culture & Community Services Department Forecast Renewal need by Asset Class

A-2-7 Identified Improvement Initiatives

The Recreation Service Area has identified initiatives to improve the asset management program, some of which have been launched, while others are under development. Table A.23 summarizes the key improvements actions, outcome, timeline and priority. The timeline is broken into three categories:

– Short (1-2 years)
– Medium (3 – 5 years) and
– Long (greater than 5 years).

The owners and nominated leads for delivering each improvement action remain to be confirmed in most cases.

Table A.16 Recreation Service Area Identified Improvement Initiatives

Area of Improvement	Action	Outcome	Timeline	Priority
Asset Hierarchy and Data	Some asset classes have data gaps which limit the asset planning from being applied comprehensively. These data gaps should be closed	The service area shall undertaken a program to formalise the condition assessment and data	Short	High
Asset Data completeness	There are some instances of gaps in asset data (primarily in GIS). The completeness issues are associated with both adequacy and accuracy of the data to varying degree depending on the asset class.	Improving asset data State of Local Infrastructure reporting, risk and financial need analysis. This is currently in progress.	Medium	High
Operations and Maintenance	Some assets appear to have low operations and or maintenance need. The allocation of O&M will be explored further to establish if changes need to be made	The Service Area proposes to undertake a review of the O&M allocation to support future planning and asset management investment	Short	Medium
Asset Condition	Detailed condition assessments program and scoring system should be developed to transition away from using age based condition assessment	This is currently in progress. Deployment will help priorities asset renewal and refurbishment needs.	Short	High

A-3 Environmental Services

A-3-1 General

The Environmental Services Service Area is responsible for managing all assets associated delivery of water, wastewater, and stormwater services to the community. This includes the pipe network, treatment, and storage facilities.

Total Asset Value:
1537.4
(2020 $M)

No. of Asset Class:
6

Average Condition:
Good

A-3-2 Asset Inventory

The assets owned by the Environmental Services Service Area, within the City of Belleville, are summarised in the Table A.17.

Table A.17 Summary of Environmental Services Asset Inventory

Asset Class	Quantity	Units	Asset valuation (2020 $M)
Building	Each	28.0	340.0
Fleet and Equipment	Each	41.0	2.4
Ponds	m3	175,449.0	70.2
Sanitary Pipe	Linear.km	209.9	390.4
Stormwater Pipe	Linear.km	160.3	340.0
Water Pipe	Linear.km	261.6	417.8
Total			**1537.4**

The breakdown of the valuation of the assets inventory is shown graphically in Figure A.14.

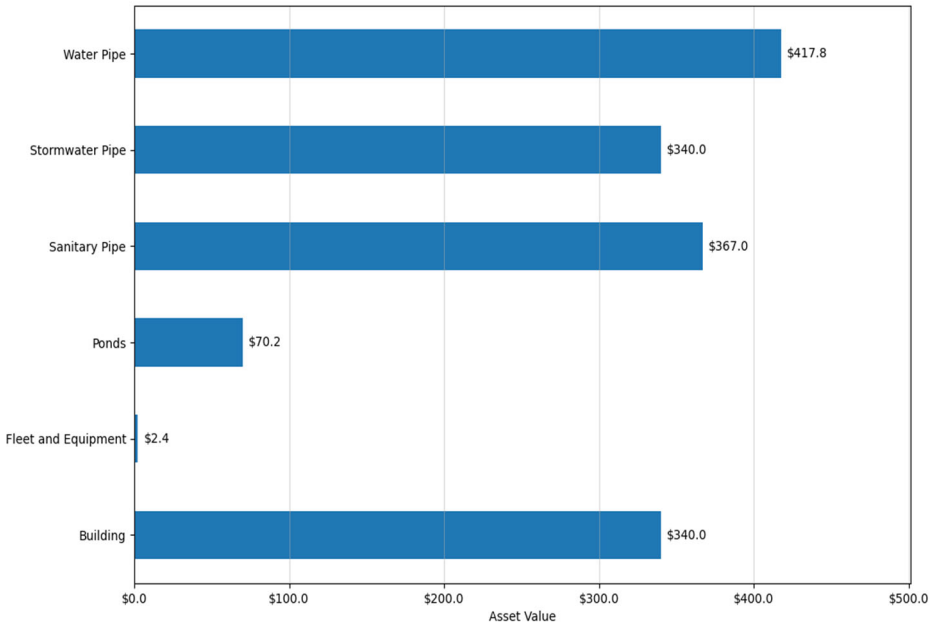


Figure A.14 Environmental Services Asset Valuation Summary

A-3-3 State of Local infrastructure

A summary of the condition rating, ranging between ‘Very Poor’ and ‘Very Good’, of the complete asset owned by the Environmental Services Service Area is shown in Figure A.15.

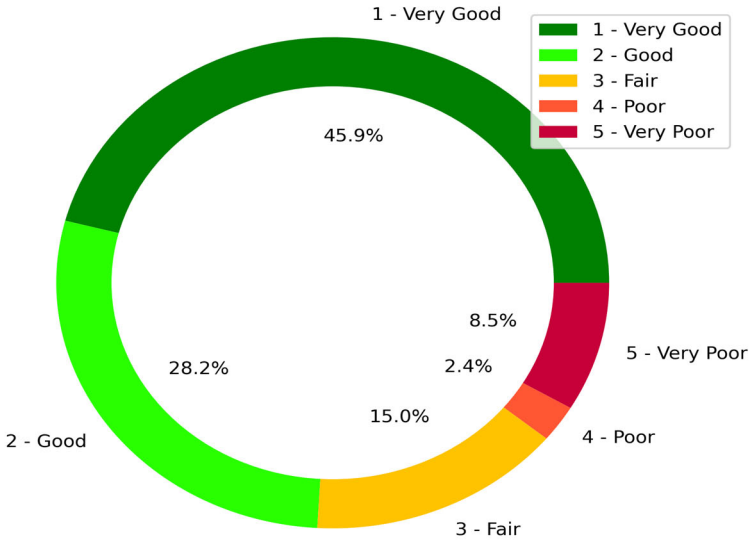


Figure A.15 Environmental Services Asset Condition Summary

The Environmental Services Service Area do not currently have a comprehensive understanding of the condition of their buried assets. They currently conduct sample destructive pipe sampling and laboratory analysis which are used to develop the useful life estimates provided in the assumptions. As such age has been utilized to develop a proxy for condition. According to this analysis the wastewater and sanitary water systems average condition is ‘fair’.

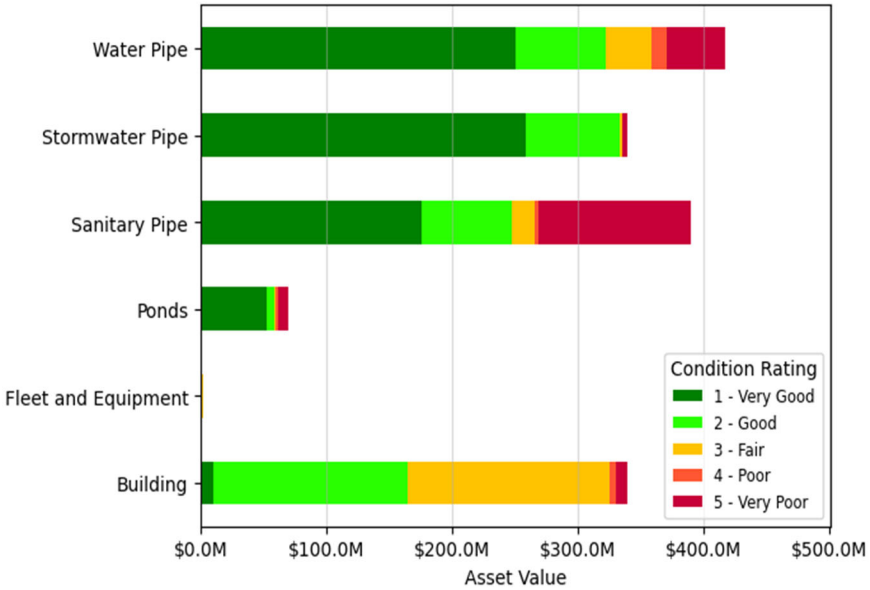


Figure A.16 Environmental Services Asset Condition Summary by Asset Class

By contrast the average asset age, compared to the “useful life” is shown for the Environmental Services Service Area in Figure A.17.

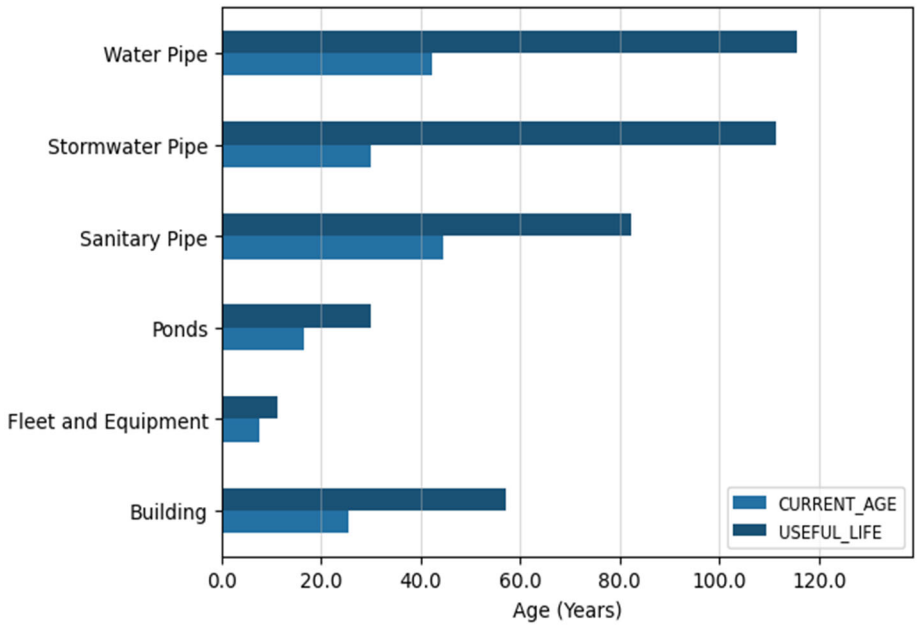


Figure A.17 Environmental Services Average Asset Age Summary by Asset Class

The Service Area notes that the absence of the details associated with the pipework may be causing an under reporting of the risk associated with pipe breaks. Anecdotally it is reported that the laterals are in worse condition than that reported, in particular within the sanitary collection network. Therefore, it is suspected that the laterals require greater asset ‘need’ and hence should be managed separately in the future.

