Asset Management Plan 2025

Town of Essex

January 2026

psdcitywide

This Asset Management Plan was prepared by:

psdcitywide

Empowering your organization through advanced asset management, budgeting & GIS solutions

Key Statistics

$1.1 b	2023 Replacement Cost of Asset Portfolio
$129 k	Replacement Cost of Infrastructure Per Household
69%	Percentage of Assets in Fair or Better Condition
42%	Percentage of Assets with Assessed Condition Data
$21.4 m	Annual Capital Infrastructure Deficit (Ideal)
$14.3 m	Annual Capital Infrastructure Deficit (PLOS)
20 Years	Recommended Timeframe to achieve Proposed Levels of Service
2.5%	Target Reinvestment Rate (Ideal)
1.9%	Target Reinvestment Rate (PLOS)
0.6%	Actual Reinvestment Rate

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1. Executive Summary

Municipal infrastructure delivers critical services that are foundational to the economic, social, and environmental health and growth of a community. The goal of asset management is to enable infrastructure to deliver an adequate level of service in the most cost-effective manner. This involves the ongoing review and update of infrastructure information and data alongside the development and implementation of asset management strategies and long-term financial planning.

1.1 Scope

This Asset Management Plan (AMP) identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the Town of Essex can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP includes the following asset categories:

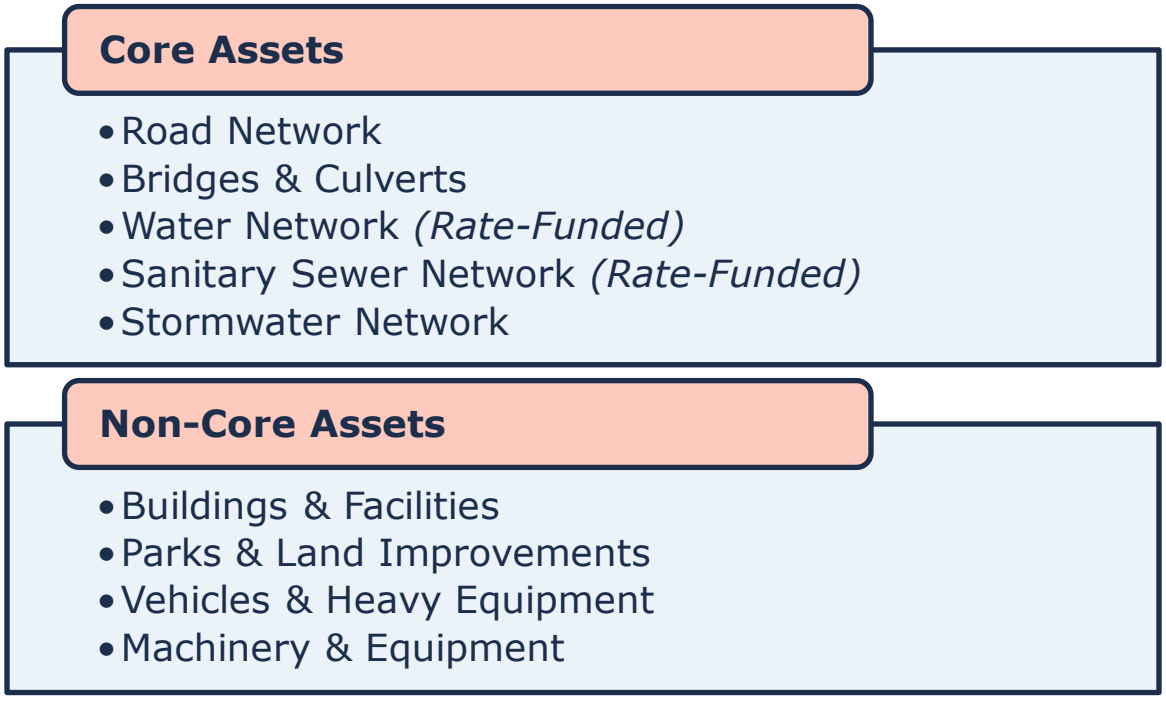


Figure 1 Core and Non-Core Asset Categories

1.2 Compliance

With the development of this AMP the Town of Essex has achieved compliance with July 1, 2025, requirements under O. Reg. 588/17. This includes requirements for levels of service and inventory reporting for all asset categories.

1.3 Findings

The overall replacement cost of the asset categories included in this AMP totals $1.1 billion. 69% of all assets analyzed in this AMP are in fair or better condition and assessed condition data was available for 42% of assets. For the remaining 58% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Town's average annual capital requirement totals $28.3 million for ideal circumstances, however, the Town has selected a proposed level of service of funding assets to 75% of the ideal investment. This results in an annual capital investment of $21.2 million. Based on a historical analysis of sustainable capital funding sources, the Town is committing approximately $6.9 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $14.3 million to reach the proposed level of service.

It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the Town. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources.

1.4 Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to meet the Town's proposed levels of service based on a 20-year plan:

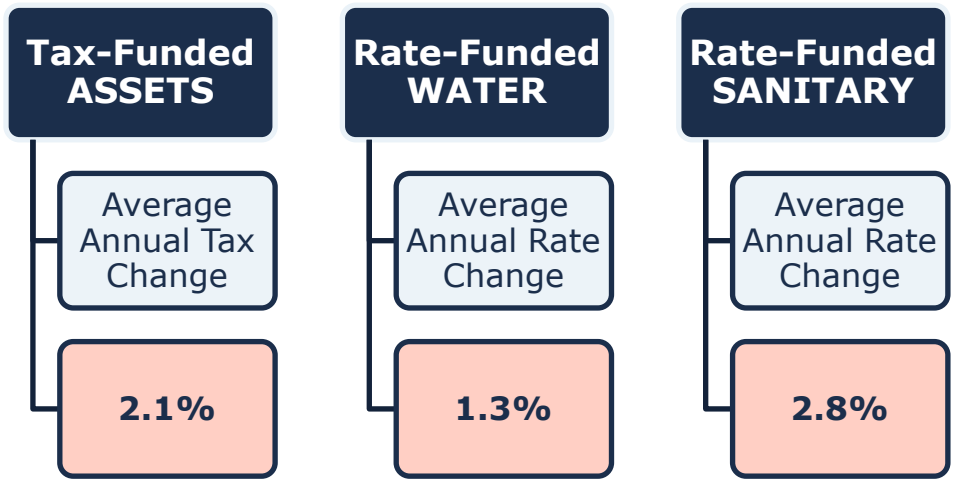


Figure 2 Proposed Tax/Rate Changes

The following summary of recommendations are intended to guide continuous refinement of the Town's asset management program and improve accuracy and confidence in future planning and reporting:

- Review data to update and maintain a complete and accurate dataset
- Develop a condition assessment strategy with a regular schedule
- Review and update lifecycle management strategies
- Develop and regularly review short- and long-term plans to meet capital requirements
- Measure current levels of service and identify any additional sustainable proposed levels of service metrics
- Commission an infrastructure growth impact study
- Report to Council annually on asset management progress

2. Introduction & Context

2.1 Community Profile

Census Characteristic[1]	Town of Essex	Ontario
Population 2021	21,216	14,223,942
Population Change 2016-2021	+3.9%	+5.8%
Total Private Dwellings	8,880	5,929,250
Population Density	76.4/km^2	15.9/km^2
Land Area	277.53 km^2	892,411.76 km^2

Table 1 Town of Essex Community Profile

The Town of Essex is a municipality located in the deep southern portion of Ontario. The Town is comprised of four main urban communities, Essex Centre, Harrow, Colchester, and McGregor.

- Essex Centre is the largest of these communities, located within the heart of the Town providing residents with easy access to larger cities such as Windsor, Ontario, and Detroit, Michigan.
- Harrow is the agricultural community of Essex, home to multiple agricultural operations, greenhouses, fields, and local shops.
- Colchester is a community located along the waterfront of Lake Erie, celebrated for its beautiful public beach and marina.
- McGregor is a community that is also brimming with agriculture; however, it is known more for its outdoor sports activities, music festival, and museum.

The Town of Essex is one of the most southernly municipalities in Canada, offering hotter summers and more mild winter seasons. Plentiful in rich agricultural lands, Essex boasts a highly productive agricultural industry, horse farms, vineyards, and many renowned wineries. As a smaller municipality, the Town also offers more affordable living and a higher standard of safety.

The Town has experienced population growth of 3.9% over the past two census cycles (2016 to 2021). A significant portion of the population is made up of seniors, with 20.6% being 65 years or older. Many of the residents are working-age adults, ranging from 15 to 64 years old, accounting for 62.8% of the population. Meanwhile, children aged 0 to 14 years represent 15.3% of the community, highlighting a diverse age distribution across the Town.

[1] Data collected from Statistics Canada 2021 Census

2.2 Climate Change

Climate change can cause severe impacts on human and natural systems around the world. The effects of climate change include increasing temperatures, higher levels of precipitation, droughts, and extreme weather events. In 2019, Canada's Changing Climate Report (CCCR 2019) was released by Environment and Climate Change Canada (ECCC).

The report revealed that between 1948 and 2016, the average temperature increase across Canada was 1.7°C; moreover, during this time period, Northern Canada experienced a 2.3°C increase. The temperature increase in Canada has doubled that of the global average. If emissions are not significantly reduced, the temperature could increase by 6.3°C in Canada by the year 2100 compared to 2005 levels. Observed precipitation changes in Canada include an increase of approximately 20% between 1948 and 2012. By the late 21st century, the projected increase could reach an additional 24%. During the summer months, some regions in Southern Canada are expected to experience periods of drought at a higher rate. Extreme weather events and climate conditions are more common across Canada. Recorded events include droughts, flooding, cold extremes, warm extremes, wildfires, and record minimum arctic sea ice extent.

The changing climate poses a significant risk to the Canadian economy, society, environment, and infrastructure. The impacts on infrastructure are often a result of climate-related extremes such as droughts, floods, higher frequency of freeze-thaw cycles, extended periods of high temperatures, high winds, and wildfires. Physical infrastructure is vulnerable to damage and increased wear when exposed to these extreme events and climate variabilities. Canadian Municipalities are faced with the responsibility to protect their local economy, citizens, environment, and physical assets.

2.2.1 Town of Essex Climate Profile

The Town of Essex is located in southern Ontario, with a 16km frontage along Lake Erie. The area is expected to experience notable effects of climate change which include higher average annual temperatures, and an increase in total annual precipitation. According to Climatedata.ca – a collaboration supported by Environment and Climate Change Canada (ECCC) – the Town of Essex may experience the following trends:

Higher Average Annual Temperature

- Between the years 1971 and 2000 the annual average temperature was 9.5 ºC
- Under a high emissions scenario, the annual average temperatures are projected to increase to 12.1 ºC by the year 2050 and up to 15.9 ºC by the end of the century.

Increase in Total Annual Precipitation

- Under a high emissions scenario, Essex is projected to experience a 11% increase in precipitation by the year 2050 and a 15% increase by the end of the century.

2.2.2 Recent Climatic Events Affecting the Town of Essex

In recent years, the Town of Essex has experienced several severe weather events, reflecting the growing impacts of climate change on the region. These events have emphasized the importance of preparedness and long-term climate adaptation strategies at the municipal level.

February 2023 Ice Storm

On February 23rd, 2023, Essex County, including the Town of Essex, was affected by a significant ice storm. The storm caused widespread power outages and damage to infrastructure due to ice accumulation on trees and power lines. This event underscored the region's exposure to freezing rain events, which are projected to increase in frequency and severity under changing climate conditions.[2]

June 2023 Windstorm (Microburst)

On June 25th, 2023, a microburst classified as an EF0 event impacted southwestern Essex, producing wind speeds of up to 125 km/h. The storm caused localized damage to trees and roofing structures. While no injuries were reported, the event illustrated the destructive potential of intense wind events, even those of relatively short duration.[3]

August 2023 Flooding

Between August 23rd and 25th, 2023, a series of thunderstorms brought record-breaking rainfall to Essex County. Harrow, one of the communities within the Town of Essex, recorded up to 214 millimeters of rain[4], representing a one-in-100-year flooding event. The resulting flooding led to infrastructure impacts such as washed-out roads, flooded basements, and overwhelmed stormwater and sewage systems. As a result, partially treated wastewater was released into Lake Erie for the first time, and many residents experienced significant property damage.[5][6]

Collectively, these events reflect the increasing frequency and intensity of extreme weather in the region and underscore the importance of integrating climate resilience into municipal planning.

September 2025 Flooding

On September 24, 2025, heavy rainfall resulted in a flash flooding event in Harrow and Colchester[7] that resulted in road closures, a road failure at County Road 50 and several flooded basements. Approximately 50-100mm of rainfall occurred within an hour.

2.2.3 Integration of Climate Change and Asset Management

Asset management practices aim to deliver sustainable service delivery - the delivery of services to residents today without compromising the services and well-being of future residents. Climate change threatens sustainable service delivery by reducing the useful life of an asset and increasing the risk of asset failure. Desired levels of service can be more difficult to achieve as a

[2] County of Essex. (2023, October 18). *Emergency Management Coordinating Committee Report*. Retrieved from https://coe-pub.escribemeetings.com/filestream.ashx?DocumentId=23734
[3] Northern Tornadoes Project. *Two EF0 tornadoes at Windsor*. Western University, June 27, 2023. Available at: https://www.uwo.ca/ntp/blog/2023/two_ef0_tornadoes_at_windsor.html
[4] Leardi, A. (2023, August 23). *Disaster Recovery Assistance Activated for the Riding of Essex*. Retrieved from https://anthonyleardimpp.ca/disaster-recovery-assistance-activated-for-the-riding-of-essex/
[5] Battagello, D. (2023, August 25). *Windsor-Essex County pounded by storm again*. *Windsor Star*. Retrieved from https://windsorstar.com/news/local-news/windsor-essex-county-pounded-by-storm-again
[6] Battagello, D. (2023, November 15). *Months after massive flooding, Essex County homeowners still fixing basements*. *Windsor Star*. Retrieved from https://windsorstar.com/news/local-news/months-after-massive-flooding-essex-county-homeowners-still-fixing-basements
[7] https://www.ctvnews.ca/windsor/video/2025/09/24/flooding-in-harrow-and-colchester/

result of climate change impacts such as flooding, high heat, drought, and more frequent and intense storms.

In order to achieve the sustainable delivery of services, climate change considerations should be incorporated into asset management practices. The integration of asset management and climate change adaptation observes industry best practices and enables the development of a holistic approach to risk management.

2.3 Asset Management Overview

Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio.

The acquisition of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% comes from operations and maintenance. This AMP focuses its analysis on the capital costs to maintain, rehabilitate and replace existing municipal infrastructure assets.

