AMP 2018

The 2018 Asset Management Plan for the

Town of East Gwillimbury

Infrastructure Overview
Town of East Gwillimbury

Asset Category	Asset Health (Condition)		Replacement Cost	Annual Funding Requirements
Road Network	Very Good	49%	$269,881,000	$5,864,000
	Good	13%		
	Fair	6%		
	Poor	8%		
	Very Poor	24%		
Structures	Very Good	37%	$26,941,000	$460,000
	Good	19%		
	Fair	16%		
	Poor	17%		
	Very Poor	11%		
Water Distribution System	Very Good	94%	$386,263,000	$4,875,000
	Good	1%		
	Fair	1%		
	Poor	1%		
	Very Poor	3%		
Sanitary Sewer Network	Very Good	95%	$181,071,000	$1,986,000
	Good	1%		
	Fair	2%		
	Poor	1%		
	Very Poor	0%		
Storm Sewer System	Very Good	91%	$341,931,000	$4,440,000
	Good	2%		
	Fair	2%		
	Poor	3%		
	Very Poor	1%		
Machinery & Equipment	Very Good	22%	$5,439,000	$723,000
	Good	38%		
	Fair	19%		
	Poor	9%		
	Very Poor	12%		
Vehicles	Very Good	20%	$8,297,000	$756,000
	Good	35%		
	Fair	16%		
	Poor	20%		
	Very Poor	8%		

Asset Category	Asset Health (Condition)		Replacement Cost	Annual Funding Requirements
Buildings & Facilities	Very Good	18%	$40,519,000	$1,412,000
	Good	28%		
	Fair	37%		
	Poor	14%		
	Very Poor	2%		
Land Improvements	Very Good	24%	$15,796,000	$681,000
	Good	28%		
	Fair	20%		
	Poor	20%		
	Very Poor	9%		

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Executive Summary

Municipal infrastructure provides the foundation for the economic, social and environmental health and growth of a community. We rely on infrastructure to facilitate the movement of goods and people, deliver clean drinking water and provide a high quality of life. Municipalities across Canada are responsible for ensuring that these vital services and critical infrastructure are accessible and reliable. Municipalities own and manage nearly 60% of all public infrastructure in the country. However, due to aging infrastructure and because of declining senior government grants, municipalities are struggling to meet desired levels of service. Developing a viable solution requires a strategic, innovative, and sustainable solution.

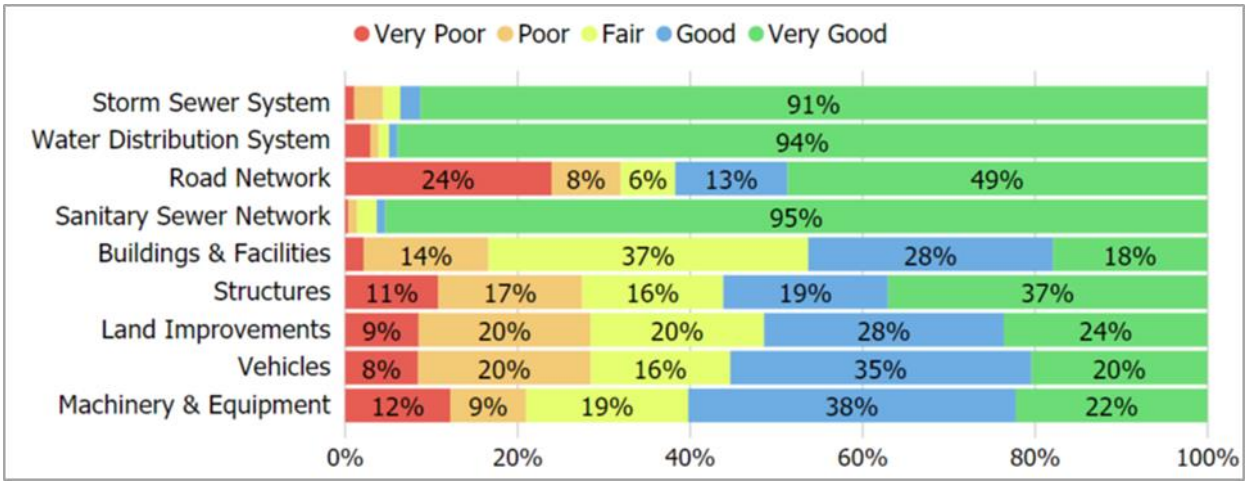
As part of Public Sector Digest's (PSD) Asset Management Roadmap the Town of East Gwillimbury committed to taking the necessary steps towards developing a systemic, sustainable and intelligently-structured asset management program. This process involved the collaboration of PSD's industry-leading asset management team with municipal staff.

This comprehensive asset management plan (AMP) serves as the culmination of all activities undertaken as part of the Roadmap. It is an indispensable guide to asset management planning and investment into the future. Asset management is critical to extracting the highest total value from public assets at the lowest lifecycle cost. This AMP outlines both the existing state of municipal infrastructure and the Town's financial capacity to sustain existing infrastructure into the future. Furthermore, it details the outcomes of each step of the Roadmap and provides recommendations for maintaining and continuing to develop the Town's asset management program.

As analyzed in this asset management plan, the Town of East Gwillimbury's infrastructure portfolio comprises the following asset categories: Road Network, Structures, Water Distribution System, Sanitary Sewer Network, Storm Sewer System, Machinery & Equipment, Vehicles, Buildings & Facilities, and Land Improvements. The replacement cost of the Town's asset portfolio is estimated to be approximately $1.28 billion as of 2017 and have a general life expectancy ranging from 3 to 75 years.

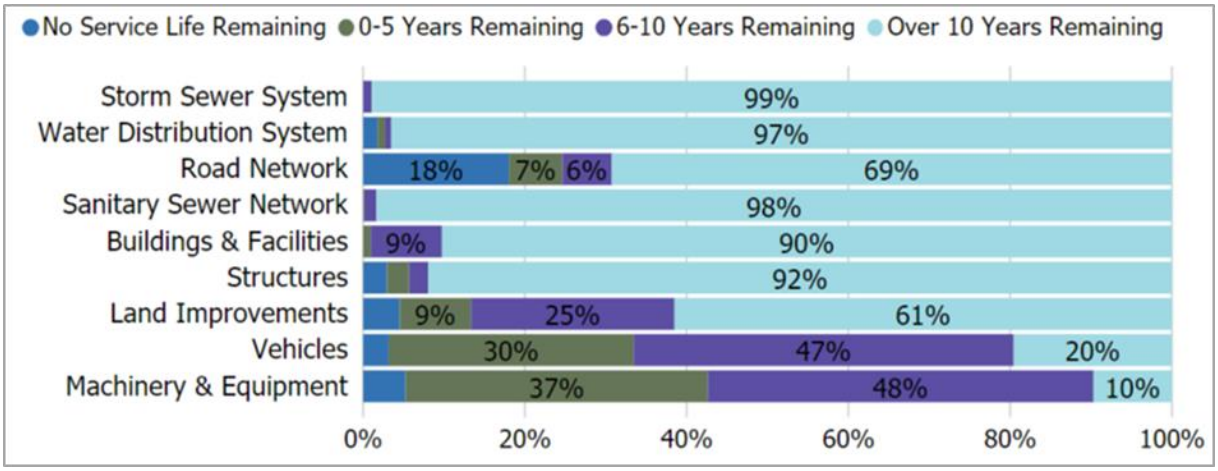
This AMP identifies capital requirements over a 10-year period (2018-2027). However, average annual capital requirements are based on whole lifecycle analysis for all assets (75+ years).

Based on a combination of assessed and age-based condition data, 84% of assets, with a valuation of $989 million, are in Very Good to Good condition, meaning that these assets are fit for the future or adequate for now. However, 11% of municipal assets are in Poor to Very Poor condition with a valuation of $134 million, meaning that these assets are unfit for sustained service or are approaching the end of their expected service life.



Current asset condition has been determined according to a combination of assessed condition data and age-based condition estimates. While municipal staff have made significant progress in collecting assessed condition data, there are still several asset categories that require assessment. To increase the confidence and accuracy of this information, the Town should strive to complete routine condition assessments across the entire asset portfolio on a regular cycle.

Asset condition directly relates to the service life remaining of existing assets and different types of infrastructure can have very different estimated useful lives. Almost 90% of the assets analyzed in this AMP, with a valuation of $1.02 billion, have at least 10 years of useful life remaining. While it is critical that the Town still plan for the assets' eventual rehabilitation and replacement, there is no immediate need to address their current state. However, 10% of all assets, with a valuation of $24 million, are within 10 years of the end of their estimated useful life and require immediate attention to determine a proper lifecycle management strategy.



In some cases, these assets may be found to be in better condition than originally thought, and simply require the adjustment of projections about their remaining service

life. In other cases, replacement or rehabilitation may be required. Municipal staff are in the process of determining appropriate asset management strategies for these high-risk assets.

For an AMP to be effective, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the municipality to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

The following table outlines annual capital funding requirements:

Funding Source	Annual Requirement
Tax-Funded Assets	$14,336,000
Rate-Funded Assets	$6,861,000
Total:	**$21,197,000**

With the release of Ontario Regulation 588/17, Ontario municipalities are responsible for implementing a wide range of asset management planning strategies and initiatives. While the Town has met many of the outlined requirements, a revised AMP, including all outstanding requirements will be required prior to July 1, 2021.

AM Program Recommendations

The following recommendations have been developed to inform the continuous refinement and development of the Town's Corporate Asset Management Program. Each recommendation has been assigned a cursory priority rating (High, Medium, or Low).

Recommendation	Priority

Develop a condition assessment program to ensure that asset management planning is based on the best available data on the current condition of existing assets.
• For this AMP, only 3% of assets had condition assessment data available
• The program should define for each asset category:
  ○ Timing/schedule for completion
  ○ Assessment criteria
  ○ Roles and responsibilities
  ○ Process to integrate condition data into asset inventory
	High

Complete a data cleansing exercise to identify inconsistencies between the Town's GIS and CityWide AM inventories:
• In the development of this AMP it was identified that there is a significant discrepancy between the Town's GIS and CityWide AM inventory for the following asset categories:
  ○ Road Network
  ○ Water Distribution System
  ○ Sanitary Sewer Network
  ○ Storm Sewer System
Town staff should identify the best source of available asset data and work towards aligning both the GIS and AM inventories
	High

Develop a process to review and update replacement costs for municipal infrastructure on a regular cycle to inform asset management planning.
• For this AMP, 92% of assets were assigned a cost/unit or defined cost that was provided by Town staff. The remaining 8% had their replacement cost determined based on the inflation of historical costs.
• This process should define:
  ○ Review/update cycle
  ○ Guidelines for assessing reliability of cost sourcing
  ○ Roles and responsibilities
  ○ Process to integrate replacement costs into asset inventory
	Medium

Collect data that measures the level of service provided by the Town across all core asset categories: • Staff and PSD have worked together to develop a basic LOS framework to measure and evaluate both Technical and Community LOS (Section 7) • Working towards July 1, 2021 the Town must collect LOS data for all core asset categories to be included in the AMP (Roads, Bridges & Culverts, Water, Sanitary, Storm) • Staff may consider re-evaluating the Technical and Community LOS metrics that have been previously selected and included in the Town's LOS framework	Medium
Identify Technical and Community levels of service metrics for non-core asset categories: • This should include Machinery & Equipment, Vehicles, Buildings & Facilities and Land Improvements • O.Reg. 588/17 provides flexibility to the Town to select the metrics that they see fitting	Medium
Evaluate lifecycle management strategies to determine the optimal combination of maintenance, rehabilitation, and replacement activities that will achieve the lowest total lifecycle costs while maintaining current levels of service: • This work has begun for many core assets as part of this AMP, and these strategies should be regularly reviewed • This work has not begun for non-core assets	Medium
Identify the projected impacts of growth on estimated capital expenditures and significant operating costs to maintain current levels of service: • O. Reg. 588/17 identifies different requirements for municipalities with a population above 25,000 based on the most recent census. Given the update to the Census expected in 2021 the Town should evaluate which legislative requirements will apply to them • Integrate O&M and growth costs into long-term financial strategy to maintain current levels of service	Medium
Establish a corporate-wide risk framework that will incorporate the tactical-level risk models already developed within this AMP: • Staff and PSD have worked together to build a framework to evaluate tactical-level asset risk for core asset categories • This process should be expanded to all asset categories and integrated into the development of a corporate-wide risk framework	Medium
Identify the staffing requirements for the implementation of the Corporate Asset Management Program and assign dedicated resources as required	High
Develop an asset management education and training program for Council, Senior & Extended Management, and staff	Medium

Develop a process for the annual review of the Town's progress in asset management, including: • The Town's progress in implementing its asset management plan • Any factors impeding the municipality's ability to implement its asset management plan • A strategy to address any impeding factors identified	Medium
Review the useful lives of assets regularly and adjust according to an evolving understanding of the estimated useful life of different asset types. • This is particularly important for assets that are consistently falling short or outlasting useful life estimates	High

1.0 Introduction & Context

1.1 What is asset management?

Canadian municipalities are responsible for managing and maintaining a broad range of infrastructure assets for the purpose of providing value and adequate services to their citizens. This includes roads and structures, to facilitate movement; water, sewer and storm sewer systems to provide clean drinking water and dispose of waste or excessive rainfall; and buildings, facilities, and parks to provide community and recreational spaces. The provision of these services requires a vast and costly network of infrastructure assets. Planning for the sustainability of these assets requires a systematic and comprehensive plan for maintaining, rehabilitating and replacing infrastructure at the lowest cost to the organization and its stakeholders.

Until recently, most public-sector organizations have taken an ad-hoc and informal approach to the management of infrastructure assets. Many organizations lacked a basic understanding of what they owned, where it was located, what it was worth and what condition it was in. As a result, there has been widespread mismanagement of municipal assets, often contributing to the rapid deterioration of critical infrastructure. Municipal asset management is comprised of a series of coordinated processes and practices designed to manage all assets effectively and sustainably.

The goal of a municipality engaged in asset management is to minimize the lifecycle costs of owning, operating, and maintaining assets, at an acceptable level of risk, while continuously delivering established levels of service for present and future customers. This encompasses the planning, design, construction, operation and maintenance of infrastructure used to provide municipal services. By implementing asset management processes, infrastructure needs can be prioritized over time, while ensuring timely investments to minimize repair and rehabilitation costs and maintain municipal assets now and into the future.

1.2 What are the benefits of asset management?

The Town of East Gwillimbury owns and manages a diverse portfolio of assets to provide residents, businesses, employees and visitors with safe access to important services, such as transportation, recreation, culture, economic development and much more. As such, it is critical that the municipality manage these assets optimally in order to produce the highest total value for taxpayers. This report will assist the municipality in the pursuit of judicious asset management of its capital assets.

Implementing the key principles and best practices of asset management can lead to a significant overhaul of organizational processes, practices and procedures. Prior to implementing these changes, an overview of the benefits of asset management is useful

to understand why this organizational change is valuable and how it will improve outcomes for all stakeholders. The following table outlines why an organization should engage in the development of a robust and sustainable asset management program.

Table 1 Benefits of Asset Management

Benefits of Asset Management	
	Good governance and increased accountability
	Data-driven decision-making
	Enhanced sustainability of infrastructure
	Improved level of service and quality of life
	Accurate forecasting of infrastructure replacement and enhancement needs
	Compliance with federal and provincial regulations

1.3 What is an asset management plan?

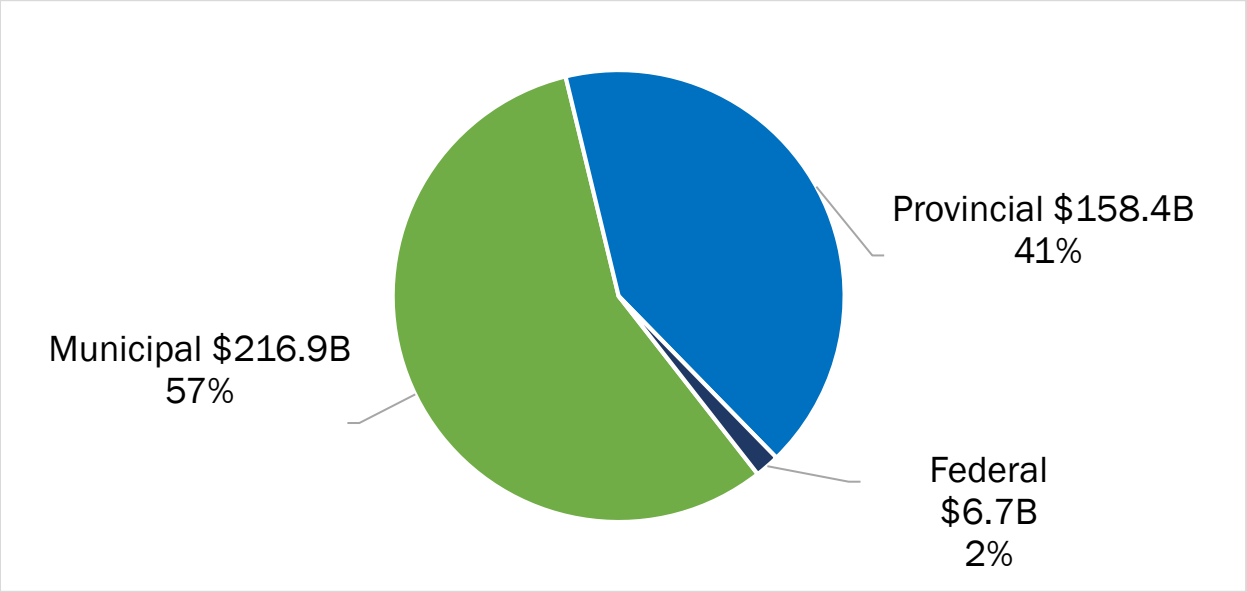
An asset management plan (AMP) is a strategic planning document that outlines key asset data and identifies the resources and funding required to meet organizational objectives. This AMP was developed to support the Town of East Gwillimbury's vision for its asset management practice and programs. It provides key asset data and information about the municipality's infrastructure portfolio, asset inventory and replacement costs. This document also includes a detailed analysis of this data to determine optimized asset management strategies, the current state of infrastructure, the municipality's capital investment framework, and financial strategies to achieve fiscal sustainability while reducing and eventually eliminating funding gaps.

The AMP is a living document that should be updated regularly as additional asset and financial data becomes available. This will allow the organization to re-evaluate the state of infrastructure and identify how the organization's asset management and financial strategies are progressing.

1.4 Infrastructure Ownership in Canada

Across Canada, the municipal share of public infrastructure increased from 22% in 1955 to nearly 60% in 2013. The federal government's share of critical infrastructure stock, including roads, water and wastewater, declined by nearly 80% in value since 1963.

Figure 1 Municipal Share of Public Infrastructure (2013)



Ontario's municipalities own and manage more infrastructure assets in the province than both the provincial and federal government combined. The municipality relies on these assets to provide residents, businesses, employees and visitors with safe access to important services, such as transportation, recreation, culture, economic development and much more. As such, it is critical that the municipality manage these assets optimally in order to produce the highest total value for taxpayers.

1.5 Ontario Regulation 588/17

Recently, the Ontario Government has moved from incentivizing proper asset management planning – through the provision of resources like the *Building Together Guide* and asset management capacity building funding – to regulating proper asset management planning. Asset management has evolved from what began as an accounting exercise via PSAB 3150 to a holistic informed approach to infrastructure management.

Recognizing the progress that has been made to date, the Ontario Government passed the Infrastructure for Jobs and Prosperity Act (IJPA) in 2015, thereby launching the process of regulating asset management planning at the local level. As with any effort to regulate, it was important to the Province to standardize planning processes while taking into consideration the differences in capacity and asset management maturity across

municipalities. Consultations with municipal stakeholders took place over the summer months of 2016, with the province collecting feedback on its proposed regulation from municipalities of all shapes and sizes.

The update to the IJPA came into force on January 1, 2017 as O. Reg. 588/17. The requirements and their proposed timelines are listed in the following table.

Table 2 O. Reg. 588/17 Requirements

	Completion Date	Requirements
Phase 1 (Core Infrastructure Assets)	July 1, 2021	1. Current Levels of Service 2. Inventory Analysis 3. Estimated Cost and Lifecycle Activities Required to Sustain Current Levels of Service 4. **Population over 25,000**: Population and Employment Forecasts and Estimated Costs to Service Growth for the Next 10 Years
Phase 2 (All Infrastructure Assets)	July 1, 2023	1. Same Requirements as Phase 1 expanded to all infrastructure assets
Phase 3	July 1, 2024	1. Proposed Levels of Service for the Next 10 Years 2. Updated Inventory Analysis 3. Lifecycle Management Strategy 4. Financial Strategy 5. Addressing Shortfalls 6. **Population Under 25,000:** Discussion of How Growth Assumptions Impacted the Lifecycle Management and Financial Strategy

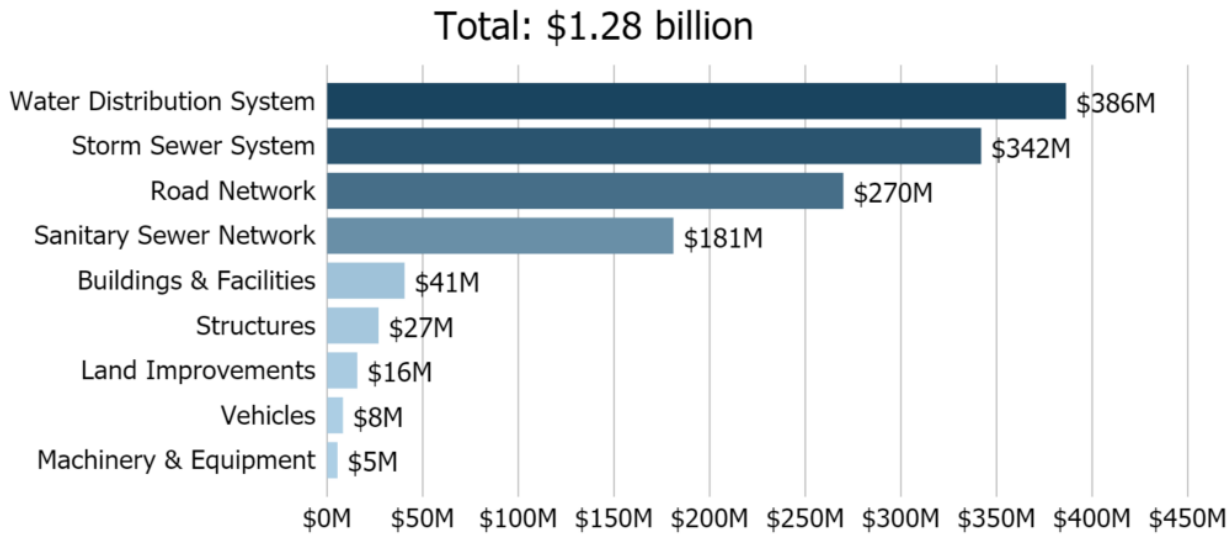
2.0 Asset Portfolio Overview

In this section, we aggregate technical and financial data across all Asset Categories analyzed in this AMP and summarize the state of the infrastructure using key asset-level and financial indicators. These indicators will provide a high-level picture of the assets that the municipality owns, historical trends in infrastructure investment and the condition and estimated useful life remaining for the municipality's assets. This data will be used as a starting point to conduct more detailed analyses on individual Asset Categories.

2.1 Asset Valuation – All Asset Categories

The asset categories analyzed in this AMP for the municipality had a total asset valuation of $1.28 billion as of the end of 2017.

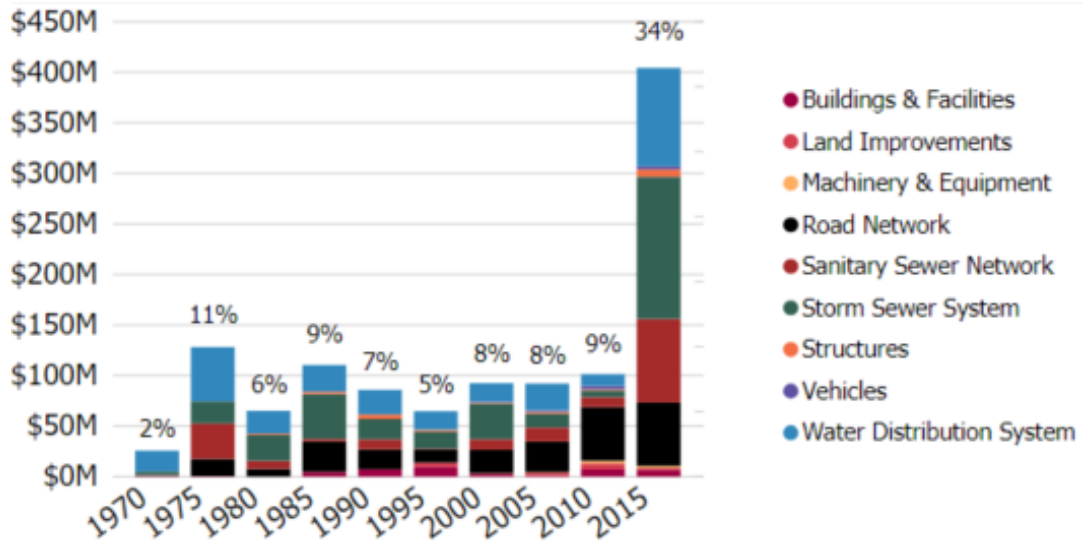
Figure 2 Asset Replacement Value - All Asset Categories



2.2 Installation Profile

Using 2018 replacement costs, **Figure 3** illustrates the installation profile for the asset categories analyzed in this AMP according to their acquisition date.

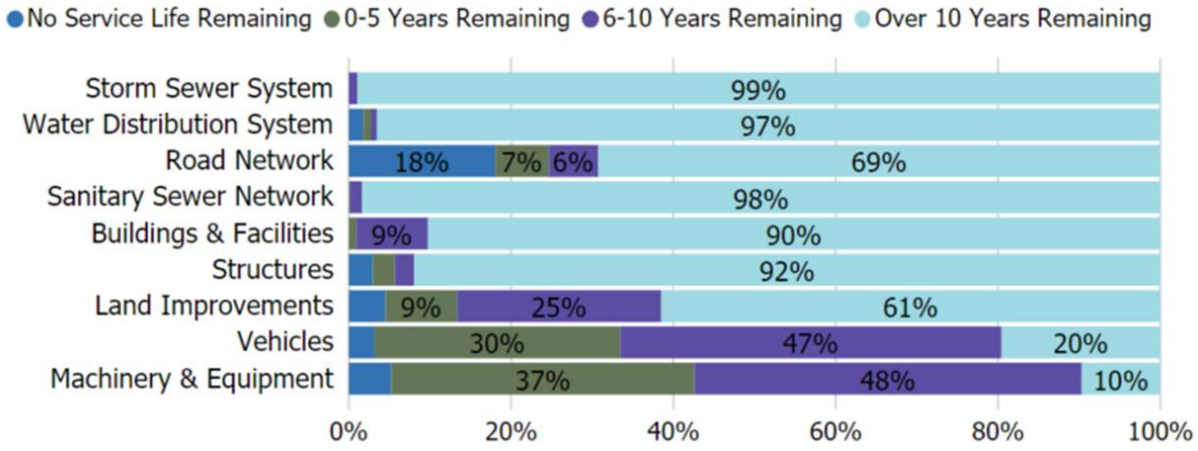
Figure 3 Installation Profile - All Asset Categories



2.3 Remaining Service Life

While age is not a precise indicator of an asset's health, in the absence of assessed condition assessment data, it can serve as a high-level, meaningful approximation and help guide replacement needs and facilitate strategic budgeting.

Figure 4 Remaining Service Life - All Asset Categories



NOTE: Vehicles and Machinery & Equipment typically have a much shorter estimated useful life (i.e. 5-25 Years) compared to other asset categories.

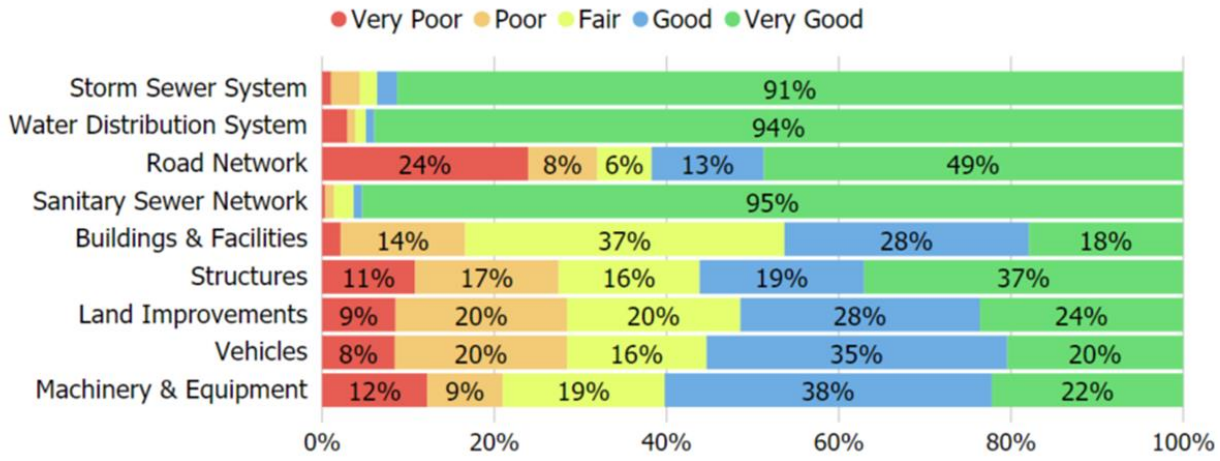
2.4 Overall Asset Condition

Based on primarily age-based condition estimates (see Table 3), 84% of assets, with a valuation of $989 million, are in Very Good to Good condition, meaning that these assets are fit for the future or adequate for now.

However, 11% of municipal assets are in Poor to Very Poor condition with a valuation of $134 million, meaning that these assets are unfit for sustained service or are approaching the end of their expected service life.

The following figure identifies the relative condition of assets within each asset category.

Figure 5 Asset Condition – All Asset Categories



3.0 Financial Overview

3.1 Annual Capital Requirements

The annual capital requirement represents the amount the municipality should allocate annually to each of its asset categories to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability.