A-3-4 Level of Service

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

Table A.18 Summary of Environmental Services Level of Service

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Water	Capacity Use	The water system has the capacity to provide customers with uninterrupted access to treated water at an adequate pressure.	VG	M	Growth	Water	Percentage of water distribution system operating below quantity, or pressure objectives.	0 %
Water	Capacity Use	Prospective customers in the urban area are able to connect or be connected to the drinking water distribution network.	VG	VH	Growth	Water	Percentage of urban customers or developments seeking connection which are able to be connected.	100 %
Water	Function	Services are provided in an environmentally responsible and sustainable way	TBD	TBD	Upgrade	Water	Infrastructure Leakage Index Score.	TBD
Water	Function	Services are provided in an environmentally responsible and sustainable way	TBD	VH	Upgrade	Water	Number (#) of instances where the limits of Permits to Take Water were exceeded.	0
Water	Function	Services are provided in an environmentally responsible and sustainable way	TBD	TBD	Upgrade	Water	Operations conducted in accordance with Source Water Climate Risk Assessments	TBD
Water	Function	Water treated and transported throughout the system meets or	VG	VH	Upgrade	Water	Number (#) of Adverse Water Quality Incidents	3

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
		exceeds all regulatory requirements for quality.					(AWQIs)	
Water	Function	Water treated and transported throughout the system meets or exceeds all regulatory requirements for quality.	VG	VH	Upgrade	Water	Number (#) of boil water advisories declared.	1
Water	Function	Services are provided prioritizing safety	G	VH	Upgrade	Water	Annual boil water advisories.	1
Water	Function	Services are provided prioritizing safety	G	H	Upgrade	Water	Percentage of distribution network capable of providing firefighting support.	99.75 %
Water	Quality	System is kept in a state of good repair.	VG	M	Renewal, Operation and Maintenance	Water	Percentage of drinking water asset portfolio in fair or better condition	86%
Water	Function	Services are provided prioritizing safety	G	VH	Upgrade	Water	Critical and dangerous areas are secured.	100 %
Water	Quality	Drinking water provided to customers meets customer expectations for taste, aesthetics and pressure.	VG	VH	Renewal, Operation and Maintenance	Water	Number of complaints caused by city-owned assets per 1,000 accounts.	1.02
Water	Quality	Drinking water provided to customers meets customer expectations for taste, aesthetics and pressure.	VG	H	Renewal, Operation and Maintenance	Water	Percentage of works conducted where attempts are made to notify all affected customers of possible disruptions to water service.	100 %
Water	Capacity Use	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.	G	H	Growth	Water	Percentage of properties connected to the municipal water system.	77 %

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Water	Capacity Use	Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	G	H	Growth	Water	Percentage of properties where fire flow is available.	76 %
Water	Quality	Description of boil water advisories and service interruptions	G	H	Renewal, Operation and Maintenance	Water	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.	66
Water	Quality	Description of boilwater advisories and service interruptions	G	H	Renewal, Operation and Maintenance	Water	The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.	6.67
Wastewater	Capacity Use	System maintains adequate capacity to allow for growth and development.	G	M	Growth	Wastewater	System (%) at risk of backflow/ overflow based on modelling of combined sewer flows.	2.8 %
Wastewater	Capacity Use	System maintains adequate capacity to allow for growth and development.	G	VH	Growth	Wastewater	Number of bypasses caused by plant flow rate exceedance.	4
Wastewater	Capacity Use	Customers in the urban area are able to connect to the sanitary sewer network.	VG	VH	Growth	Wastewater	Availability of service in urban area	100 %
Wastewater	Function	Impact of untreated wastewater spills to the natural environment are minimized.	F	VH	Upgrade	Wastewater	Number of spills involving the conveyance and treatment system.	3

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Wastewater	Function	Conveyance System condition is adequate to cope with extreme operational conditions.	G	M	Upgrade	Wastewater	Incidents of backflow/ overflows during/ following storm events where City assets are the cause.	0
Wastewater	Function	Conveyance System condition is adequate to cope with extreme operational conditions.	G	VH	Upgrade	Wastewater	Number of treatment plant bypasses conducted in response to high flows.	4
Wastewater	Function	Conveyance System condition is adequate to cope with extreme operational conditions.	G	VH	Upgrade	Wastewater	Percentage of total effluent volume discharged during bypass events	1.17 %
Wastewater	Quality	System operates to prevent odors and backups	VG	VH	Renewal, Operation and Maintenance	Wastewater	Formal odor complaints received.	2
Wastewater	Quality	Services delivered in an agreeable time frame	G	M	Renewal, Operation and Maintenance	Wastewater	Percent service requests completed in prescribed timeline.	77 %
Wastewater	Quality	Affected customers are informed of disruptions to service and developments of work to return service.	VG	H	Renewal, Operation and Maintenance	Wastewater	All excavations either limit disruption to services or inform affected customers in a timely manner	100 %
Wastewater	Capacity Use	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allowed overflow during storm events to prevent backups into homes	G	H	Growth	Wastewater	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.	5

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
Wastewater	Capacity Use	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes.	G	M	Growth	Wastewater	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	15.83
Wastewater	Quality	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.	G	VH	Renewal, Operation and Maintenance	Wastewater	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	12
Stormwater	Quality	Affected customers are kept informed with respect to significant changes in local stormwater management structures.	VG	H	Renewal, Operation and Maintenance	Stormwater	Major maintenance projects such as rehabilitations, rebuilds or expansions communicated to nearby residents or widely.	100 %
Stormwater	Capacity Use	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.	VG	H	Growth	Stormwater	Percentage of properties in municipality resilient to a 100-year storm.	94.6 %
Stormwater	Quality	Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of	VG	H	Renewal, Operation and Maintenance	Stormwater	Percentage of the municipal stormwater management system resilient to a 5-year storm.	99.25 %

Department	CLOS Category	Customer LOS	Performance	Confidence	TLOS Category	Asset(s)	Technical LOS	Performance
		the protection provided by the municipal stormwater management system.						

Areas Connected to Municipal Water System

The City is responsible for the supply of safe drinking water. The Environmental Service Area's water systems include two surface water treatment plants, elevated water storage, pumping stations and transmission, local watermains. The City is broken up into the urban core and the rural areas. In most instances, the rural areas have not been connected to the municipal system. A Map of the extent of the water system is shown in the Figure A.18.

The City owns and operates another small drinking water system known as the Point Anne Drinking Water Treatment Plant. This system services the small community of Point Anne Hamlet which consist of approximately 22 properties and is distinct from the urban network serviced by the Belleville WTP. This system not shown in the figure below.

The City also provides distribution services to Prince Edwards County which is managed through a Service Level Agreement.

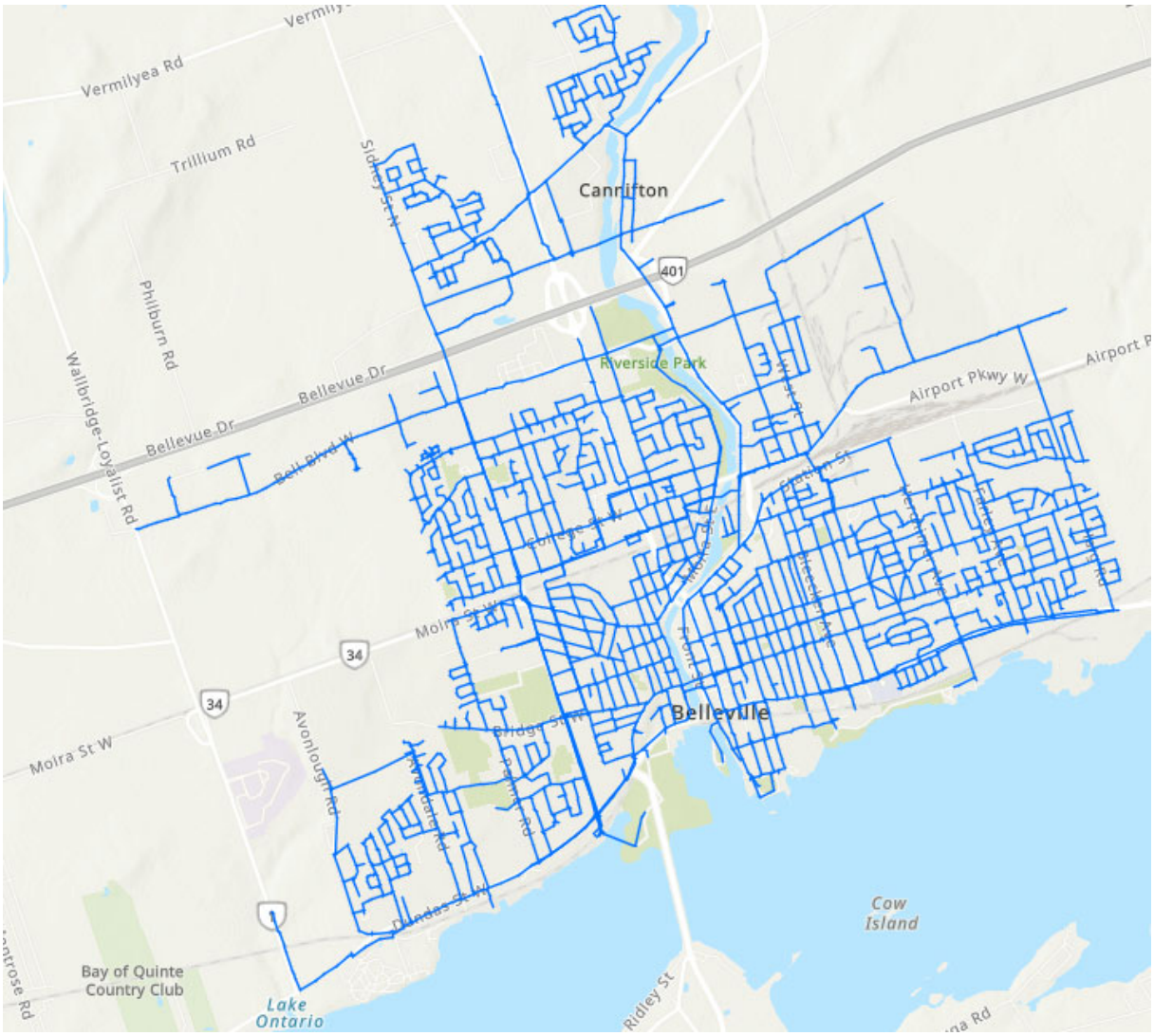


Figure A.18 Environmental Services Connected to Municipal Water System Areas

Areas with Fire Flow

The City of Belleville's service areas are currently divided into urban and rural services. Those properties within the urban core connected to the water distribution network comprise approximately 77% of all properties. With the known exception of properties located in the Point Anne Hamlet it is assumed that 99% of connected properties (approximately 76% of total properties) can be reported to have available fire flow. In the remaining rural areas this service is not currently provided. The service delivery of the fire flow services is shown in Figure A.19. The Environmental Services Area is working to quantify the number of properties which are without connection.'