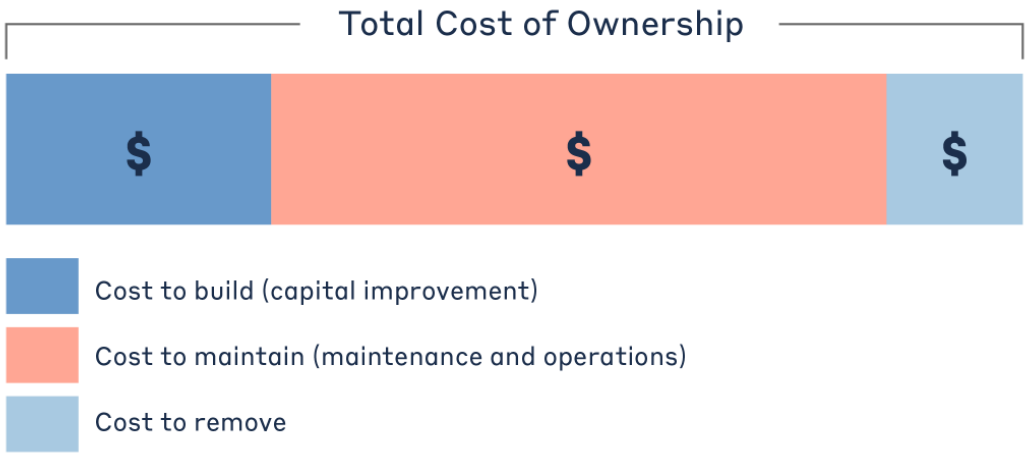


Figure 3 Total Cost of Asset Ownership

These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

2.3.1 Foundational Asset Management Documentation

The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

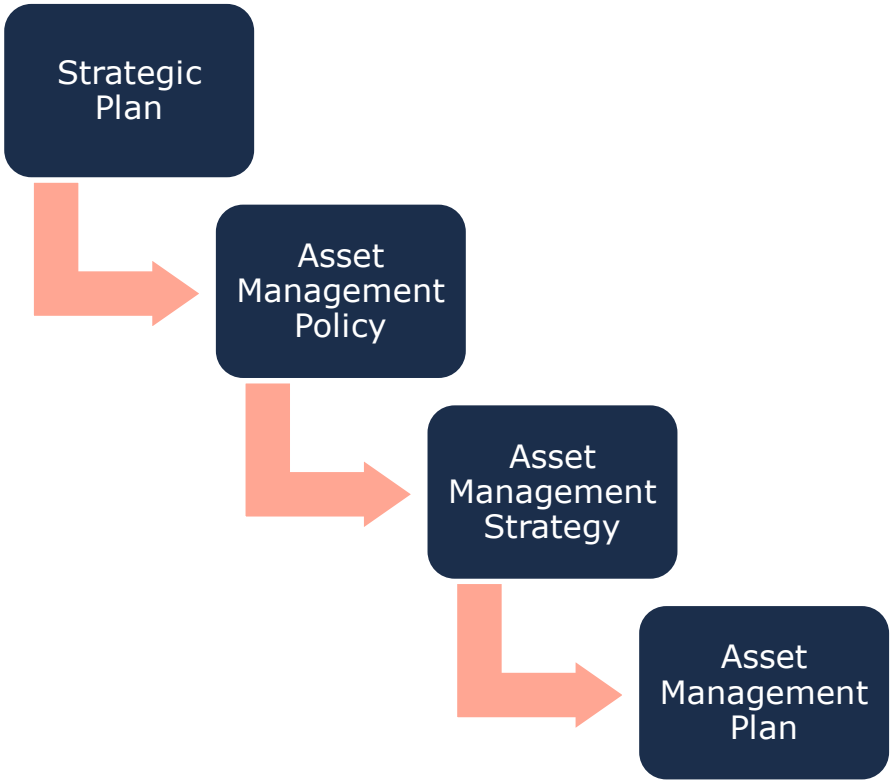


Figure 4 Foundational Asset Management Documents

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

Asset Management Policy

An asset management policy represents a statement of the principles guiding the Town's approach to asset management activities. It aligns with the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program.

The Town of Essex adopted policy #078 "Asset Management Policy" on August 12, 2024, in accordance with Ontario Regulation 588/17. The policy provides a foundation for the development of an asset management program within the Town. It covers the key components that define a comprehensive asset management policy:

- Principles to dictate the use of asset management practices to ensure all assets meet the agreed levels of service in the most efficient and effective manner;
- Commitment to, where appropriate, integrating the principles found in certain official documents into the asset management plan;

- Formally defined roles and responsibilities of internal staff and stakeholders;
- Principles and guidelines include the use of a long-term view and effective prioritization in the management of infrastructure.

Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the Town plans to achieve asset management objectives through planned activities and decision-making criteria.

The Town's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

Asset Management Plan

The asset management plan (AMP) presents the outcomes of the Town's asset management program and identifies the resource requirements needed to achieve a defined level of service. The AMP typically includes the following content:

- State of Infrastructure
- Asset Management Strategies
- Levels of Service
- Financial Strategies

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

2.3.2 Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk & criticality, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

Lifecycle Management Strategies

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. Asset 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.

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance,

rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference in cost.

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

Lifecycle Activity	Cost	Typical Associated Risks
Maintenance Activities that prevent defects or deteriorations from occurring	**$**	♦ Balancing limited resources between planned maintenance and reactive, emergency repairs and interventions; ♦ Diminishing returns associated with excessive maintenance activities, despite added costs; ♦ Intervention selected may not be optimal and may not extend the useful life as expected, leading to lower payoff and potential premature asset failure;
Rehabilitation/ Renewal Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	**$$$**	♦ Useful life may not be extended as expected; ♦ May be costlier in the long run when assessed against full reconstruction or replacement; ♦ Loss or disruption of service, particularly for underground assets;
Replacement/ Reconstruction Asset end-of-life activities that often involve the complete replacement of assets	**$$$$$**	♦ Incorrect or unsafe disposal of existing asset; ♦ Costs associated with asset retirement obligations; ♦ Substantial exposure to high inflation and cost overruns; ♦ Replacements may not meet capacity needs for a larger population; ♦ Loss or disruption of service, particularly for underground assets;

Table 2 Lifecycle Management: Typical Lifecycle Interventions

The Town's approach to lifecycle management is described within each asset category outlined in this AMP. Staff will continue to evolve and innovate current practices for developing and implementing proactive lifecycle strategies to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

Risk & Criticality

Asset risk and criticality are essential building blocks of asset management, integral in prioritizing projects and distributing funds where they are needed most based on a variety of factors. Assets in disrepair may fail to perform their intended function, pose substantial risk to the community, lead to unplanned expenditures, and create liability for the municipality. In addition, some assets are simply more important to the community than others, based on their financial significance, their role in delivering essential services, the impact of their failure on public health and safety, and the extent to which they support a high quality of life for community stakeholders.

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (i.e. low, medium, high) or quantitative measurement (i.e. 1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

Figure 5 Risk Equations

The approach used in this AMP relies on a quantitative measurement of risk associated with each asset. The probability and consequence of failure are each scored from 1 to 5, producing a minimum risk index of 1 for the lowest risk assets, and a maximum risk index of 25 for the highest risk assets.

Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure, including its condition, age, previous performance history, and exposure to extreme weather events, such as flooding and ice jams—both a growing concern for municipalities in Canada.

Consequence of Failure

Estimating criticality also requires identifying the types of consequences that the organization and community may face from an asset's failure, and the magnitude of those consequences. Consequences of asset failure will vary across the infrastructure portfolio; the failure of some assets may result primarily in high direct financial cost but may pose limited risk to the

community. Other assets may have a relatively minor financial value, but any downtime may pose significant health and safety hazards to residents.

Table 3 illustrates the various types of consequences that can be integrated in developing risk and criticality models for each asset category and segments within. We note that these consequences are common, but not exhaustive.

Type of Consequence	Description
Direct Financial	Direct financial consequences are typically measured as the replacement costs of the asset(s) affected by the failure event, including interdependent infrastructure.
Economic	Economic impacts of asset failure may include disruption to local economic activity and commerce, business closures, service disruptions, etc. Whereas direct financial impacts can be seen immediately or estimated within hours or days, economic impacts can take weeks, months and years to emerge, and may persist for even longer.
Socio-political	Socio-political impacts are more difficult to quantify and may include inconvenience to the public and key community stakeholders, adverse media coverage, and reputational damage to the community and the Municipality.
Environmental	Environmental consequences can include pollution, erosion, sedimentation, habitat damage, etc.
Public Health and Safety	Adverse health and safety impacts may include injury or death, or impeded access to critical services.
Strategic	These include the effects of an asset's failure on the community's long-term strategic objectives, including economic development, business attraction, etc.

Table 3 Risk Analysis: Types of Consequences of Failure

This AMP includes a preliminary evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize maintenance, rehabilitation, and replacement strategies for critical assets.

These models have been built in Citywide for continued review, updates, and refinements.

Levels of Service

A level of service (LOS) is a measure of the services that the Town is providing to the community and the nature and quality of those services. Within each asset category in this AMP,

technical metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

The Town measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories as applicable (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP. For non-core asset categories, general descriptions were created and are supplemented with information provided through staff engagement.

Technical Levels of Service

Technical levels of service are a measure of key technical attributes of the service being provided to the community. These include mostly quantitative measures and tend to reflect the impact of the Town's asset management strategies on the physical condition of assets or the quality/capacity of the services they provide.

For core asset categories as applicable the province, through O. Reg. 588/17, has also provided technical metrics that are required to be included in this AMP. For non-core asset categories, the Town has selected various statements that aligned with current tracking metrics and practices.

Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the Town plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the Town. They should also be determined with consideration of a variety of community expectations, fiscal capacity, regulatory requirements, corporate goals and long-term sustainability. Once proposed levels of service have been established, and prior to July 2025, the Town must identify a lifecycle management and financial strategy which allows these targets to be achieved.

2.4 Scope & Methodology

2.4.1 Asset Categories for this AMP

This asset management plan for the Town of Essex is produced in compliance with O. Reg. 588/17. The July 2024 deadline under the regulation—the second of three AMPs—requires analysis of core and non-core asset categories.

The AMP summarizes the state of the infrastructure for the Town's asset portfolio, establishes current levels of service and the associated technical and customer oriented key metrics, outlines lifecycle strategies for optimal asset management and performance, and provides financial strategies to reach sustainability for the asset categories listed below.

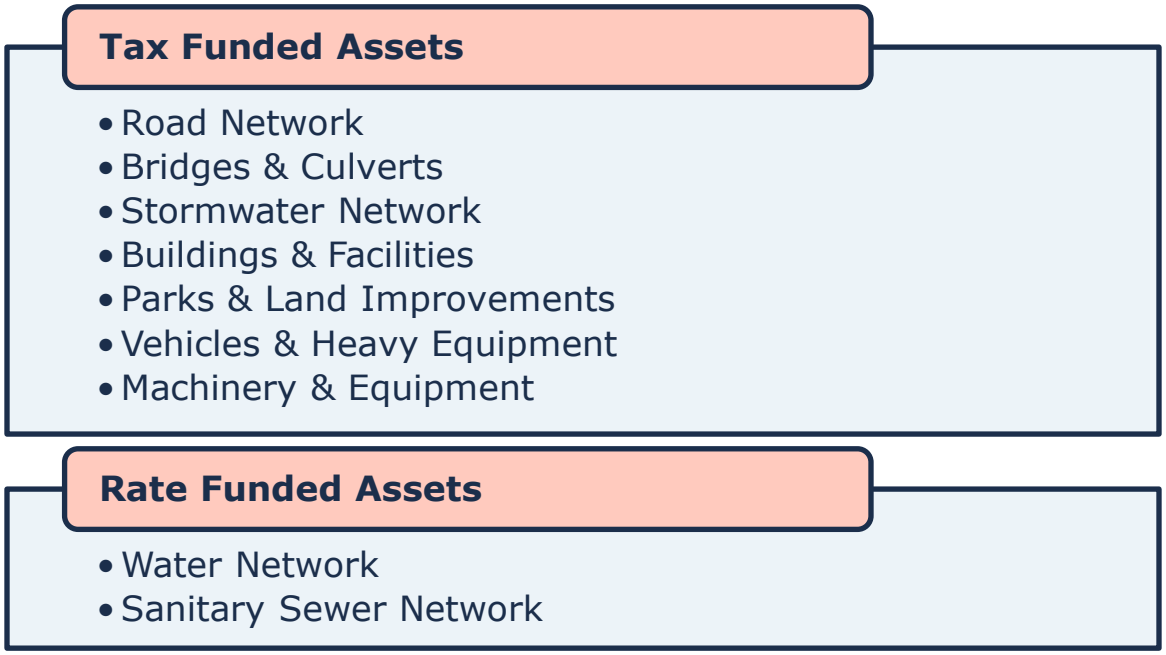


Figure 6 Tax Funded and Rate Funded Asset Categories

2.4.2 Data Effective Date

It is important to note that this plan is based on data as of **December 2023**; therefore, it represents a snapshot in time using the best available processes, data, and information at the Town. Strategic asset management planning is an ongoing and dynamic process that requires continuous data updates and dedicated data management resources.

2.4.3 Deriving Replacement Costs

There are a range of methods to determine the replacement cost of an asset, and some are more accurate and reliable than others. This AMP relies on two methodologies:

User-Defined Cost and Cost Per Unit

Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience.

Cost Inflation / CPI Tables

Historical costs of the assets are inflated based on the Consumer Price Index or Non-Residential Building Construction Price Index.

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the Town incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

2.4.4 Estimated Service Life & Service Life Remaining

The estimated useful life (EUL) of an asset is the period over which the Town expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this AMP was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

By using an asset's in-service data and its EUL, the Town can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the Town can more accurately forecast when it will require replacement. The SLR is calculated as follows:

Figure 7 Service Life Remaining Calculation

2.4.5 Reinvestment Rate

As assets age and deteriorate, they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. target reinvestment rate the Town can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

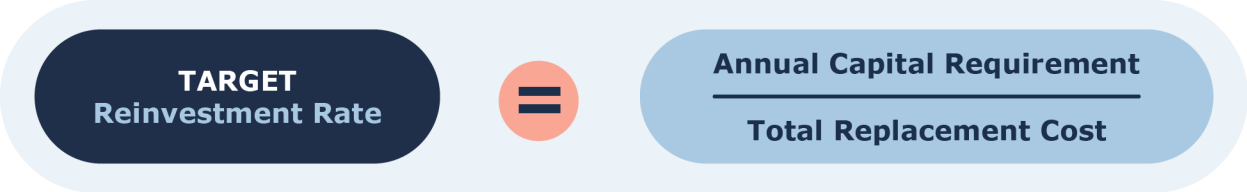


Figure 8 Target Reinvestment Rate Calculation

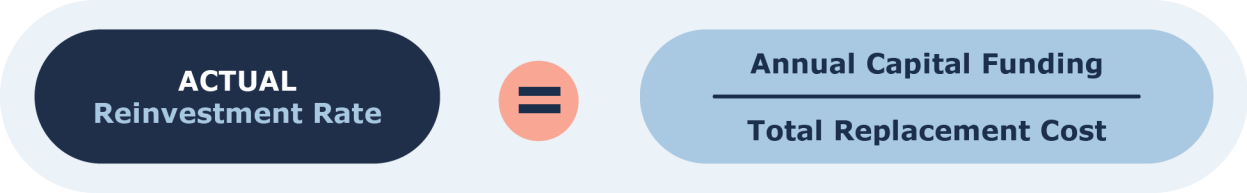


Figure 9 Actual Reinvestment Rate Calculation

2.4.6 Deriving Asset Condition

An incomplete or limited understanding of asset conditions can mislead long-term planning and decision-making. Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the Town's asset portfolio. The table below outlines the condition rating system used in this AMP to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition.

Condition	Description	Criteria	Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated	80-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	60-80
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies	40-60
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-40
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable	0-20

Table 4 Standard Condition Rating Scale

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition.

2.5 Ontario Regulation 588/17

As part of the Infrastructure for Jobs and Prosperity Act, 2015, the Ontario government introduced Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (O. Reg 588/17)[8]. Along with creating better performing organizations, more liveable and sustainable communities, the regulation is a key, mandated driver of asset management planning and reporting. It places substantial emphasis on current and proposed levels of service and the lifecycle costs incurred in delivering them.

Figure 10 below outlines key reporting requirements under O. Reg 588/17 and the associated timelines.