This AMP compares two separate lifecycle strategies:

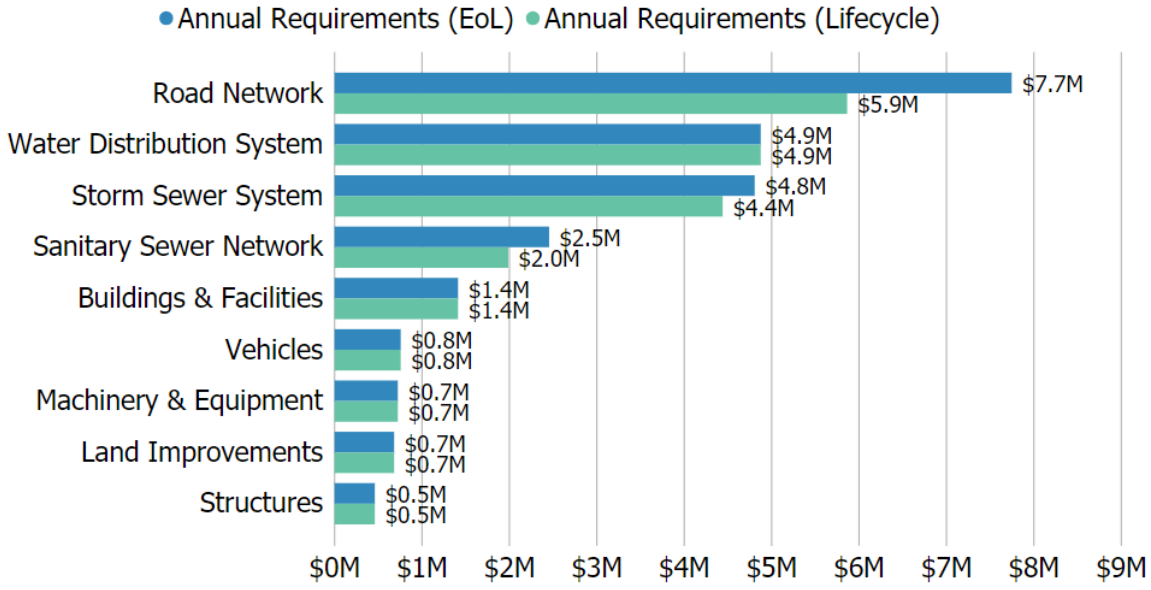
1. **End of Life Replacement Scenario:** Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.

2. **Lifecycle Strategy Scenario:** Based on the assumption that lifecycle activities are performed at the optimal time to extend the estimated useful life of assets at the lowest cost; assets are replaced at the end of the extended estimated useful life.

Under these two scenarios the annual capital requirements that the Town must allocate to address capital needs totals:

1. End of Life Replacement Scenario: **$23.9 million**
2. Lifecycle Strategy Scenario: **$21.2 million**[1]

Figure 6 Annual Capital Requirements by Asset Category



[1] Only Roads, Sanitary Mains and Storm Mains have lifecycle strategies defined in this AMP. Once determined for other assets, further cost efficiencies can be determined.

3.2 Asset Replacement Requirements

Figure 7 identifies the long-term capital requirements (50 Years).

Figure 7 Long-term Capital Requirements (50 Years)

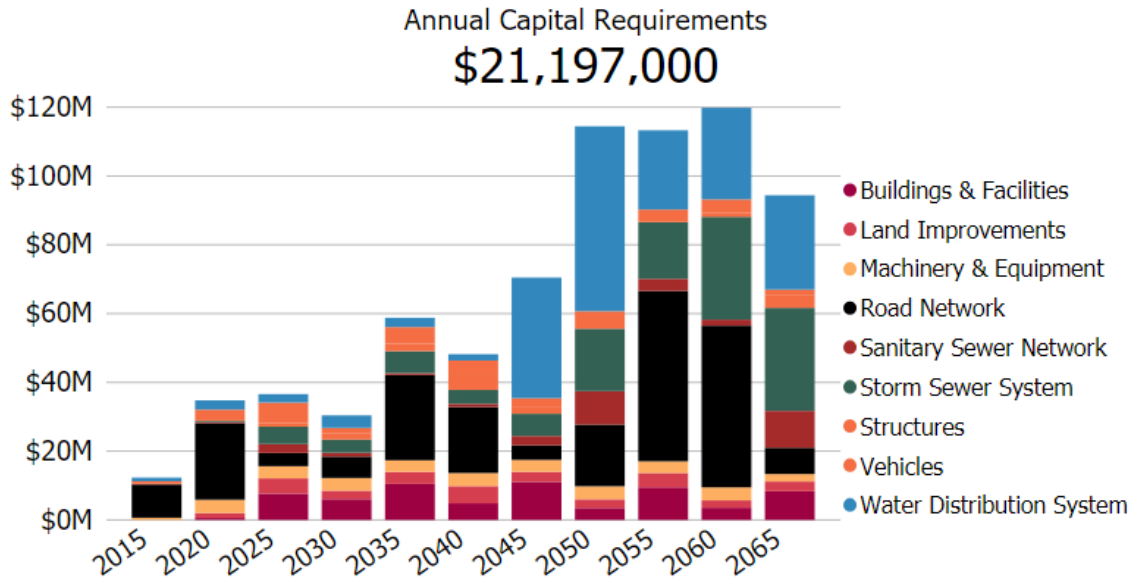
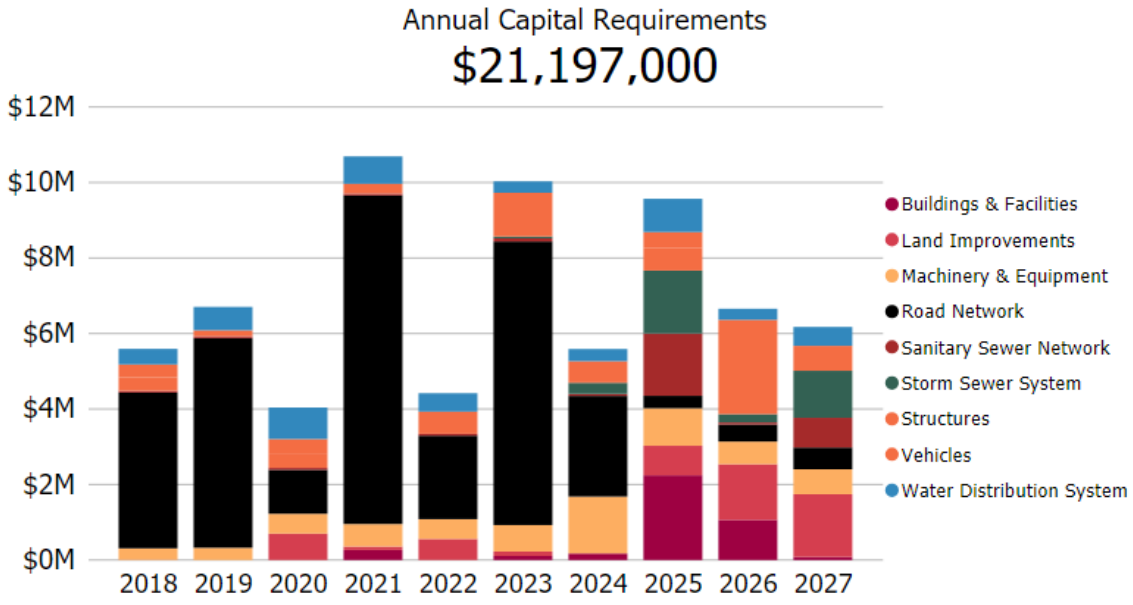


Figure 8 identifies the short-term capital requirements (10 years).

Figure 8 Short-Term Capital Requirements (10 Years)



Appendix A includes the capital requirements for the next 10 years to maintain the Town's current level of service and meet all rehabilitation and replacement requirements.

4.0 Data and Methodology

4.1 Condition Data

Assets deteriorate in condition over time. Municipalities generally implement a straight-line amortization approach to model the deterioration of their capital assets and use age-based data to estimate an asset's remaining useful life. However, this approach is often a poor representation of an asset's actual condition and rate of deterioration. In the absence of condition data and customized deterioration curves, age-based estimates can be a useful approximation of when future field intervention activities and investment is required.

As available, actual field condition data was used to make recommendations more meaningful and representative of the municipality's state of infrastructure. The value of condition data cannot be overstated as it provides a more accurate representation of the state of infrastructure than does age alone.

As part of PSD's Roadmap, the Town was encouraged to collect condition data for as many assets as possible. Town staff were provided with condition assessment guidelines to ensure the consistent and uniform collection of data in addition to data gathering templates to store all assessed data for upload to the main asset inventory.

4.1.1 Source of Condition Data by Asset Category

Table 3 provides an overview of the source of condition data used in the development of this AMP. In total, 3%[2] of the Town's assets have had condition assessments completed, documented and stored for the purposes of this AMP.

Table 3 Source of Condition Data – All Asset Categories

Asset Category	Source of Condition Data	Year(s) of Assessment Data
Buildings & Facilities	78% Assessed	2017
Vehicles	16% Assessed	2017
Land Improvements	7% Assessed	2017
Machinery & Equipment	6% Assessed	2017
Road Network	Age-based	n/a
Structures	Age-based	n/a
Water Distribution System	Age-based	n/a
Sanitary Sewer Network	Age-based	n/a
Storm Sewer System	Age-based	n/a

[2] This value is weighted by replacement cost. The total replacement cost of assets with assessed condition values is $34,031,854.

4.2 Asset Attribute Data

While asset condition data is perhaps the most important piece of data to collect, additional asset data is required to support asset management strategy development and decision-making. Asset attribute data provides greater context and clarity to the state of an asset and allows for the development of robust risk and lifecycle management strategies to prioritize projects and ultimately extend the life of assets.

Table 4 lists the asset attributes that PSD recommends collecting for core Asset Categories and the percentage of data available in the CityWide database for each attribute. This only includes core linear asset categories.

Table 4 Asset Attribute Data – Core Asset Categories

Asset Category	Asset Attribute	% Completion in Asset Inventory
Road Network (Paved Roads)	Surface Width (m)	100%
	Length (m)	100%
	Road Class	100%
	Surface Material	100%
	Design Class	100%
Water Distribution System (Water Mains)	Length (m)	100%
	Pipe Diameter (mm)	100%
	Material	100%
Sanitary Sewer Network (Sanitary Mains)	Length (m)	100%
	Material	100%
	Pipe Diameter (mm)	100%
Storm Sewer System (Storm Mains)	Length (m)	100%
	Pipe Diameter (mm)	100%
	Material	100%

4.3 Financial Data

In this AMP, the average annual requirement is the amount, based on current replacement costs, that the Town should set aside annually so that assets can be replaced upon reaching the end of their lifecycle.

Most municipalities face significant infrastructure backlogs. The infrastructure backlog is the accrued financial investment needed in the short-term to bring the assets to a state of good repair.

4.3.1 Replacement Costs

Developing an asset investment strategy requires an estimation of the cost to replace assets that have reached the end of their service life. The replacement cost considers the replacement of an asset with a similar, but not necessarily identical, asset available in the current marketplace.

There are a range of methods to determine asset replacement costs – some more accurate and reliable than others.

- **Cost/Unit** – Cost is based on replacement cost/unit provided by the municipality
- **User-Defined Cost** – Cost is based on replacement costs provided by the municipality
- **Historical Cost Inflation** – Historical cost is inflated based on Consumer Price Index tables

Replacement costs based on cost/unit values or user-defined costs from reliable sources are considered to be more accurate and relaible than historical cost inflation.

4.3.2 Source of Replacement Cost by Asset Category

Table 5 provides an overview of the source of replacement costs for major components within each asset category.

Table 5 Source of Replacement Cost - All Asset Categories

Asset Category	Asset Segment	Replacement Cost Method	Replacement Cost Source
Road Network	Paved Roads	Cost/Unit	Average of recent contracts (2015-2017)
Structures	All	User-Defined Cost	2017 OSIM Inspection Report
Water Distribution System	Water Mains, Hydrants, Valves, Junctions, Chambers	Cost/Unit	Average of recent contracts (2015-2017)
Sanitary Sewer Network	Mains, Manholes, Siphons	Cost/Unit	Average of recent contracts (2015-2017)
Storm Sewer System	Storm Sewer Mains, Catchbasins, Culverts, Headwall, Management Facilities, Manholes	Cost/Unit	Average of recent contracts (2015-2017)
Machinery & Equipment	All	Historical Cost Inflation	Historical Cost & Consumer Price Index
Vehicles	All	Historical Cost Inflation	Historical Cost & Consumer Price Index
Buildings & Facilities	All	Historical Cost Inflation	Historical Cost & Non-Residential Building Construction Price Index

4.4 Limitations and Assumptions

This section identifies the limitations of the analysis in this AMP and the assumptions that have been made throughout the document.

Asset Inventory Data

- This AMP is based on best available data and information provided by Town staff. The accuracy and reliability of asset inventory data is dependent on current data management processes.
- Without adequate data management processes in place, an asset inventory may become less accurate and reliable over time. Regular data cleansing and validation activities are required to ensure that the Town's inventory is an accurate reflection of all capital assets owned.

Asset Condition

- As available, we use assessed condition data to illustrate the current state of infrastructure and develop the requisite financial strategies. However, in the absence of assessed condition data, we rely on the age of assets and their estimated useful life to estimate their physical condition. Age-based estimates of asset condition are considered less reliable than visual and/or technical assessments.

Replacement Costs

- Asset replacement costs have been determined based on the best available source of data. Ideally, replacement costs should be based on recently completed contracts or the estimation of individuals with technical expertise. If this data is not available this AMP inflates the historical cost of assets to today's value. This method is only as reliable as the original cost estimates and the accuracy of cost inflation measures available for use.

Estimated Useful Lives

- The estimated useful life (EUL) of an asset is used to determine when it will require renewal and/or replacement. The EULs in this AMP have been assigned according to a combination of established industry standards and staff knowledge of asset lifecycles.

Lifecycle Costs

- The focus of this plan is restricted to capital expenditures and does not capture operations and maintenance (O&M) expenditures on infrastructure. O&M costs often represent a significant portion of the lifecycle costs of infrastructure and should be factored into procurement practices and long-term planning.

5.0 State of Local Infrastructure

5.1 Introduction

The State of Local Infrastructure provides a summary of East Gwillimbury's asset portfolio in 2017. This overview is divided into the following sections within each asset category:

Asset Inventory & Replacement Cost

The asset inventory contains a comprehensive list of all capital assets, which are organized by **Category** and **Segment**.

Categories include groups of assets that provide similar services to the community (E.g. Road Network, Water Distribution System, Machinery & Equipment)

Segments are divided into groups of assets that perform similar functions within each Category (e.g. Hydrants, Standpipes, Water Connections, Water Mains).

Developing an asset investment strategy requires an estimation of the cost to replace assets that have reached the end of their service life. The replacement cost considers replacement of the modern equivalent asset with similar (but not necessarily identical) assets which are available for procurement.

The asset inventory listing in each Category includes the following details for each Segment:

1. **Quantity –** unit of measure (kilometres, metres, units etc.)

2. **Replacement Cost Method** – describes how the replacement cost was determined using one of the following methods:
    a. Cost/Unit – Cost is based on replacement cost/unit provided by the municipality
    b. User-Defined Cost – Cost is based on replacement costs provided by the municipality
    c. CPI Tables – Historical cost of assets is inflated based on the Consumer Price Index or the Non-residential Building Construction Price Index

3. **Replacement Cost** – the total estimated cost to replace the asset

Current Asset Condition

As available, actual field condition data has been used to make recommendations more meaningful and representative of the Town's current state of infrastructure. The value of this condition data cannot be overstated as it provides a more accurate representation of the state of infrastructure than does age alone.

This section identifies whether each segment's condition data is based on assessed condition or age-based estimates of condition. It also identifies each segment's average condition rating and the percentage of service life remaining.

This AMP uses the following rating scale to determine asset condition, developed as part of the Canadian Infrastructure Report Card.

Table 6 Canadian Infrastructure Report Card - Rating Scale for Asset Condition

Condition Rating	% of Service Life Remaining	Criteria
Very Good	**80-100%**	Well maintained, good condition, new or recently rehabilitated
Good	**60-80%**	Acceptable, generally approaching mid-stage of expected service life
Fair	**40-60%**	Signs of deterioration, some elements exhibit significant deficiencies
Poor	**20-40%**	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration
Very Poor	**<20%**	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable

Assets that have not had condition assessments completed according to a documented condition rating criterion have their condition estimated based on their age and estimated useful life. Age-based condition estimates rely on the percentage of service life remaining as a proxy to determine current condition.

Estimated Useful Life & Average Age

Once an asset begins its service life it is generally expected that it will deteriorate over time and eventually require replacement. To plan for future asset replacement a municipality must identify, to the best of their ability, when replacement will be required. To estimate asset replacement requirements each asset is assigned an Estimated Useful Life. This value quantifies the period over which the municipality expects the asset to be available for use and remain in-service before requiring replacement or disposal. The determination of the useful life of an asset requires an element of judgment and needs appropriately qualified personnel to make the assessment.

Each asset is assigned an Estimated Useful Life according to the length of time that an asset is expected to remain in-service before requiring full replacement. This section identifies the Estimated Useful Life for each Segment in addition to the average age of assets that are currently in-service.

This section also includes the average age of assets by Segment. This data is based on the In-Service Dates provided for each asset in the Town's asset inventory.

The collection of assessed condition data can further augment the expected Service Life Remaining. Once condition is assessed it is often found that an asset may last longer, or perhaps shorter than originally estimated. This assessed condition data can either extend or decrease the Service Life Remaining for a given asset.

Risk & Criticality

With a limited amount of capital funding available to municipalities, staff must regularly make decisions about which lifecycle activities are required and which can be deferred at the lowest risk to the organization.

Ensuring that capital spending is allocated to the assets and projects with the highest risk of failure requires the development of a risk model that provides a quantitative risk rating for each asset.

For the purposes of this analysis:

$$Risk = Probability\ of\ Failure(PoF) \times Consequence\ of\ Failure(CoF)$$

This section identifies the data that has been used to determine the risk rating that has been assessed for each asset.

The risk matrix included in this section provides a visual representation of the level of risk in each asset category. Individual assets are grouped based on both their Consequence of Failure (1-5) and Probability of Failure (1-5). The assets located closer to the bottom-left of the matrix (green boxes) are less likely to fail and have lesser consequences for the municipality if they do fail. The assets located closer to the top-right of the matrix (red boxes) are at the greatest risk of failure and will have far greater consequences for the municipality if they do.

It should be noticed that there is a difference between corporate-level risk management process and asset-level risk management processes. **Section 6.5.2** explains this in greater detail.

Lifecycle Management

In this section, the lifecycle management strategy for each asset category has been identified. This details the municipality's approach to the maintenance, rehabilitation and replacement of existing infrastructure.

This can include both asset specific strategies where detailed lifecycle strategies are defined for an entire asset type, or more general strategies for the management of the entire category of assets.

Forecasted Capital Requirements

In this section, we illustrate the short, medium, and long-term infrastructure spending requirements for the Town's infrastructure.

For the asset categories which do not yet have lifecycle strategies developed, this graph will only include the cost of end-of-life replacement events. It is presumed that these assets will simply be replaced once they reach the end of their estimated useful life.

The asset categories that include assets with lifecycle management strategies will include the cost of capital rehabilitation events in addition to the cost of end-of-life replacement events.

The year-range of each graph is adjusted to include at least one full lifecycle of all assets within the asset category.

Appendix A includes the lifecycle activities that would need to be undertaken for each of the next ten years to maintain the current level of service. However, these tables do not include medium- and long-term capital requirements to replace infrastructure that will require attention beyond this ten-year period.

5.1 Road Network

5.1.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Road Network inventory. Unpaved Roads have been included as they comprise a notable portion of the Town's road network. However, the lifecycle management strategies for these assets consist of perpetual maintenance activities and do not require capital costs for rehabilitation activities or end-of-life replacement. These operational costs will not be considered in the financial strategy for this AMP.

All replacement costs/unit have been determined based on average costs incurred as part of recent engineering contracts. The asset quantities that are marked with an asterisk (*) have been updated to reflect the most reliable data available to the Town (GIS), but it does not reflect the data that is currently in the CityWide AM database.

Table 7 Asset Inventory - Road Network

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Curb And Gutter	22,495 metres	Cost included in road surface	n/a
Guide Rails	4,380 metres*	Cost/Unit	$1,313,836
Illuminations	3,079 units*	CPI Tables	$2,492,683
Poles	2,251 units*	CPI Tables	$3,553,471
Roadside Ditching	113,520 metres	CPI Tables	$4,613,992
Sidewalks	97,874 metres*	CPI Tables	$10,740,402
Paved Roads	1,260,567 m^2	Cost/Unit	$186,563,954
Surface Treated Roads	409,474 m^2	Cost/Unit	$60,602,250
Unpaved Roads	14,419 m^2	n/a	n/a
		Total:	**$269,880,588**

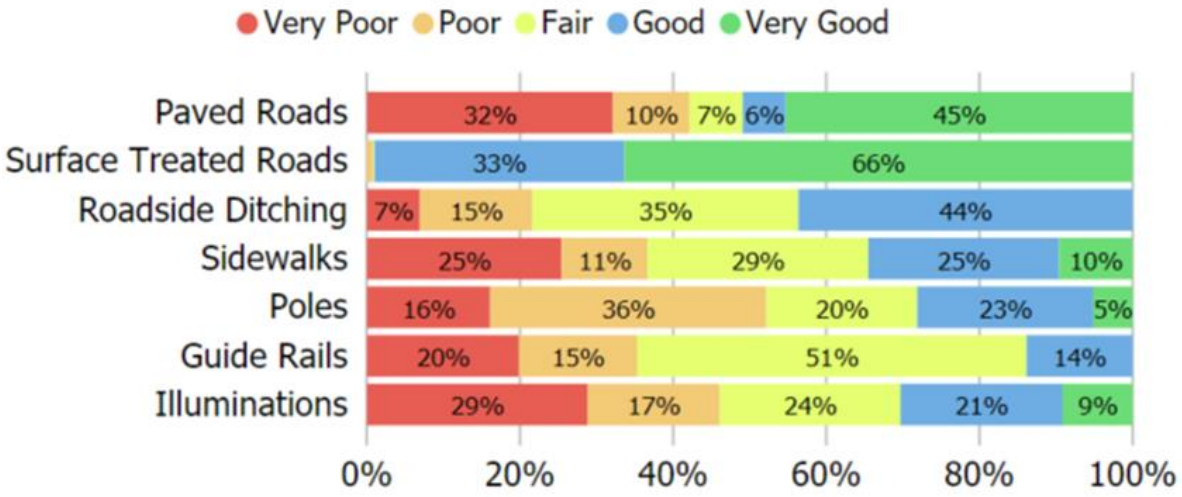
5.1.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 8 Current Asset Condition - Road Network

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Guide Rails	Age-based	Fair	40%
Illuminations	Age-based	Fair	45%
Poles	Age-based	Fair	43%
Roadside Ditching	Age-based	Fair	54%
Sidewalks	Age-based	Fair	46%
Paved Roads	Age-based	Fair	56%
Surface Treated Roads	Age-based	Very Good	83%
	Overall:	**Good**	**62%**

Figure 9 Current Asset Condition - Road Network



To ensure that the Town's Road Network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Road Network.

5.1.3 Estimated Useful Life & Average Age

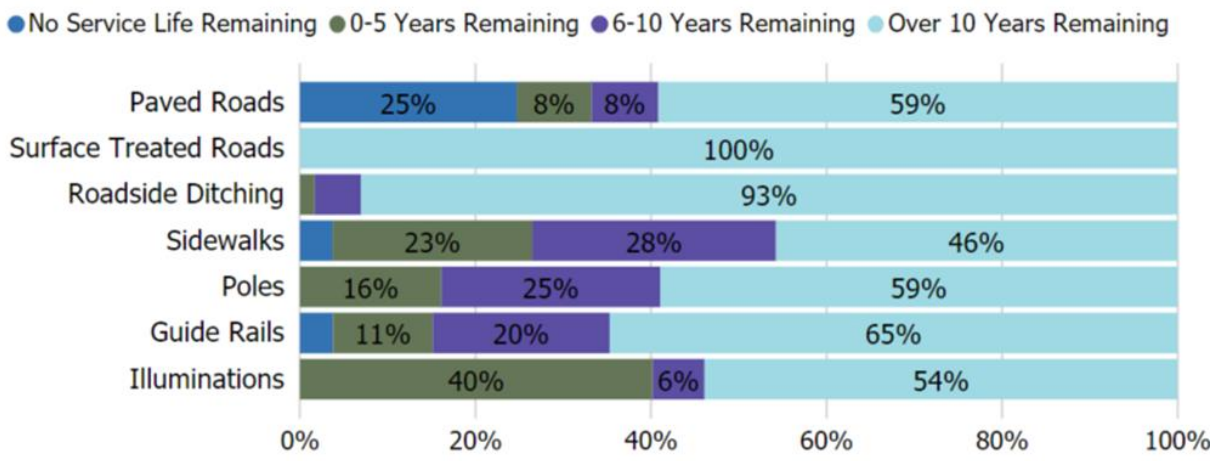
The estimated useful life for Road Network assets has been assigned according to a combination of established industry standards and staff knowledge.

Table 9 Service Life Remaining - Road Network

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Guide Rails	30 Years	7 Years 9 Months
Illuminations	20 Years	6 Years 10 Months
Poles	25-40 Years	12 Years 5 Months
Roadside Ditching	50 Years	22 Years 2 Months
Sidewalks	20 Years	8 Years 3 Months
Paved Roads	30 Years	14 Years 9 Months
Surface Treated Roads	50 Years	39 Years 9 Months

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 10 Service Life Remaining - Road Network

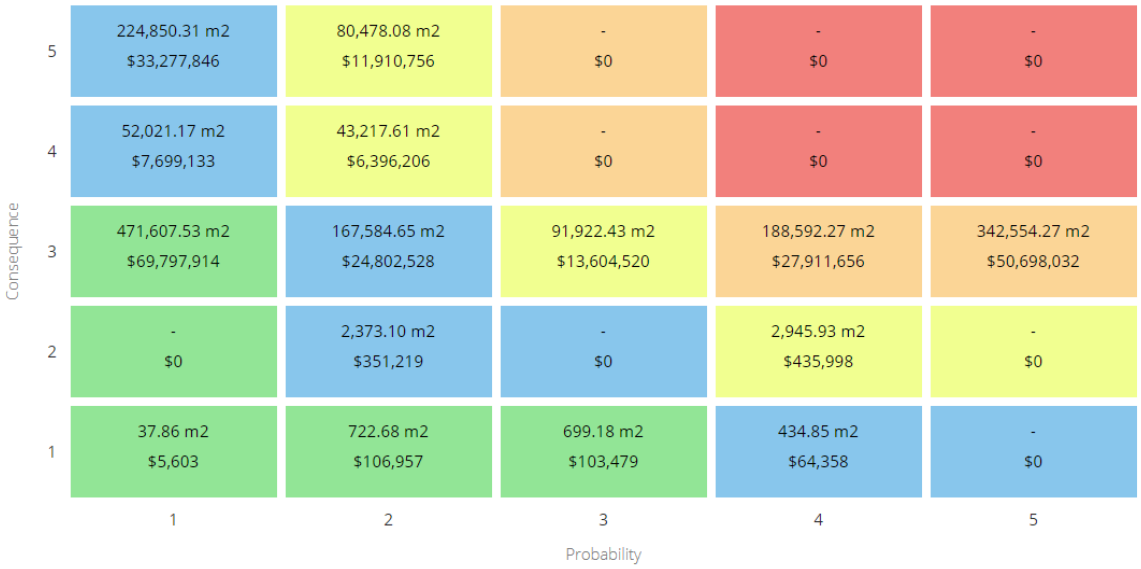


5.1.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 11 Risk Matrix - Road Network



5.1.5 Lifecycle Management

Paved Roads

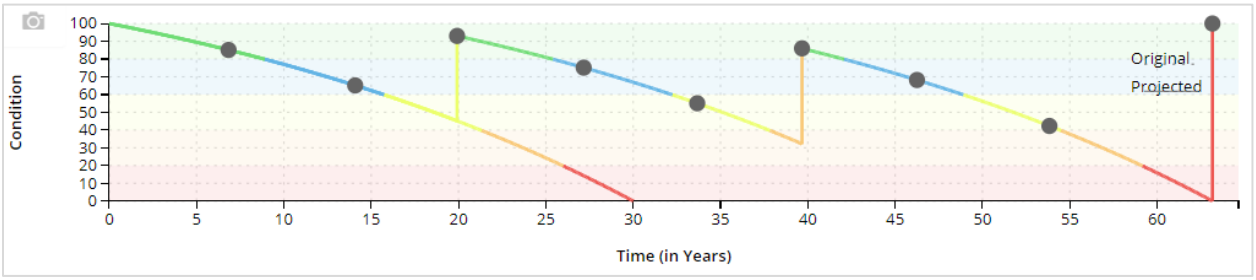
The Town's road network consists primarily of asphalt paved roads. These are often referred to as high class bituminous (HCB) roads.

As paved roads represent a significant portion of the Town's overall asset portfolio, lifecycle management strategies have been developed with the goal of lifecycle cost optimization in mind. By intervening at the right time in a paved road's life and completing maintenance and rehabilitation activities, staff believe that they can extend the life of these assets and achieve the lowest total cost of ownership. The following strategies have been developed and applied to paved road surfaces.

Table 10 Paved HCB Roads – Lifecycle Strategy

Event Name	Event Type	Age at Event
Crack Sealing	Maintenance	7 Years
Crack Sealing	Maintenance	14 Years
Mill & Resurface - Single Lift	Rehabilitation	20 Years
Crack Sealing	Maintenance	27 Years
Crack Sealing	Maintenance	33 Years
Mill & Resurface - Double Lift	Rehabilitation	40 Years
Crack Sealing	Maintenance	46 Years
Crack Sealing	Maintenance	53 Years
Road Reconstruction	Replacement	65 Years

Figure 12 Paved HCB Roads – Lifecycle Strategy



Surface Treated Roads

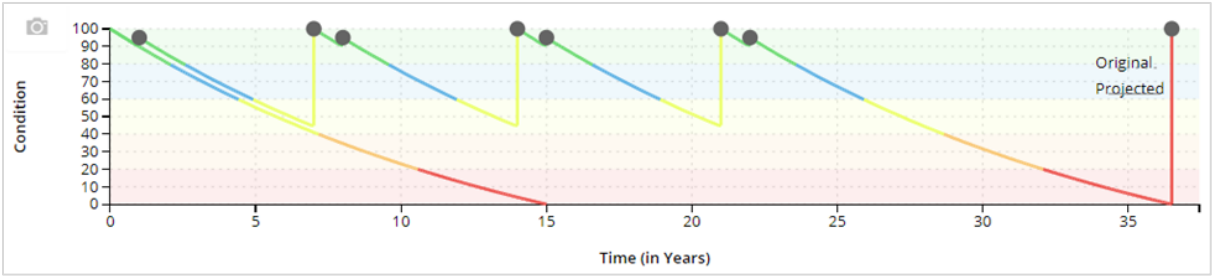
In addition to paved roads, the Town also owns and maintains a significant segment of surface treated, or low-class bituminous (LCB), roads.

These roads require a different approach to maintenance, rehabilitation and replacement. The following lifecycle management strategies have been developed and applied to surface treated road surfaces.