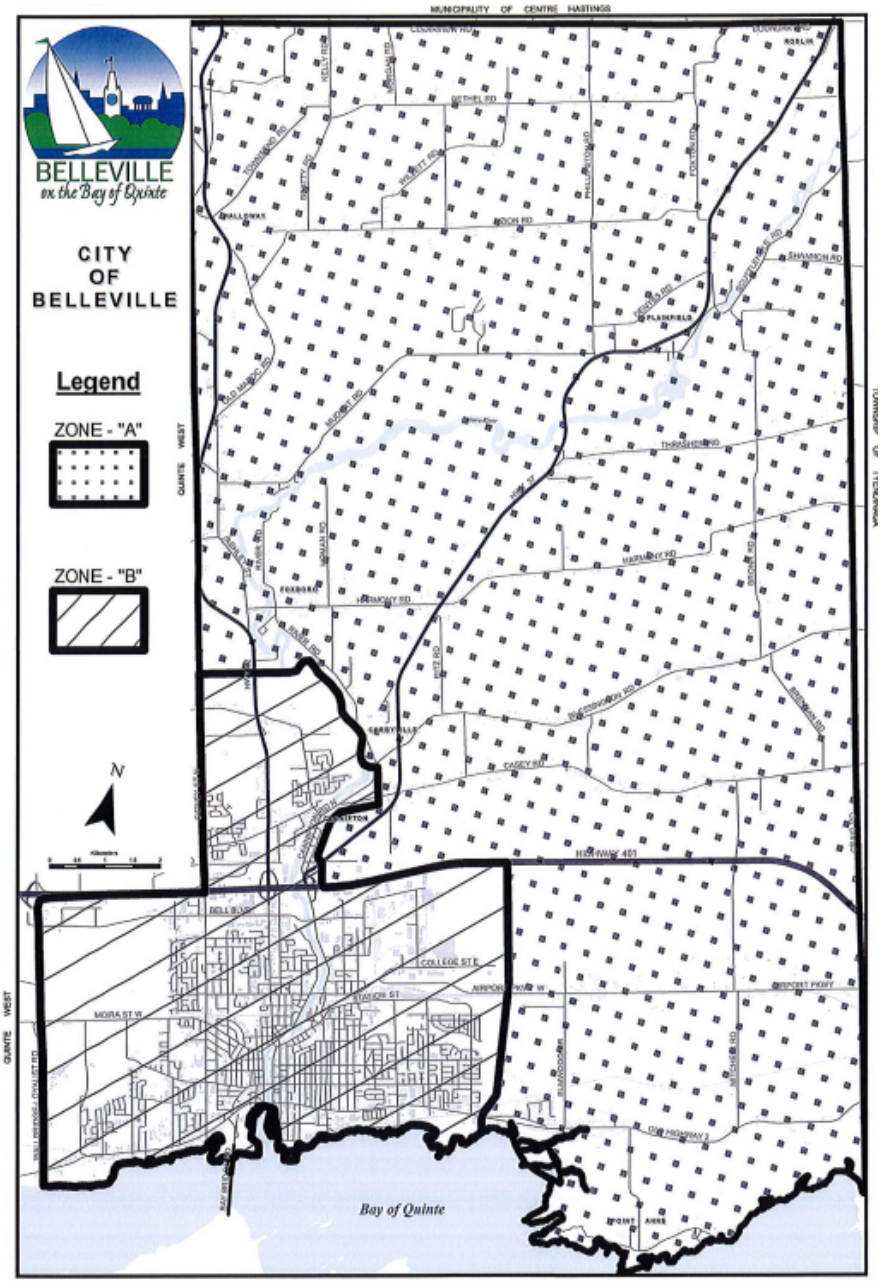


Figure A.19 Environmental Services Connected to Municipal Water System Areas

Description of Boil Water Advisories and Service Interruptions

The Environmental Service Area, in collaboration with the Public Health Department, manages water services to ensure a safe water supply. In rare instances, boil water advisories are issued when conditions or concerns may adversely affect the quality or safety of the potable water supply. A boil water advisory is put in place to protect the community from potentially harmful organisms that may be in the water that may be detrimental to the health of the community. Most boil water advisories are issued because the equipment and processes used to treat, store or distribute drinking water break down, require maintenance, or have been affected by environmental conditions. Issues include broken water mains, planned system maintenance, power failures or equipment problems. Also, extreme weather or heavy rains may cause the quality of surface or ground water sources to temporarily worsen, challenging the drinking water treatment system.

Service Interruptions (Breaks)

In 2020, the City experienced approximately 6.7 connection-days per year due to watermain breaks compared to total number of properties connected to the municipal water system". The system does include sections of redundancy however these occurred in regions were not redundancy existed. The City attempts to respond to these issues rapidly and keep the affected members of the community as informed as possible.

Inflow and Infiltration (I/I)

Inflow occurs when stormwater enters the sanitary sewer systems at points of direct connection to the systems (rain leaders, basement sump pumps, foundation drains). Infiltration occurs when groundwater enters the sanitary sewer systems through cracks and/or leaky joints in the pipes, service connections or maintenance holes. I/I can also occur by design in areas where sanitary and storm conveyance systems were historically constructed, intentionally as a combined system. The City is exploring the prevalence of these combined sewers through out the municipality and is seeking to separate these services when and where possible.

I/I increase flow to the sanitary collection system which is ultimately received by the wastewater treatment plants. I/I extraneous flow increases the risk of sanitary sewage backups in homes and businesses as well as the risk of upset to wastewater treatment plant processes including higher chance of bypasses. The City has an initiative which has been identified in its master plan (due to be delivered next year to identify and remedy I/I issues, including separation of pipework, flow monitoring, CCTV inspections, and rehabilitation and repair work.

Wastewater Treatment Effluent Discharge

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

A-3-5 Risk Analysis

Risk is evaluated by multiplying the Consequence of Failure of the asset and the Probability of Failure. A risk map for the Environmental Services asset portfolio has been developed in Table A.19. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020$M, corresponding to the risk of failure score:

– Extreme (red),
– High (orange),
– Moderate (yellow),
– Low (green), and
– Insignificant (grey).

Table A.19 Overview of Environmental Services Asset Portfolio Risk Summary

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0M	$0.47M	$119.29M	$11.09M	$0.0M
	P4	$0M	$0.08M	$29.28M	$7.84M	$0.0M
	P3	$0M	$1.81M	$63.05M	$15.12M	$150.0M
	P2	$0M	$0.11M	$345.42M	$87.72M	$0.0M
	P1	$0M	$1.33M	$484.29M	$217.15M	$3.35M

Assets falling in the higher risk categories are those assets that are most critical to the Environmental Services (have a high consequence of failure and highest probability of failure).

– Assets that appear in the extreme (red) zone are significant to the Environmental Services and are performing poorly, and therefore need to be actively monitored and managed in a more comprehensive manner than other assets. This may include immediate inspection and stop gap measures (e.g., emergency plan in case of asset failure or emergency rehabilitation or replacement) to ensure that the asset does not fail.
– Assets that appear in the high (orange) and moderate (yellow) zones will also be actively managed depending on their criticality.
– Assets that appear in the low (green) and insignificant (grey) zone are generally acceptable without significant mitigation strategies being implemented, although monitoring may still occur in some form.

This assessment allows for the identification and prioritization of high-risk assets that require closer inspection (to verify if they truly are high risk), preventive maintenance activities, and short and medium-term capital renewal works, including possible transition out of service. The Environmental Services has **no assets in the extreme risk category**. It currently has **$288.2 M (18.7%) assets in the high risk** (orange).

A-3-6 Lifecycle Initiatives

Growth and Expansion

To maintain the current levels of service, the City of Belleville has planned expansion and upgrade works which totals **$178.8 M or an average annual $17.8 M** for each of the next 10 years. These activities are summarized in Table A.20.

Table A.20 Environmental Services Planned Growth and Upgrade

Asset	Project Description	Timeframe		Cost (2020 $M)
		Start	End	
Building	Belleville Wastewater Treatment Plant Upgrades Phase 1a	2021	2023	8.3
Wastewater Pipe	Schedule 'C' Class EA for Belleville Wastewater Treatment Plant and Front Street Pump Station, Forcemain and River Crossing	2022	2024	0.3
Wastewater Pipe	Inflow and Infiltration (I) Study and Sanitary Sewer Asset Condition Assessment	2022	2025	0.6
Building	Various small Sewage pumpstation condition upgrades	2022	2030	2.4
Building	Belleville Wastewater Treatment Plant Upgrades Phase 1b	2022	2030	11.7
Building	Belleville Wastewater Treatment Plant Upgrades Phase 1c	2022	2030	29.9
Building	Belleville Wastewater Treatment Plant Upgrades Phase 1d	2022	2030	12.4
Wastewater Pipe	Coleman Street Trunk Sewer Expansion	2022	2030	3.3
Building	Belleville Wastewater Treatment Plant Upgrades Phase 2	2022	2030	2.6
Building	Front Street Sewage Pump Station, Forcemain and River Crossing	2022	2030	32.0
Wastewater Pipe	Fahey and Tracey Street Trunk Sewer Expansion	2022	2030	5.3
Building	Loyalist Secondary Plan Pump Station (EA Study Only)	2021	-	1.0
Wastewater Pipe	401 - Gravity Mains (Loyalist Secondary Plan)	-	-	0.5
Wastewater Pipe	402 - Gravity Mains (Loyalist other related new roads sewers)	-	-	2.2
Wastewater Pipe	403 - Gravity Mains (Dundas St)	-	-	0.8
Wastewater Pipe	404 - Gravity Mains Upgrade (Millennium Parkway Trunk Sewer Expansion)	-	-	0.3
Wastewater Pipe	405 - Gravity Mains Upgrade (Newberry St)	-	-	0.1
Wastewater Pipe	406 - Gravity Mains Upgrade (Catherine St)	-	-	0.2
Wastewater Pipe	407 - Gravity Mains Upgrade (Dundas St W)	-	-	0.9
Wastewater Pipe	408 - Gravity Mains Upgrade (Coleman St)	-	-	0.8

Asset	Project Description	Timeframe		Cost (2020 $M)
Wastewater Pipe	409 - Gravity Mains Upgrade (Moira St E)	-	-	0.5
Wastewater Pipe	410 - Gravity Mains Upgrade (Tracey St)	-	-	0.8
Wastewater Pipe	411 - Gravity Mains Upgrade (Finch Dr, Heartwood Dr)	-	-	0.9
Wastewater Pipe	412 - Gravity Mains Upgrade (Upstream of Fahey St)	-	-	0.4
Wastewater Pipe	414 - Gravity Mains (Mercedes Dr, Tessa Blvd, Haig Rd)	-	-	1.0
Wastewater Pipe	415 - Gravity Mains Upgrade (Haig Rd)	-	-	0.3
Wastewater Pipe	416 - Gravity Mains (Old Kingston Rd)	-	-	0.7
Wastewater Pipe	417 - Gravity Mains (East Belleville - North Industrial Area)	-	-	2.8
Wastewater Pipe	418 - Gravity Mains (Mailtland Dr)	-	-	0.5
Wastewater Pipe	419 - Gravity Mains (Cannifton SP)	-	-	0.9
Wastewater Pipe	420 - Gravity Mains (Farnham Dr)	-	-	2.2
Wastewater Pipe	421 - Gravity Mains (Fahey)	-	-	1.3
Wastewater Pipe	422 - Gravity Mains (Loyalist Secondary Plan)	-	-	4.4
Wastewater Pipe	424 - Gravity Mains (Cannifton SP)	-	-	0.5
Wastewater Pipe	425 -SPS - Forcemain (Avonlough Road SPS, Forcemain, Gravity and pressure main)	-	-	17.1
Wastewater Pipe	413 - Gravity Mains (River Crossing Sewer - Pressure Main) 428 - SPS (Front St SPS)	-	-	10.7
Study	Infrastructure Phasing Strategy (WW share)	2021.0	-	0.0
Study	Other Studies	-	-	0.1
Building	North Park Booster Pumping Station - New Pump	2025.0	-	0.1
Water Pipe	201 - Water Main (Moira Street)	-	-	0.4
Water Pipe	202 - Water Main (Avonlough Road)	-	-	0.6
Water Pipe	203 - Water Main (Avonlough Road)	-	-	0.5
Water Pipe	204 - Water Main (New Roads)	-	-	0.3
Water Pipe	205 - Water Main (Avondale Rd, Harder Dr)	-	-	0.6