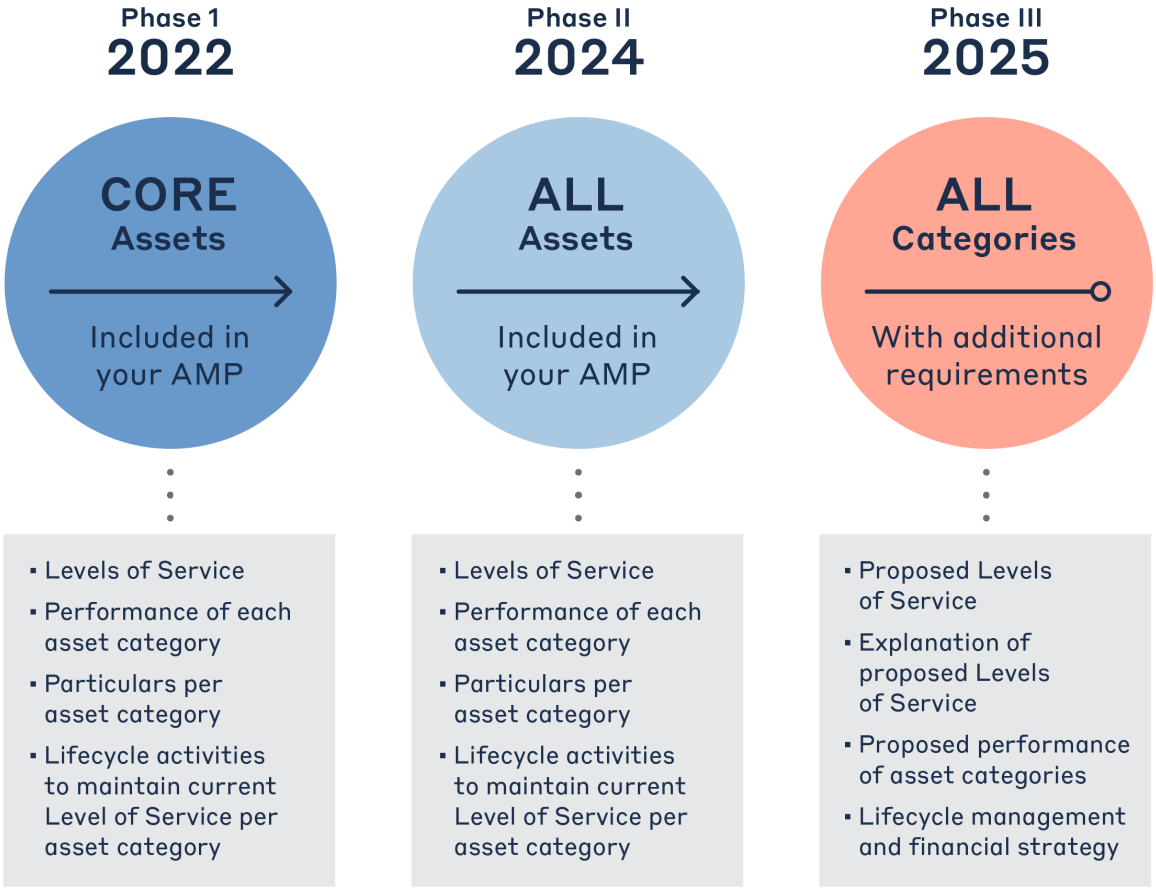


Figure 10 O. Reg. 588/17 Requirements and Reporting Deadlines

[8] O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure https://www.ontario.ca/laws/regulation/170588

2.5.1 O. Reg. 588/17 Compliance Review

Requirement	O. Reg. 588/17 Section	AMP Section Reference	Status
Summary of assets in each category	S.5(2), 3(i)	5.1 – 13.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	5.1 – 13.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	5.3 – 13.3	Complete
Condition of core assets in each category	S.5(2), 3(iv)	5.2 – 13.2	Complete
Description of municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	5.4 – 13.4	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	5.7 – 13.7	Complete
Current performance measures in each category	S.5(2), 2	5.7 – 13.7	Complete
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	5.4 – 13.4	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	Appendix B	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	14.1 – 14.2	Complete
Proposed levels of service for each category for next 10 years	S.6(1), 1(i-ii)	5.8 – 13.8	Complete
Explanation of appropriateness of proposed levels of service	S.6(1), 2(i-iv)	4.3	Complete
Lifecycle management activities for proposed levels of service	S.6(1), 4(i)	4.3	Complete
10-year capital costs for proposed levels of service	S.6(1), 4(ii)	Appendix B	Complete
Annual funding availability projections	S.6(1), 4(iii)	4.3	Complete

Table 5 O. Reg. 588/17 Compliance Review

Portfolio Overview

3. Portfolio Overview – State of the Infrastructure

The state of the infrastructure (SOTI) summarizes the inventory, condition, age profiles, and other key performance indicators for the Town's infrastructure portfolio. These details are presented for all core and non-core asset categories.

3.1 Asset Hierarchy & Data Classification

Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Key category details are summarized at asset segment level.

Figure 11 Asset Hierarchy and Data Classification

3.2 Portfolio Overview

3.2.1 Total Replacement Cost of Asset Portfolio

The nine asset categories analyzed in this Asset Management Plan have a total current replacement cost of $1.1 billion. This estimate was calculated using user-defined costing, as well as inflation of historical or original costs to current date. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today. Figure 12 illustrates the replacement cost of each asset category; at 26% of the total portfolio, the water network forms the largest share of the Town's asset portfolio, followed by the sanitary sewer network at 21%.

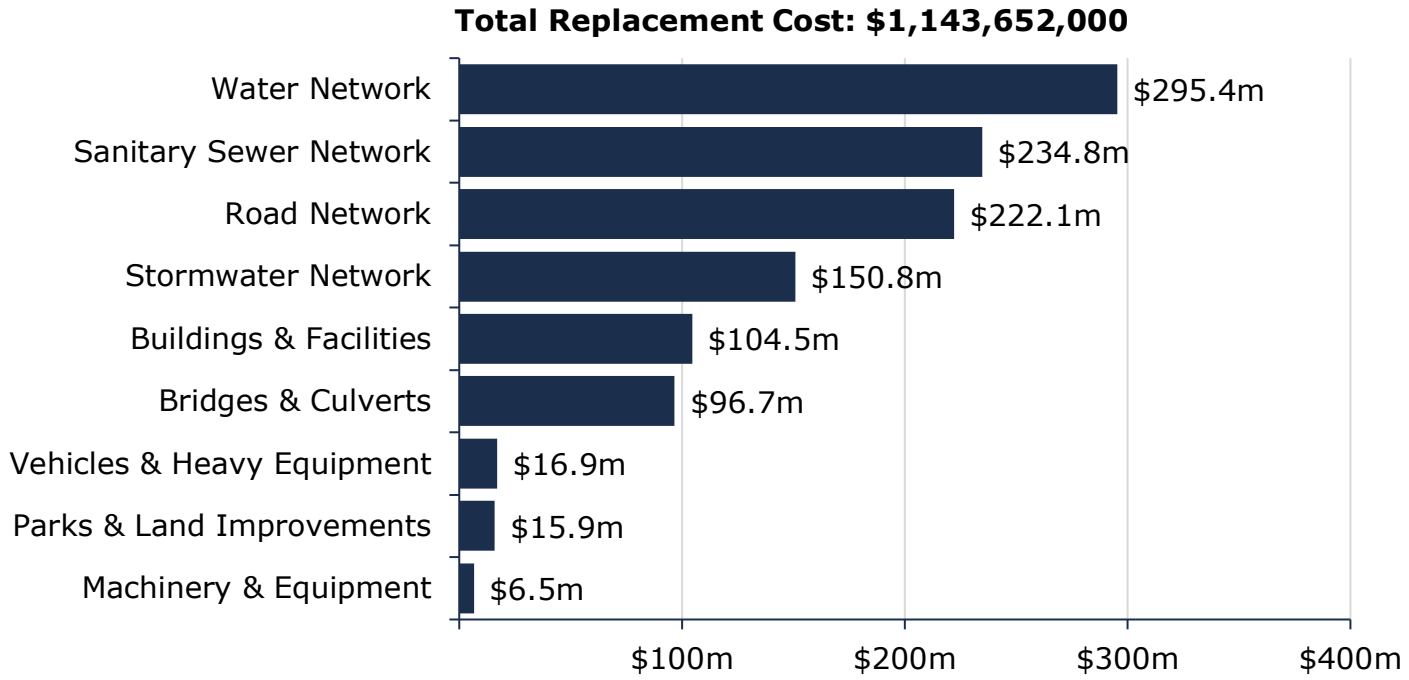


Figure 12 Current Replacement Cost by Asset Category

3.2.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps by comparing the target to the current reinvestment rate. To meet the existing long-term capital requirements, the Town requires an annual capital investment of $28.3 million, for a target portfolio reinvestment rate of 2.5%. Currently, annual investment from sustainable revenue sources is $6.9 million, for a current portfolio reinvestment rate of 0.6%. Target and current re-investment rates by asset category are detailed below.

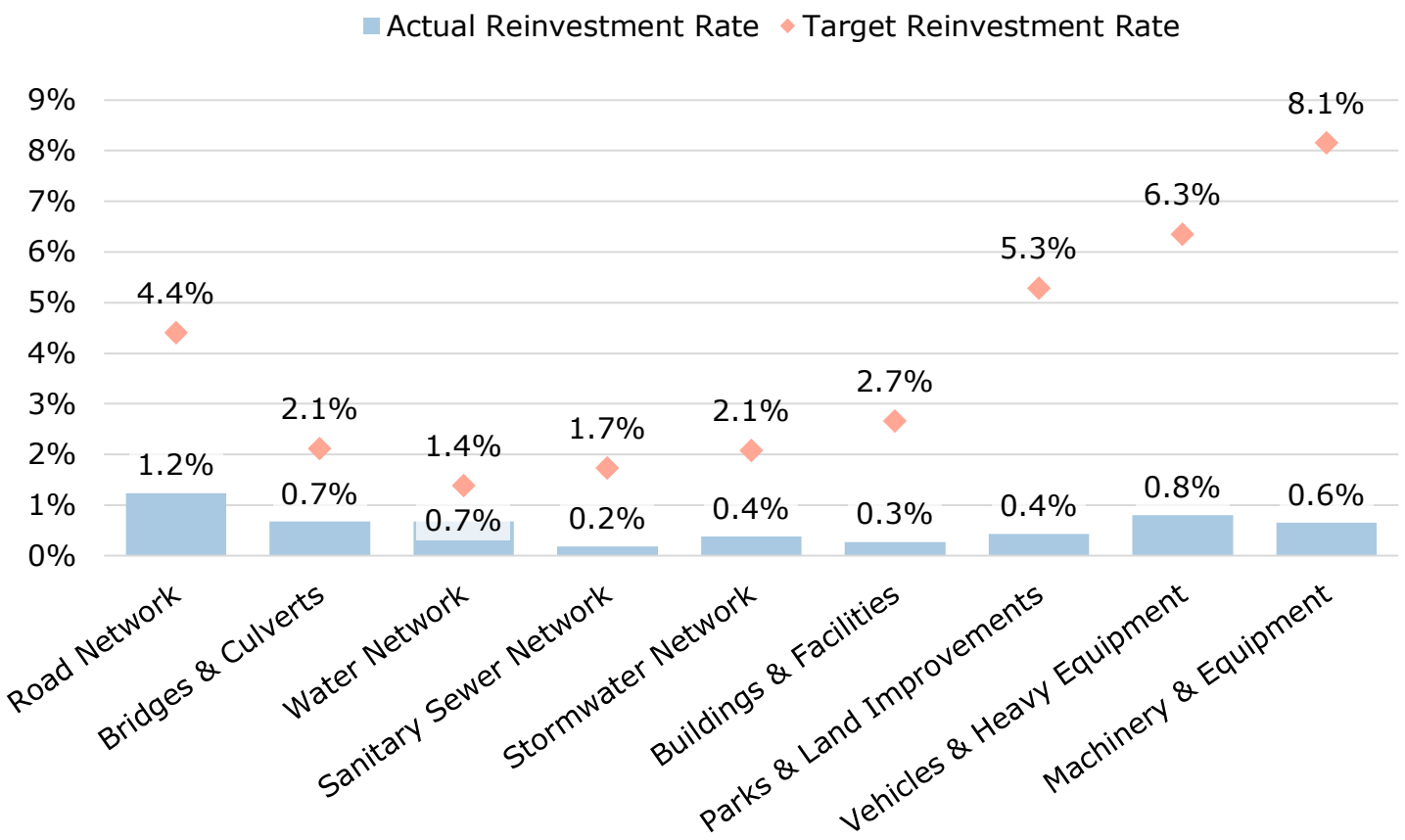


Figure 13 Current Vs. Target Reinvestment Rate

3.2.3 Condition of Asset Portfolio

Figure 14 and Figure 15 summarize asset condition at the portfolio and category levels, respectively. Based on both assessed condition and age-based analysis, 69% of the Town's infrastructure portfolio is in fair or better condition, with the remaining 31% in poor or worse condition. Typically, assets in poor or worse condition may require replacement or major rehabilitation in the immediate or short-term. Where practical and economical, targeted condition assessments may help further refine the list of assets that may be candidates for immediate intervention, including potential replacement or reconstruction.

Similarly, assets in fair condition should be monitored for disrepair over the medium term. Keeping assets in fair or better condition is typically more cost-effective than addressing assets needs when they enter the latter stages of their lifecycle or decline to a lower condition rating, e.g., poor or worse.

Note: *different asset types can have drastic differences in cost and feasibility of conducting condition assessments. For example, pressurized potable watermains are extremely difficult and expensive to formally assess and typically require interpolation of data such as acoustic measurements, assumptions based on adjacent recent replacements, or assumptions based upon leakage or breakage tracking. These challenges may lead to the determination that formal condition assessments do not have sufficient justification on a cost/benefit basis for certain assets.*

Condition data was available for all of the bridges and culverts, along with the majority of the road network, buildings and facilities, parks and land improvements, and half of the vehicles and heavy equipment. For all remaining assets, including major infrastructure such as storm, sanitary, and water, age was used as an approximation of condition for these assets. Age-based condition estimations can skew data and lead to potential under- or overstatement of asset needs.

Further, when assessed condition data was available, it was projected to current year-end (2023). This 'projected condition' can generate lower condition ratings than those established at the time of the condition assessment. The rate of this deterioration will also depend on lifecycle curves used to project condition over time.

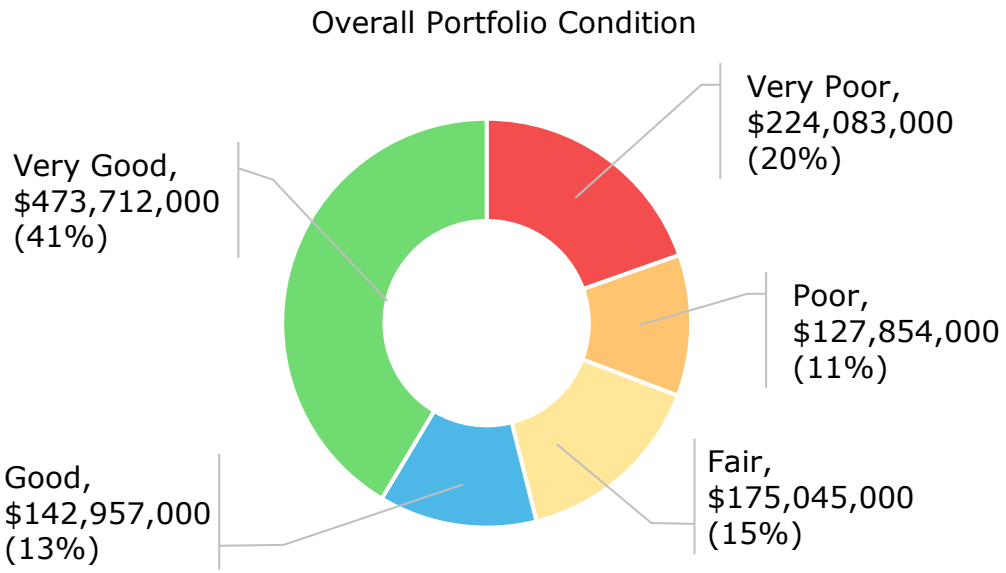


Figure 14 Asset Condition: Portfolio Overview

As further illustrated in Figure 15 at the category level, a large quantity of major, core infrastructure including bridges, culverts, water, and sanitary, are in fair or better condition, based on in-field condition assessment data and age. Most machinery and equipment, and storm are also in fair or better condition, based on recent condition assessments and age. See Table 6 for details on how condition data was derived for each asset segment.