Table 11 Surface Treated LCB Roads - Lifecycle Strategy

Event Name	Event Type	Age at Event
Slurry Seal	Maintenance	1 Year
Double Surface Treatment	Rehabilitation	7 Years
Slurry Seal	Maintenance	8 Years
Double Surface Treatment	Rehabilitation	14 Years
Slurry Seal	Maintenance	15 Years
Double Surface Treatment	Rehabilitation	21 Years
Slurry Seal	Maintenance	22 Years
Road Reconstruction	Rehabilitation	36 Years

Table 12 Surface Treated LCB Roads - Lifecycle Strategy

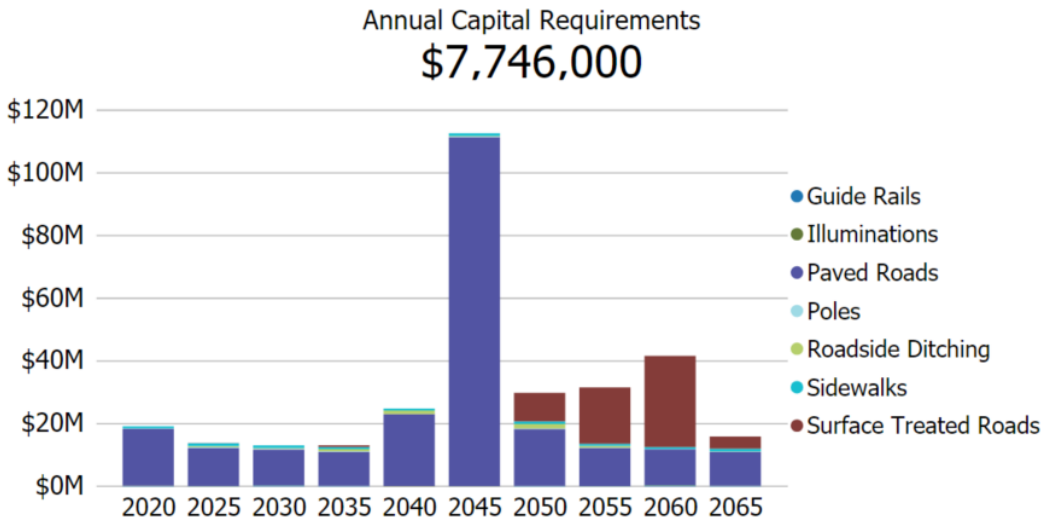


As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.1.6 Forecasted Capital Requirements

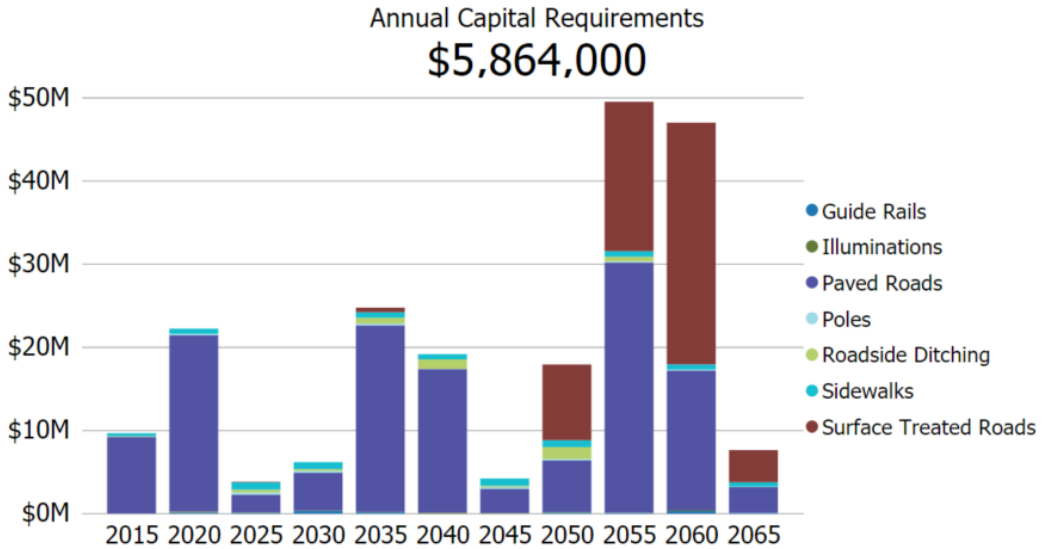
With the development of lifecycle management strategies for paved and surface treated roads there are two scenarios that can be used to determine forecasted capital requirements. The first scenario assumes that all assets are simply replaced at the end of their service life without any major maintenance or rehabilitation programs. These costs are forecasted in the following graph.

Figure 13 Forecasted Capital Requirements - Road Network (End-of-Life Replacement)



The second scenario is based on the lifecycle management strategies developed in the previous section. The following graph forecasts capital requirements, including both the cost of rehabilitation and replacement events for the Town's Road Network. This strategy was designed to extend the service life of roads at a lower annual cost.

Figure 14 Forecasted Capital Requirements - Road Network (Lifecycle Management Strategy)



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.1.7 Recommendations

1. The primary consideration of Town staff should be the review and validation of asset data. In the development of this AMP it was identified that there is a significant discrepancy between the Town's GIS and AM inventories which includes: sidewalks, poles, illuminations, guide rails. In the short-term, the replacement costs used in this AMP have been adjusted to reflect the updated quantities provided from the Town's GIS. In the long-term, staff should work towards aligning both the GIS and AM inventories.

2. The Town's AM inventory does not include assessed condition data for paved roads. To ensure that AM planning is based on the best available data staff should determine a strategy to collect and upload this data to the AM inventory or leverage the existing Pavement Management System for this purpose during the development of future AMPs.

3. Current levels of service should be measured according to the technical and community levels of service metrics established by the Town in Section **7.2** and **7.3**

5.2 Structures

5.2.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Structures inventory. All replacement costs have been determined based on the results of the Town's most recent OSIM inspection.

Table 13 Asset Inventory - Structures

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	16 units	User-Defined Cost	$15,428,360
Culverts	16 units	User-Defined Cost	$9,700,409
Pedestrian Bridges	9 units	User-Defined Cost	$1,812,198
		Total:	**$26,940,967**

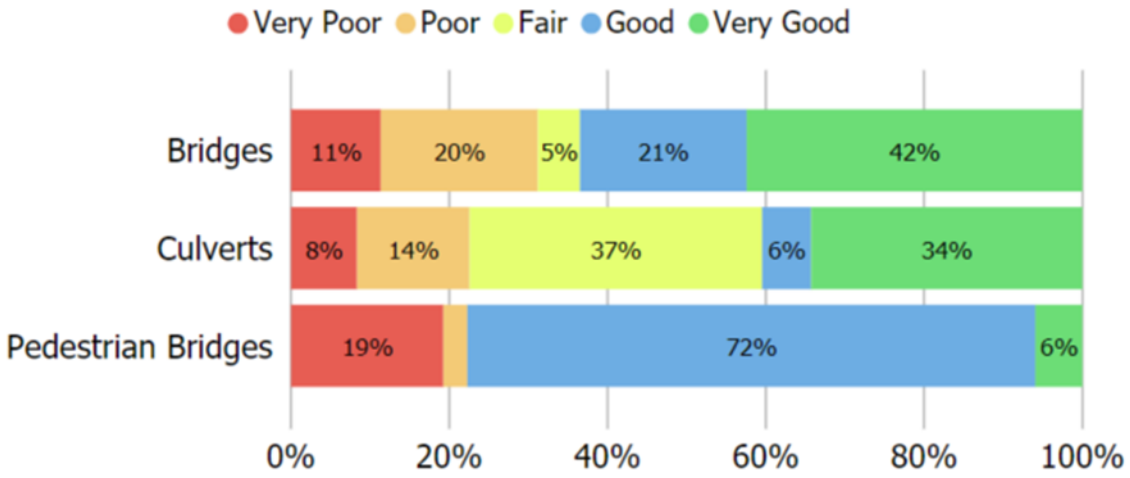
5.2.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 14 Current Asset Condition - Structures

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Bridges	Age-based	Good	66%
Culverts	Age-based	Fair	58%
Pedestrian Bridges	Age-based	Fair	55%
	Overall:	**Good**	**62%**

Figure 15 Current Asset Condition - Structures



To ensure that the Town's Structures continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Structures.

5.2.3 Estimated Useful Life & Average Asset Age

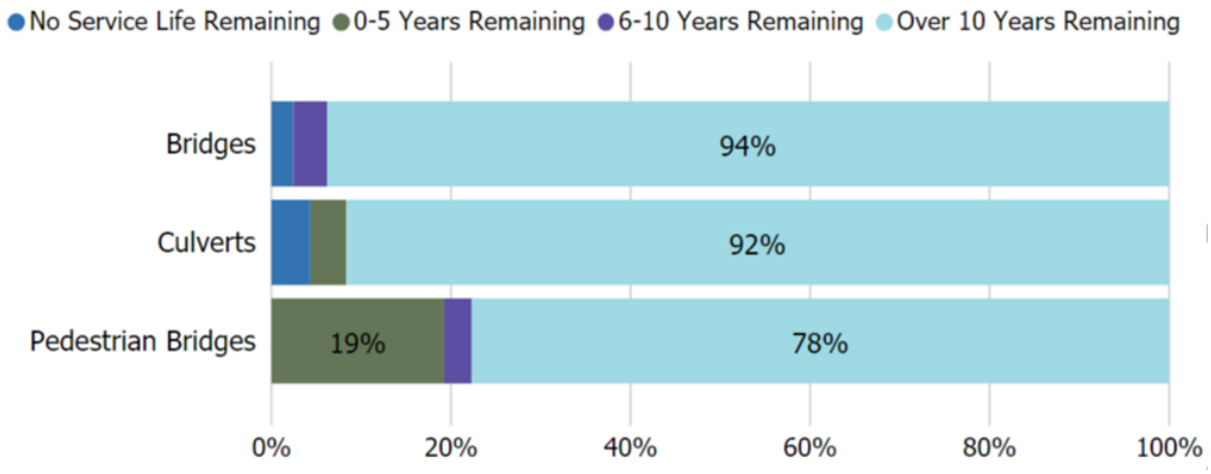
The estimated useful life for Structures has been assigned according to a combination of established industry standards and staff knowledge.

Table 15 Service Life Remaining - Structures

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Bridges	75 Years	40 Years 2 Months
Culverts	50 Years	27 Years 2 Months
Pedestrian Bridges	30 Years	16 Years 3 Months

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 16 Service Life Remaining - Structures

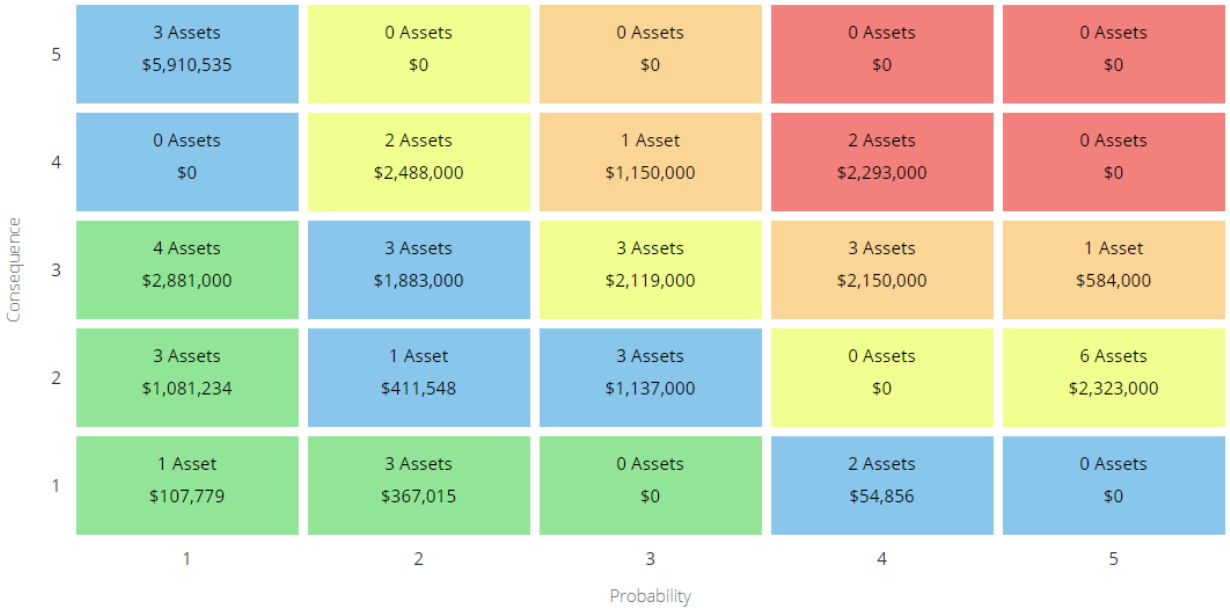


5.2.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 17 Risk Matrix - Structures



Critical Assets

The following table identifies any assets that have been classified as "Very High" risk. This is not meant to be a definitive list of how the Town should prioritize assets for rehabilitation and replacement. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g., no assessed condition data).

Asset Segment	Name	Replacement Cost	Risk Rating
Bridges	East Townline Bridge (0.9km south of Holborn Rd.)	$1,166,000	16 – Very High
Bridges	East Townline Bridge (0.8km north of Holborn Rd.)	$1,127,000	16 – Very High

5.2.5 Lifecycle Management

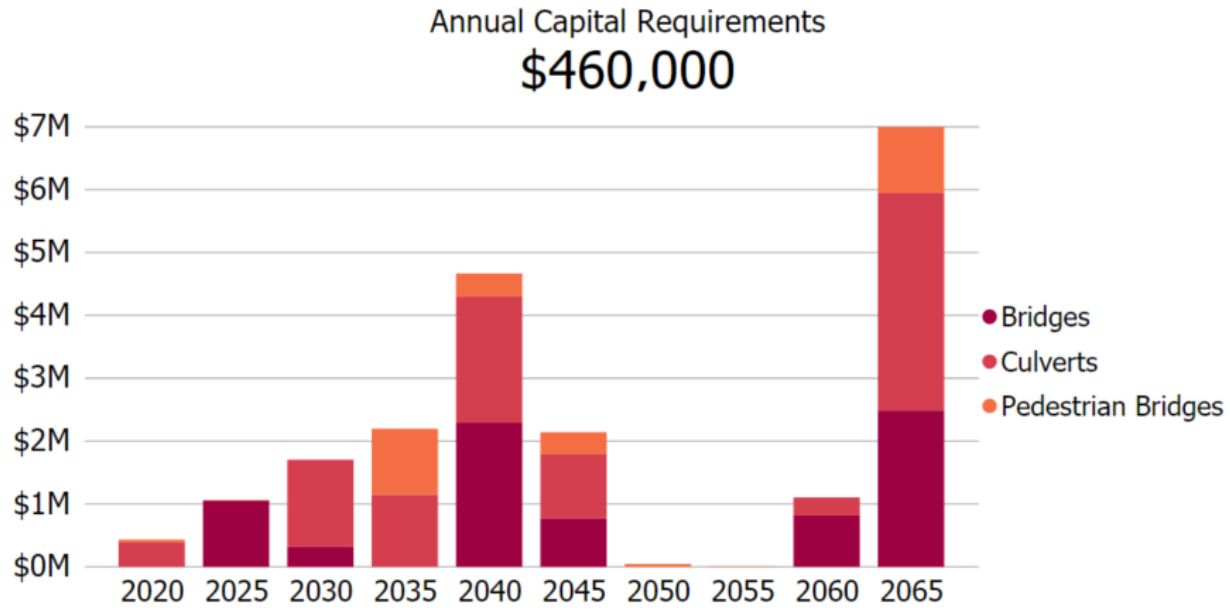
In Ontario, the Ontario Structure Inspection Manual (OSIM) dictates how regularly municipal bridges and culverts with a span of over 3 metres should be inspected. Every 2 years municipalities are required to have a licensed structure inspector perform a detailed inspection of each structure that meets the criteria. Upon the completion of this biennial inspection the municipality is provided with a report detailing the current condition of each structure and the lifecycle activities required to maintain, rehabilitate or even replace when necessary.

Town staff rely on the findings in this report to identify required lifecycle activities over short- and long-term timeframes. These inspections will continue, and staff will endeavour to carry out all recommended lifecycle activities according to the inspection report provided.

5.2.6 Forecasted Capital Requirements

The following bar chart forecasts the capital replacement requirements for the Town's Structures.

Figure 18 Forecasted Capital Requirements - Structures



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.2.7 Recommendations

1. The Town should review the most recent OSIM Bridge Report and upload assessed condition data into the asset inventory to inform asset management planning. This process should be repeated every 2 years.

2. This AMP only accounts for the cost of replacing the bridge once it reaches its end-of-life. Currently, it does not account for capital rehabilitation events in the determination of annual capital requirements. As these capital events are identified, they should be integrated into capital planning processes.

3. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for Structures should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

4. Current levels of service should be measured according to the technical and community levels of service metrics established by the Town in **Section 7.2** and **7.3**.

5.3 Water Distribution System

5.3.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Water Distribution System.

The replacement cost/unit for hydrants, water devices, water hydrant connections, water mains, water service connections, water system chambers and water valves have been determined based on average costs incurred as part of recent engineering contracts.

The asset quantities that are marked with an asterisk (*) have been updated to reflect the most reliable data available to the Town (GIS), but it does not reflect the data that is currently in the CityWide AM database.

Table 16 Asset Inventory - Water Distribution System

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Curb Stops	8585 units*	CPI Tables	$1,465,931
Hydrant Leads	1056 units*	CPI Tables	$1,695,273
Hydrants	1056 units*	Cost/Unit	$12,144,000
Water Devices	46 units*	Cost/Unit	$250,600
Water Hydrant Connections	981 metres	Cost/Unit	$1,833,778
Water Mains	150,314 metres	Cost/Unit	$282,053,815
Water Meters	7,512 units*	CPI Tables	$2,062,661
Water Service Connections	79,966 units*	Cost/Unit	$69,889,600
Water System Chambers	711 units*	Cost/Unit	$7,184,419
Water Valves	1628 units	Cost/Unit	$7,682,600
		Total:	**$386,262,677**

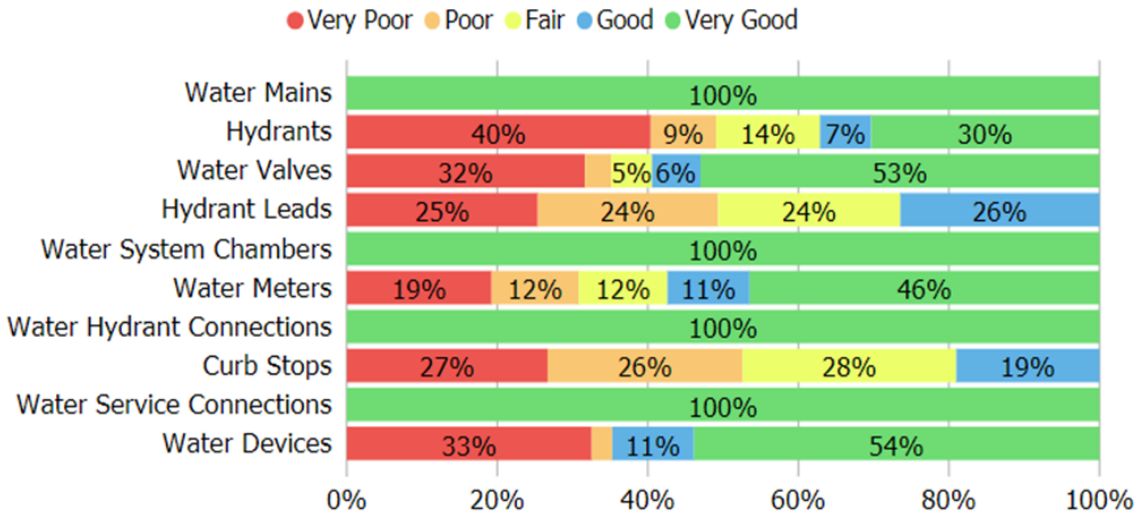
5.3.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 17 Current Asset Condition - Water Distribution System

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Curb Stops	Age-based	Poor	37%
Hydrant Leads	Age-based	Poor	40%
Hydrants	Age-based	Fair	44%
Water Devices	Age-based	Fair	59%
Water Hydrant Connections	Age-based	Very Good	100%
Water Mains	Age-based	Very Good	93%
Water Meters	Age-based	Good	61%
Water Service Connections	Age-based	Very Good	99%
Water System Chambers	Age-based	Very Good	97%
Water Valves	Age-based	Fair	59%
	Overall:	**Very Good**	**89%**

Figure 19 Current Asset Condition - Water Distribution System



To ensure that the Town's Water Distribution System continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Water Distribution System.

5.3.3 Estimated Useful Life & Average Asset Age

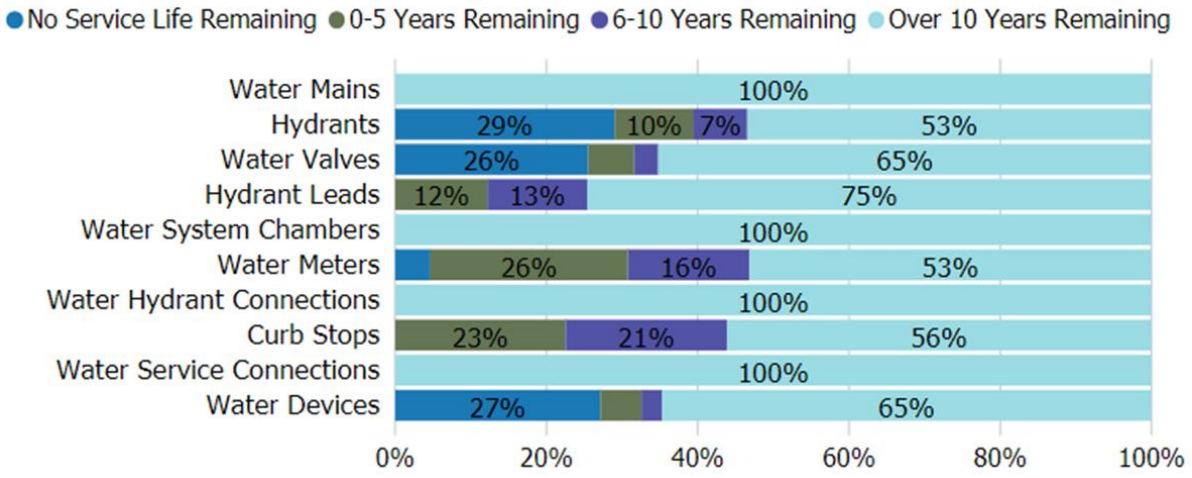
The estimated useful life for Water Distribution System has been assigned according to a combination of established industry standards and staff knowledge.

Table 18 Service Life Remaining - Water Distribution System

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Curb Stops	30 Years	11 Years 7 Months
Hydrant Leads	50 Years	20 Years
Hydrants	30 Years	11 Years
Water Devices	25 Years	12 Years 4 Months
Water Hydrant Connections	75 Years	73 Years 5 Months
Water Mains	75 Years	62 Years 10 Months
Water Meters	15 Years	11 Years 1 Month
Water Service Connections	65 Years	72 Years 2 Months
Water System Chambers	50 Years	48 Years 5 Months
Water Valves	30 Years	14 Years 3 Months

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 20 Service Life Remaining - Water Distribution System



5.3.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 21 Risk Matrix - Water Distribution System (Water Mains)

5.3.5 Lifecycle Management

The Town of East Gwillimbury has outlined its approach to water infrastructure maintenance, rehabilitation and renewal as part of its Drinking Water Quality Management System (DWQMS) Operational Plan. It has been prepared to meet the requirements of the Municipal Drinking Water Licensing Program and the Safe Drinking Water Act.

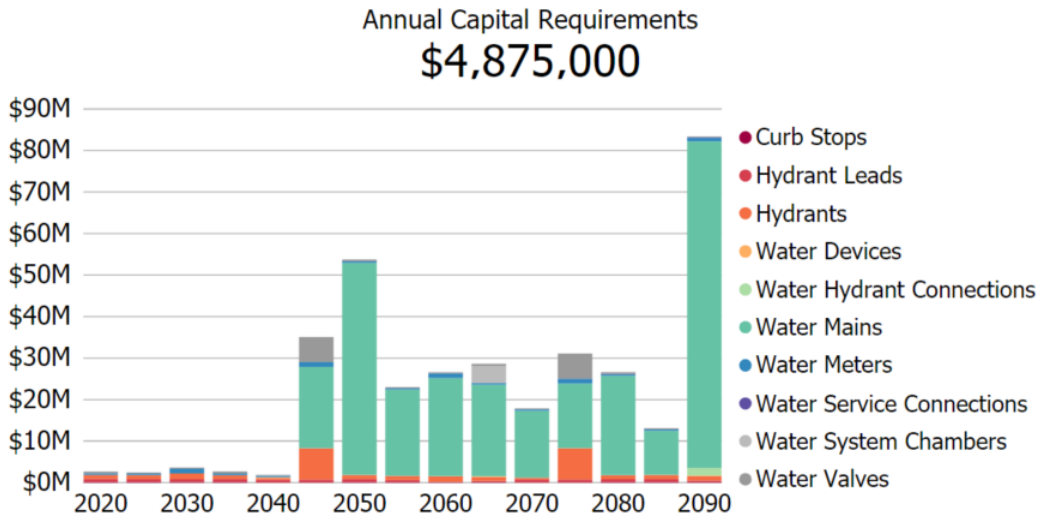
Element 15 of the Operational Plan provides a detailed approach to infrastructure maintenance, rehabilitation and renewal which includes the following:

- **Scheduled Maintenance** (e.g. watermain cleaning) as outlined in the Town's Standard Operating Procedures for Water Distribution Systems
- **Unscheduled Maintenance** (e.g. watermain breaks) on a case by case basis
- **Rehabilitation and Renewal:**
  - The condition of the Town's water systems is assessed on an ongoing basis
  - When appropriate, upgrades and rehabilitation for the Town's water systems are considered and added to the Town's water operational activities or capital program

5.3.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for the replacement of the Town's Water Distribution System.

Figure 22 Forecasted Capital Requirements - Water Distribution System



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.3.7 Recommendations

1. The Town should continue to update the DWQMS to ensure that the Water Distribution System meets all regulatory requirements. Where deficiencies and opportunities are identified, the Town should identify a lifecycle management strategy that combines maintenance, rehabilitation and replacement activities that aim to maintain the current level of service provided.

2. In the development of this AMP it was identified that there is a significant discrepancy between the Town's GIS and AM inventories which includes: water service connections, curb stops, chambers and valves. In the short-term, the replacement costs used in this AMP have been adjusted to reflect the updated quantities provided from the Town's GIS. In the long-term, staff should work towards aligning both the GIS and AM inventories.

3. The current condition of water infrastructure is determined only according to age-based estimates. The Town should work towards gathering assessed condition data on the entirety of the Water Distribution System to inform capital planning.

4. Current levels of service should be measured according to the technical and community levels of service metrics established by the Town in **Section 7.2** and **7.3**.

5.4 Sanitary Sewer Network

5.4.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Sanitary Sewer Network.

The replacement cost/unit for sewer mains, manholes and siphons has been determined based on average costs incurred as part of recent engineering contracts.

The asset quantities that are marked with an asterisk (*) have been updated to reflect the most reliable data available to the Town (GIS), but it does not reflect the data that is currently in the CityWide AM database.

Table 19 Asset Inventory - Sanitary Sewer Network

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Force Mains	1,505 metres	Cost/Unit	$3,217,452
Gravity Sewer Line	81,621 metres	Cost/Unit	$150,877,951
Lift Stations	3 units	CPI Tables	$2,984,764
Sanitary Laterals	5,254 units*	CPI Tables	$9,439,184
Sanitary Manholes	1,345 units	Cost/Unit	$14,498,300
Siphons	75 metres	Cost/Unit	$53,250
		Total:	**$181,070,900**

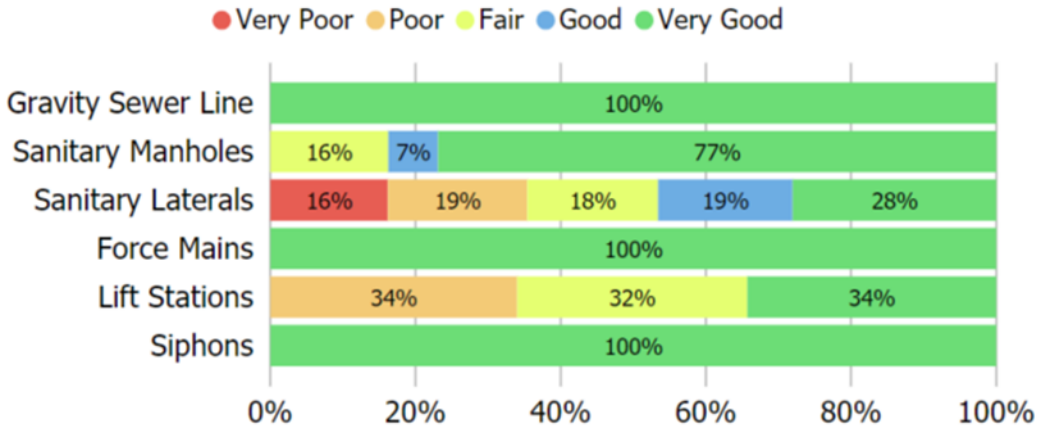
5.4.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 20 Current Asset Condition - Sanitary Sewer Network

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Force Mains	Age-based	Very Good	92%
Gravity Sewer Line	Age-based	Very Good	95%
Lift Stations	Age-based	Fair	56%
Sanitary Laterals	Age-based	Fair	53%
Sanitary Manholes	Age-based	Very Good	89%
Siphons	Age-based	Very Good	97%
	Overall:	**Very Good**	**93%**

Figure 23 Current Asset Condition - Sanitary Sewer Network



To ensure that the Town's Sanitary Sewer Network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Sanitary Sewer Network.

5.4.3 Estimated Useful Life & Average Asset Age

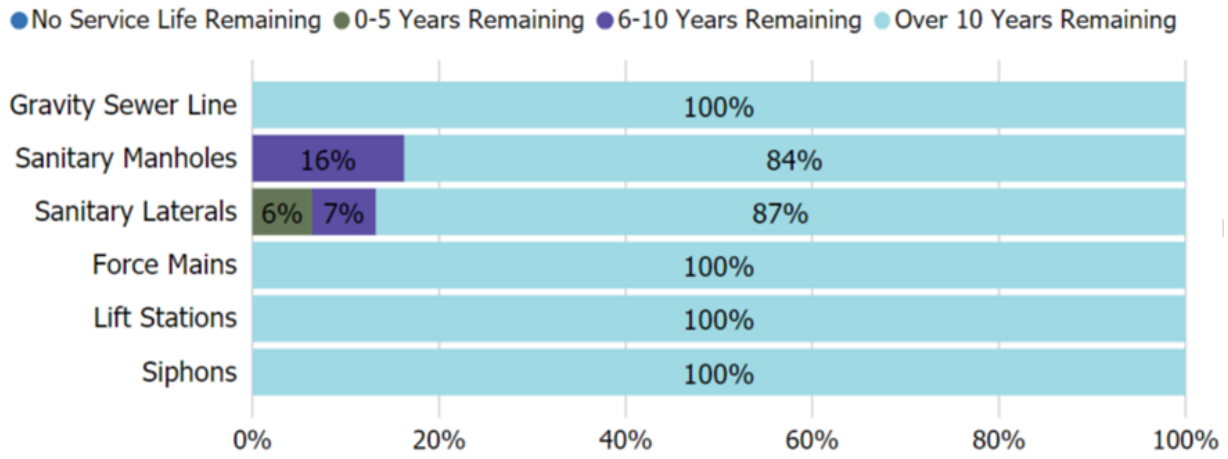
The estimated useful life for Sanitary Sewer Network has been assigned according to a combination of established industry standards and staff knowledge.