Asset	Project Description	Timeframe		Cost (2020 $M)
Water Pipe	206 - Water Main (Marshal Rd, Bridge St)	-	-	1.3
Water Pipe	207 - Water Main (New Roads)	-	-	0.8
Water Pipe	208 - Water Main (New Roads)	-	-	0.9
Water Pipe	209 - Water Main (New Roads)	-	-	0.9
Water Pipe	210 - Water Main (Wallbridge Loyalist Rd)	-	-	1.9
Water Pipe	211 - Water Main (New Roads)	-	-	1.7
Water Pipe	212 - Water Main (Farnham Road, Maitland to Hwy 62)	-	-	1.4
Water Pipe	213 - Water Main (Tank Farm Rd)	-	-	1.7
Water Pipe	214 - Water Main (New Roads)	-	-	1.1
Water Pipe	215 - Water Main (Scott Dr)	-	-	1.7
Water Pipe	220 - New Elevated Tank (Cannifton Planning Area)	-	-	1.5
Water Pipe	224 - New BPS (Bell Blvd Area)	-	-	0.6
Study	Infrastructure Phasing Strategy (W share)	-	-	0.0
Study	Other Studies	-	-	0.1
Total				**178.8**

It should be noted that these projects are primarily associated with the sanitary and storm system managed by the Environmental Services Area. Master planning for the water assets has not been completed at the time of this report. Historically activities are determined reactively on an annual basis.

Operations

Asset operations activities are those regular activities (and costs) which are required to support delivery of service to the City's residents. Table A.21 summarizes the cost associated with delivery of Asset Operations by asset class. These costs have been determined through review of the 2020 financial information and assumed to be representative of the annual investment.

Table A.21 Environmental Services Summary of Planned Operational Activities

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Operation (2020 $M)
Building	Inspections, water quality sampling, electricity, chemicals, cleaning	28 Each	$185,098	5.18
Ponds	Quarterly inspections, mowing.	1754,49.0 m3	$0.0	0.0
Sanitary Pipe	Locates and sewer flushing (mains)	209.9 Linear.km	$2,502	0.52
Stormwater Pipe	Locates, catch basin cleaning	160.3 Linear.km	$634	0.10

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Operation (2020 $M)
Water Pipe	Water flushing, weekly flushing of chlorine residuals (higher in some nominated section, quarterly (4xtimes annual), locates (1 FTE locates),	261.5 Linear.km	$2,451	0.64
Total				**6.7**

Maintenance

When an Environmental Services asset experiences a defect, which impacts its LOS (capacity, function, or quality), the activity that is required to restore it to its original operational condition is defined as maintenance. At the City, maintenance is usually triggered based on findings of a physical inspection or customer complaint.

Table A.22 Environmental Services Summary of Planned Maintenance Activities

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Maintenance (2020 $M)
Building	Preventative maintenance on mechanical and electrical equipment (e.g., greasing).	28 Each	$60,621	2.12
Ponds	NA	1754,49.0 m3	$0.0	0.0
Sanitary Pipe	CCTV (to be implemented), repair risers and manholes upper section (reactive), repairs on the pipe.	209.9 Linear.km	$1,935	0.40
Stormwater Pipe	CCTV (to be implemented), repair risers and manholes upper section (reactive), repairs on the pipe.	160.3 Linear.km	$141	0.02
Water Pipe	Annual flushing (remove blockages), annual valve exercising and hydrants, reactive maintenance (repairs, breaks all asset), pipe sampling an analysis (annual x 5 mains per year (15-30 samples),	261.5 Linear.km	$1,102	0.28
Total				**2.8**

Rehabilitation and Renewal

Based on the rehabilitation and refurbishment lifecycle proposed by the Environmental Services Subject Matter Experts (SME) the projected rehabilitation and replacement activities have been projected. The projected investment indicates that an average need of **$36.9M**.per year in asset renewal (rehabilitations and replacements) is required or a total of **$368.9M**. over the next 10 years.

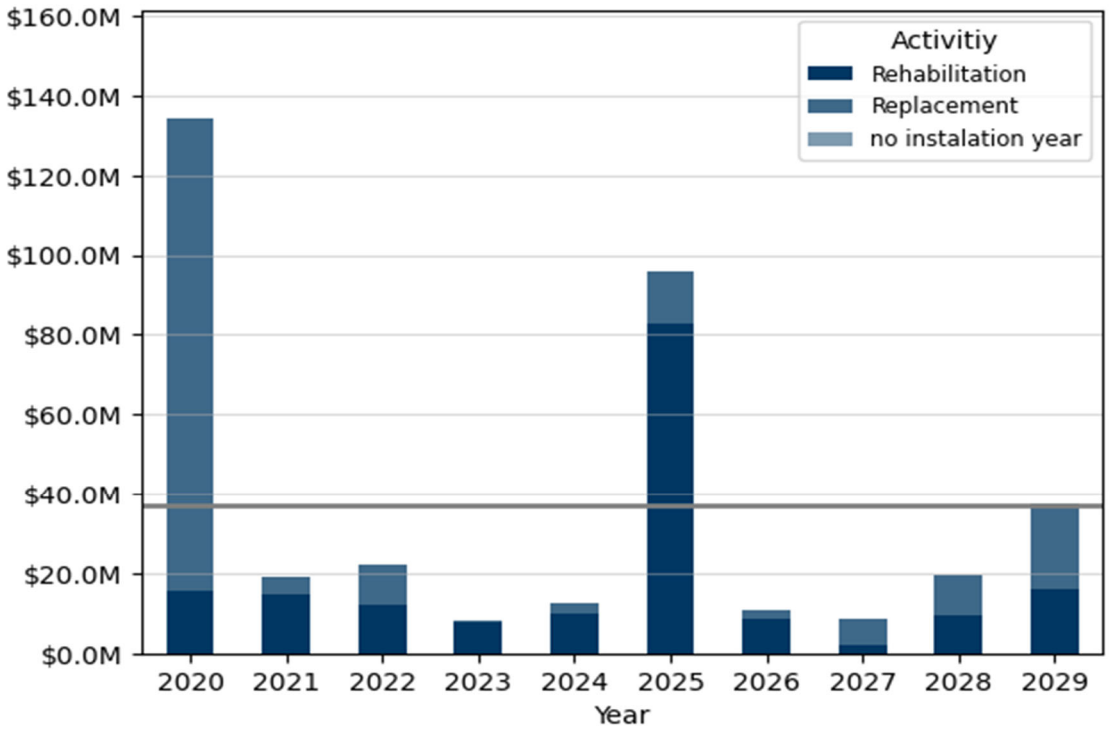


Figure A. 20 Environmental Services Forecast Renewal need by Activity

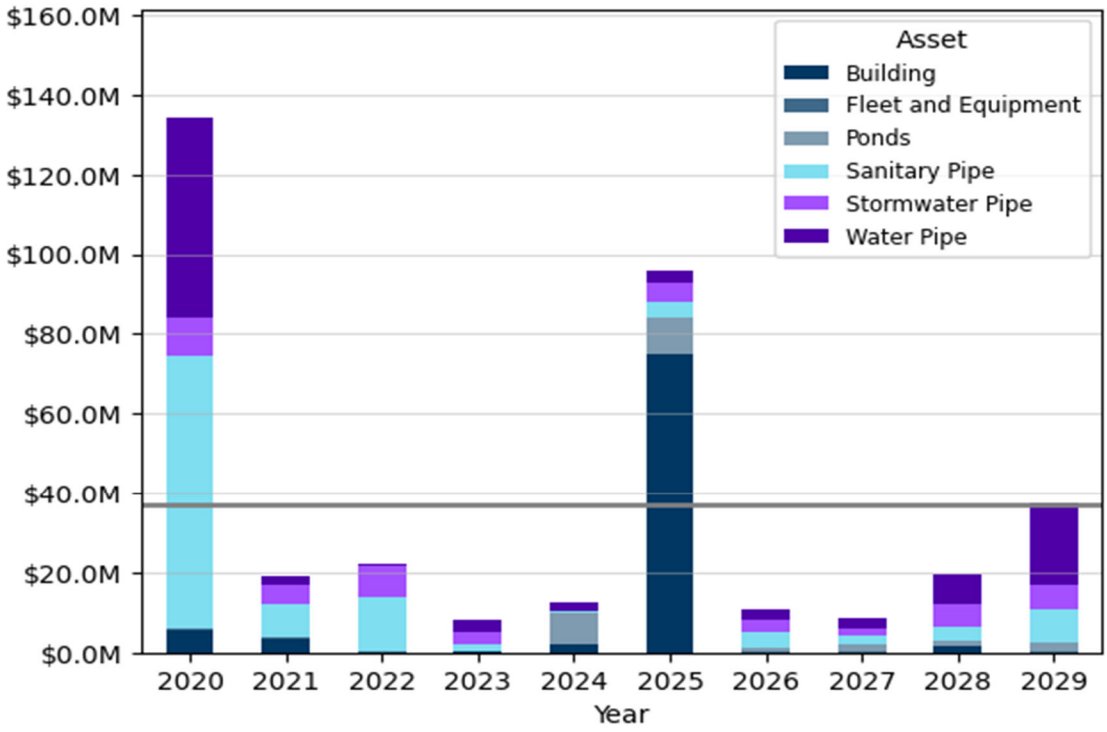


Figure A. 21 Environmental Services Forecast Renewal need by Asset Class

A-3-7 Identified Improvement Initiatives

The Environmental Service Area has identified initiatives to improve the asset management program, some of which have been launched, while others are under development. Table A.23 summarizes the key improvements actions, outcome, timeline and priority. The timeline is broken into three categories:

– Short (1-2 years)
– Medium (3 – 5 years) and
– Long (greater than 5 years).

The owners and nominated leads for delivering each improvement action remain to be confirmed in most cases.