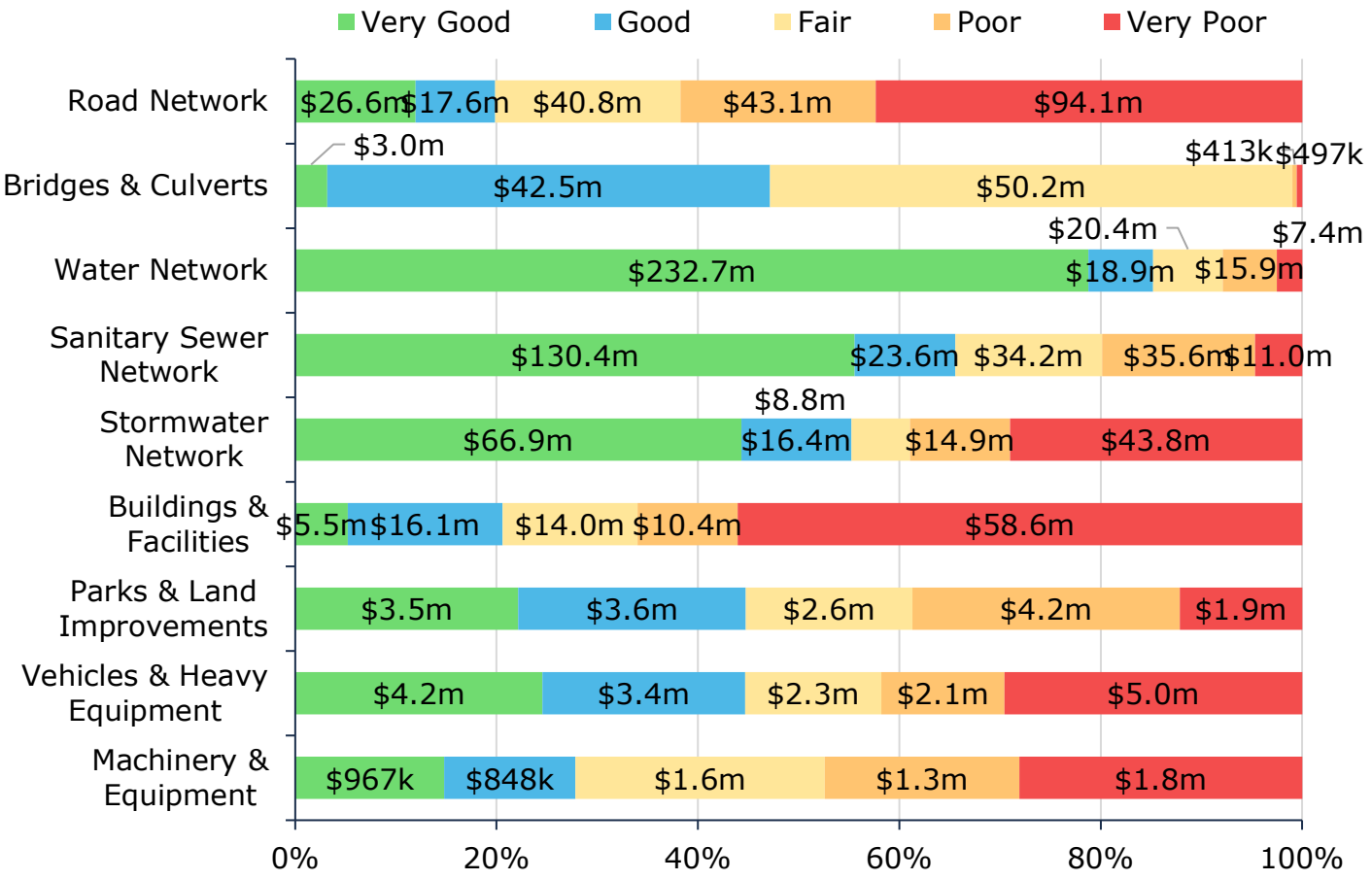


Figure 15 Asset Condition by Asset Category

Note: buildings and facilities are not consistently componentized into their individual major elements and components. This limits the validity of current condition estimates as they are presented only at the 'parent' asset level, such as 'Police Station', or 'Town Hall'.

Source of Condition Data

This AMP relies on assessed condition for 42% of assets, based on and weighted by replacement cost. For the remaining assets, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. Table 6 below identifies the source of condition data used throughout this AMP.

Note: The majority of assessed condition data is outdated and likely contributing to inaccurate condition reporting within this AMP. Inaccurate conditions will also result in inaccurate capital forecasts.

Asset Category	Asset Segment(s)	% of Assets with Assessed Conditions	Source of Condition Data
Road Network	Asphalt Roads	86%	2020 Staff Assessments
	Gravel Roads, Signalized Intersections	0%	Age-Based
	Pedestrian Infrastructure	9%	2015 Staff Assessments
	Streetlights & Signage	<1%	2010 Staff Assessments
	Surface Treated Roads	99%	2020 Staff Assessments
Bridges & Culverts	All Segments	100%	2022/24 OSIM Reports
Water Network	Valves, Water Equipment	0%	Age-Based
	Water Facilities	99%	2024 Staff Assessments
	Water Mains, Hydrants	<1%	2015/16 Staff Assessments
Sanitary Sewer Network	Lagoons	0%	Age-Based
	Sanitary Equipment	13%	2024 Staff Assessments
	Sanitary Facilities	100%	2024 Staff Assessments
	Sanitary Manholes, Sanitary Sewer Mains	<1%	2015 Staff Assessments
Stormwater Network	Catch Basins	8%	2015 Staff Assessments
	Storm Mains, Storm Manholes	<1%	2015 Staff Assessments
	Storm Management Ponds	0%	Age-Based
Buildings & Facilities	All Segments	88%	2013/15 Staff Assessments
Parks & Land Improvements	Marina	53%	2013/24 Staff Assessments
	Parking Lots	84%	2013 Staff Assessments
	Parks, Sport Fields & Courts	78%	2013/15/24 Staff Assessments
	Pools & Splashpads	100%	2013/15/24 Staff Assessments
	Trails	100%	2016 Staff Assessments
Vehicles & Heavy Equipment	Administration	100%	2013 Staff Assessments
	Community Services	31%	2013/16 Staff Assessments
	Environmental Services	27%	2013/16 Staff Assessments
	Fire	64%	2013/15 Staff Assessments

Asset Category	Asset Segment(s)	% of Assets with Assessed Conditions	Source of Condition Data
	Public Works	28%	2011/16 Staff Assessments
Machinery & Equipment	Administration	54%	2013/15 Staff Assessments
	Community Services	51%	2013/15/16 Staff Assessments
	Environmental Services	7%	2015 Staff Assessments
	Fire	0%	Age-Based
	Public Works	48%	2012/15/16 Staff Assessments

Table 6 Source of Condition Data

3.2.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 27% of the Town's assets will require replacement within the next 10 years. Refer to Appendix B – 10-Year Capital Requirements.

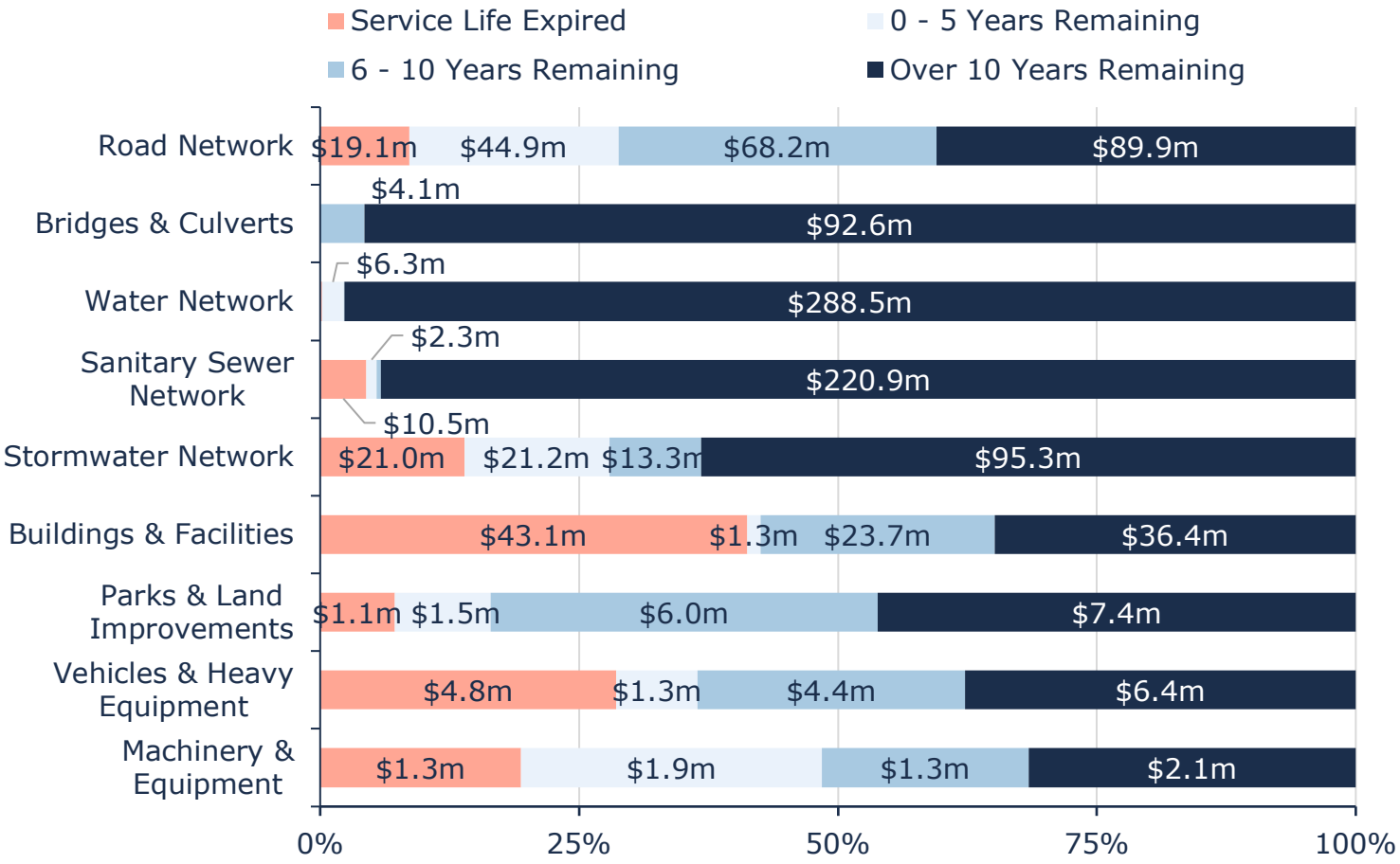


Figure 16 Service Life Remaining by Asset Category

3.2.5 Risk Matrix

Using the risk equation and preliminary risk models, Figure 17 shows how assets across the different asset categories are stratified within a risk matrix.

1 - 4 Very Low	5 - 7 Low	8 - 9 Moderate	10 - 14 High	15 - 25 Very High
$428,290,828 (37%)	$214,351,107 (19%)	$105,506,295 (9%)	$144,325,055 (13%)	$251,178,307 (22%)

Figure 17 Risk Matrix: All Assets

The analysis shows that based on current risk models, approximately 22% of the Town's assets, with a current replacement cost of approximately $251 million, carry a risk rating of 15 or higher (red) out of 25. Assets in this group may have a high probability of failure based on available condition data and age-based estimates and were considered to be most essential to the Town.

As new asset attribute information and condition assessment data are integrated with the asset register, asset risk ratings will evolve, resulting in a redistribution of assets within the risk matrix. Staff should also continue to calibrate risk models.

We caution that since risk ratings rely on many factors beyond an asset's physical condition or age, assets in a state of disrepair can sometimes be classified as low-risk, despite their poor condition rating. In such cases, although the probability of failure for these assets may be high, their consequence of failure ratings were determined to be low based on the attributes used and the data available.

Similarly, assets with very high condition ratings can receive a moderate to high-risk rating despite a low probability of failure. These assets may be deemed as highly critical to the Town based on their costs, economic importance, social significance, and other factors. Continued calibration of an asset's criticality and regular data updates are needed to ensure these models more accurately reflect an asset's actual risk profile.

3.2.6 Forecasted Capital Requirements

Aging assets require maintenance, rehabilitation, and replacement. Figure 18 below illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for all asset categories analyzed in this AMP over a 75-year time horizon. On average, $28.3 million is required each year to remain current with capital replacement needs for the Town's asset portfolio (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. This figure relies on age and available condition data.

The chart also illustrates a backlog of more than $101.5 million, comprising assets that remain in service beyond their estimated useful life. It is unlikely that all such assets are in a state of disrepair, requiring immediate replacements. This makes continued and expanded targeted and consistent condition assessments integral. Risk frameworks, proactive lifecycle strategies, and levels of service targets can then be used to prioritize projects, continuously refine estimates for both backlogs and ongoing capital needs and help select the right treatment for each asset.