Table 21 Service Life Remaining - Sanitary Sewer Network

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Force Mains	75 Years	40 Years 9 Months
Gravity Sewer Line	75 Years	61 Years 7 Months
Lift Stations	70 Years	38 Years 10 Months
Sanitary Laterals	60 Years	25 Years 11 Months
Sanitary Manholes	50 Years	36 Years 2 Months
Siphons	75 Years	57 Years 5 Months

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 24 Service Life Remaining - Sanitary Sewer Network



5.4.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 25 Risk Matrix (Sanitary Sewer Mains)

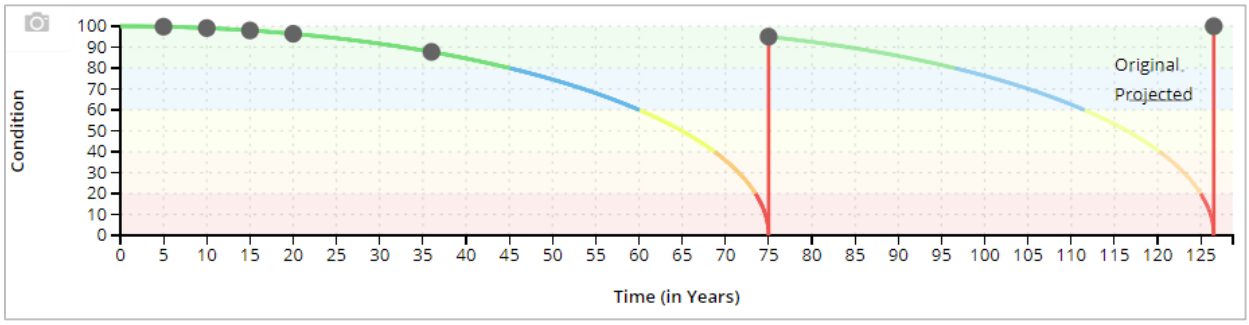
5.4.5 Lifecycle Management

The Town's lifecycle management strategy for the Sanitary Sewer Network includes maintenance, rehabilitation and renewal events. The following lifecycle strategy has been developed for sanitary sewer mains and incorporated into this AMP to help forecast capital requirements over the short-, medium- and long-term:

Table 22 Lifecycle Strategy - Sanitary Sewer Mains

Event Name	Event Type	Age at Event
Flushing/CCTV Inspection	Maintenance	20% of network every 5 Years
Rodding	Maintenance	36 Years
Re-lining	Rehabilitation	75 Years
End-of-life Replacement	Replacement	126 Years

Figure 26 Lifecycle Strategy - Sanitary Sewer Mains

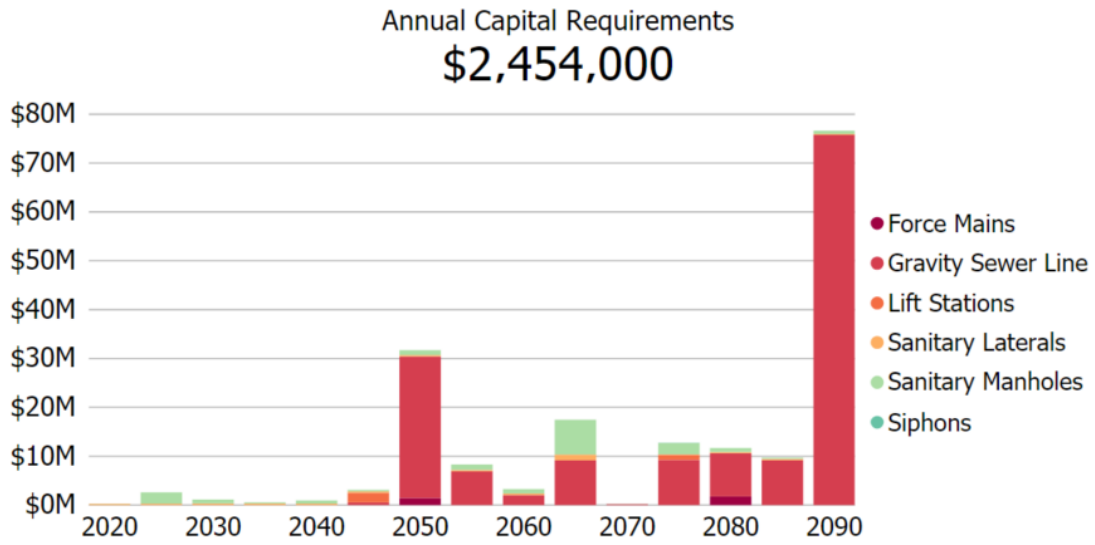


As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.4.6 Forecasted Capital Requirements

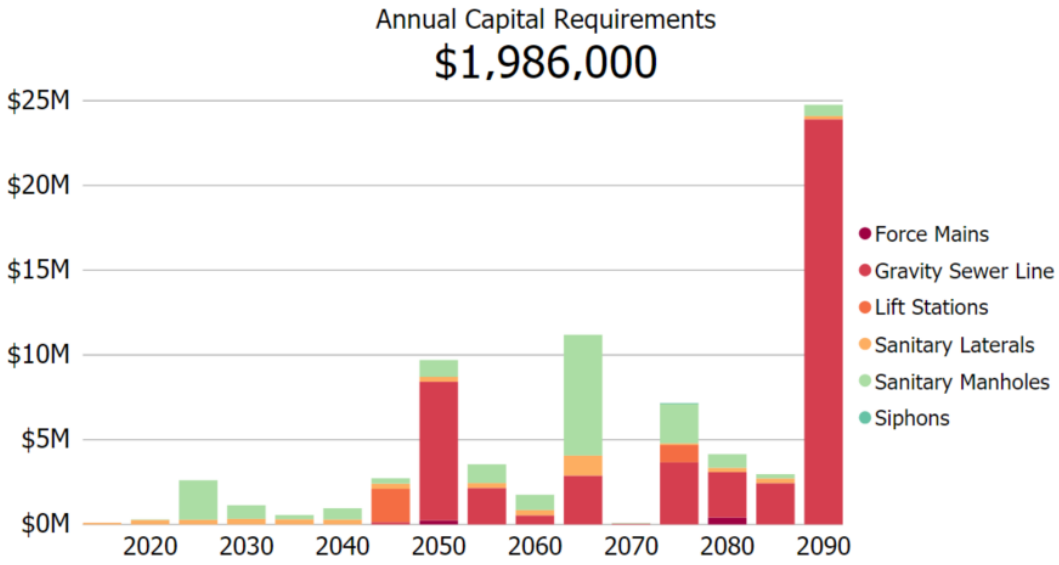
With the development of lifecycle management strategies for sanitary sewer mains there are two scenarios that can be used to determine forecasted capital requirements. The first scenario assumes that all assets are simply replaced at the end of their service life without any major maintenance or rehabilitation programs. These costs are forecasted in the following graph.

Figure 27 Forecasted Capital Requirements – Sanitary Sewer Network (End-of-Life Replacement)



The second scenario is based on the lifecycle management strategies developed in the previous section. The following graph forecasts capital requirements, including both the cost of rehabilitation and replacement events for the Town's sanitary sewer mains. This strategy was designed to extend the service life of mains at a lower annual capital cost.

Figure 28 Forecasted Capital Requirements – Sanitary Sewer Network (Lifecycle Management Strategy)



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.4.7 Recommendations

1. There are currently no assessed condition values in the asset inventory. The Town's CCTV inspections for sanitary mains should include an assessed condition value for each pipe segment. Assessed condition values should be uploaded into the inventory to increase the reliability of long-term needs forecasting.

2. In the development of this AMP it was identified that there is a significant discrepancy between the Town's GIS and AM inventories for sanitary laterals. In the short-term, the replacement costs used in this AMP have been adjusted to reflect the updated quantities provided from the Town's GIS. In the long-term, staff should work towards aligning both the GIS and AM inventories.

3. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for the Sanitary Sewer Network should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

4. Current levels of service should be measured according to the technical and community levels of service metrics established by the Town in **Section 7.2** and **7.3**

5.5 Storm Sewer System

5.5.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Storm Sewer System.

The replacement cost/unit for all storm sewer system components except for storm inlet/outlet structures has been determined based on average costs incurred as part of recent engineering contracts.

The asset quantities that are marked with an asterisk (*) have been updated to reflect the most reliable data available to the Town (GIS), but it does not reflect the data that is currently in the CityWide AM database.

Table 23 Asset Inventory - Storm Sewer System

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Catch Basins	3,194 units*	Cost/Unit	$20,380,119
Culverts	6,276 metres*	Cost/Unit	$8,849,643
FDC Mains	905 metres*	Cost/Unit	$1,651,799
FDC Manholes	16 units	Cost/Unit	$158,000
Headwall	126 units	Cost/Unit	$259,500
Management Facilities	338,623 m^2*	Cost/Unit	$27,800,768
Storm Inlet and Outlet Structures	31 units	CPI Tables	$288,786
Storm Mains	123,872 metres	Cost/Unit	$261,773,684
Storm Manholes	1,830 units	Cost/Unit	$20,768,400
		Total:	**$341,930,699**

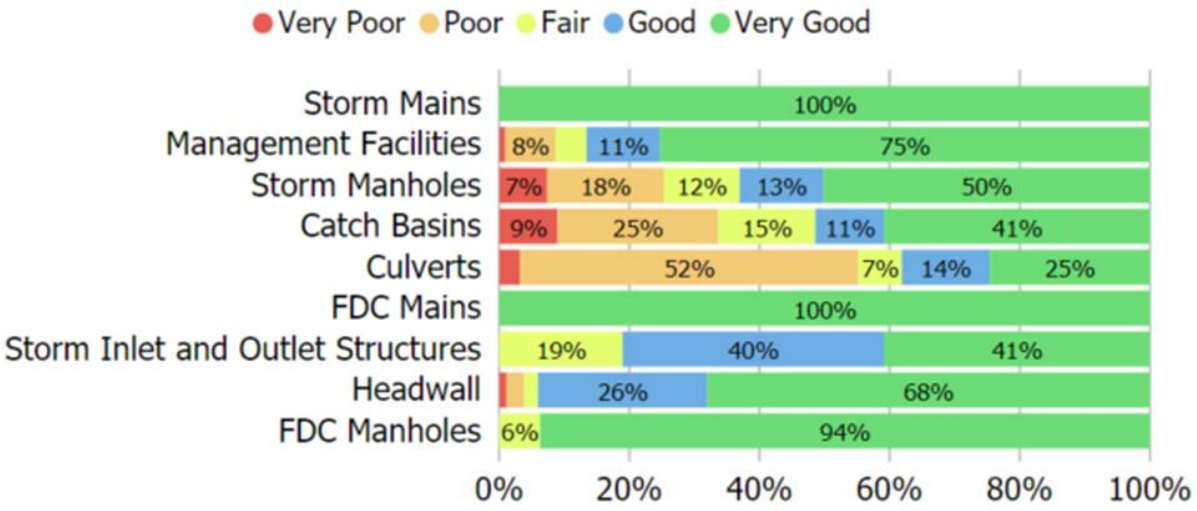
5.5.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 24 Current Asset Condition - Storm Sewer System

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Catch Basins	Age-based	Good	64%
Culverts	Age-based	Fair	55%
FDC Mains	Age-based	Very Good	99%
FDC Manholes	Age-based	Very Good	96%
Headwall	Age-based	Very Good	87%
Management Facilities	Age-based	Very Good	86%
Storm Inlet and Outlet Structures	Age-based	Good	74%
Storm Mains	Age-based	Very Good	96%
Storm Manholes	Age-based	Good	70%
	Overall:	**Very Good**	**91%**

Figure 29 Current Asset Condition - Storm Sewer System



To ensure that the Town's Storm Sewer System continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Storm Sewer System.

5.5.3 Estimated Useful Life & Average Asset Age

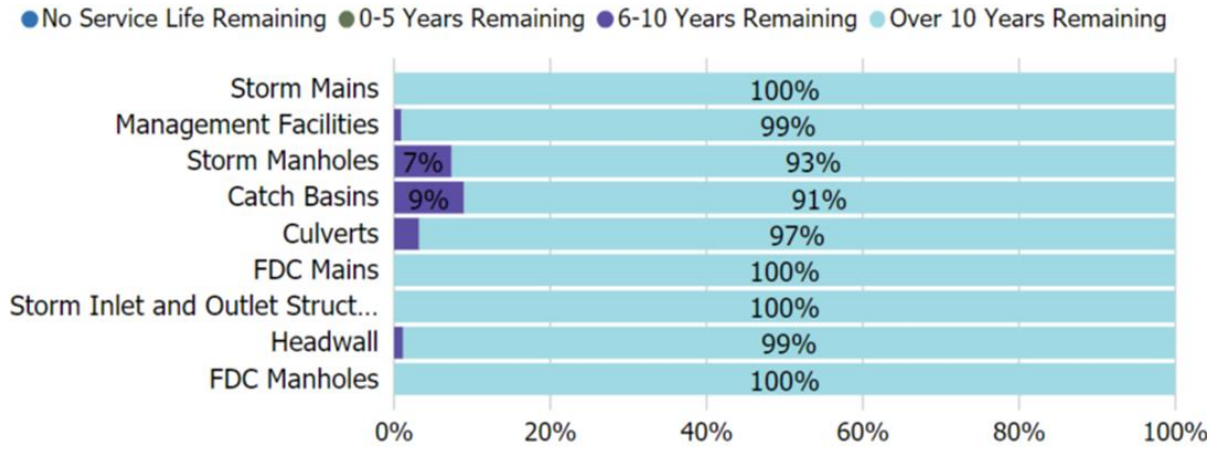
The estimated useful life for Storm Sewer System has been assigned according to a combination of established industry standards and staff knowledge.

Table 25 Service Life Remaining - Storm Sewer System

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Catch Basins	50 Years	31 Years 10 Months
Culverts	50 Years	27 Years
FDC Mains	75 Years	71 Years 10 Months
FDC Manholes	50 Years	48 Years 1 Month
Headwall	50 Years	38 Years 2 Months
Management Facilities	50 Years	33 Years
Storm Inlet and Outlet Structures	75 Years	54 Years 11 Months
Storm Mains	75 Years	63 Years 4 Months
Storm Manholes	50 Years	33 Years 1 Month

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 30 Service Life Remaining - Storm Sewer System



5.5.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 31 Risk Matrix - Storm Sewer Mains

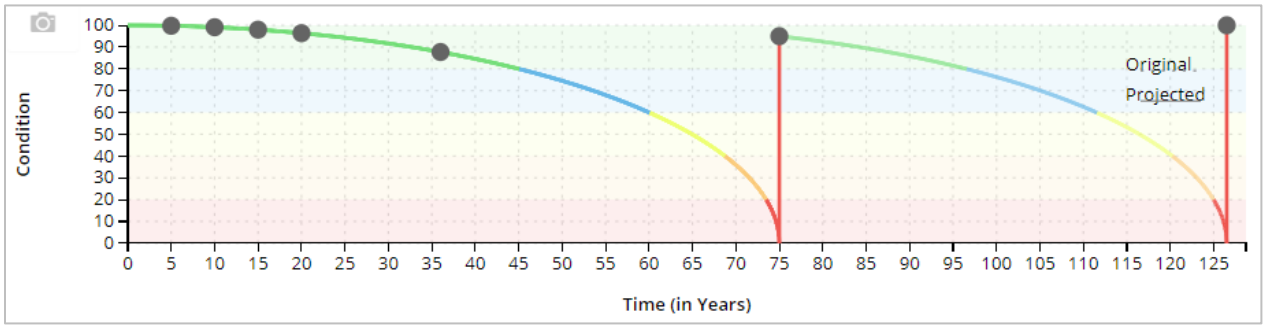
5.5.5 Lifecycle Management

The Town's lifecycle management strategy for the Storm Sewer System includes maintenance, rehabilitation and renewal events. The following lifecycle strategy has been developed for sanitary sewer mains and incorporated into this AMP to help forecast capital requirements over the short-, medium- and long-term:

Table 26 Lifecycle Strategy – Storm Sewer Mains

Event Name	Event Type	Age at Event
Flushing/CCTV Inspection	Maintenance	20% of network every 5 Years
Rodding	Maintenance	36 Years
Re-lining	Rehabilitation	75 Years
End-of-life Replacement	Replacement	126 Years

Figure 32 Lifecycle Strategy – Storm Sewer Mains

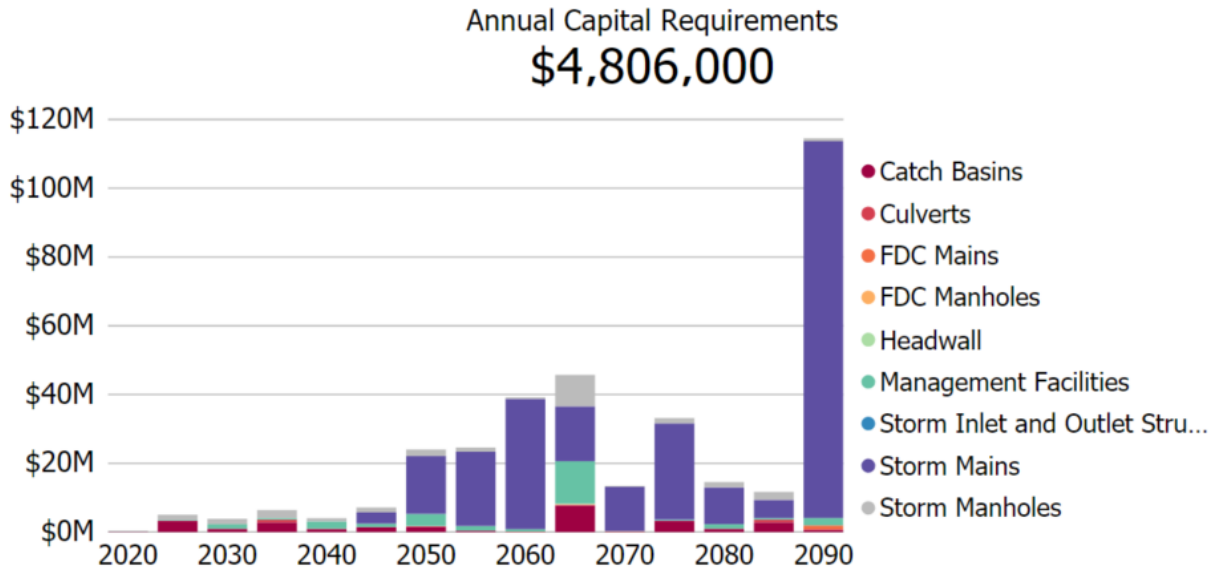


As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.5.6 Forecasted Capital Requirements

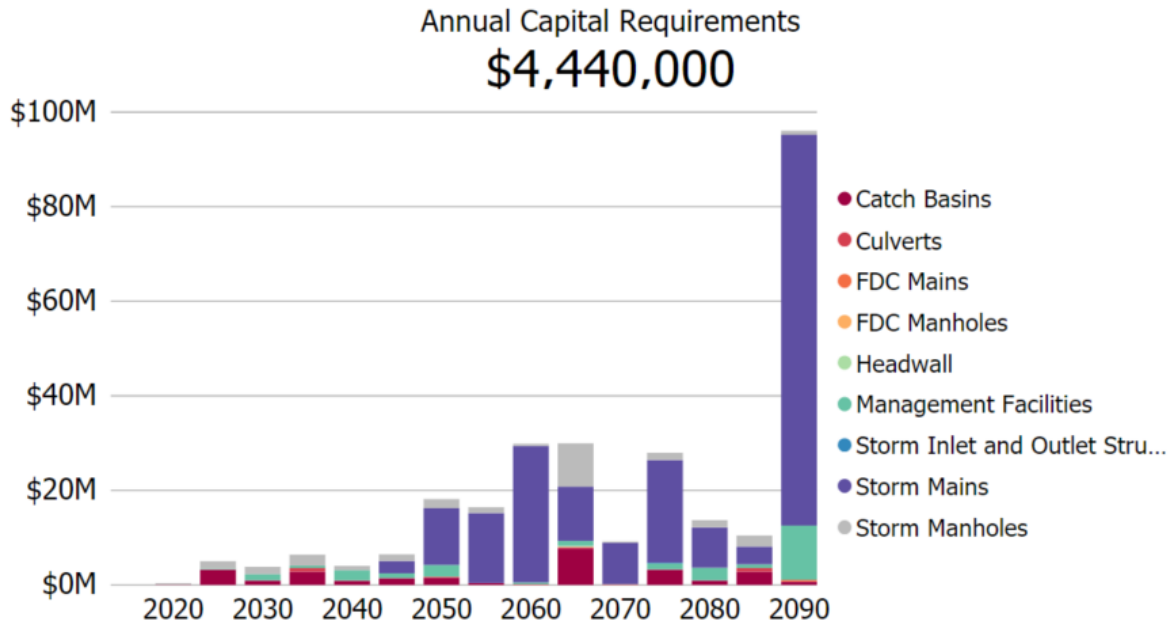
With the development of lifecycle management strategies for storm sewer mains there are two scenarios that can be used to determine forecasted capital requirements. The first scenario assumes that all assets are simply replaced at the end of their service life without any major maintenance or rehabilitation programs. These costs are forecasted in the following graph.

Figure 33 Forecasted Capital Requirements – Storm Sewer System (End-of-Life Replacement)



The second scenario is based on the lifecycle management strategies developed in the previous section. The following graph forecasts capital requirements, including both the cost of rehabilitation and replacement events for the Town's storm sewer mains. This strategy was designed to extend the service life of mains at a lower annual capital cost.

Figure 34 Forecasted Capital Requirements – Storm Sewer System (Lifecycle Management Strategy)



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.5.7 Recommendations

1. There are currently no assessed condition values in the asset inventory. The Town's CCTV inspections for storm mains should include an assessed condition value for each inspected pipe segment. This assessed condition value should be uploaded into the inventory to increase the accuracy and reliability of long-term needs forecasting.

2. In the development of this AMP it was identified that there is a significant discrepancy between the Town's GIS and AM inventories which includes: catch basins, culverts, FDC mains and management facilities. In the short-term, the replacement costs used in this AMP have been adjusted to reflect the updated quantities provided from the Town's GIS. In the long-term, staff should work towards aligning both the GIS and AM inventories.

3. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for the Sanitary Sewer Network should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

4. Current levels of service should be measured according to the technical and community levels of service metrics established by the Town in **Section 7.2** and **7.3**

5.6 Machinery & Equipment

5.6.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Machinery & Equipment inventory.

All replacement costs have been determined through the inflation of each asset's historical cost to today's value.

Table 27 Asset Inventory - Machinery & Equipment

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Facility Equipment	43 units	CPI Tables	$867,664
Fire Department Equipment	306 units	CPI Tables	$1,276,362
Fleet Garage Equipment	6 units	CPI Tables	$395,641
Furniture	978 units	CPI Tables	$755,116
IT Equipment	526 units	CPI Tables	$1,320,368
Maintenance Equipment	64 units	CPI Tables	$824,007
		Total:	**$5,439,158**

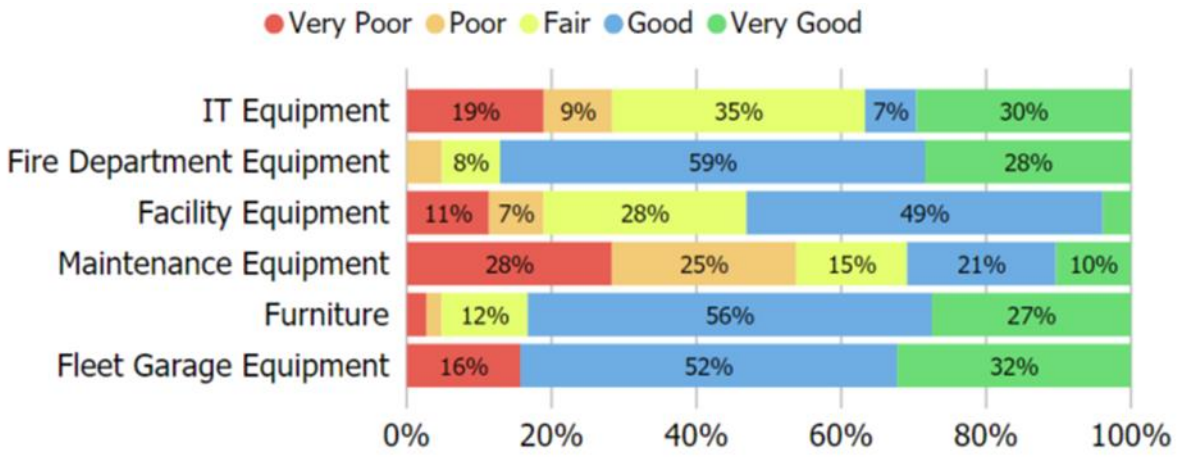
5.6.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 28 Current Asset Condition - Machinery & Equipment

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Facility Equipment	Age-based	Fair	54%
Fire Department Equipment	Internal Assessment (2017) and Age-based	Good	71%
Fleet Garage Equipment	Age-based	Good	67%
Furniture	Age-based	Good	67%
IT Equipment	Internal Assessment (2017) and Age-based	Fair	52%
Maintenance Equipment	Age-based	Fair	40%
	Total:	**Fair**	**59%**

Figure 35 Current Asset Condition - Machinery & Equipment



To ensure that the Town's Machinery & Equipment continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of Machinery & Equipment.

5.6.3 Estimated Useful Life & Average Asset Age

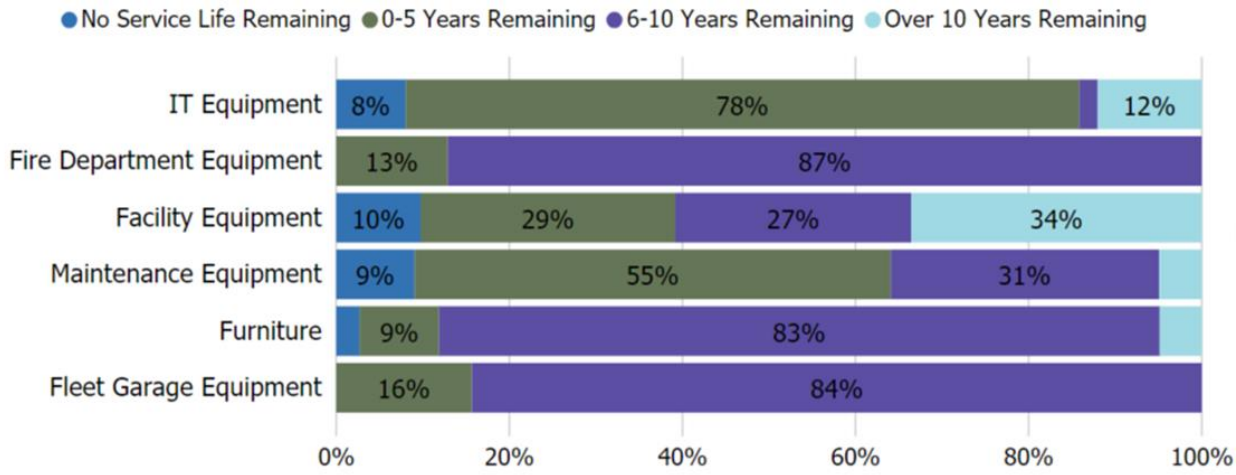
The estimated useful life for Machinery & Equipment has been assigned according to a combination of established industry standards and staff knowledge.

Table 29 Service Life Remaining - Machinery & Equipment

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Facility Equipment	5-15 Years	5 Years 4 Months
Fire Department Equipment	8-10 Years	8 Years 5 Months
Fleet Garage Equipment	10-12 Years	6 Years 10 Months
Furniture	8-20 Years	7 Years 1 Month
IT Equipment	3-60 Years	2 Years 7 Months
Maintenance Equipment	5-25 Years	6 Years 2 Months

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 36 Service Life Remaining - Machinery & Equipment

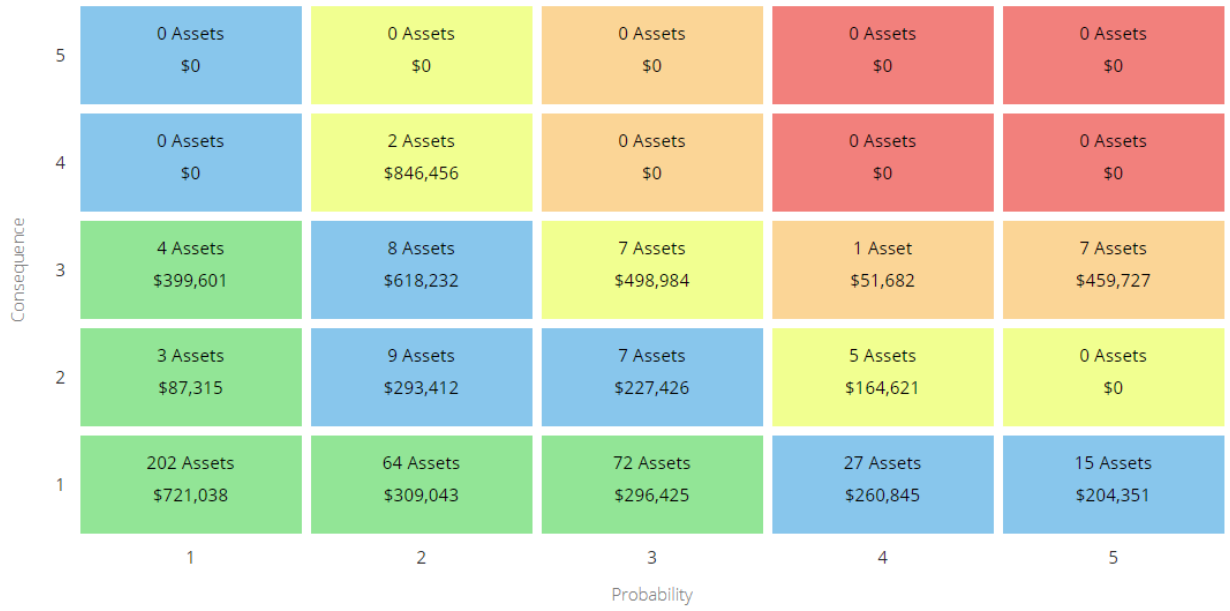


5.6.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 37 Risk Matrix - Machinery & Equipment



5.6.5 Lifecycle Management

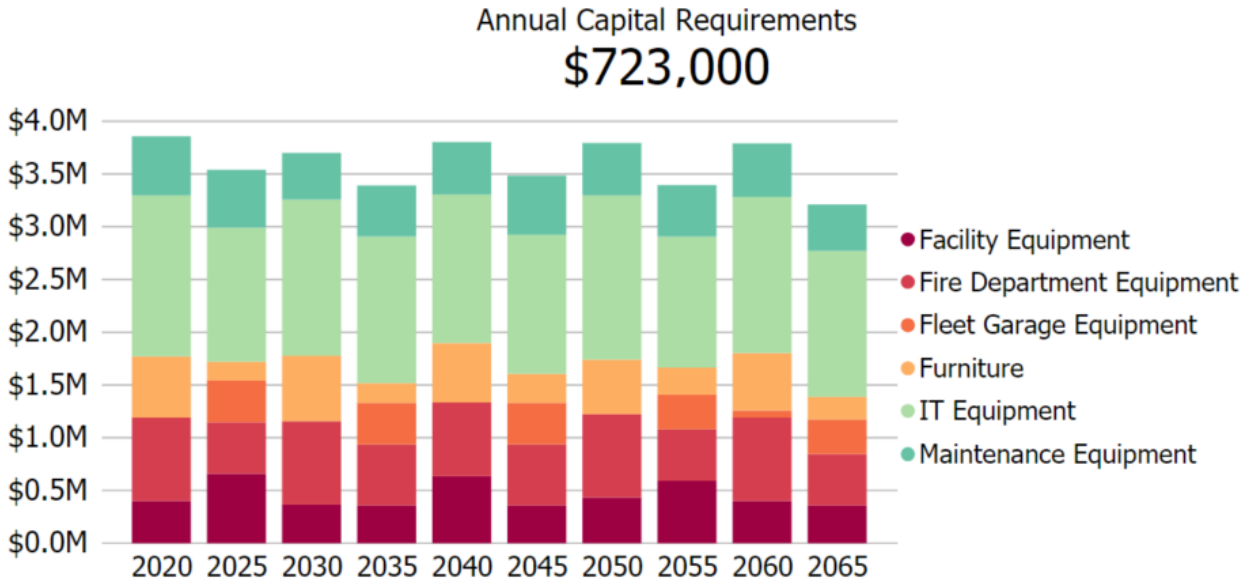
Machinery & Equipment assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation and replacement activities. Although regular maintenance is required to ensure the proper operation of all assets, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.6.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for replacement of the Town's Machinery & Equipment.