Table A.23 Environmental Service Area Identified Improvement Initiatives

Area of Improvement	Action	Outcome	Timeline	Priority
Asset Hierarchy and Data	The condition of the mains is generally being effectively managed however the Environmental Service Area is aware that the Laterals are driving the majority of issues and impacting the needs for renewal. These are currently not captured in the current version of the AMP.	Creation of distinct asset classes with unique lifecycle activities will provide greater clarity around asset governance and asset planning.	Short	High
Improved inspection activities	There is a need to introduce a CCTV program to develop a more comprehensive system to score condition and review of the useful life assumptions which are currently operated at the City.	This is currently in progress. Deployment will help with prioritization of asset renewal and refurbishment needs.	Short	High
Asset Data completeness	There are some instances of gaps in asset data (primarily in GIS). The completeness issues are associated with both adequacy and accuracy of the data to varying degree depending on the asset class.	Improving asset data State of Local Infrastructure reporting, risk and financial need analysis. This is currently in progress.	Medium	High
Pipe Material	Some historical pipe segments were constructed using materials that do not currently meet todays standards. The City has removed most of this material however records indicate that approximately 25m of residual lead pipe may remain.	These segments have been prioritized for inspection, assessment and replacement, as required. The presence or not of these materials will be confirmed and addressed as a priority.	Short	High

A-4 Protective Services

Total Asset Value:
44.2
(2020 $M)

No. of Asset Class:
2

Average Condition:
Very Good

A-4-1 General

The Protective Services Service Area are responsible for managing all assets associated delivery of emergency services including fire and policing.

A-4-2 Asset Inventory

The assets owned by the Protective Services Service Area, within the City of Belleville, are summarised in the Table A.24.

Table A.24 Summary of Protective Services Asset Inventory

Asset Class	Quantity	Units	Asset valuation (2020 $M)
Building	Each	6	33.2
Fleet and Equipment	Each	82	11.1
			44.2

The breakdown of the valuation of the assets inventory is shown graphically in Figure A.22.

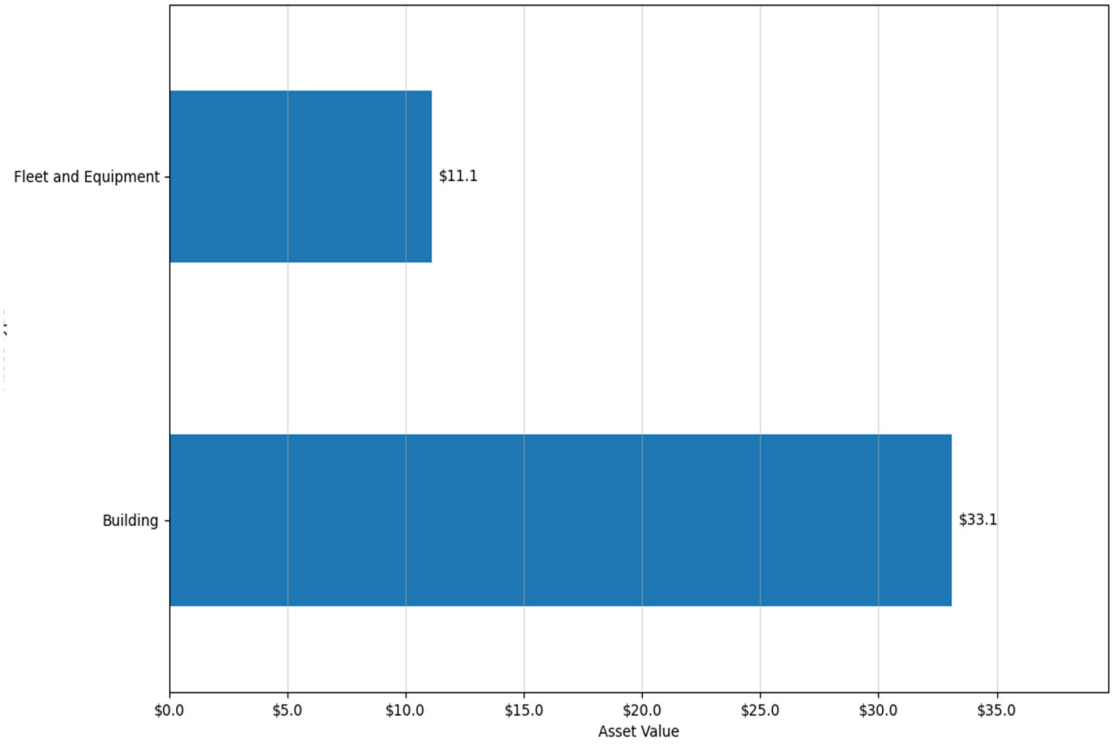


Figure A.22 Protective Services Asset Valuation Summary

A-4-3 State of Local infrastructure

A summary of the condition rating, ranging between ‘Very Poor’ and ‘Very Good’, of the complete asset owned by the Environmental Services Service Area is shown in Figure A.23.

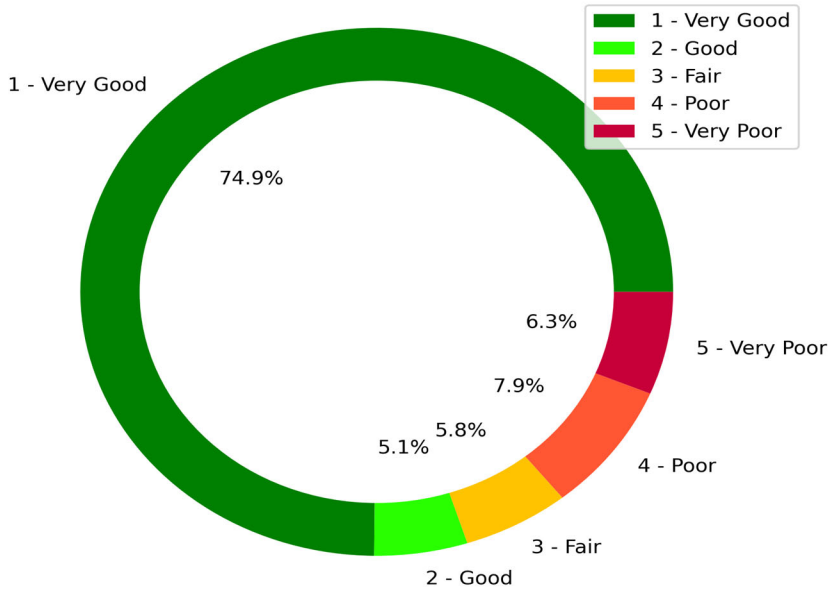


Figure A.23 Protective Services Asset Condition Summary

As is evident from the Figure, the majority of the Protective Services Service Area assets are in ‘Very Good’ condition. There is a reasonable percentage (21.5%) of asset are in ‘Poor’ and ‘Very Poor’ condition. The asset condition rating was primarily determined using a combination of remaining useful life and the financial depreciation. Further breakdown of the condition by class is provided in Figure A.24

Figure A.24 Protective Services Asset Condition Summary by Asset Class

Compared to the other asset groups, the fleet assets appear to be in the worst condition. Further investigation of the feet assets indicates that the poor condition is primarily associated with the passenger vehicles (utilities, vans, cars). However, a notable component of the fire trucks was also found to be in poor condition. By contrast the average asset age, compared to the “useful life” is shown for the Protective Services Service Area in Figure A.25.

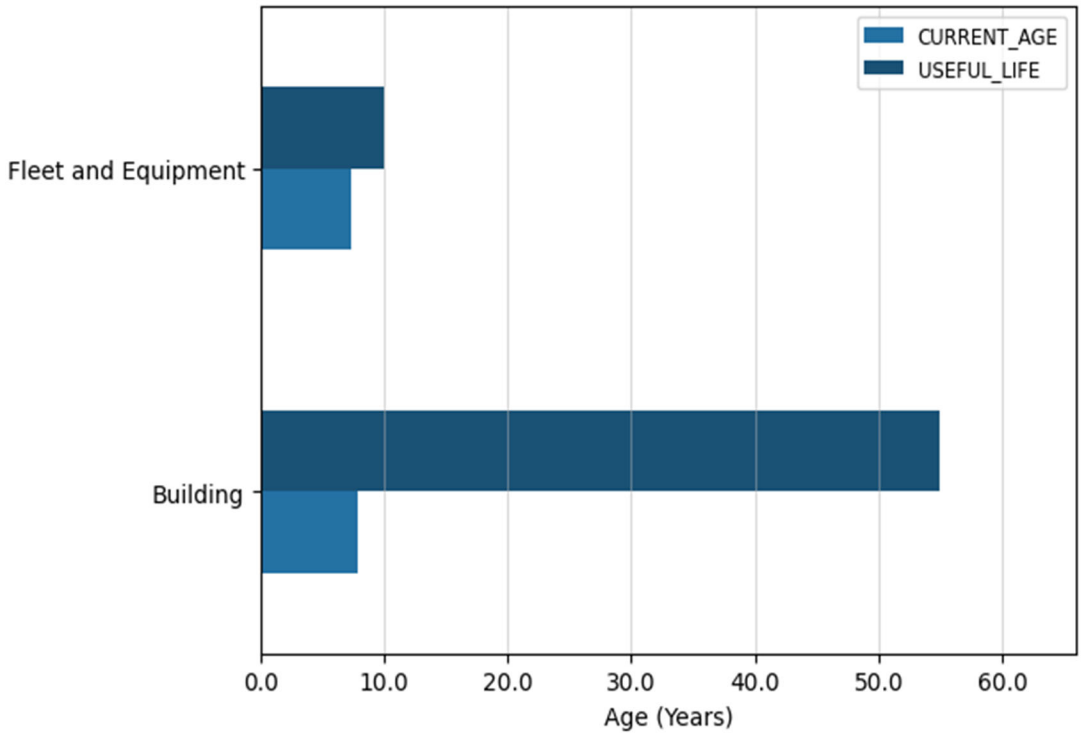


Figure A.25 Protective Services Average Asset Age Summary by Asset Class

The Protection Services Service Area has identified a number of areas of improvement which they wish to undertake, including adding in future some of their other critical and safety and communications equipment.

A-4-4 Level of Service

There are no legislated technical requirements for the Protection Services assets. Similarly, at the time of this plan no development of customer, and technical Level of Service had been occurred however this has been identified as an area of improvement for the next iteration of this plan.

A-4-5 Risk Analysis

Risk is evaluated by multiplying the Consequence of Failure of the asset and the Probability of Failure. A risk map for the Transportation asset portfolio has been developed in Table A.25. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020$M, corresponding to the risk of failure score:

– Extreme (red),
– High (orange),
– Moderate (yellow),
– Low (green), and

– Insignificant (grey).