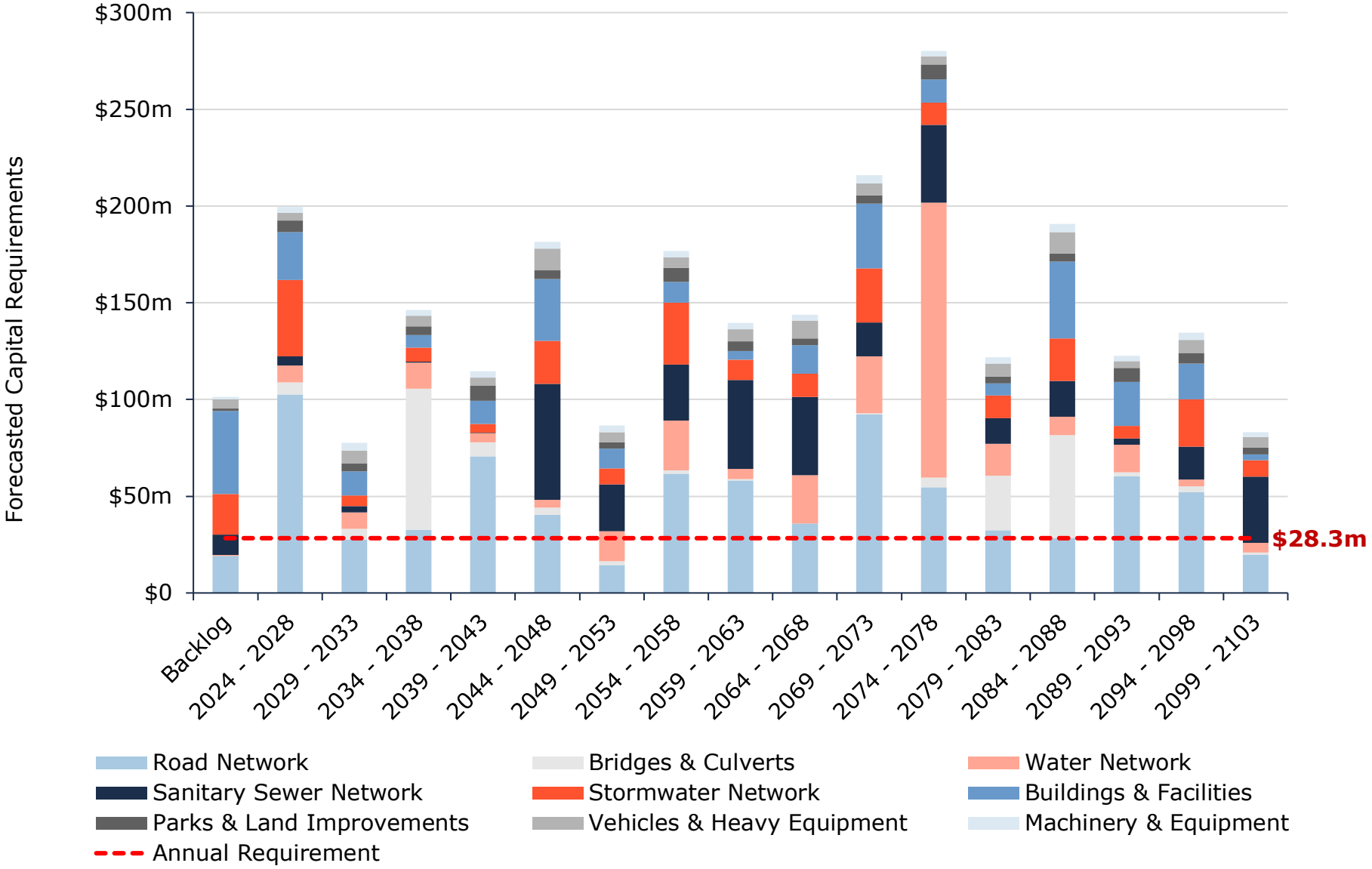


Figure 18 Capital Replacement Needs: Portfolio Overview 2024-2103

4. Proposed Levels of Service Analysis

4.1 Overview

4.1.1 O. Reg. 588/17 Proposed Levels of Service Requirements

The third iteration of municipal Asset Management Plans required under O. Reg. 588/17 requires the evaluation of levels of service (LOS) that includes:

- Proposed LOS options (i.e. increase, decrease, or maintain current LOS) and the risks associated with these options.
- How the proposed LOS may differ from current LOS.
- Whether the proposed LOS are achievable; and
- The municipality's ability to afford proposed LOS.

Additionally, a lifecycle management and financial strategy to support the proposed LOS must be identified for a period of 10 years with specific reporting on:

- Identification of lifecycle activities needed to provide the proposed LOS.
- Annual costs over the next 10 years to achieve the proposed LOS; and
- Identification of proposed funding projected to be available.

4.1.2 Considerations

Proposed LOS for the Town have been developed through comprehensive engagement with Town staff. In order to achieve any target LOS goal, careful consideration should be given to the following:

Financial Impact Assessments

- Assess historical expenditures/budget patterns to gauge feasibility of increasing budgets to achieve increased service levels
- Consider implications of LOS adjustments on other services and other infrastructure programs (i.e. trade-offs)

Infrastructure Condition Assessments

- Regularly assess the condition of critical infrastructure components
- Use standardized condition assessment protocols (where possible) to quantify the state of the infrastructure
- Identify non-critical components where maintenance could potentially be deferred without causing severe degradation
- Use current condition metrics as benchmarks to gauge feasibility of large adjustments to LOS

Service Metrics

- Measure user satisfaction, response times, and other relevant indicators for specific services

Service Impact Assessments

- Evaluate potential impacts on user satisfaction and service delivery due to changes in infrastructure condition

Key Lifecycle Activities

- Implement routine maintenance and inspections to ensure infrastructure reaches its optimal useful life
- Monitor and optimize operational processes for efficiency
- Regularly review and update preventive maintenance schedules
- Prioritize critical infrastructure components for maintenance
- Implement cost-saving measures without compromising safety or compliance
- Develop strategies for managing and communicating service impacts to stakeholders
- Invest in technology and process improvements to enhance maintenance efficiency
- Upgrade critical infrastructure components to improve overall reliability
- Explore opportunities for innovation and efficiency gains

Risk Management

- Identify potential risks to infrastructure and service quality resulting from adjusted service levels
- Develop contingency plans to address unforeseen challenges without compromising service quality
- Monitor performance closely to ensure that the target investment translates to the desired infrastructure condition

Infrastructure Condition Enhancements

- Identify areas for improvement and increased maintenance to enhance overall infrastructure condition

Timelines

- Although O. Reg. 588/17 requires evaluation of expenditures for a 10-year period in pursuit of proposed LOS, it does not require municipalities to achieve the LOS within this 10-year timeframe (ex. a municipality may have a goal to reach X% condition by 2050, the AMP is required to review the first 10 years of the strategy to reach this goal)
- Careful consideration should be given to setting realistic targets for when proposed service levels can be achieved.

Stakeholder Engagement

- It is recommended to ensure adjustments to LOS are not made in isolation and without consultation of various stakeholders. This could include, but is not limited to:
  - Department Heads/Infrastructure Managers
  - Residents
  - Service Users
  - Council
- Efforts should be made to communicate changes to LOS transparently to all affected stakeholders

Flexibility

- Priorities may change over time due to a variety of factors, such as:
  - Financial state of the municipality
  - Availability of grants
  - Significant increases or decreases in population
  - Changes in political priorities
  - Changes in resident priorities
  - New technologies
  - Changes in legislation
- Any proposed changes to LOS should be flexible and able to adapt to changes listed above, and other unforeseen circumstances

4.2 Stakeholder Engagement

To facilitate public engagement regarding any changes to service levels, the Town created a digital questionnaire consisting of 13 questions targeted at obtaining the following information related to levels of service and asset management:

- Background information of the participant (age, ward, family, etc.)
- Public perception of what makes Essex a great place to live
- Public perception of what asset categories participants believe the Town should target for spending
- Public perception of the condition and reliability of the Town's assets
- Public Feedback on taxation increases related to levels of service
- Any other general feedback that participants were willing to share

The survey was available for public participation for a period of three weeks from June 5 to June 26, 2025. In total, 136 residents answered the questionnaire in its entirety with an additional 76 who partially completed the survey.

The results of this survey were considered in the development of the proposed levels of service.

4.3 Proposed Levels of Service Scenarios

The three scenarios outlined in the following section were analyzed as options for proposed service levels for all categories included in this Asset Management Plan.

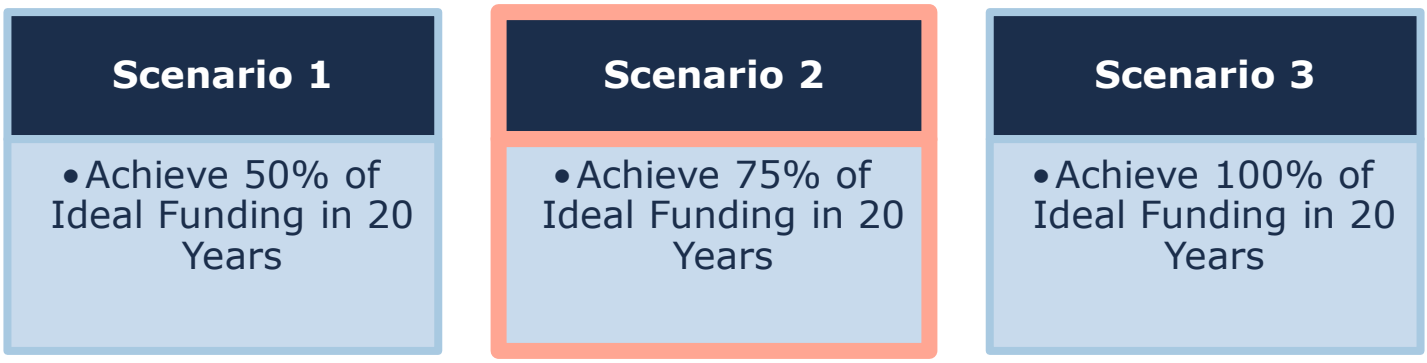


Figure 19 PLOS Scenario Overview

While all three scenarios were reviewed, ***the Town of Essex administration selected Scenario 2 as their preferred path forward regarding proposed levels of service***, which is reflected in the financial strategy and 10-year capital replacement forecasts.

4.3.1 Scenario 1: Achieving 50% Funding in 20 Years

This scenario assumes gradual tax and rate increases, stabilizing at 50% of recommended funding in 20 years.

- Annual Tax Increase ~1.1%
- Annual Water Rate Increase ~0.1%
- Annual Wastewater Rate Increase ~1.7%

While this scenario was modelled for consideration, the Town did not elect to move forward with this scenario.

Lifecycle Changes Required for Scenario 1

For all asset categories, no changes to lifecycle strategies are required in order to achieve Scenario 1. For the Town's current approach to lifecycle management of each category, refer to the below table to be directed to the specific section of the AMP.

In future iterations of the AMP, it is recommended to more closely analyze changes to lifecycle management strategies to find long-term cost savings and efficiencies.

Affordability/Achievability of Scenario 1

Of the three scenarios analyzed, Scenario 1 is the least expensive option. Reaching 50% of full funding immediately would require an increase of 30% in tax revenue. This is not reasonable or realistic to achieve in a short period of time. With the recommended implementation timeframe of 20 years, tax revenue would be increased gradually from $18.3 million to $22.8 million, water revenue from $3.8 million to $3.9 million, and sanitary revenue from $3.3 million to $4.6 million. Based on these gradual proposed increases, while maintaining existing sustainable grant funding, the available capital funding over the next 10 years for Scenario 1 is indicated in the table below:

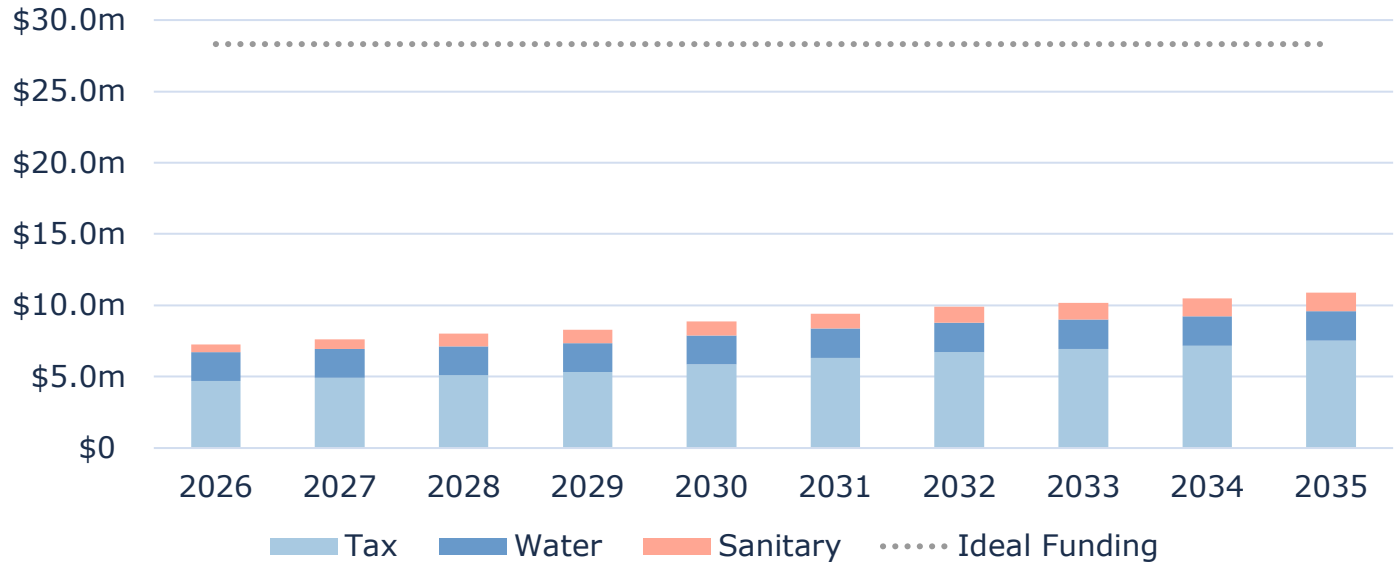


Figure 20 Scenario 1 Available Capital Funding Over Next 10 Years

It is important to note that an AMP is a dynamic document which should be reviewed regularly to ensure up-to-date information is incorporated including accurate replacement costs, changes in inventory, changes in available funding sources, and reflection on progress made on previous recommendations.

Changes to Community and Technical Levels of Service for Scenario 1

The Town of Essex does not anticipate any changes to qualitative community levels of services for any of the asset categories included within this AMP. All asset categories will see adjustments to their technical levels of service over time, particularly relating to capital reinvestment rate and average condition of assets. Refer to each asset category for more details.

Risks Associated with Scenario 1

There are pros and cons associated with each scenario analyzed, and each benefit is counter-balanced with consequences. For Scenario 1, the following risks have been identified:

- Increased infrastructure backlog
  - While mitigating the impact of financial increases on residents and businesses, taking 20 years to reach the targeted funding levels means 20 years of sub-optimal lifecycle management of assets. Being unable to complete strategic lifecycle interventions and replacements may result in increased asset failures, reduced reliability, and the potential for costly unbudgeted repairs to maintain services.
  - In addition to the risks of reaching the desired funding levels gradually, Scenario 1 only targets 50% funding. By intentionally underfunding the Town's asset portfolio, there is increased risk of services being impacted by deteriorating asset conditions.
- Reliance on Grants
  - As Scenario 1 targets 50% of recommended funding levels, the Town will be more reliant on conditional grants, as they become available. While these are beneficial to all municipalities to secure to reduce their tax/rate burden on residents, they are considered an unsustainable revenue source. The Town will be more vulnerable to changes in provincial and federal policy and funding programs.
- Missed opportunities for efficiencies
  - While analyzing Scenario 1, no alternative lifecycle strategies were proposed. Mid-lifecycle interventions, such as asphalt overlays and sewer lining, can result in extended lifespans of assets and reduced costs over the lifetime of the assets. By relying on existing lifecycle strategies, the Town risks paying more than necessary to maintain their asset inventory.

4.3.2 Scenario 2: Achieving 75% Funding in 20 Years (Preferred Scenario)

This scenario assumes gradual tax and rate increases, stabilizing at 75% of recommended funding in 20 years.

- Annual Tax Increase ~2.1%
- Annual Water Rate Increase ~1.3%
- Annual Wastewater Rate Increase ~2.8%

Lifecycle Changes Required for Scenario 2

For all asset categories, no changes to lifecycle strategies are required in order to achieve Scenario 2. In future iterations of the AMP, it is recommended to more closely analyze changes to lifecycle management strategies to find long-term cost savings and efficiencies.