Figure 38 Forecasted Capital Requirements - Machinery & Equipment



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.6.7 Recommendations

1. While the Town has collected assessed condition data for some assets through internal assessments, most assets rely on age-based condition estimates. The Town should develop and implement a routine condition assessment schedule for Machinery & Equipment to better identify short-, medium- and long-term capital requirements.

2. The replacement cost for Machinery & Equipment in this AMP is based entirely on the inflation of historical costs. Town staff should work towards reviewing and verifying that the replacement value of these assets is accurate and updated regularly to inform capital planning.

3. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for Machinery & Equipment. These metrics and descriptions should be developed prior to the development of the Town's next AMP.

4. The evaluation of asset risk for Machinery & Equipment should be reviewed and updated to include additional risk metrics. Currently the consequence of failure criteria is based solely upon the replacement cost of the asset and does not take account for social, environmental or operational consequences of asset failure.

5.7 Vehicles

5.7.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Vehicles inventory.

All replacement costs have been determined through the inflation of each assets historical cost to today's value.

Table 30 Asset Inventory - Vehicles

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Fire Trucks	9 units	CPI Tables	$4,399,648
Light Vehicles	5 units	CPI Tables	$192,988
Heavy Vehicles	50 units	CPI Tables	$3,704,586
		Total:	**$8,297,222**

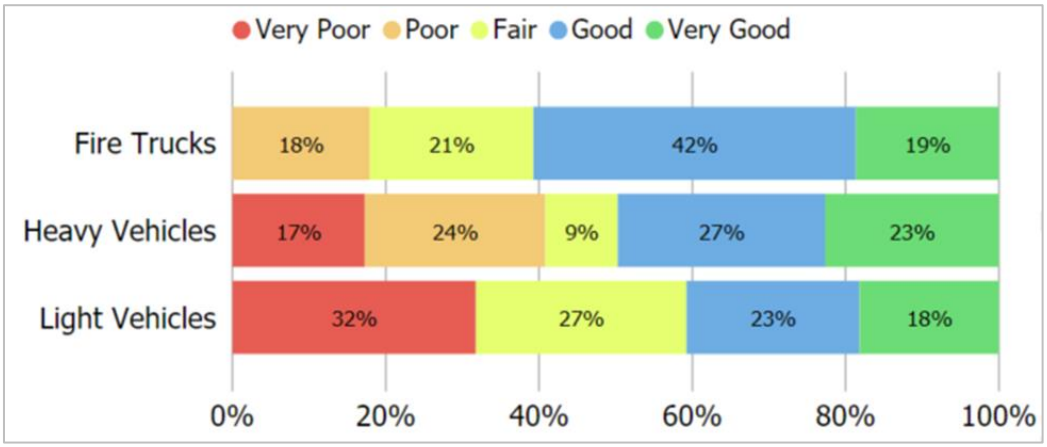
5.7.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 31 Current Asset Condition - Vehicles

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Fire Trucks	Internal Assessment (2017) and Age-based	Good	65%
Light Vehicles	Age-based	Fair	51%
Heavy Vehicles	Internal Assessment (2017) and Age-based	Fair	48%
	Overall:	**Fair**	**58%**

Figure 39 Current Asset Condition - Vehicles



To ensure that the Town's Vehicles continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Vehicles.

5.7.3 Estimated Useful Life & Average Asset Age

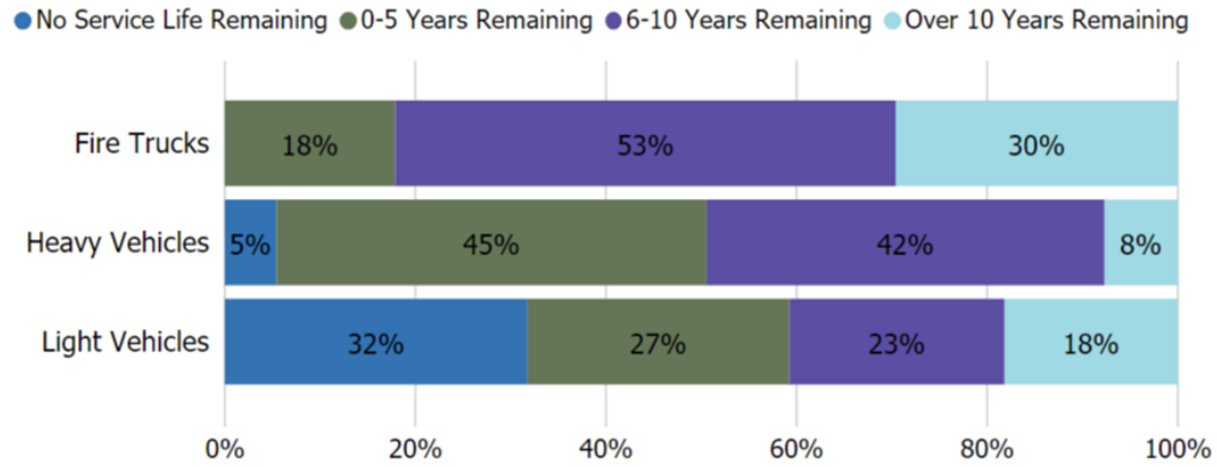
The estimated useful life for Vehicles has been assigned according to a combination of established industry standards and staff knowledge.

Table 32 Service Life Remaining - Vehicles

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Fire Trucks	12-20 Years	8 Years 10 Months
Light Vehicles	7-15 Years	4 Years 6 Months
Heavy Vehicles	5-20 Years	6 Years 1 Month

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 40 Service Life Remaining – Vehicles



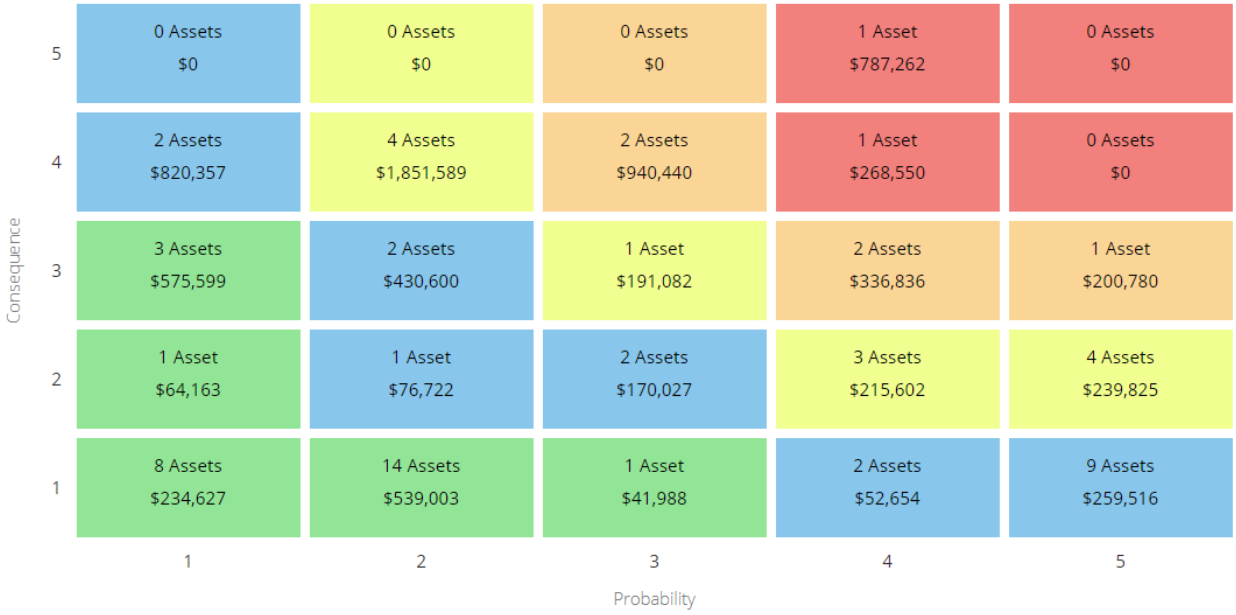
5.7.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to

visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 41 Risk Matrix - Vehicles



Critical Assets

The following table identifies any assets that have been classified as "Very High" risk. This is not meant to be a definitive list of how the Town should prioritize assets for rehabilitation and replacement. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g., no assessed condition data).

Asset Segment	Name	Replacement Cost	Risk Rating
Fire Trucks	Aerial 246	$787,262	20 – Very High
Heavy Vehicles	R07-41 Grader	$268,550	16 – Very High

5.7.5 Lifecycle Management

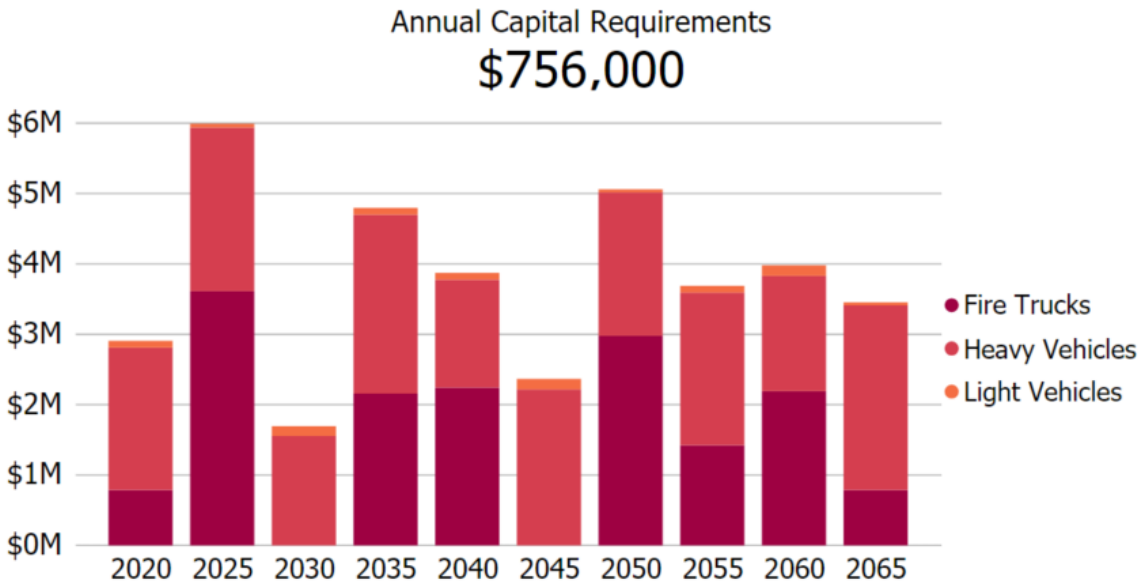
Vehicles assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation and replacement activities. Although regular maintenance is required to ensure the proper operation of all Vehicles assets, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.7.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Town's Vehicles.

Figure 42 Forecasted Capital Requirements - Vehicles



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.7.7 Recommendations

1. While the Town has collected assessed condition data for some assets through internal assessments, most assets rely on age-based condition estimates. The Town should develop and implement a routine condition assessment schedule for vehicles to better identify short-, medium- and long-term capital requirements.

2. The replacement cost for vehicles in this AMP is based entirely on the inflation of historical costs. Town staff should work towards reviewing and verifying that the replacement value of these assets is accurate and updated regularly to inform capital planning.

3. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for vehicles. These metrics and descriptions should be developed prior to the development of the Town's next AMP.

4. The evaluation of asset risk for vehicles should be reviewed and updated to include additional risk metrics. Currently the consequence of failure criteria is based solely upon the replacement cost of the asset and does not account for social, environmental or operational consequences of asset failure.

5.8 Buildings & Facilities

5.8.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Buildings & Facilities inventory.

All replacement costs have been determined through the inflation of each asset's historical cost to today's value.

Table 33 Asset Inventory - Buildings & Facilities

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Arenas	18 units	CPI Tables	$11,249,577
Community Centres	65 units	CPI Tables	$11,282,781
Fire Halls	27 units	CPI Tables	$8,448,794
General Buildings	8 units	CPI Tables	$538,276
Maintenance Garages	12 units	CPI Tables	$755,783
Office Buildings	14 units	CPI Tables	$8,225,501
Storage Sheds	4 units	CPI Tables	$18,180
		Total:	**$40,518,892**

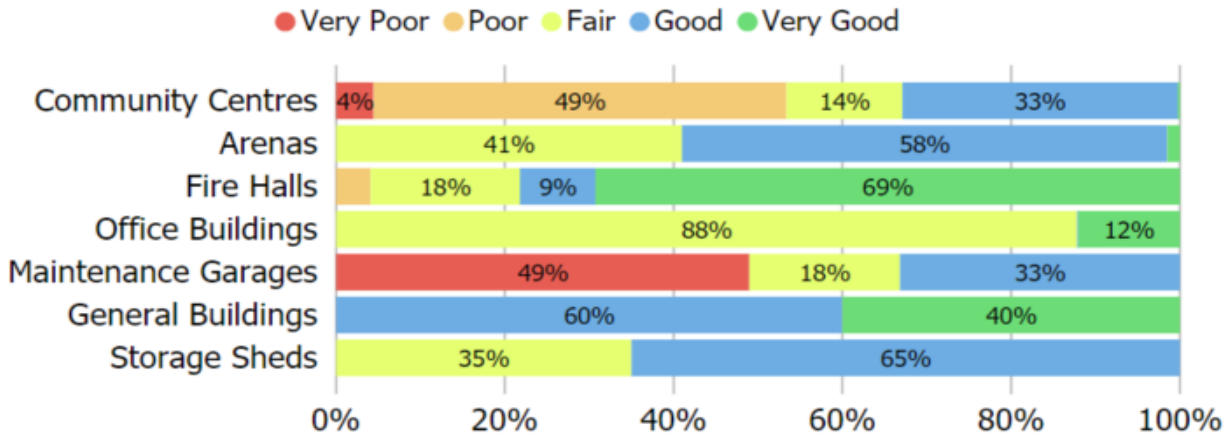
5.8.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 34 Current Asset Condition - Buildings & Facilities

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Arenas	Internal Assessment (2017)	Good	69%
Community Centres	Internal Assessment (2017)	Fair	52%
Fire Halls	Internal Assessment (2017) and Age-based	Very Good	83%
General Buildings	Internal Assessment (2017) and Age-based	Very Good	80%
Maintenance Garages	Internal Assessment (2017) and Age-based	Poor	39%
Office Buildings	Internal Assessment (2017) and Age-based	Good	60%
Storage Sheds	Age-based	Good	66%
	Overall:	**Good**	**65%**

Figure 43 Current Asset Condition - Buildings & Facilities



To ensure that the Town's Buildings & Facilities continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Buildings & Facilities.

5.8.3 Estimated Useful Life & Average Asset Age

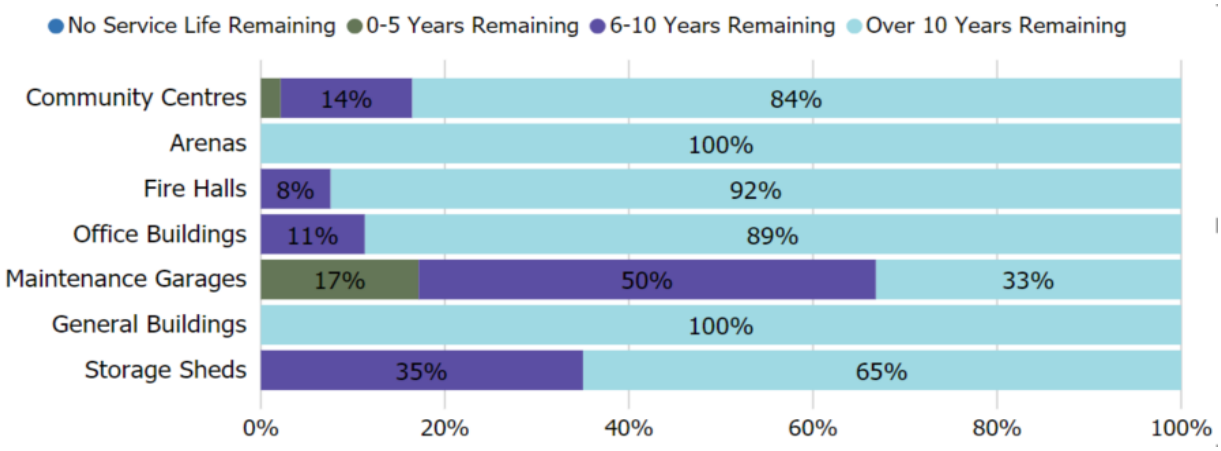
The estimated useful life for Buildings & Facilities has been assigned according to a combination of established industry standards and staff knowledge.

Table 35 Service Life Remaining - Buildings & Facilities

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Arenas	25-50 Years	23 Years 6 Months
Community Centres	50-80 Years	13 Years 11 Months
Fire Halls	10-70 Years	27 Years 7 Months
General Buildings	25-70 Years	28 Years 5 Months
Maintenance Garages	20-45 Years	11 Years 9 Months
Office Buildings	15-50 Years	16 Years 6 Months
Storage Sheds	15-30 Years	15 Years

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 44 Service Life Remaining - Buildings & Facilities

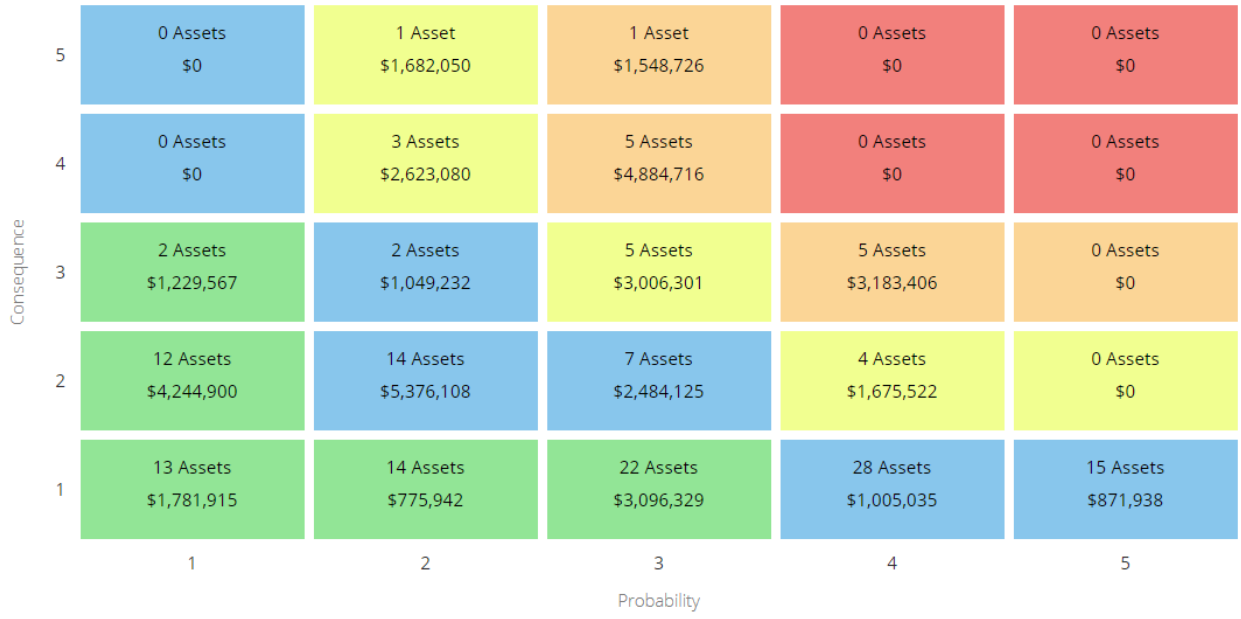


5.8.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 45 Risk Matrix - Buildings & Facilities



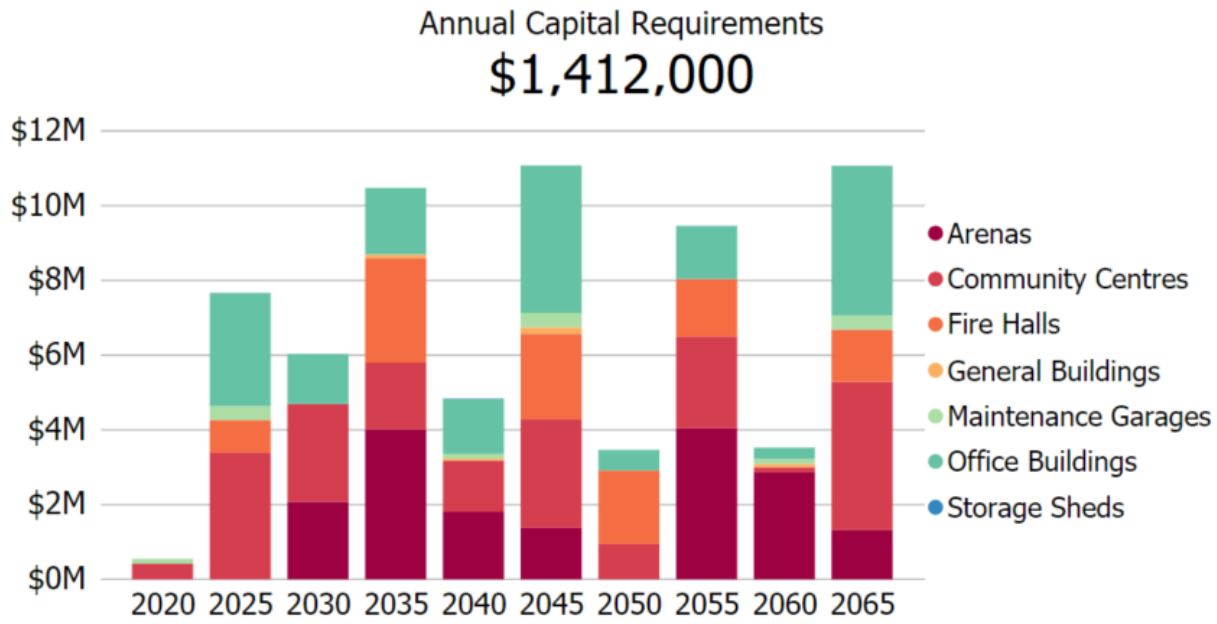
5.8.5 Lifecycle Management

Buildings & Facilities can benefit from a proactive maintenance, rehabilitation, and replacement strategy. This AMP does not factor the costs and potential benefits that may be realized through this strategy. Facility lifecycle management strategies should be incorporated into future iterations of the AMP.

5.8.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Town's Buildings & Facilities.

Figure 46 Forecasted Capital Requirements - Buildings & Facilities



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.8.7 Recommendations

1. The Town should develop and implement a regular inspection/inventory review program for Buildings & Facilities. It is recommended that inventory be collected at a component level that aggregates to the overall portfolio level and include updates to current replacement value. Additionally, this program should also collect physical condition information on a severity and extent principal or based on local industry best practices.

2. Should recommendation #1 not be achievable and integrated by the July 1, 2023 regulatory deadline for an Asset Management Plan for non-core assets, then consider the following:

    a) Determine and integrate a current replacement value for these assets
    b) Review and update the asset condition using a similar methodology as outlined in Section 5.8.2

3. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for buildings and facilities. These metrics and descriptions should be developed prior to the development of the Town's next AMP.

4. The evaluation of asset risk for buildings and facilities should be reviewed and updated to include additional risk metrics. Currently the consequence of failure criteria is based solely upon the replacement cost of the asset and does not account for social, environmental or operational consequences of asset failure.

5.9 Land Improvements

5.9.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Land Improvements inventory.

All replacement costs have been determined through the inflation of each assets historical cost to today's value.

Table 36 Asset Inventory - Land Improvements

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Landscaping	10 units	CPI Tables	$887,511
Miscellaneous	40 units	CPI Tables	$1,264,141
Park Structures	15 units	CPI Tables	$604,485
Parking, Paving & Curbs	11 units	CPI Tables	$1,304,345
Parks	10 units	CPI Tables	$2,845,239
Play Structures	23 units	CPI Tables	$1,413,561
Sports Fields	72 units	CPI Tables	$4,563,507
Trails, Pathways & Bike Paths	27 units	CPI Tables	$2,913,136
		Total:	**$15,795,925**

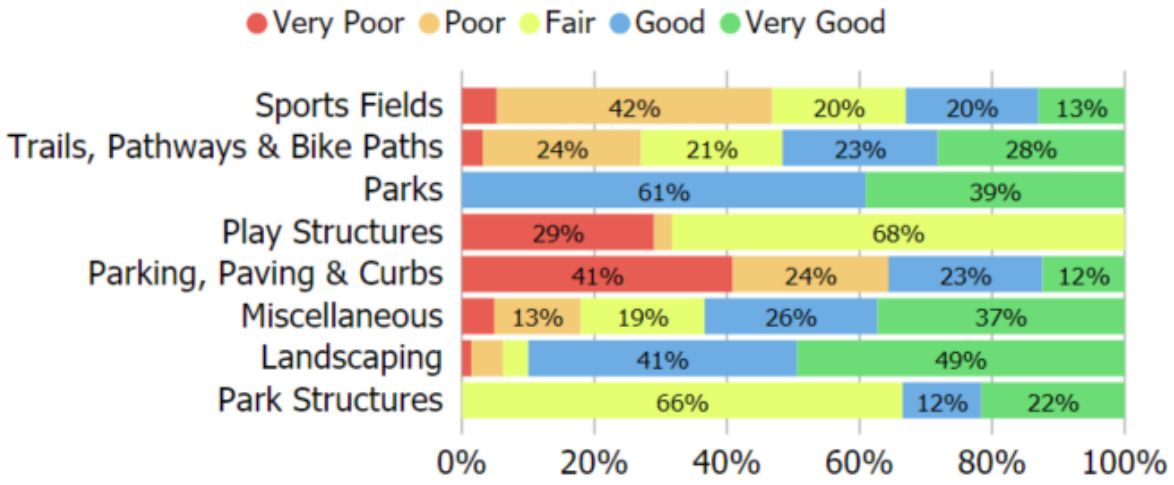
5.9.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 37 Current Asset Condition - Land Improvements

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Landscaping	Age-based	Very Good	80%
Miscellaneous	Age-based	Good	63%
Park Structures	Age-based	Good	63%
Parking, Paving & Curbs	Age-based	Fair	41%
Parks	Age-based	Good	77%
Play Structures	Internal Assessment (2017) and Age-based	Poor	39%
Sports Fields	Internal Assessment (2017) and Age-based	Fair	48%
Trails, Pathways & Bike Paths	Age-based	Good	61%
	Overall:	**Fair**	**58%**

Figure 47 Current Asset Condition - Land Improvements



To ensure that the Town's Land Improvements continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Land Improvements.

5.9.3 Estimated Useful Life & Average Asset Age

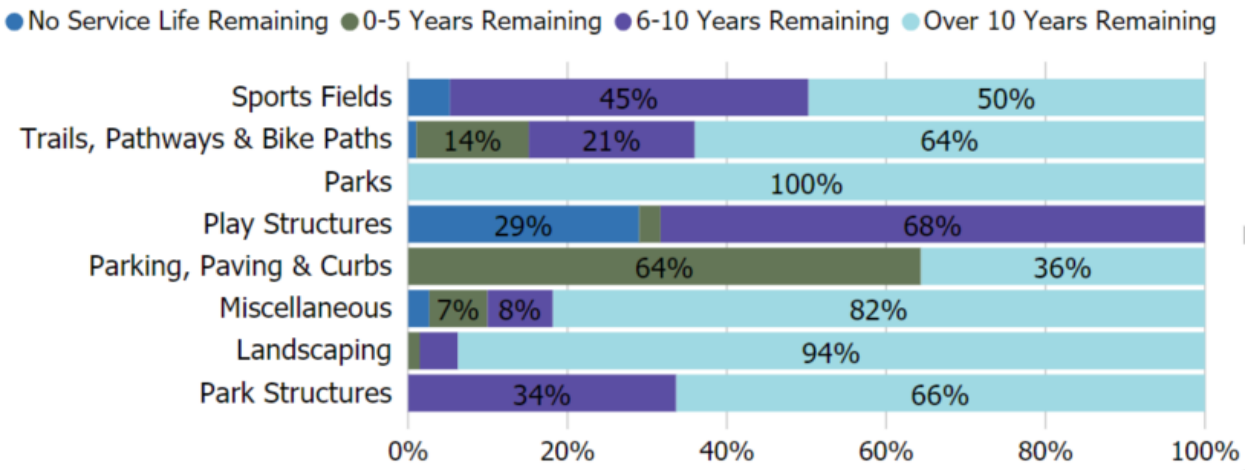
The estimated useful life for Land Improvements has been assigned according to a combination of established industry standards and staff knowledge.