Table A.25 Overview of Protective Services Asset Portfolio Risk Summary

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0M	$1.39M	$0.0M	$1.4M	$0M
	P4	$0M	$0.31M	$0.0M	$3.2M	$0M
	P3	$0M	$0.32M	$0.0M	$2.26M	$0M
	P2	$0M	$0.55M	$0.69M	$1.01M	$0M
	P1	$0M	$0.25M	$32.43M	$0.45M	$0M

Assets falling in the higher risk categories are those assets that are most critical to the Protective Services (have a high consequence of failure and highest probability of failure).

– Assets that appear in the extreme (red) zone are significant to the Protective Services and are performing poorly, and therefore need to be actively monitored and managed in a more comprehensive manner than other assets. This may include immediate inspection and stop gap measures (e.g., emergency plan in case of asset failure or emergency rehabilitation or replacement) to ensure that the asset does not fail.
– Assets that appear in the high (orange) and moderate (yellow) zones will also be actively managed depending on their criticality.
– Assets that appear in the low (green) and insignificant (grey) zone are generally acceptable without significant mitigation strategies being implemented, although monitoring may still occur in some form.

This assessment allows for the identification and prioritization of high-risk assets that require closer inspection (to verify if they truly are high risk), preventive maintenance activities, and short and medium-term capital renewal works, including possible transition out of service. The Protective Services has **no assets in the extreme risk category**. It currently has **$4.6M (10.4%) assets in the high risk** (orange).

A-4-6 Lifecycle Initiatives

Growth and Expansion

To maintain the current levels of service, the City of Belleville has planned expansion and upgrade works for each of the next 10 years. The following graph shows these planned growth and upgrade investments which average approximately **$0.45 M** over the next ten years.

Table 9.2 Summary of Protective Services planned Growth and Expansion

Asset	Project Description	Timeframe		Cost (2020 $M)
		Start	End	
Building	Base Expansion	-	-	0.3
Building	Fire Hall No.1 - Bettis Rd	2021	2033	3.8
Building	Satellite Fire Station No.5 -Plainfield	2021	2036	0.4
Total				**4.5**

Operations

Asset operations activities are those regular activities (and costs) which are required to support delivery of service to the City's residents. Table A.26 summarizes the cost associated with delivery of Asset Operations by asset class. These costs have been determined through review of the 2020 financial information and assumed to be representative of the annual investment.

Table A.26 Protective Services Summary of Planned Operational Activities

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Operation (2020 $M)
Building	Electricity, insurance, heating	6 Each	$25,008	0.37
Fleet and Equipment	Fuel, registration, prestart (visual), insurance	82 Each	$6,294	0.51
Total				**0.9**

Maintenance

When a Protective Services asset experiences a defect, which impacts its LOS (capacity, function, or quality), the activity that is required to restore it to its original operational condition is defined as maintenance. At the City, maintenance is usually triggered based on findings of a physical inspection.

Table A.27 Protective Services Summary of Planned Maintenance Activities

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Maintenance (2020 $M)
Building	Maintenance, periodic servicing of equipment which is subcontracted	6 Each	$8,018	0.12
Fleet and Equipment	Regular maintenance works are conducted based on a usage (Hours/km), annual safety checks	82 Each	$3,222	0.26
Total				**0.4**

Rehabilitation and Renewal

The City of Belleville plans to invest on average approximately **$0.9M**.per year over the next 10 years in asset renewal (rehabilitations and replacements) totally**$8.9M**.

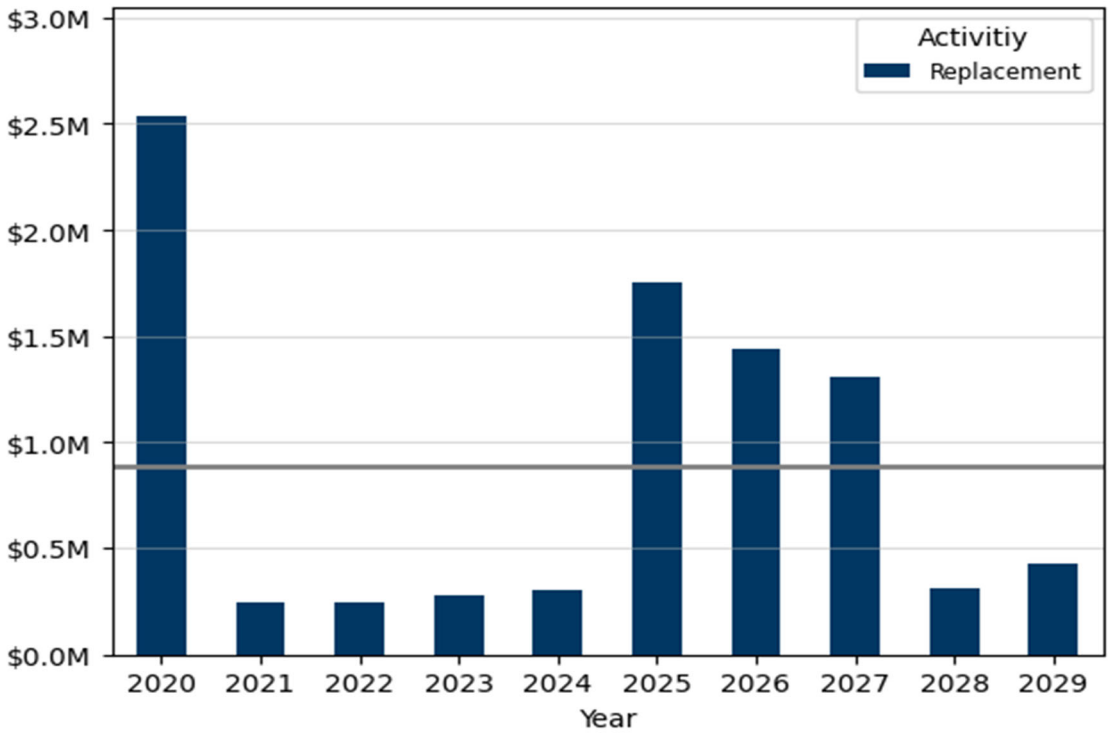


Figure A.26 Protective Services Forecast Renewal need by Activity

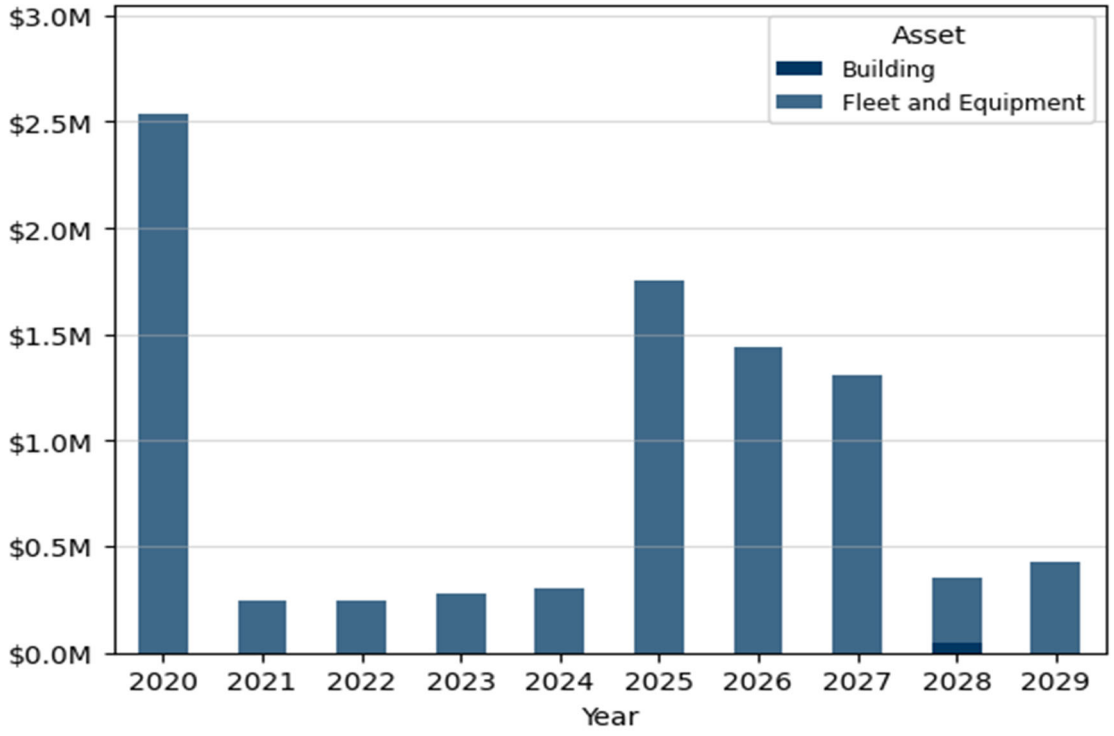


Figure A.27 Protective Services Forecast Renewal need by Asset Class

A-4-7 Identified Improvement Initiatives

The Protective Service Area has identified initiatives to improve the asset management program, some of which have been launched, while others are under development. Table A.23 summarizes the key improvements actions, outcome, timeline and priority. The timeline is broken into three categories:

Short (1-2 years)

Medium (3 – 5 years) and

Long (greater than 5 years).

The owners and nominated leads for delivering each improvement action remain to be confirmed in most cases.

Table A.28 Protective Service Area Identified Improvement Initiatives

Area of Improvement	Action	Outcome	Timeline	Priority
Asset Data completeness	There are some instances of gaps in asset data (primarily in GIS). The completeness issues are associated with both adequacy and accuracy of the data to varying degree depending on the asset class.	Improving asset data State of Local Infrastructure reporting, risk and financial need analysis. This is currently in progress.	Medium	High
Asset Condition	Detailed condition assessments program and scoring system should be developed to transition away from using age-based condition assessment (e.g. building).	This is currently in progress. Deployment will help priorities asset renewal and refurbishment needs.	Short	High
Lifecycle development	The protective service group have unique assets. It is important the critical assets' lifecycle and investment needs are clearly understood. This could be improved in the future	Undertake a review of high-risk assets and their needs to ensure they are reflected correctly at the asset level as some specialist equipment may require greater assessment	Medium	Medium
Level of service	No legislated, customer or technical LOS standards documented for this service area. This should be addressed to document the importance of investment in this service area.	Establish LOS and the necessary tools or systems to help support monitoring of LOS performance against the current standards. Support any further development and refinement of the LOS.	High	Medium

A-5 Community Facilities

A-5-1 General

The Community Facilities Service Area are responsible for managing all assets associated general administration and delivery of community services.

Total Asset Value:
24.0
(2020 $M)

No. of Asset Class:
2

Average Condition:
Good

A-5-2 Asset Inventory

The assets owned by the Community Facilities Service Area, within the City of Belleville, are summarised in the Table A.29.

Table A.29 Summary of Community Facilities Inventory

Asset Class	Quantity	Units	Asset valuation (2020 $M)
Building	Each	4	23.4
Parking Lot	Each	7	0.6
Total			**24.0**

The breakdown of the valuation of the assets inventory is shown graphically in Figure A.28.