Affordability/Achievability of Scenario 2

Of the three scenarios analyzed, Scenario 2 is a middle option in terms of tax/rate increases. Reaching 75% of full funding immediately would require an increase of 58% in tax revenue. This is not reasonable or realistic to achieve in a short period of time. With the recommended implementation timeframe of 20 years, tax revenue would be increased gradually from $18.3 million to $27.8 million, water revenue from $3.8 million to $4.9 million, and wastewater revenue from $3.3 million to $5.8 million. Based on these gradual proposed increases, while maintaining existing sustainable grant funding, the available capital funding over the next 10 years for Scenario 2 is indicated in the table below:

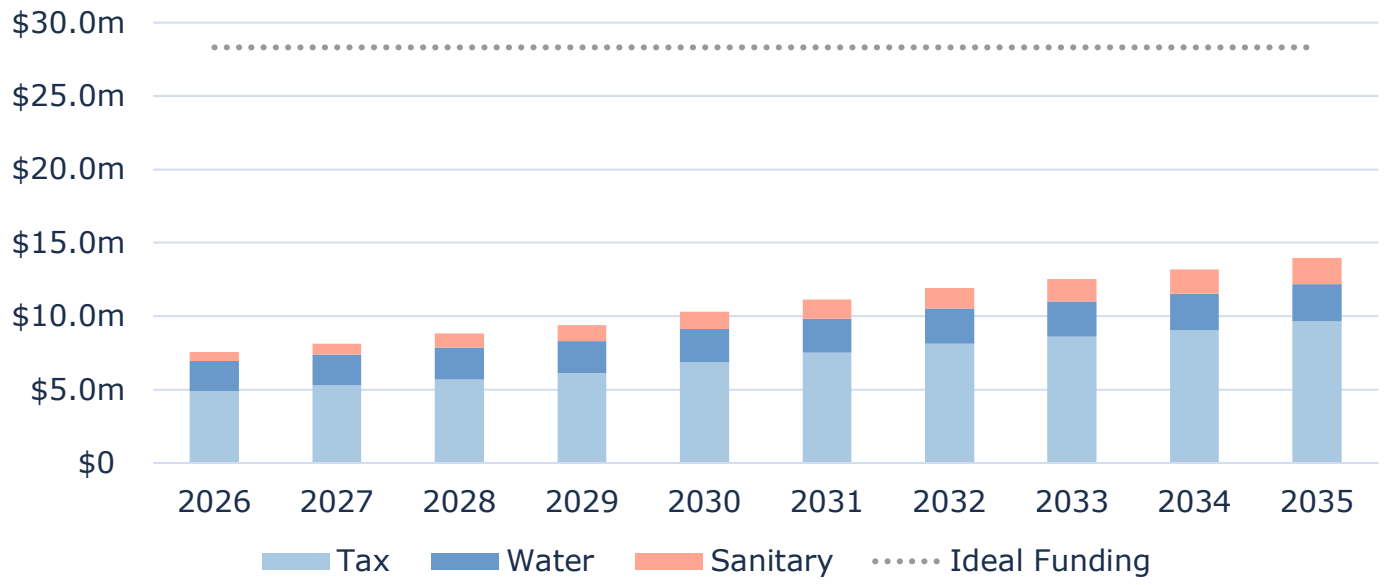


Figure 21 Scenario 2 Available Capital Funding Over Next 10 Years

The above table accounts for both current and future expenditures in order to achieve and maintain the proposed levels of service. This requires a combination of capital spending and saving (i.e. reserves) to ensure future large expenditures can be financed. As an example, Essex owns and maintains 58 bridges each with an estimated useful life of 50 years or more (especially with maintenance interventions). Because of the long duration between replacements, and low relatively quantity of assets, it is likely that there will be occasional years with no capital expenditures relating to bridges, however, this does not mean that the Town should ignore the funding requirements in these years. Instead, annual funding should be set aside in the form of reserves to ensure funding for upcoming lifecycle events is available when required.

As the Town of Essex selected Scenario 2 as their preferred proposed level of service, a further breakdown of projected capital expenditures by asset category can be found in Appendix B – 10-Year Capital Requirements.

It is important to note that an AMP is a dynamic document which should be reviewed regularly to ensure up-to-date information is incorporated including accurate replacement costs, changes in inventory, changes in available funding sources, and reflection on progress made on previous recommendations.

Changes to Community and Technical Levels of Service for Scenario 2

The Town of Essex does not anticipate any changes to qualitative community levels of services for any of the asset categories included within this AMP. All asset categories will see adjustments to their technical levels of service over time, particularly relating to capital reinvestment rate and average condition of assets. Refer to each asset category for more details.

Appropriateness of Scenario 2 to Meet the Town's Needs

Town staff emphasized a need to balance financial impacts on residents with the reality of the current state of infrastructure within the municipality. Upon review of all three scenarios, Scenario 2 was selected as the most appropriate option as an annual tax increase of 2.1% was

determined to be subjectively manageable to implement, while creating a sustainable future for the Town's infrastructure. The risks associated with relying on conditional grants from higher levels of government were deemed to be too great considering the country-wide trend of downloading responsibilities (and costs) to municipal governments and reducing funding opportunities.

Risks Associated with Scenario 2

There are pros and cons associated with each scenario analyzed, and each benefit is counter-balanced with consequences. For Scenario 2, the following risks have been identified:

- Increased infrastructure backlog
  - While mitigating the impact of financial increases on residents and businesses, taking 20 years to reach the targeted funding levels means 20 years of sub-optimal lifecycle management of assets. Being unable to complete strategic lifecycle interventions and replacements may result in increased asset failures, reduced reliability, and the potential for costly unbudgeted repairs to maintain services.
  - In addition to the risks of reaching the desired funding levels gradually, Scenario 2 only targets 75% funding. By intentionally underfunding the Town's asset portfolio, there is increased risk of services being impacted by deteriorating asset conditions.
- Reliance on Grants
  - As Scenario 2 targets 75% of recommended funding levels, the Town will be more reliant on conditional grants, as they become available. While these are beneficial to all municipalities to secure to reduce their tax/rate burden on residents, they are considered an unsustainable revenue source. The Town will be more vulnerable to changes in provincial and federal policy and funding programs.
- Missed opportunities for efficiencies
  - While analyzing Scenario 2, no alternative lifecycle strategies were proposed. Mid-lifecycle interventions, such as asphalt overlays and sewer lining, can result in extended lifespans of assets and reduced costs over the lifetime of the assets. By relying on existing lifecycle strategies, the Town risks paying more than necessary to maintain their asset inventory.

4.3.3 Scenario 3: Achieving 100% Funding in 20 Years

This scenario assumes gradual tax and rate increases, stabilizing at 100% of recommended funding in 20 years.

- Annual Tax Increase ~2.9%
- Annual Water Rate Increase ~2.2%
- Annual Wastewater Rate Increase ~3.6%

While this scenario was modelled for consideration, the Town did not elect to move forward with this scenario.

Lifecycle Changes Required for Scenario 3

For all asset categories, no changes to lifecycle strategies are required in order to achieve Scenario 3. In future iterations of the AMP, it is recommended to more closely analyze changes to lifecycle management strategies to find long-term cost savings and efficiencies.

In future iterations of the AMP, it is recommended to more closely analyze changes to lifecycle management strategies to find long-term cost savings and efficiencies.

Affordability/Achievability of Scenario 3

Of the three scenarios analyzed, Scenario 3 is the most expensive option. Reaching 100% of full funding immediately would require an increase of 86% in tax revenue. This is not reasonable or realistic to achieve in a short period of time. With the recommended implementation timeframe of 20 years, tax revenue would be increased gradually from $18.3 million to $32.5 million, water revenue from $3.8 million to $5.9 million, and sanitary revenue from $3.3 million to $6.7 million. Based on these gradual proposed increases, while maintaining existing sustainable grant funding, the available capital funding over the next 10 years for Scenario 3 is indicated in the table below:

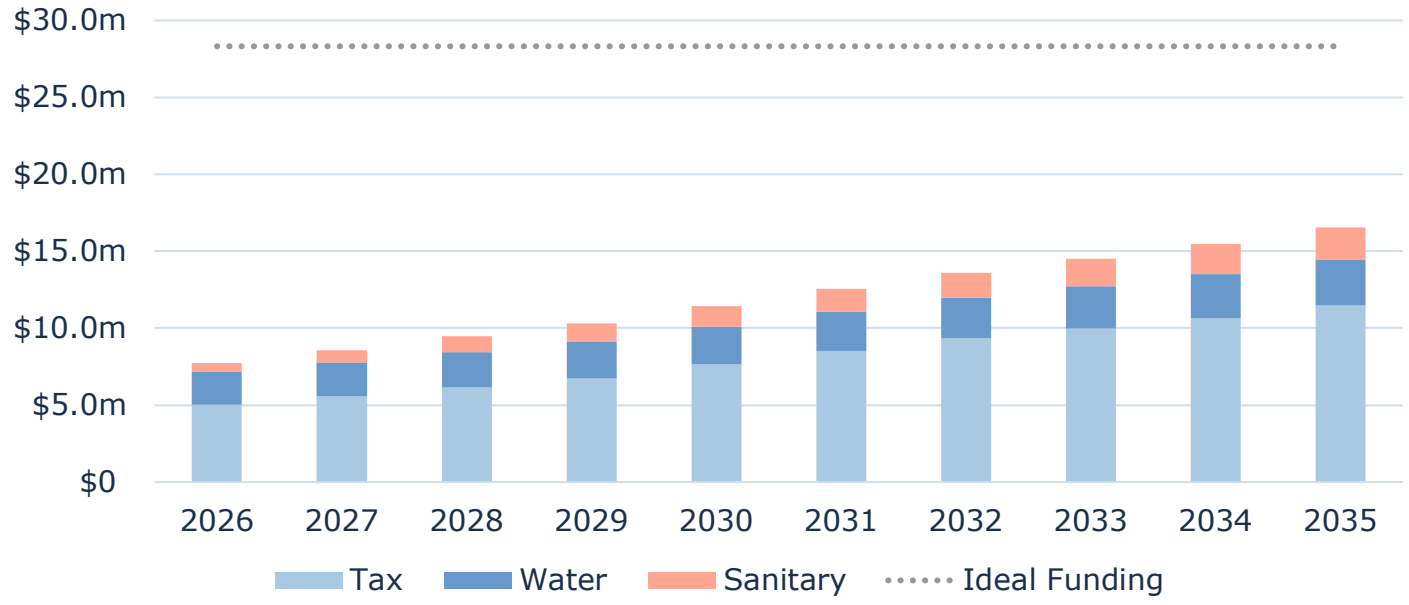


Figure 22 Scenario 3 Available Capital Funding Over Next 10 Years

It is important to note that an AMP is a dynamic document which should be reviewed regularly to ensure up-to-date information is incorporated including accurate replacement costs, changes in inventory, changes in available funding sources, and reflection on progress made on previous recommendations.

Changes to Community and Technical Levels of Service for Scenario 3

The Town of Essex does not anticipate any changes to qualitative community levels of services for any of the asset categories included within this AMP. All asset categories will see adjustments to their technical levels of service over time, particularly relating to capital reinvestment rate and average condition of assets. Refer to each asset category for more details.

Risks Associated with Scenario 3

There are pros and cons associated with each scenario analyzed, and each benefit is counter-balanced with consequences. For Scenario 3, the following risks have been identified:

- Increased infrastructure backlog
  - While mitigating the impact of financial increases on residents and businesses, taking 20 years to reach the targeted funding levels means 20 years of sub-optimal lifecycle management of assets. Being unable to complete strategic lifecycle interventions and replacements may result in increased asset failures, reduced reliability, and the potential for costly unbudgeted repairs to maintain services.
- Missed opportunities for efficiencies
  - While analyzing Scenario 3, no alternative lifecycle strategies were proposed. Mid-lifecycle interventions, such as asphalt overlays and sewer lining, can result in extended lifespans of assets and reduced costs over the lifetime of the assets. By relying on existing lifecycle strategies, the Town risks paying more than necessary to maintain their asset inventory.
- Political resistance tax/rate increases
  - Scenario 3 is the most expensive option analyzed in this asset management plan. It is likely that implementing a strategy which would require annual tax increases of 2.9% would result in stakeholder pushback with extreme pressure on politicians to reduce the tax burden on residents.

Core Assets

5. Road Network

The Town's road network comprises 16% of the Town's asset portfolio, surpassed only by underground utility assets, and has a current replacement cost of more than $222 million, distributed primarily between asphalt and surface treated roads. The Town also owns and manages other supporting infrastructure and capital assets including streetlights, signage, signalized intersections, and sidewalks.

5.1 Inventory & Valuation

Table 7 summarizes the quantity and current replacement cost of the Town's various road network assets as managed in its primary asset management register, Citywide.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Asphalt Roads	136.8	Length (km)	$133,717,770	Cost per Unit
Gravel Roads	45.5	Length (km)	$3,463,241	Cost per Unit
Pedestrian Infrastructure	56.9	Length (km)	$9,300,906	Cost per Unit
Signalized Intersections	7	Assets	$3,008,191	Cost per Unit
Streetlights & Signage	4,633	Assets	$18,930,290	Cost per Unit
Surface Treated Roads	147.0	Length (km)	$53,691,790	Cost per Unit
TOTAL			**$222,112,187**	

Table 7 Detailed Asset Inventory: Road Network

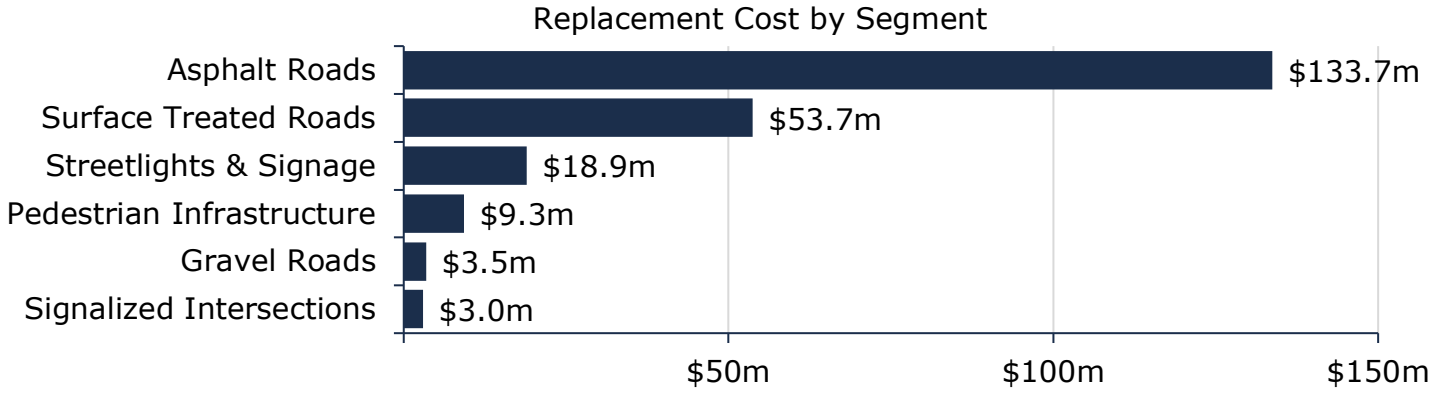


Figure 23 Portfolio Valuation: Road Network

5.2 Asset Condition

Figure 24 summarizes the replacement cost-weighted condition of the Town's road network. Based on a combination of field inspection data and age, 38% of assets are in fair or better condition; the remaining 62% of assets are in poor to very poor condition. Condition assessments were available for 86% of paved roads and 99% of surface treated roads, based on replacement cost. This condition data was projected from inspection date to current year to estimate their condition today. Condition data was available for less than 10% of the remaining asset types. It is worth noting that assessment data for pedestrian infrastructure, streetlights, and signage is over a decade old, limiting its validity.

Assets in poor or worse condition may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition. As illustrated in Figure 24, the majority of the Town's road network assets are in poor or worse condition.