Table 38 Service Life Remaining - Land Improvements

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Landscaping	25 Years	15 Years 2 Months
Miscellaneous	5-50 Years	14 Years 11 Months
Park Structures	15-40 Years	22 Years 8 Months
Parking, Paving & Curbs	10-25 Years	9 Years 5 Months
Parks	15-75 Years	40 Years 5 Months
Play Structures	15 Years	3 Years 11 Months
Sports Fields	15-40 Years	15 Years 8 Months
Trails, Pathways & Bike Paths	10-20 Years	9 Years 8 Months

The following graph identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 48 Service Life Remaining - Land Improvements

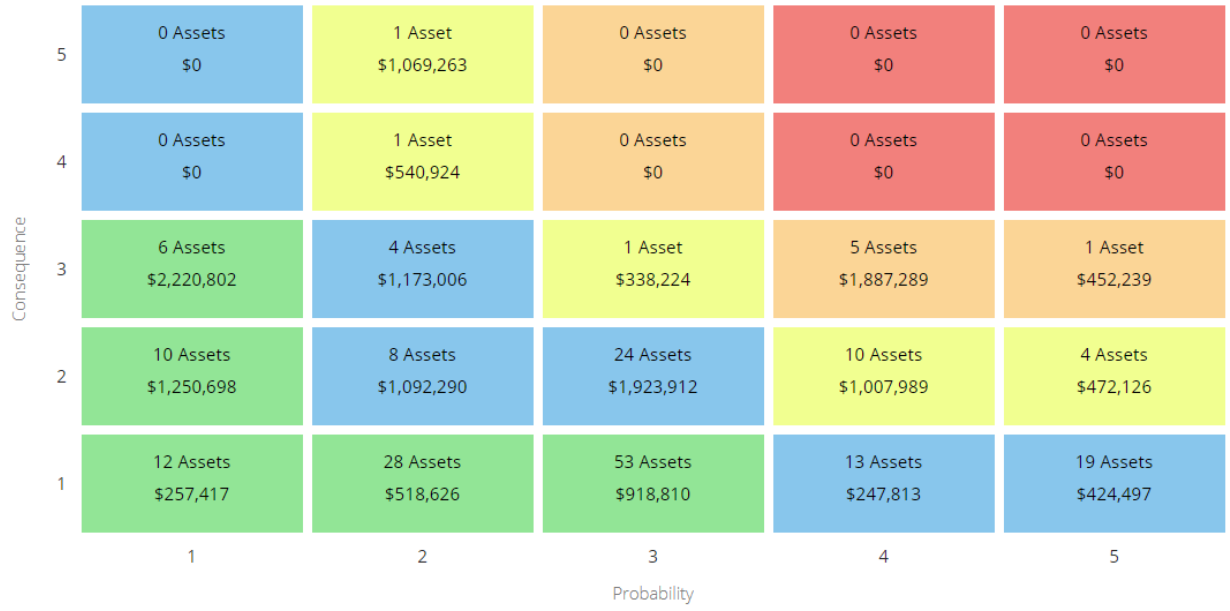


5.9.4 Risk & Criticality

Asset Risk Rating Criteria & Matrix

The asset data and information used to determine asset risk ratings has been included in **Appendix B**. Based on this criterion the following risk matrix has been developed to visualize the level of risk present within the asset category and assist with asset management decision-making.

Figure 49 Risk Matrix - Land Improvements



5.9.5 Lifecycle Management

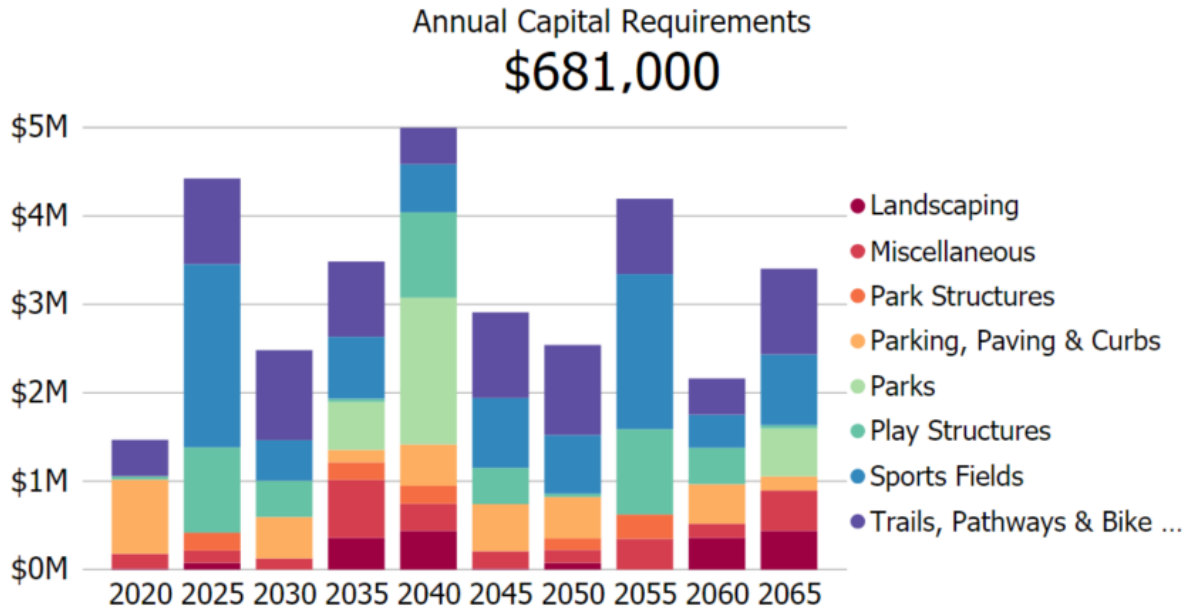
Land Improvements assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation and replacement activities. Although regular maintenance is required to ensure the proper operation of these facilities, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.9.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Town's Land Improvements.

Figure 50 Forecasted Capital Requirements - Land Improvements



The projected capital expenditures that will need to be undertaken over the next 10 years to maintain the current levels of service can be found in **Appendix A**.

5.9.7 Recommendations

1. While the Town has collected assessed condition data for some assets through internal assessments, most assets rely on age-based condition estimates. The Town should develop and implement a routine condition assessment schedule for land improvements to better identify short-, medium- and long-term capital requirements.

2. The replacement cost for land improvements in this AMP is based entirely on the inflation of historical costs. Town staff should work towards reviewing and verifying that the replacement value of these assets is accurate and updated regularly to inform capital planning.

3. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for land improvements. These metrics and descriptions should be developed prior to the development of the Town's next AMP.

4. The evaluation of asset risk for land improvements should be reviewed and updated to include additional risk metrics. Currently the consequence of failure criteria is based solely upon the replacement cost of the asset and does not account for social, environmental or operational consequences of asset failure.

6.0 Asset Management Strategies

After outlining the State of Local Infrastructure, the next step of an AMP is to identify the procedures and practices that will support the Town's organizational objectives, and derive maximum value from its assets. Good asset management requires a focus on continuous program improvement based on industry best practice. This involves strategies for data collection and condition assessment, strategies for the analysis of collected data (lifecycle and risk) and strategies for performance measurement (levels of service).

This section contains information and best practices that will inform the Town's asset management strategies, outline Roadmap activities and their deliverables, and provide strategic recommendations for the continuous improvement of program activities and outputs.

6.1 Non-Infrastructure Solutions & Requirements

The municipality should explore, as requested through the provincial requirements, which non-infrastructure solutions should be incorporated into the budgets for its infrastructure services. Non-infrastructure solutions are such items as studies, policies, condition assessments, consultation exercises, etc., that could potentially extend the life of assets or lower total asset program costs in the future without a direct investment into the infrastructure.

Typical solutions for a municipality include linking the asset management plan to the strategic plan, growth and demand management studies, infrastructure master plans, better integrated infrastructure and land use planning, public consultation on levels of service and condition assessment programs. As part of future asset management plans, a review of these requirements should take place, and resources should be dedicated to these items.

It is recommended, under this category of solutions, that the municipality develop and implement holistic condition assessment programs for all asset categories. This will advance the understanding of infrastructure needs, improve budget prioritization methodologies and provide a clearer path of what is required to achieve sustainable infrastructure programs.

6.2 State of Maturity Report

6.2.1 Introduction

Improving asset management practices requires a structured and coordinated approach to the individual components of an asset management program. As a first step, it is important to gauge the current state of practice related to asset management at the municipality. A thorough gap analysis helps to determine where to focus efforts in order to build a strong asset management program.

The first phase of PSD's Roadmap involved a comprehensive, organization-wide assessment of asset management programs and practices within the Town. The development of the State of Maturity Report involved two key components: the Asset Management Self-Assessment Test (AMSAT) and a series of stakeholder interviews. The final State of Maturity Report outlined the organization's overall state of maturity, proficiency ratings along the six key components of asset management, and recommendations to improve the Town's asset management program.

6.2.2 Asset Management Self-Assessment Test

The Asset Management Self-Assessment Test, implemented in a survey format, relies on a series of questions across specific categories that have been established through international standards and best practice identified as the requirements of a successful asset management program. The results of the AMSAT are then aggregated to provide a performance rating (Basic, Intermediate, Advanced) across six key components. The following table summarizes the Town's results and compares them to the national average of communities surveyed:

Table 39 AMSAT Results

Asset Management Component	Proficiency Level	National Average
Organizational Cognisance	Advanced	Intermediate
Organizational Capacity	Intermediate	Intermediate
Infrastructure Data/Information	Intermediate	Intermediate
Asset Management Strategies	Basic	Basic
Financial Strategies	Intermediate	Basic
Level of Service	Basic	Basic

6.2.3 Stakeholder Interviews

As a supplement to the AMSAT, additional information was gathered through a series of in-depth interviews with departmental staff who are either directly involved in or support the delivery of an asset category. The results were used for clarification of the features of the organization's asset management program along with who is responsible for managing and delivering the activities involved in the asset management process.

6.2.4 Highlights from the State of Maturity Report

Workshop Date: March 2016

Organizational Cognizance

In recent years, asset management has become a priority at the council level, partly due to the development of the first Asset Management Plan in 2014, and AM as a program is starting to be prioritized by the senior management level down through the municipality. Asset management has also been linked to the Town's list of Strategic Planning Initiatives and is being used to advance the overall financial planning of the Town.

Organizational Capacity

There has been substantial progress with the implementation and understanding of asset management practices; however, there is still room for improvement. There is an established cross-functional team at the senior management level which has promoted synergies and collaboration with regards to infrastructure priorities and budgeting, across all departments. There is significant work underway, across the organization, to enhance infrastructure information and data sets, although there is a lack of dedicated positions for this work.

Asset Management Strategies

In general, across all asset categories, life cycle activity analysis is performed at the project planning stage and not at the network need analysis stage within the Town. In other words, there is no consistent framework that determines when a section of infrastructure should have a rehabilitation intervention applied (e.g., resurfacing a road or re-lining a sewer main) instead of full reconstruction.

Financial Strategies

Currently, the financial strategies within East Gwillimbury are sound based on the availability of current information. There has been thorough analysis of short- and long-term capital and operating/maintenance requirements for capital assets, including a detailed review of the various sources available to fund the budgets (tax levy, user fees, reserves, debt, etc.).

Levels of Service

Similar to most municipalities within Ontario, there are currently no holistic level of service models in place at the Town for the various capital asset categories. There are, however, a number of level of service initiatives in place, such as full compliance with regulatory requirements for bridges, roads, and water, and the start of level of service key performance reporting as documented in the 2014 asset management plan.

6.2.5 Advancing the Town's State of Maturity

Municipal asset management is an ever-evolving discipline that requires organizations to adapt to emerging regulations and continue to advance internal capabilities. The five key competencies above are areas that the Town should continue to evaluate on a regular basis to determine what areas are seeing advances and which need additional attention.

Since the development of this report, the Town has made tremendous progress towards advancing maturity within each of the six core competencies assessed. The development and implementation of a regular audit and review process will identify this progress and assist with developing a plan for continuous improvement.

6.3 Asset Inventory Data

6.3.1 Introduction

An asset management program is only as strong as the data and information available in an organization's asset inventory. Without detailed and accurate asset data, the ability to analyze and evaluate the Town's state of the infrastructure is limited. Data gathering is a resource-intensive process, requiring sufficient human resources capacity and a significant amount of time to develop and maintain. However, committing resources to data collection will result in exponential benefits to the Town's asset management program. Better data results in greater data confidence and ultimately more reliable asset management and financial strategies.

6.3.2 Assessing Data Maturity

As a starting point, it is critical to understand the current state of data collection practices. From there it is possible to develop techniques and strategies that ensure that the Town's

asset management program is being supported by detailed, consistent and complete data. A detailed data maturity assessment will evaluate and analyze the state of the Town's data collection practices. This will help to identify what asset component data has been collected and what needs to be collected in order to increase the quality of data and allow for more accurate and advanced analysis.

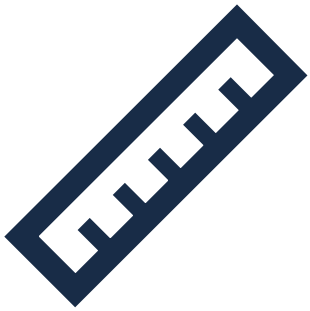
6.3.3 Ongoing Data Collection

Without plans in place for the ongoing collection of asset data and information the ability of an organization to undertake advanced forecasting and analysis will be limited. It is critical that the Town continue to provide resources for the continuing collection of data and the regular updating and maintenance of the Town's asset registry.

6.3.4 Recommendations

- Implement programs and protocols for the continuous collection and maintenance of asset data
- Centralize and consolidate all infrastructure related data (inventory, condition, needs, prioritized requirements, financial data and GIS data) into the CityWide software database, the main asset registry database
- Implement a data governance policy that outlines a consistent corporate approach to database maintenance and management including data handling procedures, roles and responsibilities

6.4 Condition Assessment Programs & Guidelines



6.4.1 Introduction

The foundation of good asset management practice is comprehensive and reliable information on the current condition of infrastructure. Municipalities need to have a clear understanding of the performance and condition of their assets, and all management decisions regarding future expenditures and field activities should be based on this knowledge.

Asset condition is a measure of the physical state of an asset or the ability of an asset to meet its required utility or level of service. An incomplete or limited understanding about the condition of a given asset can lead to substandard asset management decision-making. While there will be a point where asset rehabilitation or replacement is beneficial, it is important that field intervention activities are conducted at the optimal time to maximize the value of existing assets, and to reduce the threat of service disruption. Accurate and reliable condition data will help to prevent premature and costly rehabilitative or replacement activities and ensure that lifecycle activities occur at the right time to maximize asset value and useful life.

6.4.2 Establishing Condition Assessment Programs & Guidelines

In practice, integrating condition assessments into an asset management program requires a systematic and coordinated approach to asset data collection. Standardized condition assessment guidelines and data gathering templates will ensure that all collected asset data is comprehensive and comparable. Ultimately, this will lead to increased confidence in the quality of asset data and provide a stronger basis for decision-making. Condition assessment guidelines serve as a reference for field employees responsible for collecting condition data. This document includes all component and asset level data required, element listing and code guidelines as well as specific instructions for determining asset condition.

Condition assessment can involve different forms of analysis including subjective opinion, mathematical models, or variations thereof, and can be completed through a very detailed or very cursory approach. When establishing the condition of an entire asset category, the cursory approach (metrics such as Very Good, Good, Fair, Poor, Very Poor) is used. This will be a less expensive and time-consuming approach when applied to thousands of assets, yet will still provide actionable data. Condition ratings derived from this model use the grading system described in the following table:

Table 40 Canadian Infrastructure Report Card 2016 - Condition Grading System

Condition Rating	Description	Criteria
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable

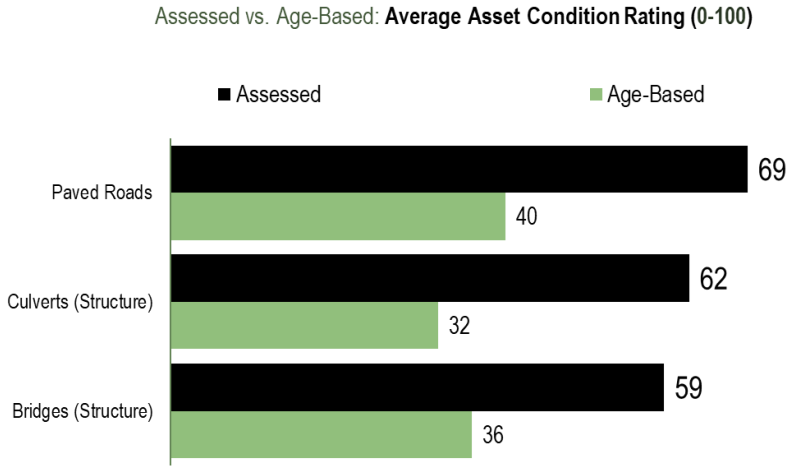
6.4.3 Assessed Condition Data vs. Age-based Data

Measuring asset condition can be a time consuming, labour-intensive and costly practice. However, there is strong evidence that the benefits of implementing condition assessment programs will outweigh any additional costs. In 2015, PSD published a study in partnership with the Association of Municipalities of Ontario (AMO). The report, *The State of Ontario's Roads and Structures: An Analysis of 93 Municipalities*, enumerated the

infrastructure deficits, annual investment gaps, and the physical state of roads, Structures and culverts with a 2013 replacement value of $28 billion.

A critical finding of the report was the dramatic difference in the condition profile of the assets when comparing age-based estimates and actual field inspection observations. For each asset category, field data based condition ratings were significantly higher than age-based condition ratings, with paved roads, culverts, and bridges showing an increase in score (0-100) of +29, +30, and +23 points respectively (**Figure 51**). In other words, age-based measurements may be underestimating the condition of assets by as much as 30%. The implication of this finding is that municipalities are making asset management decisions based on inaccurate data, and as a result, are likely making ineffective lifecycle maintenance and replacement decisions.

Figure 51 Assessed vs Age-based Condition Rating



This report represents a strong statistical justification for the use of condition assessments over age-based estimates. Not only will condition-based data provide a more accurate representation of asset condition, it will also provide a stronger basis for making asset management decisions and achieving the lowest total cost of ownership.

6.4.4 PSD's Condition Assessment Programs and Protocols

Workshop Date: September 2016

In September 2016 PSD staff held an on-site workshop to guide Town staff in gathering condition data and asset attribute data for all major Asset Categories. The delivery of this workshop included hands-on training displaying how to effectively capture and store condition data as well as guidance for determining asset condition.

The Condition Assessment Documentation Package included internal condition assessment guidelines for the following Asset Categories:

1. **Facilities**
2. **Parks & Recreational Areas**
3. **Road Network**
4. **Right-of-Way Appurtenances**
5. **Sidewalks**
6. **Watermains**

The Town was also provided with Request for Proposal (RFP) specifications if condition assessments were preferred to be conducted by external consultant. These specifications were included for the following Asset Categories:

1. **Facilities**
2. **Parks & Recreational Areas**
3. **CCTV Sanitary Sewers**
4. **Road Network**
5. **Right-of-way Appurtenances**
6. **Zoom Storm Sewers**

After this workshop, the Town was given the task of collecting as much relevant and useful asset data as possible within the Roadmap project scope. The collection of additional data allows for more advanced evaluation and analysis of lifecycle and financial requirements. Throughout the Roadmap, PSD worked alongside the Town to ensure that data was collected as per their recommendations, and uploaded into the asset inventory in the proper format.

6.4.5 Recommendations

- Work towards gathering assessed condition on the Town's entire network of infrastructure assets and implementing routine condition assessment program for all Asset Categories that were not completed during the Roadmap
- All future asset condition assessments should be synchronized with CityWide records in order for captured overall condition ratings to be stored within the CityWide database

6.5 Risk Management and Project Prioritization

6.5.1 Introduction

A municipality's assets are often the leading edge of its exposure to external risk. As such, it is important that policies and procedures are put in place in order to manage and mitigate organizational risk exposure. Minimizing risk exposure and using a risk-based analysis to drive asset management decision-making and capital project prioritization helps to prevent consequential asset failure and major service disruption. A risk management framework allows staff to determine the probability and consequence of failure for each asset across the asset portfolio and use that data to optimize capital funding decisions.

For an organization that manages a vast and diverse inventory of capital assets deciding which capital projects to fund can be an intimidating task. There is rarely enough money available to complete all required infrastructure projects. Generally, infrastructure needs exceed municipal financial resources and capacity. This resource scarcity means projects and investments must be prioritized according to their relative importance and risk of failure in order to ensure vital services and critical infrastructure continue to be provided to the community.

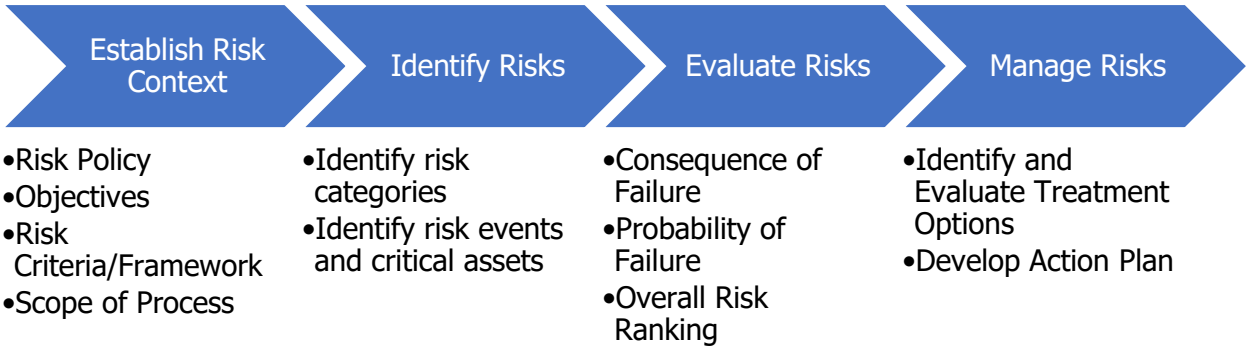
Traditionally, municipalities have prioritized capital projects according to a "worst-first" approach, in which the assets in the worst condition are the highest priority for rehabilitation or replacement. However, this approach fails to account for the fact that some assets are more important to the delivery of vital services and the provision of critical infrastructure than others. As a result, many assets that should be prioritized to prevent service disruption are left to deteriorate.

Ensuring that capital spending is allocated to the assets and projects with the highest risk of failure requires the development of a risk model that provides a quantitative risk rating for each asset.

6.5.2 Risk Management Process

The International Infrastructure Management Manual, with reference to ISO 31000, details a structured approach to identifying, evaluating and managing risk in the context of asset management.

Figure 52 Risk Management Process (International Infrastructure Management Manual)



The development of a corporate risk management framework requires an extensive process involving the collaboration of stakeholders across the organization. This AMP focuses on the evaluation of asset-level risk that allows the Town to identify its level of exposure to risk and determine the actions required to minimize this risk. This approach can be easily adjusted and adapted to fit within the Town's existing and/or future risk management processes.

6.5.3 Economic, Social and Environmental Risks

The creation of a robust risk management framework requires the development of risk profiles that consider three different types of risk: economic, social and environmental. This is often referred to as the "triple bottom line" of assets. These three types of risk can be defined as follows:

Table 41 Triple Bottom Line of Asset Risk

	Economic	The monetary consequences of asset failure for the organization and its customers
	Social	The consequences of asset failure on the social dimensions of the community
	Environmental	The consequence of asset failure on an asset's surrounding environment

6.5.4 Calculating Asset Risk

Integrating a risk management framework into an asset management program requires the translation of risk potential into a quantifiable format. This allows for an analysis and comparison of individual assets across the Town's entire asset portfolio. From an asset

management perspective, risk is a function of the probability of failure and, the consequence of failure.

$$Risk = Probability\ of\ Failure(PoF) \times Consequence\ of\ Failure(CoF)$$

The following table defines both the probability of failure and consequence of failure and the data that could be used to calculate them.

Table 42 Risk Equation Explanation

	Probability of Failure	Consequence of Failure
Definition	The probability of failure directly correlates to the condition of the asset.	The consequence of failure relates to the economic, social and environmental impact of failure.
Data/Parameters	• Asset condition • % of asset life consumed • Known operational issues • Other parameters contributing to asset deterioration (e.g. traffic counts, soil types)	• **Economic**: Cost of rehabilitation or replacement • **Socia**l: Number of people or critical service affected • **Environmental**: Impact of failure on surrounding environment

The strength of a risk management framework depends on the reliability and availability of asset attribute data. The integration of meaningful asset attribute data that represents the economic, social and environmental risks will provide increased confidence in capital project decision-making and support evidence-based budget deliberations. While more data does not necessarily mean better outcomes, the careful selection of risk parameters that consider the triple bottom line of assets can optimize asset management decision-making.

6.5.5 Managing Risk

Risk treatment options may include a wide range of risk-mitigation techniques. The International Infrastructure Management Manual identifies the following strategies that may be considered by the Town to manage asset risk:

1. Reduce the risk through capital or maintenance expenditure
2. Reduce the risk by implementing operational and management initiatives
3. Reduce the impact of failure by actions such as preparing emergency response plans
4. Accept some risk and carry the consequential costs

5. Insure against the consequential costs

These strategies as well as the specific activities that would be required to implement them should be regularly reviewed by staff to ensure that asset management decision-making reduces the overall risk exposure of the Town.

6.5.6 Risk Report Summary

Workshop Date: March 2018

In March 2018, PSD delivered a workshop on developing a risk management framework in the Town of East Gwillimbury. PSD worked alongside staff at the Town to develop risk parameters that allow for the calculation of both the consequence and probability of asset failure. The following table summarizes which asset types had customized risk profiles developed and uploaded into the CityWide database.

Table 43 Overview of Risk Models Developed by Asset Category

Asset Category	Asset Type	Risk Parameters
Road Network	Road Surface	Condition Road Surface Material MMS Class Roadside Environment Roadside Classification AADT Speed Limit
Sanitary Sewer Network	Sanitary Mains	Condition Pipe Diameter Structure Type Pipe Material
Storm Sewer System	Storm Sewer Mains	Condition Pipe Diameter Structure Type Surface Above Material
Water Distribution System	Water Mains	Condition Structure Type Pipe Class Pipe Material Surface Above Material Pipe Diameter

6.5.7 Project Prioritization

One of the benefits of implementing a risk management framework is a stronger foundation for the prioritization of capital projects based on the greatest risk of failure. This is not always the asset that is in the worst condition. The implementation of the developed risk management framework enables the municipality to create reports that rank assets according to the highest risk and consequence of failure.

6.5.8 Recommendations

- Complete risk model development and assessment for minor Asset Categories including Vehicles, IT, Land Improvements etc.
- Integrate climate change risk assessment into risk management framework (exposure, vulnerability, resilience, adaptation)

6.6 Lifecycle Activity Framework

6.6.1 Introduction

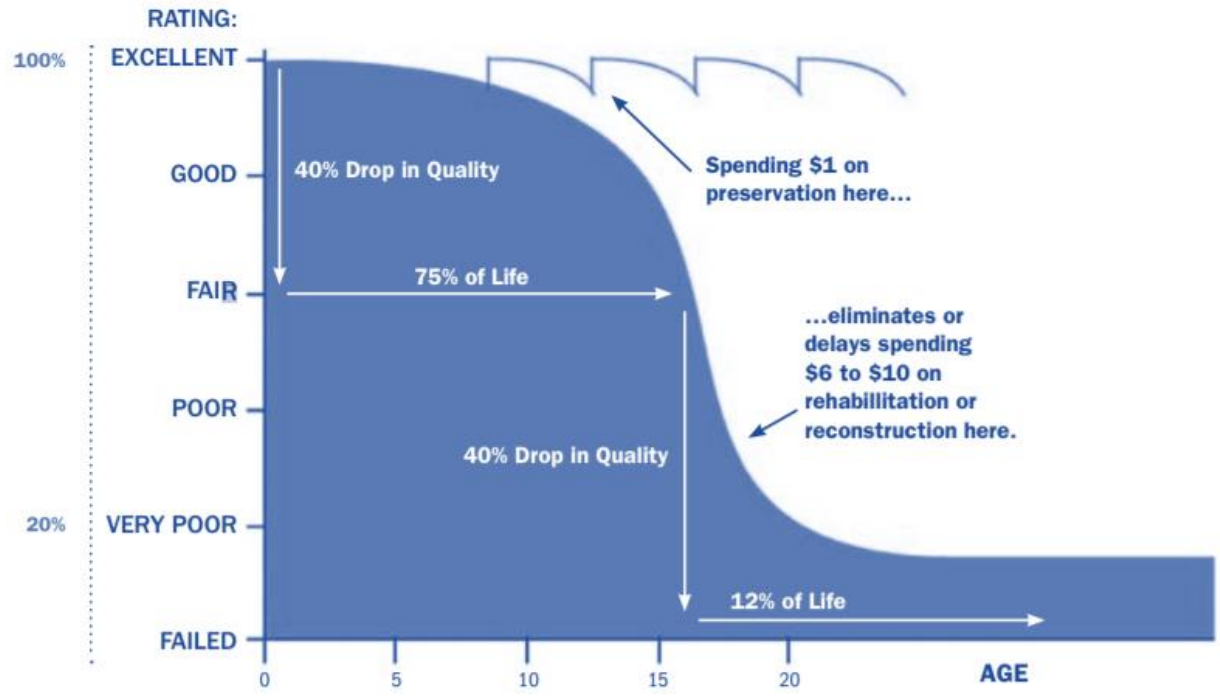
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. This deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk, and even service disruption. In order to ensure that municipal assets are performing as expected and meeting the needs of stakeholders, it is important to establish a strategy to proactively manage the deterioration of municipal assets.

6.6.2 Lifecycle Activity Management

Lifecycle activity management is the practice of managing the asset deterioration through the implementation of a maintenance, rehabilitation and replacement strategy. An asset lifecycle strategy will ensure that the right thing is being done to the right asset at the right time. Effective lifecycle activity management can extend the service life of assets and ensure that assets continue to meet service and performance requirements at the lowest total cost of ownership.

Figure 53 provides an example of the benefits of lifecycle activity management over the service life of an asset.

Figure 53 Deterioration Curve Outlining Benefits of Lifecycle Activities (Canadian Infrastructure Report Card 2016)



6.6.3 Developing a Lifecycle Activity Strategy

Developing a lifecycle activity strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest cost. There are a number of field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: preventative maintenance, rehabilitation and reconstruction. The following table provides a description of each type of activity and the general difference in cost.

Table 44 Cost of Lifecycle Activity Types

Activity Type	Description	Example	Cost
Preventative Maintenance	Any activities that prevent defects or deteriorations from occurring	(Roads) Crack Seal	**$**
Rehabilitation	Any activities that rectify defects or deficiencies that are already present and may be affecting asset performance	(Roads) Mill & Resurface	**$$**
Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	(Roads) Full Reconstruction	**$$$**

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of preventative maintenance and rehabilitation, but at some point reconstruction or replacement is required. Understanding what effect these

activities will have on the lifecycle of an asset, and their cost, will enable better decision-making.

6.6.4 Lifecycle Strategy and Asset Profile Development

Workshop Date: March 2018

In March 2018, PSD consultants and Town of East Gwillimbury staff collaborated to develop customized lifecycle strategies that optimize maintenance, rehabilitation and replacement activities for major infrastructure assets. At this time the Town has developed lifecycle strategies for both roads, sanitary mains, and storm mains that have been used in this AMP to more accurately identify long-term capital requirements.