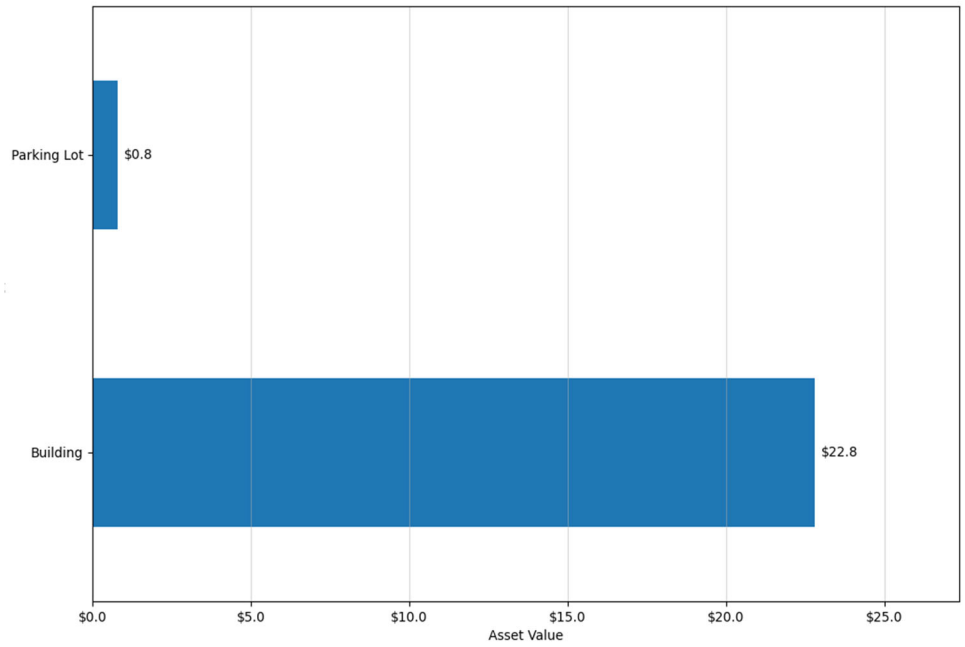


Figure A.28 Community Facilities Asset Valuation Summary

A-5-3 State of Local infrastructure

A summary of the condition rating, ranging between ‘Very Poor’ and ‘Very Good’, of the complete asset owned by the Community Facilities Service Area is shown in Figure A.29. All assets within the Community Facilities Service Area are in “Good” condition.

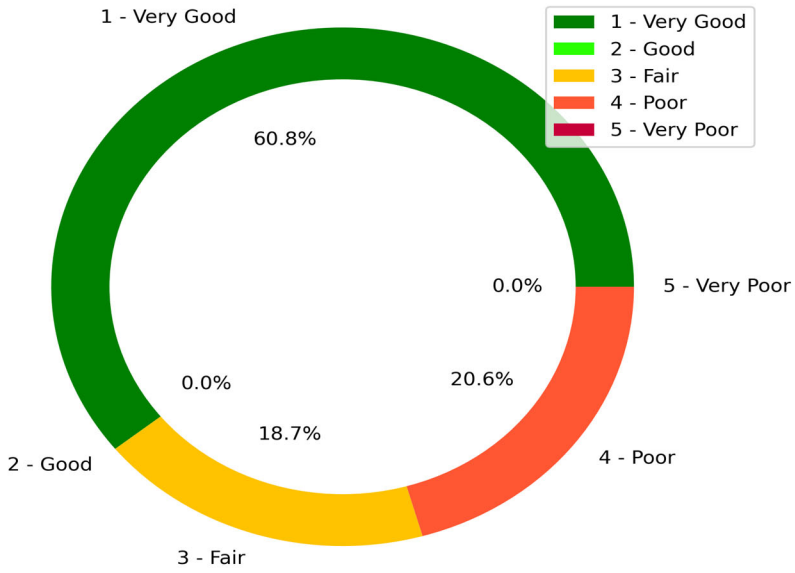


Figure A.29 Community Facilities Asset Condition Summary

By contrast the average asset age, compared to the “useful life” is shown for the Community Facilities Service Area in Figure A.30.

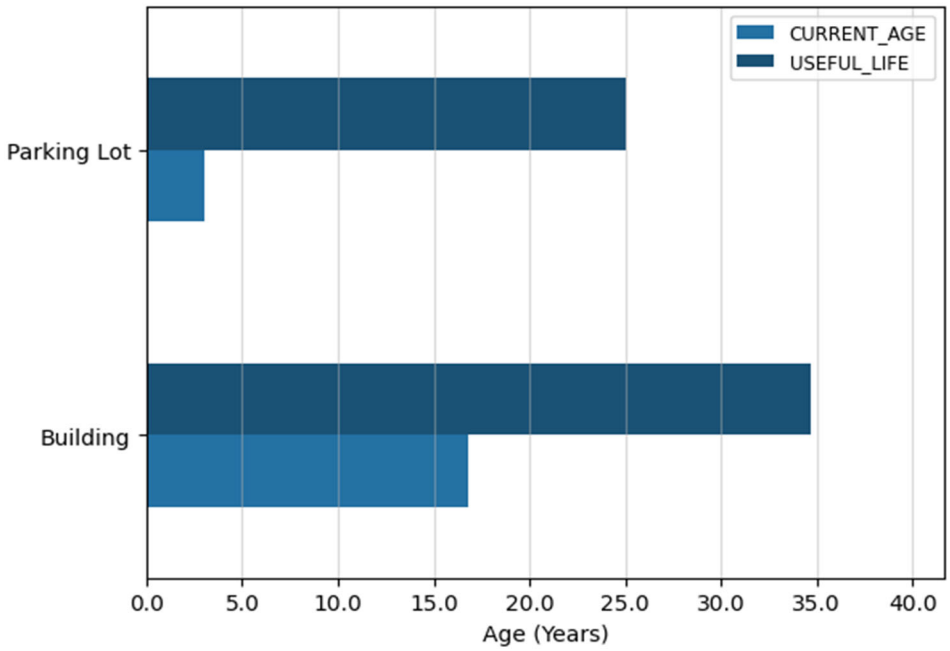


Figure A.30 Community Facilities Average Asset Age Summary by Asset Class

This includes historical buildings, such as the city hall, which are in excess of 100 years old. However, since their original construction these structures have been refurbishment. The refurbishment activities are considered to “reset” the useful life of these particular assets. The structures are understood to undergo regular inspections. These assets hold special significance to the community as this asset class provides a main contact point with the public and other stakeholders. As such other considerations which are often monitored in addition to condition include accessibility and safety. The Service Area aims to

provide greater asset breakdown in future revisions of the plans to consider sub systems within the building (mechanical electrical and structural).

A-5-4 Level of Service

There are no legislated technical requirements for the Community Facilities asset. Similarly, at the time of this plan no development of customer, and technical Level of Service had been occurred however this has been identified as an area of improvement for the next iteration of this plan.

A-5-5 Risk Analysis

Risk is evaluated by multiplying the Consequence of Failure of the asset and the Probability of Failure. A risk map for the Community Facilities asset portfolio has been developed in Table 7.3. This shows the highest risk calculated across any of the customer LOS attributes. The risk map is expressed in terms of the asset replacement value, in 2020$M, corresponding to the risk of failure score:

- Extreme (red),
- High (orange),
- Moderate (yellow),
- Low (green), and
- Insignificant (grey).

Table A.30 Overview of Community Facilities Asset Portfolio Risk Summary

		Consequence of Failure				
		C1	C2	C3	C4	C5
Probability of Failure	P5	$0.0M	$0.0M	$0.0M	$0M	$0M
	P4	$0.0M	$0.0M	$4.95M	$0M	$0M
	P3	$0.13M	$0.0M	$4.36M	$0M	$0M
	P2	$0.0M	$0.0M	$0.0M	$0M	$0M
	P1	$0.51M	$14.08M	$0.01M	$0M	$0M

Assets falling in the higher risk categories are those assets that are most critical to the Community Facilities (have a high consequence of failure and highest probability of failure).

- Assets that appear in the extreme (red) zone are significant to the Community Facilities and are performing poorly, and therefore need to be actively monitored and managed in a more comprehensive manner than other assets. This may include immediate inspection and stop gap measures (e.g., emergency plan in case of asset failure or emergency rehabilitation or replacement) to ensure that the asset does not fail.
- Assets that appear in the high (orange) and moderate (yellow) zones will also be actively managed depending on their criticality.
- Assets that appear in the low (green) and insignificant (grey) zone are generally acceptable without significant mitigation strategies being implemented, although monitoring may still occur in some form.

This assessment allows for the identification and prioritization of high-risk assets that require closer inspection (to verify if they truly are high risk), preventive maintenance activities, and short and medium-term capital renewal works, including possible transition out of service. The Community Facilities has **no assets in the extreme or high-risk category**.

A-5-6 Lifecycle Initiatives

Growth and Expansion

At the time of this report there was no formal master planning associated with the Community Facilities assets.

Operations

Asset operations activities are those regular activities (and costs) which are required to support delivery of service to the City's residents. Table A.31 summarizes the cost associated with delivery of Asset Operations by asset class. These costs have been determined through review of the 2020 financial information and assumed to be representative of the annual investment.

Table A.31 Community Facilities Summary of Planned Operational Activities

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Operation (2020 $M)
Building	Electricity, insurance, heating	4 Each	$239,405	0.96
Parking Lot	Electricity, security	7 Each	$71,037	0.50
Total				**1.5**

Maintenance

When a Community Facilities asset experiences a defect, which impacts its LOS (capacity, function, or quality), the activity that is required to restore it to its original operational condition is defined as maintenance. At the City, maintenance is usually triggered based on findings of a physical inspection.

Table A.32 Community Facilities Summary of Planned Maintenance Activities

Asset	Description of Activities	Units	Operations Cost per Asset Unit	Maintenance (2020 $M)
Building	General maintenance, periodic servicing (annual) which is subcontracted.	4 Each	$120,467.0	0.48
Parking Lot	Regrading, pothole filling	7 Each	$4,105.0	0.02
Total				**0.5**

Rehabilitation and Renewal

The City of Belleville plans to invest on average approximately **$0.1M**.per year over the next 10 years in asset renewal (rehabilitations and replacements) totally**$1.1M**.