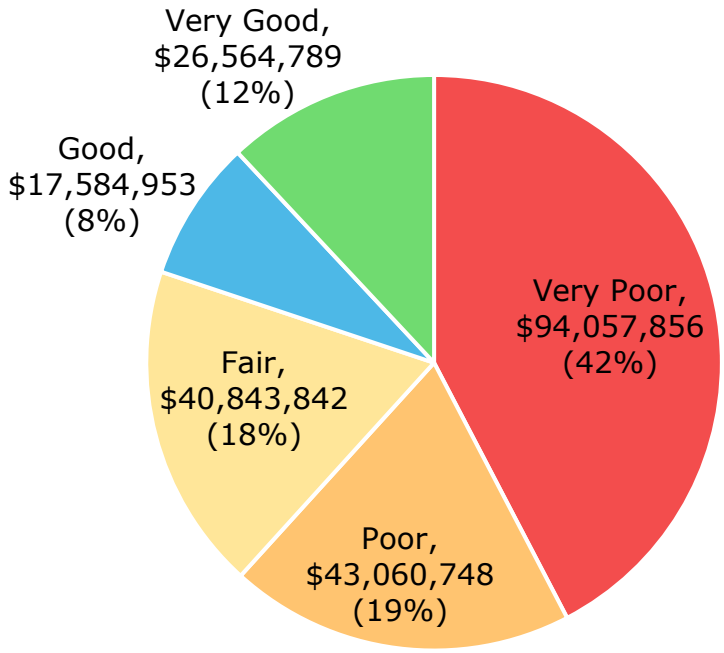


Figure 24 Asset Condition: Road Network Overall

As illustrated in Figure 25, based on a combination of condition assessments and age-base condition projections, the majority of the Town's paved and unpaved road network is in poor or worse condition.

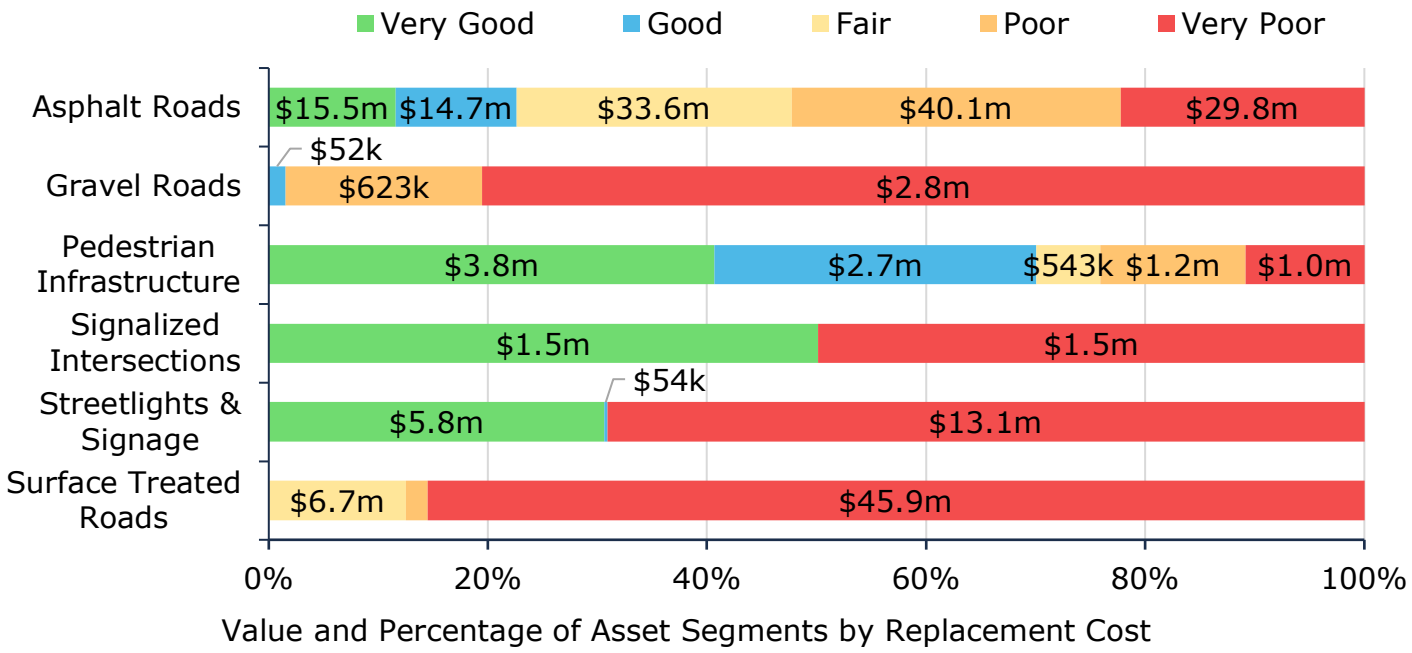


Figure 25 Asset Condition: Road Network by Segment

5.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential long-term replacement spikes.

Figure 26 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

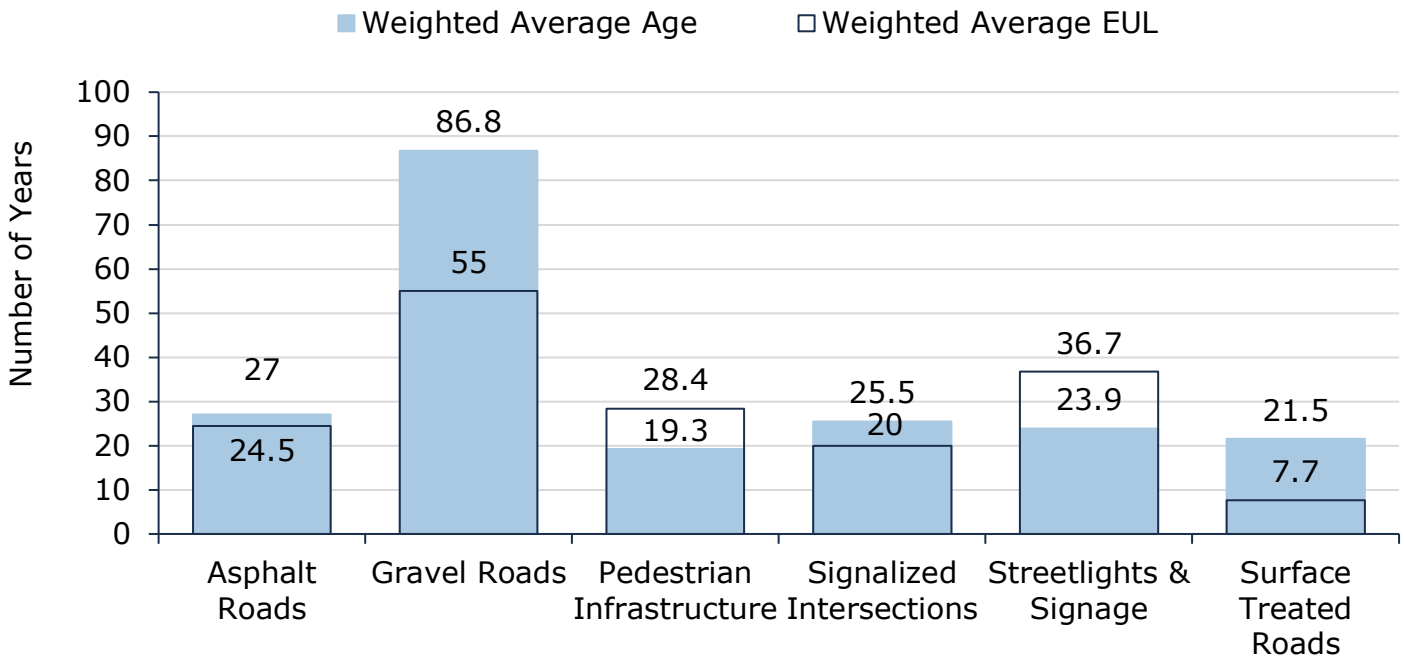


Figure 26 Estimated Useful Life vs. Asset Age: Road Network

Age analysis shows that the majority of paved roads have surpassed their expected useful life, with an average age of 27 years against a design life of 24.5 years for asphalt roads and an average age of 21.5 years against a design life of 7.7 years for surface treated roads. Unpaved roads are also well beyond their design life. However, unpaved roads can be maintained on a perpetual cycle through the operational maintenance budget with a regular roadway granular replacement program. Asphalt and surface treated roads can also be extended well past their originally estimated useful lives with lifecycle interventions as described in the next section.

Although asset age is an important measurement for long-term planning, condition assessments provide a more accurate indication of actual asset needs. Further, useful life estimates established as part of the PSAB 3150 implementation may not be accurate and may not reflect in-field asset performance.

5.4 Current Approach to Lifecycle Management

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.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of HCB and LCB roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Asphalt (HCB) Roads		
Event Name	**Event Class**	**Event Trigger**
Crack Sealing	Preventative Maintenance	Condition: 70-100
Mill and Pave	Rehabilitation	Condition: 45
Asphalt Full Depth Removal	Rehabilitation	Condition: 30-40
Asset Reconstruction	Replacement	Condition: 25

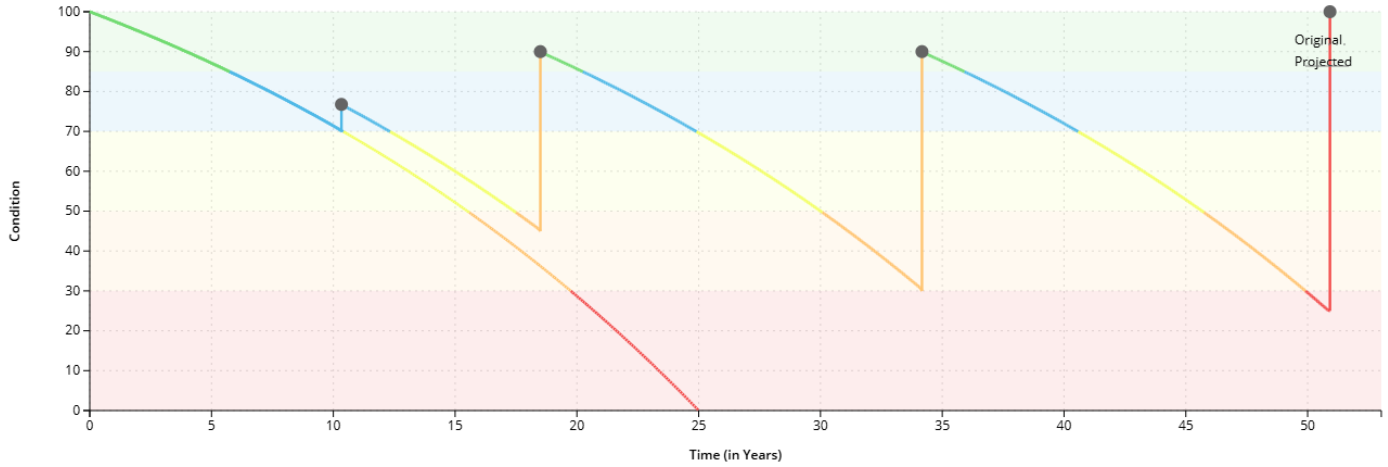


Table 8 Lifecycle Management Strategy: Road Network (Asphalt Roads)

Surface Treated (LCB) Roads		
Event Name	**Event Class**	**Event Trigger**
First Single Surface Treatment	Maintenance	Condition: 60-85
Pulverize/Grade OR Cold Rolled Recycle with 3 Layers of Tar & Chip	Rehabilitation	Condition: 30-69 (Repeated)
Single Surface Treatment	Rehabilitation	Condition: 50-85 (Repeated)
Asset Reconstruction	Replacement	Condition: 25

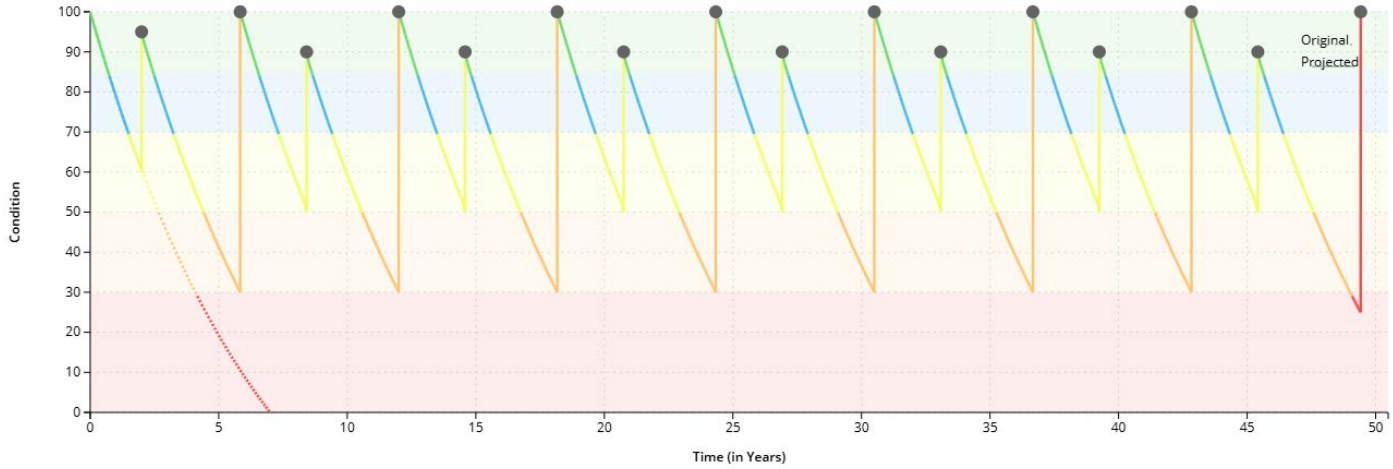
Surface Treated (LCB) Roads


Table 9 Lifecycle Management Strategy: Road Network (Surface Treated Roads)

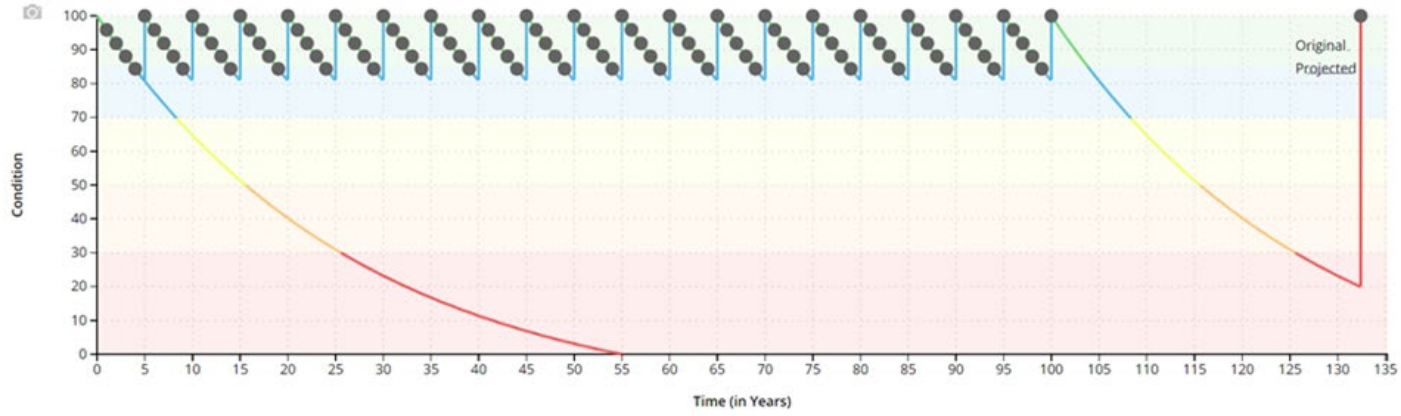
Gravel Roads		
Event Name	**Event Class**	**Event Trigger**
Dust Control/Suppressant	Maintenance	Annually (Localized)
Grading with Stone	Rehabilitation	Every 5 Years
Asset Reconstruction and/or Asset Surface Upgrade	Replacement	Condition: 20
		

Table 10 Lifecycle Management Strategy: Road Network (Gravel Roads)