6.6.5 Recommendations

- Continue to develop and refine lifecycle strategies for core Asset Categories including roads, bridges, water, sewer, and storm
- Integrate lifecycle strategies based on any upcoming studies or reports (e.g. Road Needs Study, OSIM inspections)

6.7 Climate Change

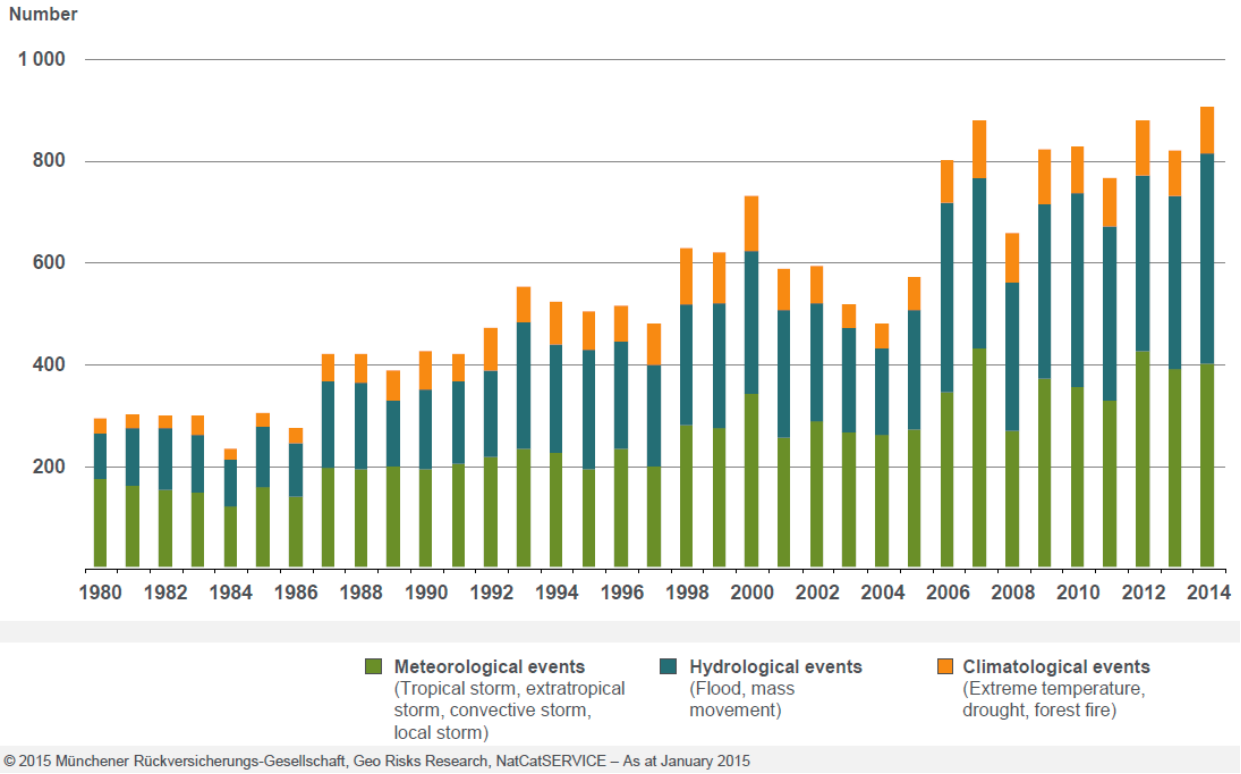
6.7.1 Introduction

The impacts of climate change present a momentous challenge to municipal infrastructure. As temperatures and sea levels rise, and extreme weather events occur with greater frequency, it is critical that municipalities attempt to understand the emerging threat of climate change and develop strategies to ensure that vital services and critical infrastructure continue to operate as expected. This will require consideration of four key factors of climate change (exposure, vulnerability, resilience and adaptation) at every stage of an asset's lifecycle.

6.7.2 Threat of Climate Change

Globally, there has been a significant increase in weather-related loss events resulting in property damage and/or bodily injury (**Figure 54**). Municipal infrastructure is at particular risk to meteorological, hydrological and climatological events leading to an increasing rate of asset deterioration, failure and service disruption.

Figure 54 Weather related loss events worldwide 1980-2014



According to *Canada's Sixth National Report on Climate Change 2014* the type of climate threats that are most likely to impact the Town's infrastructure include:

Higher Average Annual Temperature

- Between 1948 and 2012, the annual average air surface temperature over Canada's landmass has increased by about 1.7ºC, approximately twice the global average.
- Average summer temperatures to rise by 2-4ºC with more warming in the winter
- Increase in instances of heatwaves
- Increase in average rainfall

Increase in Total Annual Precipitation

- There will be significant changes in precipitation between seasons, with winters becoming wetter and summer becoming drier
- Increased rate of ice and windstorms

Increase in Frequency of Extreme Weather Events

- It is expected that the frequency and severity of extreme weather events will change
- In some geographical areas, extreme weather events will occur with greater frequency and severity than others

6.7.3 Exposure & Vulnerability

Climate change exposure is the nature and degree to which a system is exposed to significant climate variations. Exposure is a combination of the probable range of a climate stressor and the physical characteristics of a geographical location. For example, for a coastal facility, its height above sea level correlates to the exposure of the asset to rising sea levels caused by the onset of climate change. Understanding the exposure of existing infrastructure and integrating climate change exposure into the planning and design process of asset management is a critical step towards minimizing the impacts the expected threats of climate change.

The Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as "the degree to which a system is susceptible, and unable to cope with, adverse effects of climate change, including climate variability and extremes". Vulnerability considers the structural strength, integrity and function of assets or asset systems in terms of the potential for damage or functional disruption as a result of climate stressors.

6.7.4 Resilience & Adaptation

Resilience is used to refer to the capacity of a system to absorb disturbance without losing essential function. In the context of physical assets or asset systems, it is the ability of a system to continue to operate as a result of a built-in redundancy. An example of this is a Road Network's ability to operate despite the loss of a single road or bridge, or the relative ease with which it can be replaced. The context for resilience is a combination of physical constraints on repair or replacement, socio-economic limitations and system redundancy.

The IPCC defines adaptation as "the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". Adaptive strategies fall into three categories: protect, accommodate and retreat. In a coastal region, a protection strategy might aim to protect assets from flooding by constructing hard or soft structures by installing sea walls, beach nourishment or wetland restoration. Accommodation may call for preparing for periodic flooding by having operational plans inplace. Retreat involves no attempt to protect the asset. Under these conditions a facility or structure may be abandoned completely. Although applied specifically to coastal examples, these adaptive strategies may be generalized to all types of asset and asset geographical locations.

6.7.5 Expected Impact of Climate Change on Infrastructure

The International Institute for Sustainable Development identified the following impacts of climate change on municipal infrastructure in Canada:

Table 45 Impacts of Climate Change on Infrastructure (International Institute for Sustainable Development)

	Greater frequency of freeze-thaw cycles leading to thermal cracking, rutting, frost heave and thaw weakening
	Soil instability, ground movement and slope instability
	Triggered instability of embankments and pavement structures
	Shortened life expectancy of highways, roads and rail
	Drier conditions affecting the lifecycle of structures and culverts
	Reduced structural integrity of building components through mechanical, chemical and biological degradation
	Increased corrosion and mold growth
	Damaged or flooded structures
	Reduced service life and functionality of components and systems
	Increased repair, maintenance, reserve fund contingencies and energy costs
	Increased water demand and pressure on infrastructure
	Loss of potable water
	Increased risk of flooding; storm sewer infrastructure more frequently exceeded
	Rupture of drinking water lines, sewage lines and sewage storage tanks
	Saltwater intrusion in groundwater aquifers

6.7.6 Recommendations

- Consider the impact of climate change on the estimated useful life of all assets
- Adjust lifecycle activity strategies for assets that are particularly exposed or vulnerable to the impacts of climate change
- Develop policies that outline a commitment to consider the impact of climate change on existing infrastructure and future development
- Include climate change considerations into the design and planning phase of asset lifecycle
- Integrate impacts of climate change into risk management frameworks
- Develop disaster mitigation plans in the event of infrastructure failure

7.0 Levels of Service Framework

7.1 Introduction

The primary responsibility of a municipality is to ensure that they are providing adequate and sustainable services to their community. This outcome is generally supported by organizational objectives, mission statements and official plans that outline the rationale for these activities.

To ensure that organizational objectives align with expected service outcomes, it is necessary to develop a process for the systematic measurement, monitoring and evaluation of an organization's level of service. A level of service can be defined as a description of the service output for an activity or service area against which performance may be measured. To put it simply, a level of service is a measure of what a municipality is providing to its community.

7.1.1 Performance Measurement

Performance measurement is a key component of an effective level of service strategy. It allows the Town to analyze how well municipal services are meeting the needs and expectations of stakeholders, and identify where there are gaps that need to be addressed. Developing realistic levels of service using meaningful key performance indicators (KPIs) is instrumental in managing citizen expectations, identifying areas requiring higher investments, driving organizational performance and securing the highest value for money from public assets.

To facilitate this process, it is useful to develop a framework for tracking and evaluating the levels of service being provided. This will require the translation of organizational objectives and expected service outcomes into key performance indicators that reflect evolving demand on infrastructure, the organization's fiscal capacity and overall organizational objectives. A centralized database that is used to measure and evalaute levels of service and KPIs will assist with this process.

7.1.2 Guiding Principles and Core Values

As a guide to developing and measuring levels of service, it is useful to understand what the public values in the provision of municipal services. **Table 46** provides an overview of the values that the municipality should strive to accommodate when delivering services to the public. These are based on the values that the public generally expects to be delivered when a service is being provided to them.

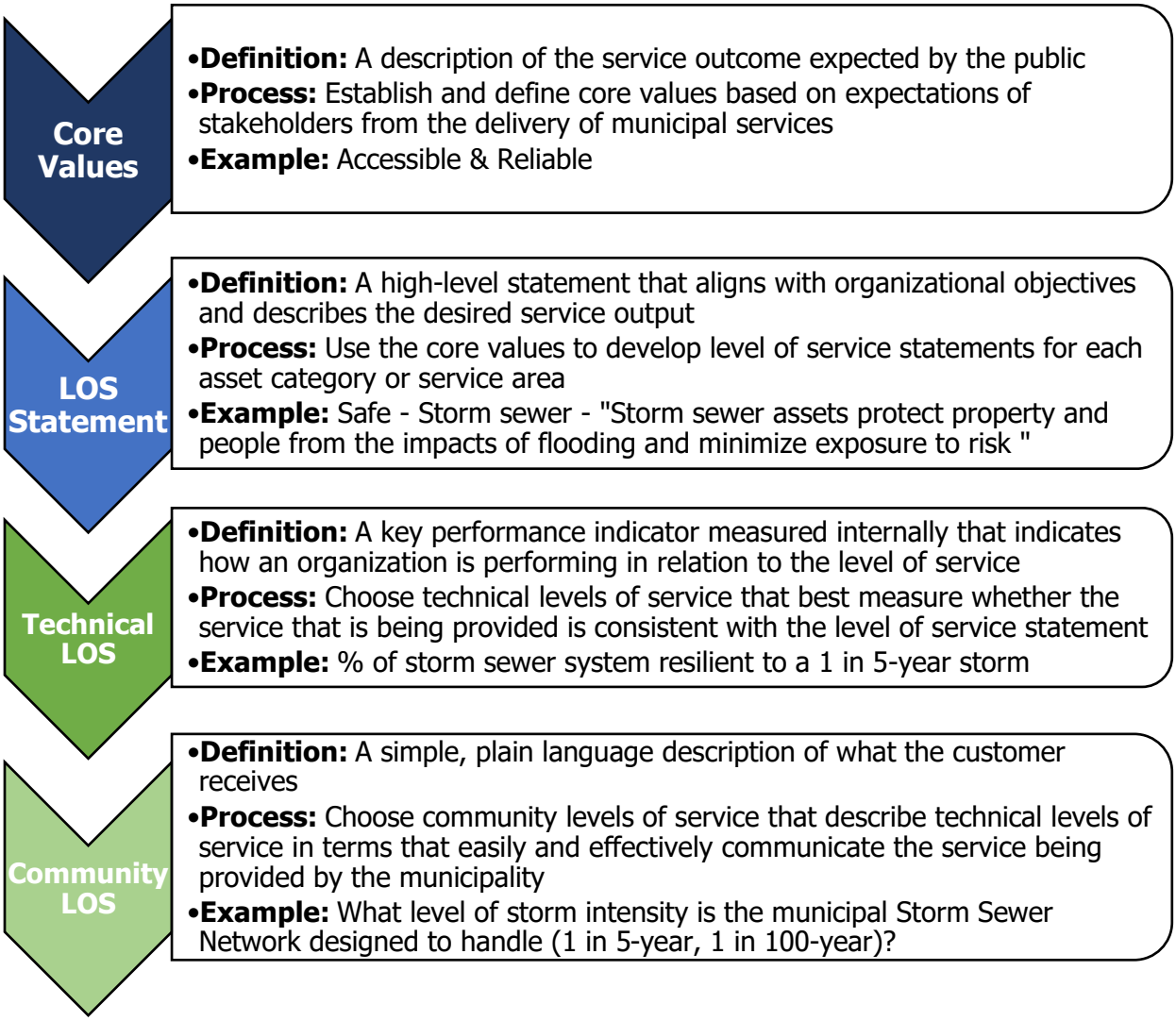
Table 46 Core Values Guiding Levels of Service

Value	Description
Accessible	Services are available and accessible for customers who require them.
Reliable	Services are provided with minimal service disruption and are available to customers in line with needs and expectations.
Safe	Services are delivered such that they minimize health, safety and security risks.
Regulatory	Services meet regulatory requirements of all levels of government.
Affordable	Services are suitable for the intended function (fit for purpose).
Sustainable	Services are designed to be used efficiently and long-term plans are in place to ensure that they are available to all customers into the future.

7.1.3 Defining and Establishing Levels of Service

Figure 55 provides a basic guide to establishing levels of service.

Figure 55 Guide to Establishing Levels of Service



7.1.4 Selecting Technical Levels of Service

Deciding which KPIs to use when establishing technical levels of service is not a science, but there are a few key considerations to consider. A good rule to follow in determining the best indicators is to use **SMART** system developed by the Institute of Public Works Engineering Australasia:

KPIs should cover a **Specific** aspect of service, be **Measurable**, and have a clear plan for achieving targets (**Achievable**). They should also be **Relevant** to the level of service and strategic objective and have a clear timeframe for when targets will be achieved (**Timebound**).

7.1.5 Levels of Service Workshop

Workshop Date: August 22nd, 2018

On August 22nd, 2018 PSD met with Town staff to develop a customized levels of service framework. The initial presentation and discussion covered the importance of levels of service in an asset management program and the role that it should play in decision-making moving forward. From there the workshop focused on developing meaningful level of service statements, technical and customer levels of service (included in the State of Local Infrastructure) that take into consideration the availability of data and the ability of these indicators to provide actionable data.

The Workshop concluded with an interview of Town staff on the various internal and external factors and trends that may affect their ability to provide expected levels of service in the future. The results of this interview are summarized in the following section.

7.2 Technical Levels of Service

The following tables outline the performance measures that the Town has selected to measure the current technical level of service provided to the community. This has been developed in preparation for the requirements outlined in O.Reg. 588/17. At this time, staff are working towards measuring and collecting the data required to fill in this framework. This work will be completed prior to the development of the Town's next AMP by July 1, 2021.

Table 47 Technical Levels of Service - Water Distribution System

Asset Category	Core Value	Performance Measure
Water Distribution System	Accessible & Reliable	% of properties connected to the municipal water system
		# of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system
		% of properties where fire flow is available
	Safe & Regulatory	# 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
		# of AWQI annually
		# of water quality customer complaints / 1,000 people served
	Affordable	(Average annual residential water bill / average household income) * 100
		O&M Cost (distribution only)/ pipe km length
	Sustainable	Annual capital reinvestment rate
		# of O&M FTEs / 100 km length
		Water Master Plan reviewed and/or updated annually
		Water System AMP reviewed and/or updated annually

Table 48 Technical Levels of Service - Sanitary Sewer Network

Asset Category	Core Value	Performance Measure
Sanitary Sewer Network	Accessible & Reliable	% of properties connected to the municipal wastewater system
		% of sewer network length CCTV inspected
		# of sanitary service backups
		# of sanitary main backups
	Safe & Regulatory	# 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
		# of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system
		# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system
	Affordable	(Average annual residential sewer bill / average household income) * 100
		O&M Cost (collection only) / km pipe length
	Sustainable	Wastewater Master Plan reviewed and/or updated annually
		# of O&M FTEs / 100 km length
		Annual capital reinvestment rate
		Wastewater System AMP reviewed annually

Table 49 Technical Levels of Service - Storm Sewer System

Asset Category	Core Value	Performance Measure
Storm Sewer System	Accessible & Reliable	# of service requests
		# of service requests per capita
		% of catch basins cleaned
	Safe & Regulatory	% of properties in municipality resilient to a 100-year storm
		% of the municipal stormwater management system resilient to a 5-year storm
	Sustainable	Annual capital reinvestment rate
		# of O&M FTEs / 100 km length
		Stormwater Master Plan reviewed and/or updated annually
		Stormwater System AMP reviewed and/or updated annually

Table 50 Technical Levels of Service Road Network

Asset Category	Core Value	Performance Measure
Road Network	Accessible & Reliable	Lane-km of arterial roads (MMS classes 1 and 2) per land area in the municipality (km/km2)
		Lane-km of collector roads (MMS classes 3 and 4) per land area in the municipality (km/km2)
		Lane-km of local roads (MMS classes 5 and 6) per land area in the municipality (km/km2)
		% of service requests responded to within 72 hours
		# of unplanned road closures
		Km of sidewalks per land area in the municipality (km/km2)
	Safe & Regulatory	% of sidewalks inspected
		% of road network inspected
		% of winter event responses that met or exceeded municipal road maintenance standards
		# of service requests related to the road network
		# of service requests related to the sidewalk network
	Affordable	O&M costs for paved roads / lane-km (excluding winter control, including bridges)
		O&M costs for winter control / lane-km (including sidewalks)
	Sustainable	Road Network AMP reviewed and/or updated annually
		# of O&M FTEs / 100 km length
		Average pavement condition index for paved roads in the municipality
		Annual capital reinvestment rate

Table 51 Technical Levels of Service - Structures

Asset Category	Core Value	Performance Measure
Structures	Accessible & Reliable	% of bridges in the municipality with loading or dimensional restrictions
		# of unplanned bridge closures
	Safe & Regulatory	% of bridges and structural culverts inspected every two years
	Sustainable	Bridges & Culverts AMP reviewed and/or updated annually
		Annual capital reinvestment rate
		Average bridge condition index value for bridges in the municipality
		Average bridge condition index value for structural culverts in the municipality

7.3 Community Levels of Service

The following tables outline the qualitative descriptions that the Town has selected to measure the current community level of service provided to the community. This has been developed in preparation for the requirements outlined in O.Reg. 588/17. At this time, staff are working towards measuring and collecting the data required to fill in this framework. This work will be completed prior to the development of the Town's next AMP by July 1, 2021.

Table 52 Community Levels of Service - Water Distribution System

Asset Category	Core Value	Qualitative Description
Water Distribution System	Accessible & Reliable	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
	Safe & Regulatory	Description of boil water advisories and service interruptions
	Affordable	What is the average quarterly residential water bill?
	Sustainable	When was the last time that the Water System AMP was reviewed and/or updated?

Table 53 Community Levels of Service - Sanitary Sewer Network

Asset Category	Core Value	Qualitative Description
Sanitary Sewer Network	Accessible & Reliable	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system
	Safe & Regulatory	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes
		Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches
		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 how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3
		Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system
	Affordable	What is the amount of the average quarterly residential sewer bill?
	Sustainable	When was the last time that the Wastewater System AMP was reviewed?

Table 54 Community Levels of Service Storm Sewer System

Asset Category	Core Value	Qualitative Description
Storm Sewer System	Accessible & Reliable	Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater management system
	Safe & Regulatory	What level of storm intensity is the municipal stormwater network designed to handle (e.g. 1 in 5-year)?
	Sustainable	When was the last time that the Stormwater System AMP was reviewed and/or updated?

Table 55 Community Levels of Service - Storm Sewer System

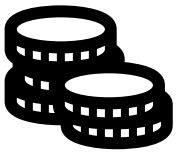
Asset Category	Core Value	Qualitative Description
Road Network	Accessible & Reliable	Description, which may include maps, of the road network in the municipality and its level of connectivity
	Safe & Regulatory	Description of minimum maintenance standards for road network (road surfaces and sidewalks)
	Affordable	What is the O&M cost to maintain the road network per household?
	Sustainable	When was the last time the Road Network AMP was reviewed and/or updated?
		Description or images that illustrate the different levels of road class pavement condition

Table 56 Community Levels of Service - Structures

Asset Category	Core Value	Qualitative Description
Structures	Accessible & Reliable	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)
	Safe & Regulatory	Description of the OSIM inspection process
	Sustainable	When was the last time the Bridges & Culverts AMP was reviewed and/or updated?
		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

7.4 Trends Impacting Levels of Service

The provision of desired levels of service is not simply a matter of proper asset management. There are a wide range of internal and external factors that may impact the ability of a municipality to provide reliable public services. As part of the Levels of Service Workshop, PSD interviewed Town staff to gain greater insight into the challenges and opportunities facing the municipality now and into the future. The following sections summarize the results of this interview:



Fiscal Capacity

Maintaining municipal infrastructure and providing desired levels of service requires the allocation of adequate financial resources. Fiscal capacity and budget constraints are a constant concern for staff across all departments attempting to manage the maintenance and rehabilitation of municipal infrastructure, and they certainly impact the level of service being provided to the community. For example, while there is a keen understanding of the benefits of a proactive approach to managing the lifecycle of infrastructure assets, there simply is not enough funding to engage in more proactive maintenance, rehabilitation and replacement activities. Managing the infrastructure deficit is a key concern, not only for East Gwillimbury, but all municipalities. Capital funding is all too often negatively impacted by increasing operating costs. With a lack of adequate funding available to fund necessary capital projects, the Town has begun to explore additional revenue sources. Most recently there has been a discussion about implementing a stormwater user rate to help fund critical capital projects for the Town's stormwater network.

Municipalities typically have few means at their disposal to raise adequate and sustainable funding to meet operational and capital requirements. As a result, they are heavily dependent on both provincial and federal grant programs to maintain and replace municipal infrastructure. Any fluctuations in annual grant funding secured can have a dramatic impact on provided services. In recent years, the Town has had moderate success with available grant funding opportunities. As staff identified, there are additional grant funding opportunities that have yet to be leveraged (e.g. FCM – Municipal Asset Management Program). However, it was also noted that it is a constant struggle to find extra resources needed to accomplish tasks attached to the grant funding being provided.

Aging Infrastructure

The condition and performance of municipal infrastructure assets directly correlates to the quality of services a municipality can deliver to its residents. Aging and deteriorating assets increasingly remain in service past their estimated service lives due to a lack of fiscal capacity to replace or rehabilitate as needed. In general, East Gwillimbury is fortunate to have relatively new infrastructure in place across their entire network. Water and wastewater infrastructure and bridges are all considered to be in good condition, and with the coming

implementation of a pavement management system the Town will have a clearer picture of the current state of their roads. As of yet, many assets have not even reached the end of their first full lifecycle.

Due to rapid growth in recent years there are large sections of the Town's infrastructure that were built at the same time. Since all this infrastructure came into service around the same time there is going to be significant portions of the Town's network that deteriorate in a relatively uniform fashion. This will be a concern as all these assets are projected to be replaced at around the same time in the future. As a result, it is critical that a proactive and staggered approach to infrastructure renewal and replacement is developed to prevent a dramatic increase to annual capital costs in the future.

Climate Change and Weather Events

Forecasting for infrastructure needs based on climate change remains an imprecise science. However, broader environmental and weather patterns have shown a direct impact on the reliability of critical infrastructure services. As such, it is important that the impacts of weather events on municipal infrastructure are accounted for in the development of asset management strategies.

In recent years staff have observed an increase to the intensity and frequency of extreme weather events. While this has not led to any immediate impacts on service delivery or critical infrastructure failure, there is a general concern about future impacts. In particular, there is concern about the impact of flooding events due to East Gwillimbury's local topography and the current capacity of stormwater infrastructure. In an effort to address these concerns the Town is currently developing a Stormwater Master Plan which will help to guide the growth and expansion of the stormwater network.

Demographic Change and Expected Growth

Municipal demographics can also serve as an infrastructure demand driver, and as a result, can change how a municipality decides to allocate its resources. Population growth is also a significant demand driver for existing assets and may require the municipality to construct new infrastructure to parallel community expectations. Due to the Town's proximity to the Greater Toronto Area, the town has experienced dramatic population growth and does not expect it to slow down any time soon. Forecasts project the Town's population to double by 2026 and triple by 2051.

In an effort to anticipate these changes and develop plans and strategies that take population growth into account the Town has formally integrated growth projections into their Development Charge Bylaw. This Bylaw then directly funnels revenue into growth-

related capital projects. In order to meet desired levels of service it is critical that all asset management planning and strategies are developed with growth in mind. This includes the impact of population growth on the lifecycle activities required to maintain municipal infrastructure that can accommodate a larger population.

Community Expectations

The general public will often have their own opinions about how a public service should be delivered. Municipal staff are tasked with balancing requests from the public with the reality of available funding to provide the best service possible at the lowest total cost. This can be a difficult task as there is often a significant gap between expectations and reality. Town staff remarked that there has been a noticeable increase in service expectations in recent years. These higher expectations often are seen partially as a result of the influx of citizens that have moved from larger cities. Larger cities tend to have additional revenue available to provide additional services that small and mid-size communities may not be able to. Managing these expectations can be a tricky task, but it can also be made easier through the development of a level of service framework and the use of community and technical levels of service to better communicate the scope and resources required to provide adequate services to the community.

Town staff remarked that active transportation networks supporting pedestrians, cyclists and motor vehicles is among one of the biggest desires from the public for service enhancements. However, the hamlets weren't originally designed to support active transportation networks, so this will be a significant challenge to bridge the gap between expectations and reality. It is expected that the Town will need to re-evaluate the connectivity of their transportation network and design solutions to accommodate emerging community expectations for levels of service.

Organizational Change and Capacity

Managing municipal assets and delivering public services requires adequate organizational capacity. The availability of staff to facilitate these projects is a concern for many municipalities. Town staff remarked that there have been no additional positions created to support expanding responsibilities and regulatory requirements. With rapid population growth occurring it is expected that organizational capacity will be one of the major challenges faced in the coming years. While there is a general sense that there is a low capacity to adapt to change at the corporate level, asset management has been one of the few areas to gain additional staff capacity recently.

In addition to existing staff capacity, succession planning is one of the key challenges that an aging municipal workforce faces as senior staff progress towards possible retirement or relocation. The loss of knowledge and experience that accompanies staff

departures can have a dramatic impact on the ability of an organization to continue operations and provide services to the level that has previously been expected. East Gwillimbury, has experienced significant staff turnover resulting in the re-organization of internal roles and responsibilities. This has led to staff being overburdened with responsibilities; in many cases one person is responsible for up to 2 or 3 separate roles. One department that has been particularly stretched thin is IT, and this has the effect of trickling through the organization. There is an immediate need for additional capital for IT infrastructure (work stations, servers etc.) and additional staffing capacity to implement and support this infrastructure.

7.5 Recommendations

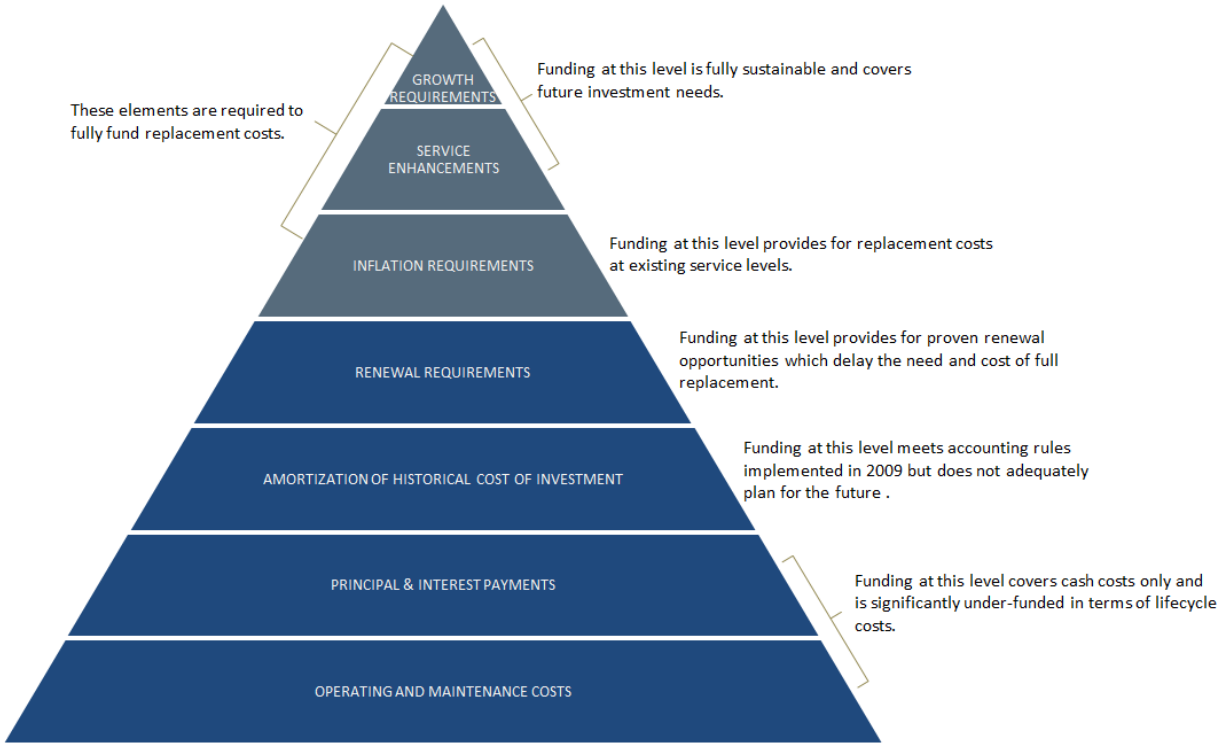
- Begin to measure current levels of service as part of a comprehensive performance measurement framework
- Once current levels of service have been measured, establish proposed levels of service
- Evaluate levels of service on an annual basis and adjust targets in collaboration with Council in an effort to balance community expectations, cost, risk and performance
- Communicate provided levels of service with the public and engage in public consultation to identify emerging perceptions and priorities

8.0 Financial Requirements Analysis

In order for an asset management plan to be effective and meaningful, it must be integrated with long-term financial planning and budgeting. The development of a comprehensive financial plan will allow the Town of East Gwillimbury to identify the financial resources required for sustainable asset management.

8.1 Financial Plan Overview

The following pyramid depicts the various cost elements and resulting funding levels that should be incorporated into a financial plan based on best practices:



A financial plan should address the following components in the development of several funding scenarios:

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels
    d. Requirements of anticipated growth

2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves
    d. Debt

3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods

4. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants[3]

If the financial plan results in a funding shortfall, a strategy should be developed to address how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a municipality's approach to the following:

1. In order to reduce financial requirements, consideration has been given to revising service levels downward

2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not the use of debt should be considered.
    b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

[3] Periodic grants are normally not included in long-term financial plans as they are considered an unsustainable revenue source. However, if moving a specific project forward is wholly dependent on receiving a one-time grant, the replacement cost included in the financial strategy is net of such grant being received.

8.2 Determining Financial Requirements

Asset categories have been split into two groups based on their primary funding source:

1. **Tax Funded Assets**: Road Network[4], Structures, Storm Sewer System, Machinery & Equipment, Buildings & Facilities and Vehicles

2. **Rate Funded Assets**: Sanitary Sewer Network, Water Distribution System

Additionally, two separate scenarios have been developed to determine financial requirements based on the Town's approach to lifecycle management:

1. **End of Life Replacement Scenario:** Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.