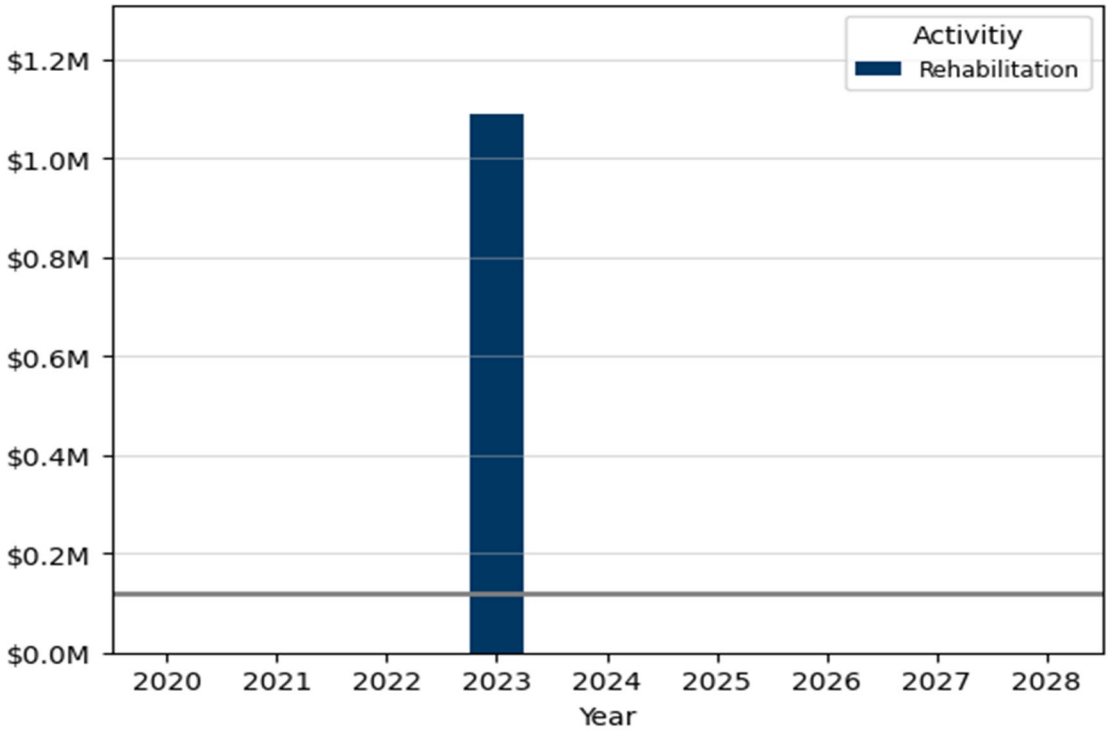


Figure A.31 Community Facilities Forecast Renewal need by Activity

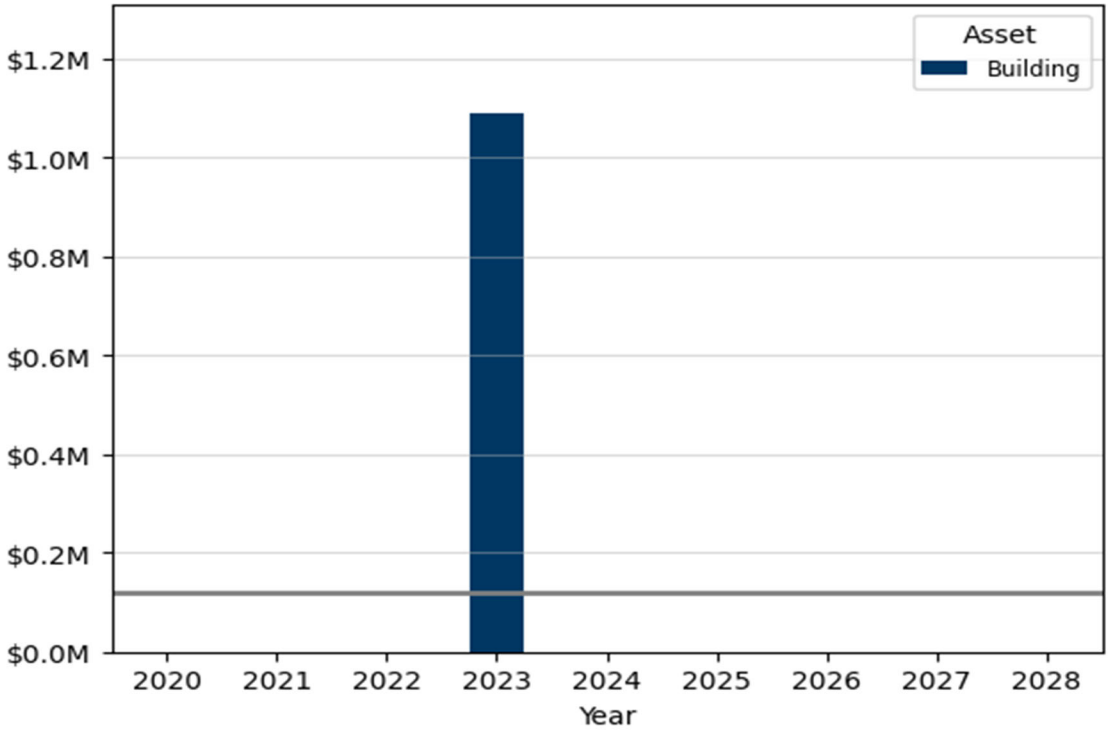


Figure A.32 Community Facilities Forecast Renewal need by Asset Class

A-5-7 Identified Improvement Initiatives

The Community Facilities has identified initiatives to improve the asset management program, some of which have been launched, while others are under development. Table A.23 summarizes the key improvements actions, outcome, timeline and priority. The timeline is broken into three categories:

– Short (1-2 years)
– Medium (3 – 5 years) and
– Long (greater than 5 years).

The owners and nominated leads for delivering each improvement action remain to be confirmed in most cases.

Table A.33 Community Facilities Service Area Identified Improvement Initiatives

Area of Improvement	Action	Outcome	Timeline	Priority
Asset Data completeness	The Service Area aims to provide greater asset breakdown in future revisions of the plans to consider sub systems within the building (mechanical electrical and structural).	Improving asset data State of Local Infrastructure reporting, risk and financial need analysis. This is currently in progress and may be supported by GIS strategy which is in progress	Medium	High
Asset Condition	Detailed condition assessments program and scoring system should be developed to transition away from using age-based condition assessment (e.g. building).	This is currently in progress. Deployment will help priorities asset renewal and refurbishment needs.	Short	High
Lifecycle Development	The protective service group have unique assets. It is important the critical assets' lifecycle and investment needs are clearly understood. This could be improved in the future	Undertake a review of high-risk assets and their needs to ensure they are reflected correctly at the asset level as some specialist equipment may require greater assessment	Medium	Medium
Level of Service	No legislated, customer or technical LOS standards documented for this service area. This should be addressed to document the importance of investment in this service area.	Establish LOS and the necessary tools or systems to help support monitoring of LOS performance against the current standards. Support any further development and refinement of the LOS.	High	Medium
Growth and Expansion	No growth or upgrade planning activities have been recorded currently.	Review that the growth and expansion need is correct and actively participate in the capital planning process and phasing.	Medium	Medium

Appendix B

Assumptions

B-1 SOLI Assumptions

B-1-1 Valuation Assumptions

Table B 1 *Water pipework valuation assumptions*

Material	<= 250mm	251- 400mm	> 400mm	Blank
PVC	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
CI	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
DI	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
LEAD	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,500.00
PVC	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
RL	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,500.00
AC	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
CU	$ 1,000.00	$ 1,750.00	$ 2,000.00	$ 1,000.00
HYPOTEC	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
CC	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
GI	$ 1,000.00	$ 1,750.00	$ 2,000.00	$ 1,000.00
PVC CLASS 150	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
Concrete	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
PE	$ 1,000.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
Stainless Steel	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
C	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
PVC DR-18	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
PVC DR18	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
CPP	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
CPP AWWA C301	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 2,000.00
PE SDR 11	$ 1,000.00	$ 1,750.00	$ 2,000.00	$ 1,750.00

Material	<= 250mm	251- 400mm	> 400mm	Blank
HDPE SDR-11	$ 1,000.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
UNKNOWN	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00
Blank	$ 1,500.00	$ 1,750.00	$ 2,000.00	$ 1,750.00

Table B 2 Wastewater pipework Valuation Assumptions

Material	<= 250mm	251- 400mm	> 400mm	Blank
PVC	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 2,000.00
Concrete	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 1,750.00
PVC	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 1,750.00
Vitrified Clay	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 1,750.00
AC	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 1,750.00
Vit. Clay	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 1,750.00
Ductile Iron	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 1,750.00

Table B 3 Storm Water pipework Valuation Assumptions

Material	<= 250mm	251- 400mm	> 400mm	Blank
Concrete	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 2,000.00
Vitrified Clay	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 2,000.00
CSP	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 2,125.00
PVC	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 2,000.00
RCP	$ 1,750.00	$ 2,000.00	$ 2,250.00	$ 2,125.00

B-1-2 Useful Life Assumptions

Table B 4 Water Pipework Useful Life (years)

Material	<= 250mm	251- 400mm	> 400mm	Blank

Material	<= 250mm	251- 400mm	> 400mm	Blank
PVC	150	150	150	150
CI	60	80	140	60
DI	80	100	160	80
LEAD	0	0	0	0
PVC	150	150	150	150
RL	40	40	40	40
AC	150	150	150	150
CU	50	50	50	50
HYPOTEC	100	100	75	75
CC	100	100	75	75
GI	80	80	80	80
PVC CLASS 150	150	150	150	150
Concrete	100	100	75	75
PE	150	150	150	150
Stainless-steel	100	100	100	100
C	60	80	140	60
PVC DR-18	150	150	150	150
PVC DR18	150	150	150	150
CPP	100	100	75	75
CPP AWWA C301	100	100	75	75
PE SDR 11	150	150	150	150
HDPE SDR-11	150	150	150	150
UNKNOWN	100	100	75	75
Blank	100	100	75	75

Table B 5 Wastewater Pipework Useful Life (years)

Material	<= 250mm	251- 400mm	> 400mm	Blank

Material	<= 250mm	251- 400mm	> 400mm	Blank
PVC	100	100	100	100
Concrete	75	75	75	75
PVC	100	100	100	100
Vitrified Clay	50	50	50	50
AC	100	100	100	100
Vit. Clay	50	50	50	50
Ductile Iron	75	75	75	75

Table B 6 Sanitary Pipework Useful Life (years)

Material	<= 250mm	251- 400mm	> 400mm	Blank
Concrete	100	100	100	100
Vitrified Clay	50	50	50	50
CSP	50	50	50	50
PVC	125	125	125	125
RCP	125	125	125	125

B-1-3 Financial Assumptions

The following assumptions have been made to support the development of the financial strategy section.

1. Asset expansion (growth) will occur at a rate which will keep the current asset proportions of assets within the asset portfolio consistent.
2. Assume Federal and Provincial Gas Tax, donations and casino revenue will remain at a consistent level
3. The contributions of each tax stream are assumed to remain consistent level.
4. Expansion and upgrade projects and revenue contributions have been developed using the respective Service Area master plans and Development Charges study.
5. ‘Current funding’ is determined based on the projected capital expenditure provided for the year 2020.
6. Operations and Maintenance funding will be prioritized over renewal activities to ensure risks are mitigated.
7. All financial costs are based on 2020 budgets and estimates. These figures were provided by the Finance Department.
8. The City of Belleville, defines replacement cost as the total cost required to acquire, install and commission an asset. Where these are estimates are historical, they have been brought to 2020 dollars using a fixed 2% annual increased (based on an average Consumer Price Index (CPI))

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