2. **Lifecycle Strategy Scenario:** Based on the assumption that lifecycle activities are performed at the optimal time to extend the useful life of assets at the lowest cost; assets are replaced at the end of the extended useful life.

8.3 Annual Capital Requirements

8.3.1 Annual Capital Requirements – Tax-Funded Assets

Table 57 outlines average annual capital requirements and the difference in cost requirements between two lifecycle management scenarios:

Table 57 Annual Capital Requirements – Tax-Funded Assets

Asset Category	Annual Capital Requirements		Difference
	End of Life Scenario	Lifecycle Strategy Scenario	
Road Network	7,746,000	5,864,000	1,882,000
Storm Sewer System	4,806,000	4,440,000	366,000
Buildings & Facilities	1,412,000	1,412,000	0
Machinery & Equipment	723,000	723,000	0
Land Improvements	681,000	681,000	0
Vehicles	756,000	756,000	0
Structures	460,000	460,000	0
Total:	**16,584,000**	**14,336,000**	**2,248,000**

Through the implementation of the Lifecycle Strategy Scenario there is a potential annual cost avoidance of $2,248,000 for tax-funded assets.

[4] For the purposes of this AMP, we have excluded gravel roads since gravel roads are a perpetual maintenance asset. If gravel roads are maintained properly, they, in essence, could last forever.

8.3.2 Annual Capital Requirements – Rate-Funded Assets

Table 58 outlines average annual capital requirements and the difference in cost requirements between two lifecycle management scenarios:

Table 58 Annual Capital Requirements – Rate-Funded Assets

Asset Category	Annual Capital Requirements		Difference
	End of Life Scenario	Lifecycle Strategy Scenario	
Sanitary Sewer Network	2,454,000	1,986,000	468,000
Water System	4,875,000	4,875,000	0
Total:	**7,329,000**	**6,861,000**	**468,000**

Through the implementation of the Lifecycle Strategy Scenario there is a potential annual cost avoidance of $468,000 for rate-funded assets.

8.3.3 Annual Capital Requirements – Summary

Table 59 aggregates annual capital requirements between both tax-funded and rate-funded assets.

Table 59 - Annual Capital Requirements - Summary

Asset Category	Annual Capital Requirements		Difference
	End of Life Scenario	Lifecycle Strategy Scenario	
Tax-Funded Assets	16,584,000	14,336,000	2,248,000
Rate-Funded Assets	7,329,000	6,861,000	468,000
Total:	**23,913,000**	**21,197,000**	**2,716,000**

Through the implementation of the Lifecycle Strategy Scenario there is a potential annual cost avoidance of $2,716,000 for all assets.

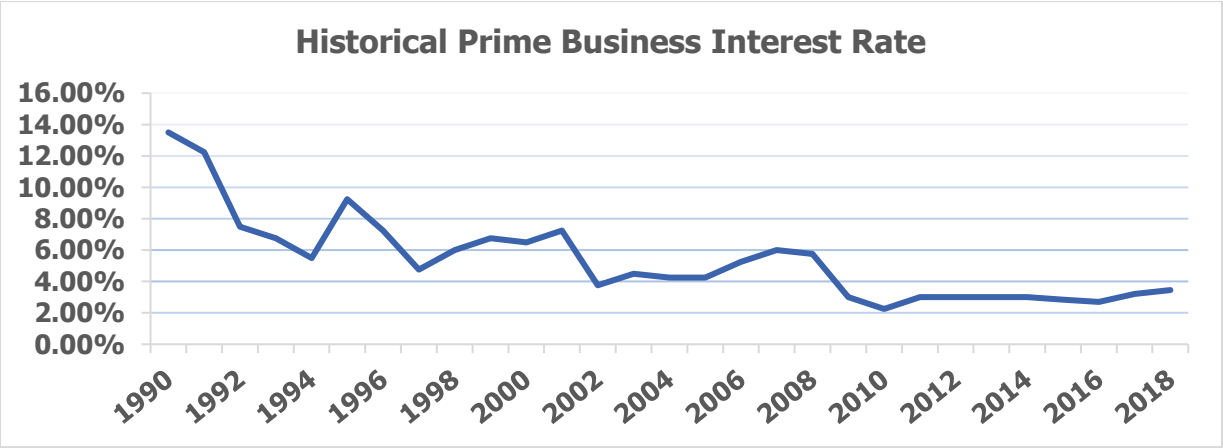
8.4 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[5] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

Table 60 Total Interest Paid as a % of Project Costs

Interest Rate	Number of Years Financed					
	5	10	15	20	25	30
7.0%	22%	42%	65%	89%	115%	142%
6.5%	20%	39%	60%	82%	105%	130%
6.0%	19%	36%	54%	74%	96%	118%
5.5%	17%	33%	49%	67%	86%	106%
5.0%	15%	30%	45%	60%	77%	95%
4.5%	14%	26%	40%	54%	69%	84%
4.0%	12%	23%	35%	47%	60%	73%
3.5%	11%	20%	30%	41%	52%	63%
3.0%	9%	17%	26%	34%	44%	53%
2.5%	8%	14%	21%	28%	36%	43%
2.0%	6%	11%	17%	22%	28%	34%
1.5%	5%	8%	12%	16%	21%	25%
1.0%	3%	6%	8%	11%	14%	16%
0.5%	2%	3%	4%	5%	7%	8%
0.0%	0%	0%	0%	0%	0%	0%

It should be noted that current interest rates are near all-time lows. Sustainable funding models that include debt need to incorporate the risk of rising interest rates. The following graph shows where historical lending rates have been:



[5] Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

As illustrated in **Table 60**, a change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

East Gwillimbury has no debt on the assets covered in this AMP. The revenue options outlined in this plan allow East Gwillimbury to fully fund its long-term infrastructure requirements without the use of future debt.

8.5 Use of Reserves

8.5.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include:

a) the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
b) financing one-time or short-term investments
c) accumulating the funding for significant future infrastructure investments
d) managing the use of debt
e) normalizing infrastructure funding requirement

By asset category, **Table 61** outlines the details of the reserves currently available to East Gwillimbury.

Table 61 Summary of Reserves Available

Asset Category	Balance at December 31, 2018
Road Network	1,835,000
Storm Sewer System	1,942,000
Buildings & Facilities	4,185,000
Machinery & Equipment	7,917,000
Land Improvements	1,689,000
Vehicles	1,406,000
Structures	1,020,000
Total Tax Funded:	**19,994,000**
Sanitary Sewer Network	3,848,000
Water System	1,942,000
Total Rate Funded:	**5,790,000**

There is considerable debate in the municipal sector as to the appropriate level of reserves that a municipality should have on hand. There is no clear guideline that has gained wide

acceptance. Factors that municipalities should consider when determining their capital reserve requirements include:

a) breadth of services provided
b) age and condition of infrastructure
c) use and level of debt
d) economic conditions and outlook
e) internal reserve and debt policies.

The reserves in **Table 61** are available for use by applicable asset categories during the phase-in period to full funding. This coupled with East Gwillimbury' judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

8.5.2 Recommendation

As East Gwillimbury updates its AMP and expands it to include other asset categories, we recommend that future planning should include determining what its long-term reserve balance requirements are and a plan to achieve such balances.

Appendix A: Lifecycle Activity Requirements

The following tables identify the cost of capital lifecycle activities that would need to be undertaken to maintain the current level of service provided by the Town's infrastructure. This data includes both end-of-life replacement and lifecycle activities.

Road Network

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Curb and Gutter	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Guide Rails	$0	$0	$55,971	$0	$28,417	$35,044	$20,408	$94,249	$0	$0
Illuminations	$0	$14,140	$53,208	$11,220	$31,060	$16,146	$0	$0	$0	$0
Paved Roads	$4,124,679	$5,097,096	$974,417	$8,432,824	$2,012,288	$7,370,707	$2,400,301	$89,684	$142,561	$47,156
Poles	$0	$9,338	$0	$40,470	$105,137	$0	$27,340	$102,816	$18,632	$90,962
Roadside Ditching	$0	$78,200	$0	$0	$0	$0	$9,359	$32,011	$12,178	$188,563
Sidewalks	$0	$352,220	$79,640	$219,469	$31,613	$87,772	$207,862	$10,542	$278,769	$249,378
Surface Treated Roads	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total:	$4,124,679	$5,550,994	$1,163,235	$8,703,983	$2,208,515	$7,509,669	$2,665,270	$329,302	$452,140	$576,059

Structures

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Bridges	$0	$0	$0	$0	$0	$0	$0	$584,000	$0	$0
Culverts	$0	$0	$388,000	$0	$0	$0	$0	$0	$0	$0
Pedestrian Bridges	$349,000	$0	$0	$0	$0	$0	$44,856	$10,000	$0	$0
Total:	$349,000	$0	$388,000	$0	$0	$0	$44,856	$594,000	$0	$0

Water Distribution System

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Curb Stops	$29,302	$29,406	$28,924	$26,332	$26,038	$25,809	$26,491	$26,594	$26,792	$26,805
Hydrant Leads	$125,728	$127,241	$133,804	$141,976	$145,984	$147,872	$159,904	$152,980	$138,705	$128,067
Hydrants	$126,500	$345,000	$437,000	$287,500	$92,000	$115,000	$57,500	$368,000	$69,000	$264,500

Water Devices	$0	$0	$6,800	$0	$6,800	$0	$0	$0	$6,800	$0
Water Hydrant Connections	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Meters	$88,289	$91,947	$94,996	$112,781	$104,112	$14,562	$77,646	$118,062	$38,896	$66,603
Water Service Connections	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water System Chambers	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Valves	$42,300	$24,500	$132,300	$157,500	$112,000	$0	$0	$215,000	$11,700	$14,400
Total:	$412,119	$618,094	$833,824	$726,089	$486,934	$303,243	$321,541	$880,636	$291,893	$500,375

Sanitary Sewer Network

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Force Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gravity Sewer Line	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lift Stations	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Laterals	$49,541	$50,677	$51,521	$51,299	$51,341	$51,991	$53,445	$54,603	$55,695	$56,703
Sanitary Manholes	$0	$0	$0	$0	$0	$32,400	$0	$1,595,000	$0	$729,300
Siphons	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total:	$49,541	$50,677	$51,521	$51,299	$51,341	$84,391	$53,445	$1,649,603	$55,695	$786,003

Storm Sewer System

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Catch Basins	$0	$0	$0	$0	$0	$30,300	$54,400	$678,900	$147,900	$779,300
Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$50,069
FDC Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FDC Manholes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Headwall	$0	$0	$0	$0	$0	$0	$0	$1,000	$1,000	$1,000
Management Facilities	$0	$0	$0	$0	$0	$0	$0	$218,589	$0	$0
Storm Inlet and Outlet Structures	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Manholes	$0	$0	$0	$0	$0	$19,800	$238,800	$767,700	$68,700	$415,800

Total:	$0	$0	$0	$0	$0	$50,100	$293,200	$1,666,189	$217,600	$1,246,169

Machinery & Equipment

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Facility Equipment	$0	$68,929	$35,834	$76,226	$74,149	$134,599	$79,982	$104,557	$33,581	$42,336
Fire Department Equipment	$0	$0	$14,408	$47,306	$102,750	$0	$625,270	$123,960	$64,589	$298,079
Fleet Garage Equipment	$0	$62,024	$0	$0	$0	$0	$0	$205,911	$127,706	$0
Furniture	$0	$0	$15,852	$25,174	$28,351	$23,908	$487,479	$81,068	$56,647	$0
IT Equipment	$198,702	$143,892	$394,122	$332,771	$206,939	$321,391	$270,532	$326,293	$281,458	$271,698
Maintenance Equipment	$107,453	$51,365	$66,695	$114,386	$113,317	$222,756	$43,208	$152,336	$36,011	$48,837
Total:	$306,155	$326,210	$526,911	$595,863	$525,506	$702,654	$1,506,471	$994,125	$599,992	$660,950

Vehicles

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Fire Trucks	$0	$0	$0	$0	$0	$787,262	$0	$0	$1,841,188	$468,847
Light Vehicles	$347,041	$158,948	$375,857	$203,288	$587,599	$325,491	$529,641	$427,402	$658,563	$191,688
Heavy Vehicles	$0	$0	$0	$53,046	$0	$43,575	$0	$0	$0	$0
Total:	$347,041	$158,948	$375,857	$256,334	$587,599	$1,156,328	$529,641	$427,402	$2,499,751	$660,535

Buildings & Facilities

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Arenas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Community Centres	$0	$0	$0	$136,915	$0	$107,536	$175,251	$1,355,409	$0	$82,149
Fire Halls	$0	$0	$0	$0	$0	$0	$0	$641,671	$0	$0
General Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Maintenance Garages	$0	$0	$0	$129,530	$0	$0	$0	$240,557	$134,994	$0
Office Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$929,235	$0
Storage Sheds	$0	$0	$0	$0	$0	$0	$0	$6,363	$0	$0
Total:	$0	$0	$0	$266,445	$0	$107,536	$175,251	$2,244,000	$1,064,229	$82,149

Land Improvements

Asset Segment	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Landscaping	$0	$0	$0	$0	$12,894	$0	$0	$42,511	$0	$0
Miscellaneous	$4,588	$0	$23,222	$64,429	$0	$78,729	$0	$35,942	$11,549	$0
Park Structures	$0	$0	$0	$0	$0	$0	$0	$0	$203,380	$0
Parking, Paving & Curbs	$0	$0	$306,755	$0	$532,734	$0	$0	$0	$0	$0
Parks	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Play Structures	$0	$0	$0	$0	$0	$37,958	$0	$0	$965,658	$0
Sports Fields	$0	$0	$0	$0	$0	$0	$0	$357,994	$157,323	$1,537,872
Trails, Pathways & Bike Paths	$0	$0	$369,569	$27,929	$13,309	$0	$0	$346,373	$136,713	$123,953
Total:	$4,588	$0	$699,546	$92,358	$558,937	$116,687	$0	$782,820	$1,474,623	$1,661,825

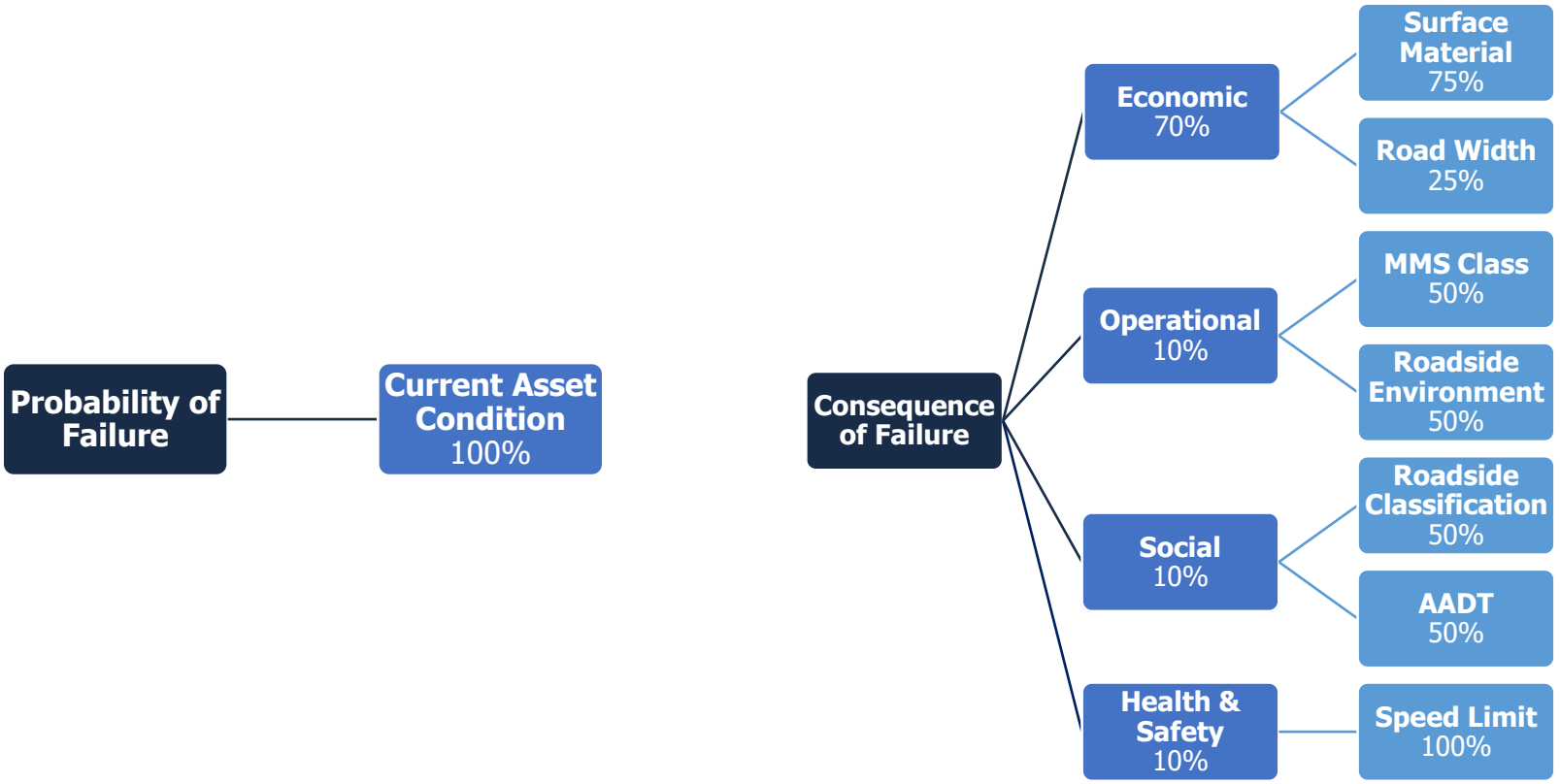
All Asset Categories

Asset Category	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Road Network	$4,124,679	$5,550,994	$1,163,235	$8,703,983	$2,208,515	$7,509,669	$2,665,270	$329,302	$452,140	$576,059
Structures	$349,000	$0	$388,000	$0	$0	$0	$44,856	$594,000	$0	$0
Water Distribution System	$412,119	$618,094	$833,824	$726,089	$486,934	$303,243	$321,541	$880,636	$291,893	$500,375
Sanitary Sewer Network	$49,541	$50,677	$51,521	$51,299	$51,341	$84,391	$53,445	$1,649,603	$55,695	$786,003
Storm Sewer System	$0	$0	$0	$0	$0	$50,100	$293,200	$1,666,189	$217,600	$1,246,169
Machinery & Equipment	$306,155	$326,210	$526,911	$595,863	$525,506	$702,654	$1,506,471	$994,125	$599,992	$660,950
Vehicles	$347,041	$158,948	$375,857	$256,334	$587,599	$1,156,328	$529,641	$427,402	$2,499,751	$660,535
Buildings & Facilities	$0	$0	$0	$266,445	$0	$107,536	$175,251	$2,244,000	$1,064,229	$82,149
Land Improvements	$4,588	$0	$699,546	$92,358	$558,937	$116,687	$0	$782,820	$1,474,623	$1,661,825
Total:	$5,593,123	$6,704,923	$4,038,894	$10,692,371	$4,418,832	$10,030,608	$5,589,675	$9,568,077	$6,655,923	$6,174,065

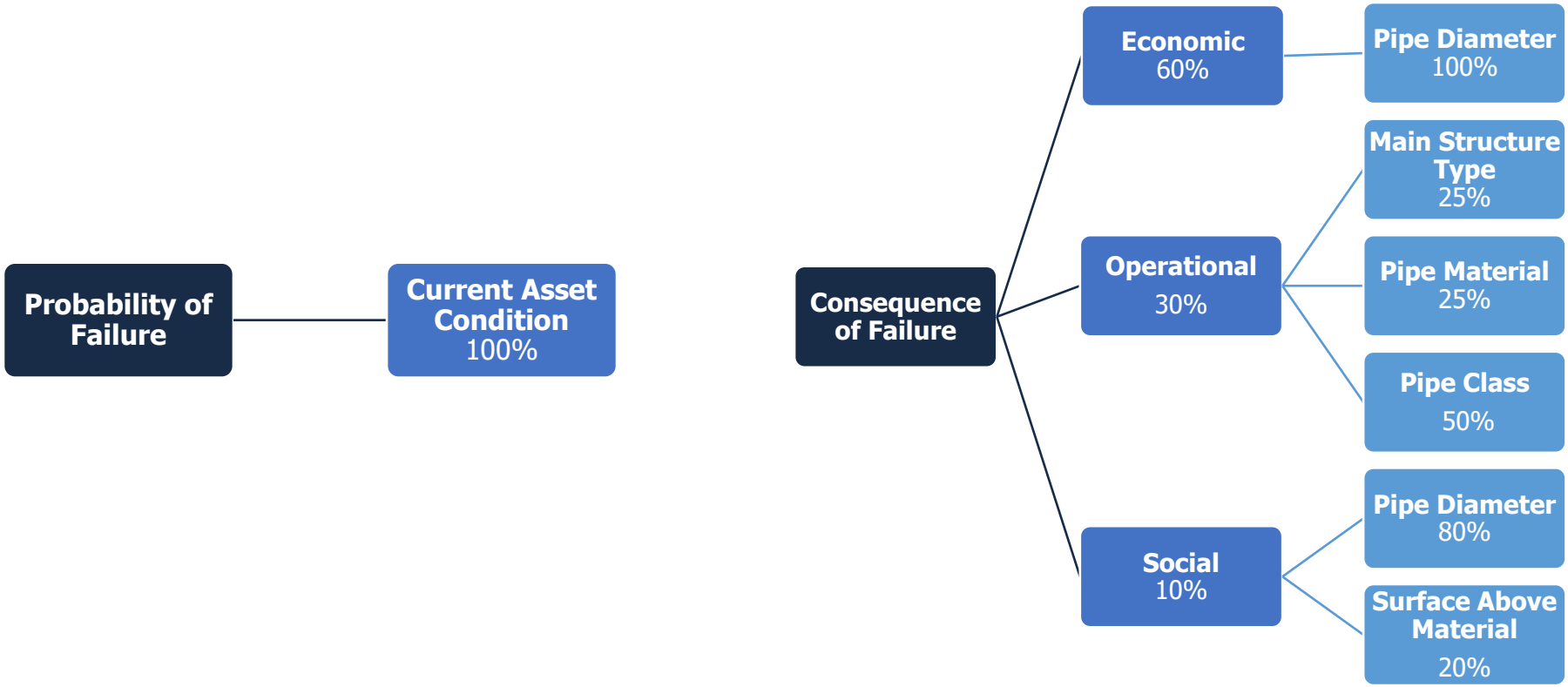
Appendix B: Asset Risk Scoring Criteria

The following hierarchies identify the criteria that has been used to assess asset risk within each Asset Category in this AMP.

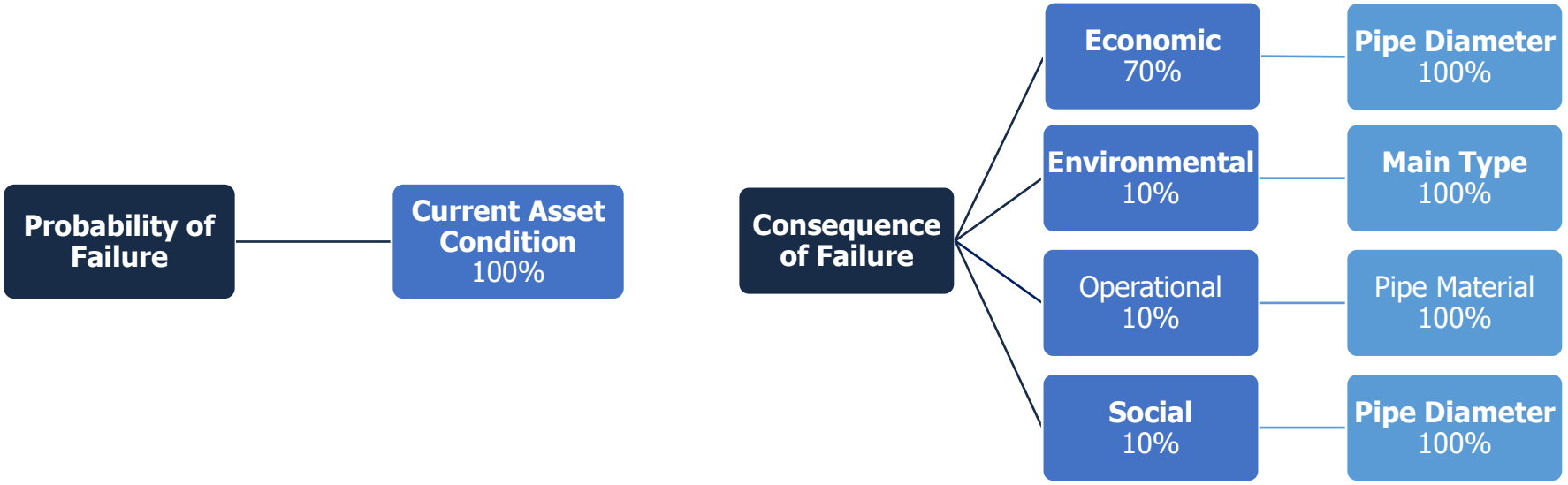
Road Network



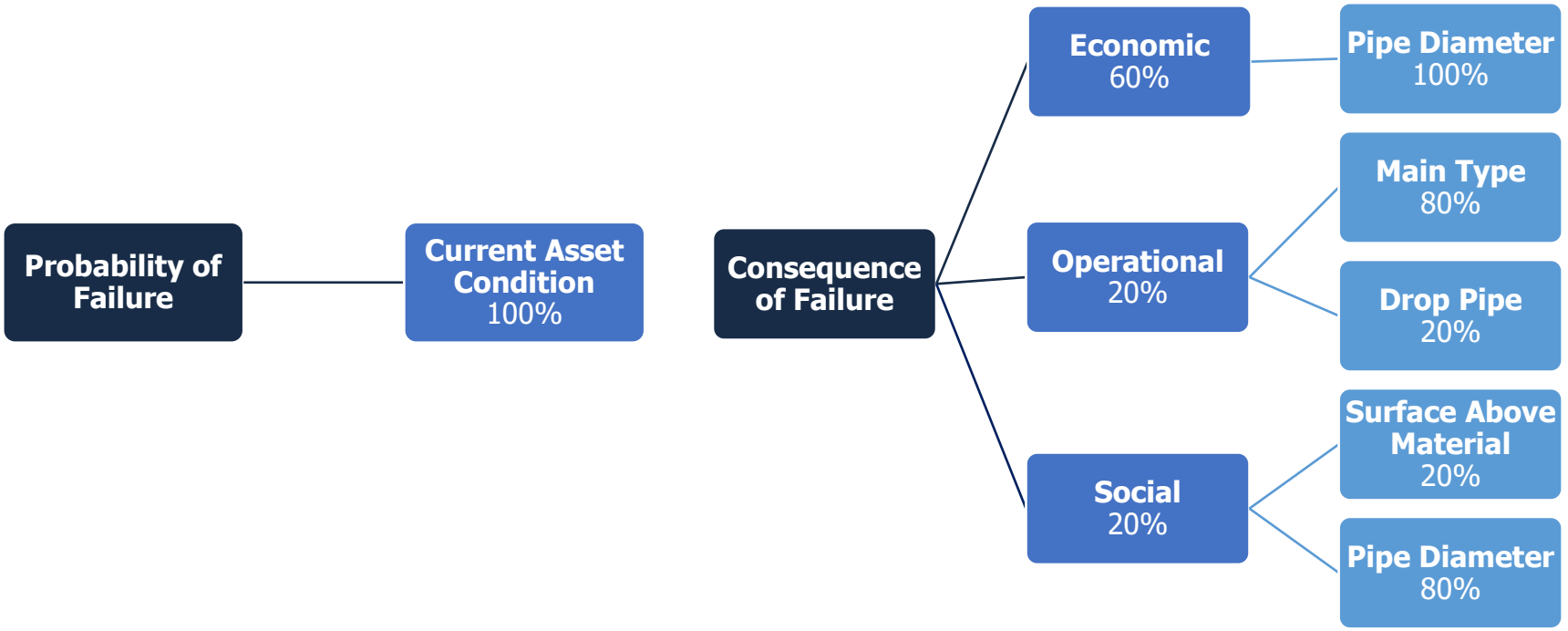
Water Distribution System



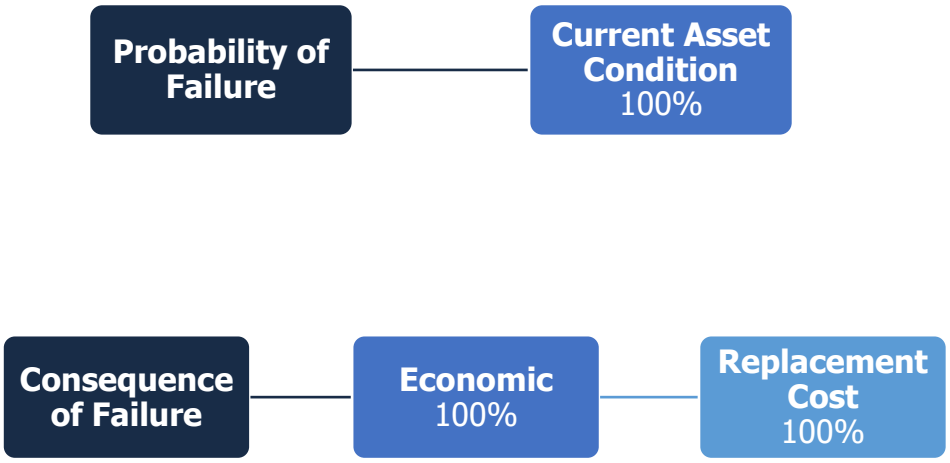
Sanitary Sewer Network



Storm Sewer System



Structures, Machinery & Equipment, Vehicles, Buildings & Facilities, Land Improvements



Appendix C: Limitations & Assumptions

This section identifies the limitations of the analysis in this AMP and the assumptions that have been made throughout the document.

Asset Inventory Data

- This AMP is based on best available data and information provided by Town staff. The accuracy and reliability of asset inventory data is dependent on current data management processes.
- Without adequate data management processes in place, an asset inventory may become less accurate and reliable over time. Regular data cleansing and validation activities are required to ensure that the Town's inventory is an accurate reflection of all capital assets owned.

Asset Condition

- As available, we use assessed condition data to illustrate the current state of infrastructure and develop the requisite financial strategies. However, in the absence of assessed condition data, we rely on the age of assets and their estimated useful life to estimate their physical condition. Age-based estimates of asset condition are considered less reliable than visual and/or technical assessments.

Replacement Costs

- Asset replacement costs have been determined based on the best available source of data. Ideally, replacement costs should be based on recently completed contracts or the estimation of individuals with technical expertise. If this data is not available this AMP inflates the historical cost of assets to today's value. This method is only as reliable as the original cost estimates and the accuracy of cost inflation measures available for use.

Estimated Useful Lives

- The estimated useful life (EUL) of an asset is used to determine when it will require renewal and/or replacement. The EULs in this AMP have been assigned according to a combination of established industry standards and staff knowledge of asset lifecycles.

Lifecycle Costs

- The focus of this plan is restricted to capital expenditures and does not capture operations and maintenance (O&M) expenditures on infrastructure. O&M costs often represent a significant portion of the lifecycle costs of infrastructure and should be factored into procurement practices and long-term planning.