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Crack sealing is conducted annually on selected HCB road sections with a condition range of 60-100
	Single surface treatment is applied on LCB roads when the condition ranges from 70-85
	Gravel roads receive annual dust control/suppressant application and grading with stone
	Summer maintenance activities include grading, re-graveling, ditching, roadside mowing, tree trimming, brush cleanup, road sign maintenance, and line painting
	Winter maintenance activities include snow plowing, salting, and snow removal
Rehabilitation	Mill and pave rehabilitation for HCB roads with PCI range 40-60
	Asphalt full-depth removal is performed on HCB roads with a condition range of 30-40
	Rehabilitative activities (cold in-place recycling, mill and paving, asphalt overlaying, single and double surface treatments) are conducted on LCB roads with a condition range of 30-69
	Localized grading with stone is performed annually on gravel roads
Replacement	Asset reconstruction (full-depth reconstruction) is conducted on HCB and LCB roads when the condition reaches 30 or less
	Asset reconstruction and/or surface upgrade is conducted for gravel roads when the condition reaches 0
	Road reconstruction projects are prioritized based on road condition, risk, sub-surface asset requirements (stormwater, wastewater, water), and consideration of growth, health & safety, and social impact
Inspection	A Road Needs Study (RNS) is completed every four years by an external consultant for all paved and unpaved roads, with the most recent RNS conducted in 2018
	A Pavement Condition Index (PCI) is calculated based on distress quantity, type, and severity
	PCI is updated regularly for road sections undergoing maintenance, rehabilitation, or reconstruction.
	Condition assessments, staff judgment, traffic loads, and opportunity to bundle projects with sub-surface asset requirements help inform lifecycle interventions

Table 11 Lifecycle Management Strategy: Road Network

5.5 Forecasted Long-Term Replacement Needs

Figure 27 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Town's road network. This analysis was run until 2073 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $9.8 million for all assets in the road network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The chart illustrates substantial capital needs through the forecast period. It also shows a backlog of $19.1 million, dominated by asphalt roads. These projections are based on asset replacement costs, age analysis, and condition data when available, as well as lifecycle modeling (roads only). They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

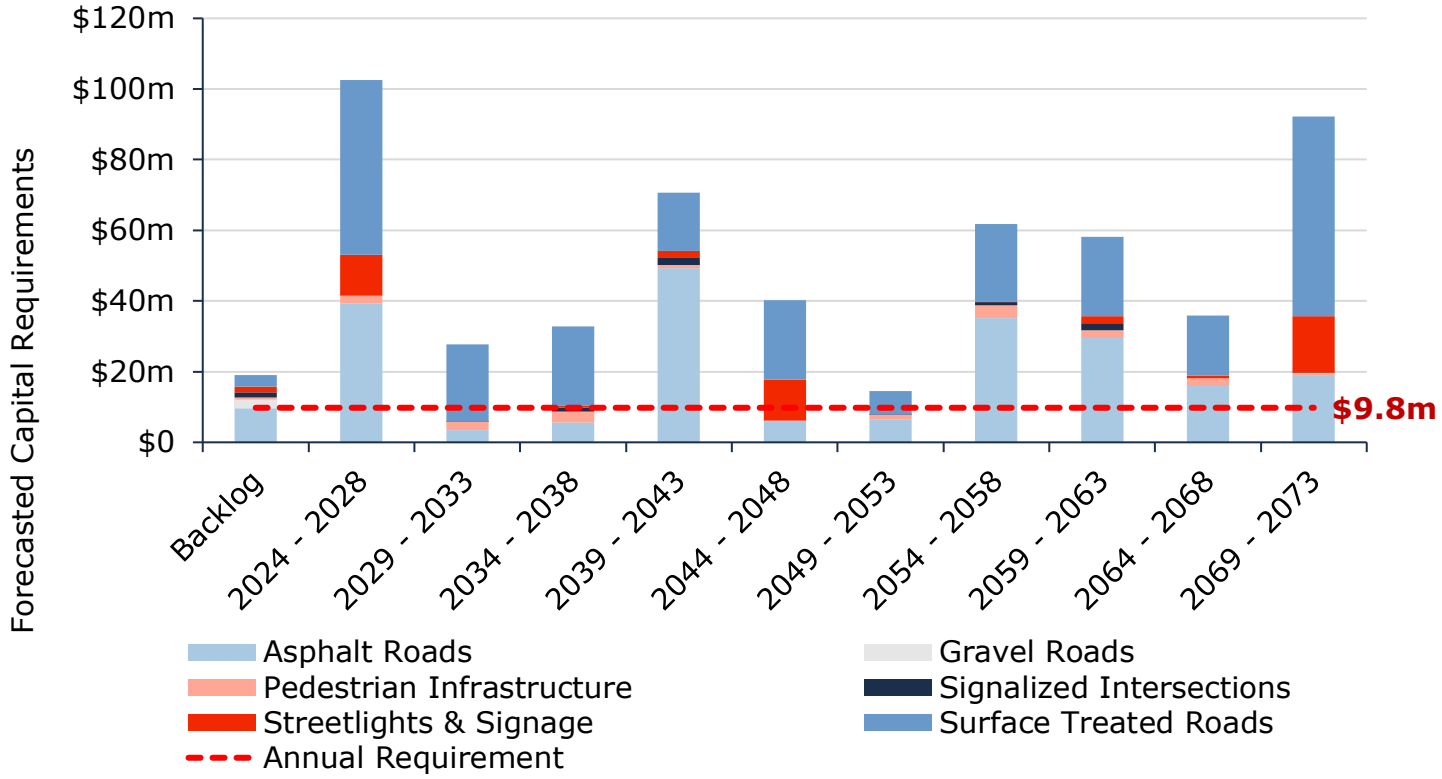


Figure 27 Forecasted Capital Replacement Needs: Road Network 2024-2073

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. Regular pavement condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

5.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition, service life remaining, replacement costs, traffic data, and road class. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low	5 - 7 Low	8 - 9 Moderate	10 - 14 High	15 - 25 Very High
$30,287,087 (14%)	$49,707,492 (22%)	$35,944,198 (16%)	$39,396,486 (18%)	$66,776,924 (30%)

Figure 28 Risk Matrix: Road Network

5.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17, as well as any additional performance measures that the Town selected for this AMP.

5.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	The Town's road network spans a total of 329 km primarily within a rural setting, with areas of urban and semi-urban development. The road network consists of approximately 137 km of high class bituminous (HCB) roads, 147 km of low class bituminous (LCB) roads and 46 km of unpaved roads. The road network also contains other roadside appurtenances such as sidewalks, streetlights, traffic signals and pedestrian crossings. Also refer to Appendix C – Level of Service Maps & Photos

<table>
<tr><th>Service Attribute</th><th>Qualitative Description</th><th>Current LOS (2023)</th></tr>
<tr><td>Quality</td><td>Description or images that illustrate the different levels of road class pavement condition</td><td>Every road section receives a pavement condition index (PCI) rating (0-100). The rating incorporates pavement roughness measurements and surface distresses (type, quantity, severity).
Ratings are categorized into 5 general qualitative descriptors as detailed below:
<table>
<tr><th>PCI Label</th><th>PCI Range</th></tr>
<tr><td>Excellent</td><td>85-100</td></tr>
<tr><td>Good</td><td>70-85</td></tr>
<tr><td>Fair</td><td>50-70</td></tr>
<tr><td>Poor</td><td>30-50</td></tr>
<tr><td>Very Poor</td><td>0-30</td></tr>
</table>
</td></tr>
</table>

Table 12 O. Reg. 588/17 Community Levels of Service: Road Network

5.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0.12 km/km^2 [9]
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	1.17 km/km^2 [10]
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	1.09 km/km^2 [11]
Quality	Average pavement condition index for paved roads in the Town	Asphalt: 49% Surface Treated: 21%
	Average surface condition for unpaved roads in the Town (e.g. excellent, good, fair, poor, very poor)	Very Poor
Performance	Target vs. Actual capital reinvestment rate	4.4% vs. 1.2%
	O&M costs for unpaved (loose top) roads per lane-km	$4,600/year

Table 13 O. Reg. 588/17 Technical Levels of Service: Road Network

[9] 16.1km of arterial roads, assumed at 2 lanes.
[10] 161.7km of collector roads, assumed at 2 lanes.
[11] 151.5km of local roads, assumed at 2 lanes.

5.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for the road network. Further PLOS analysis at the portfolio level can be found in Section *4. Proposed Levels of Service Analysis.*

5.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Road network capital funding gradually increases from $2.7m/year to $4.9m/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Road network capital funding gradually increases from $2.7m/year to $7.3m/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Road network capital funding gradually increases from $2.7m/year to $9.8m/year over a span of 20 years

Table 14 Road Network PLOS Scenario Descriptions

5.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	60%	40%	36%	
	Average Asset Risk	8.0	10.3	10.9	
	Average Annual Investment		$4,892,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		2.2%		
Scenario 2 (75%)	Average Condition	60%	44%	47%	
	Average Asset Risk	8.0	9.8	10.2	
	Average Annual Investment		$7,338,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		3.3%		
Scenario 3 (100%)	Average Condition	60%	46%	56%	
	Average Asset Risk	8.0	9.5	8.9	
	Average Annual Investment		$9,784,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		4.4%		

Table 15 Road Network PLOS Scenario Analysis

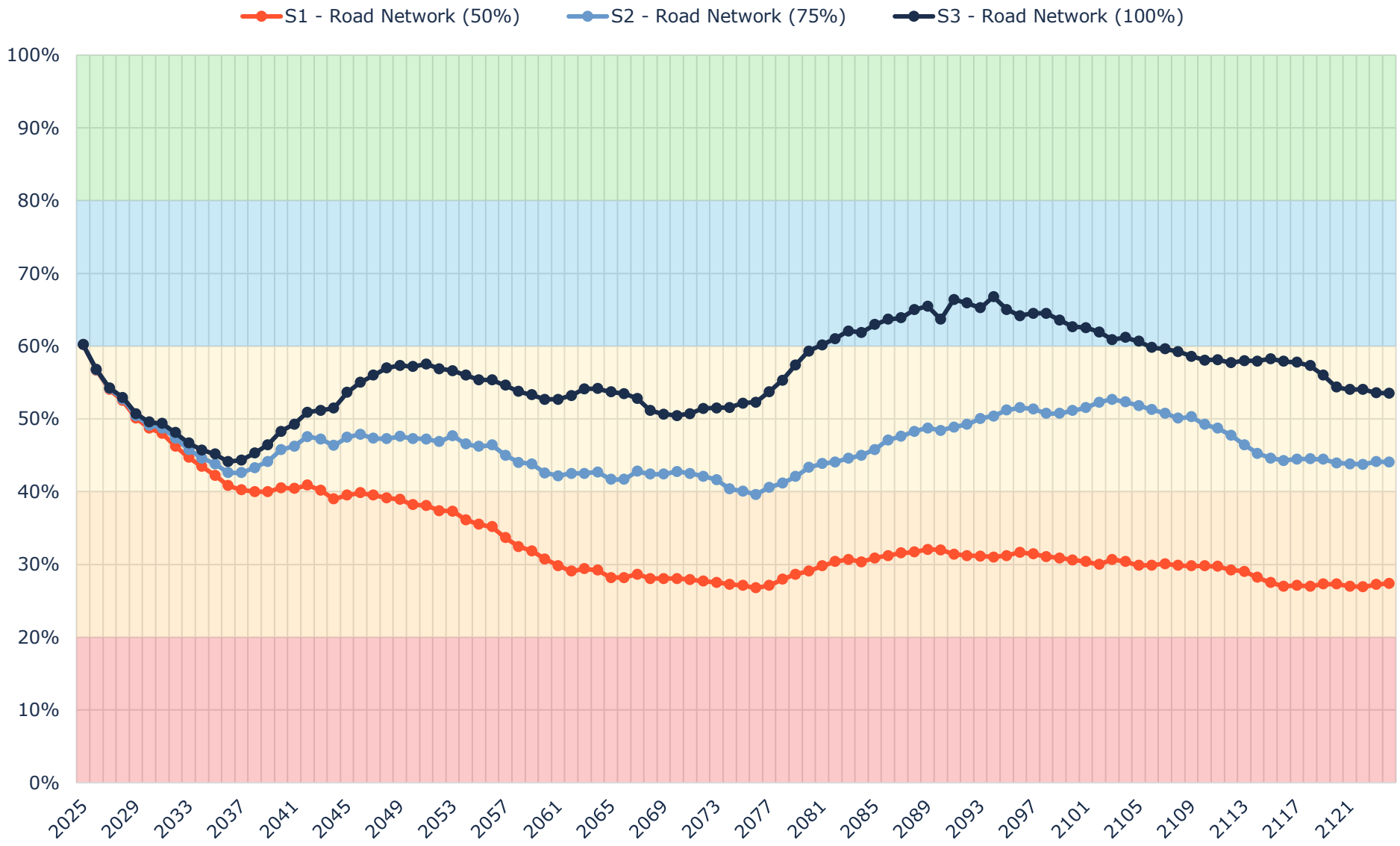


Figure 29 Road Network PLOS Scenario Condition Results

5.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for the road network if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**	**$7.3m**
Projected Capital Spending	$2.9m	$3.1m	$3.3m	$3.4m	$3.8m	$4.1m	$4.3m	$4.5m	$4.7m	$5.0m
Funding Deficit	$4.4m	$4.2m	$4.1m	$3.9m	$3.6m	$3.3m	$3.0m	$2.8m	$2.6m	$2.4m
Target Reinvestment Rate	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**	**3.3%**
Projected Reinvestment Rate	1.3%	1.4%	1.5%	1.6%	1.7%	1.8%	1.9%	2.0%	2.1%	2.2%

Table 16 Road Network 10-Year PLOS Financial Projections

6. Bridges & Culverts

The Town's transportation network also includes bridges and structural culverts, with a current replacement cost of approximately $97 million that are critical to the movement of people and goods through the region.

6.1 Inventory & Valuation

Table 17 summarizes the quantity and current replacement cost of bridges and culverts. The Town owns and manages 57 bridges and 19 structural culverts.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Bridges	58	Assets	$75,153,000	User-Defined
Non-Structural Culverts	20	Assets	$6,021,000	User-Defined
Structural Culverts	19	Assets	$15,550,000	User-Defined
TOTAL			**$96,724,000**	

Table 17 Detailed Asset Inventory: Bridges & Culverts

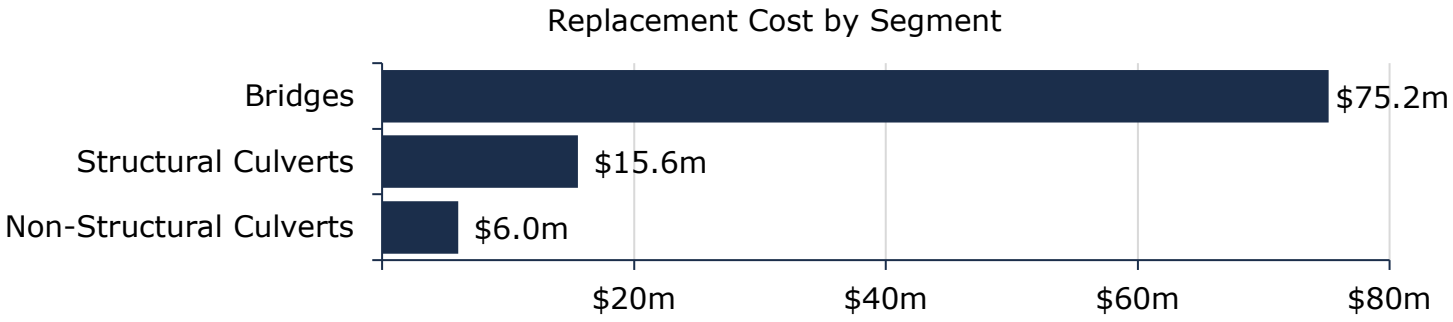


Figure 30 Portfolio Valuation: Bridges & Culverts

6.2 Asset Condition

Figure 31 summarizes the replacement cost-weighted condition of the Town's bridges and culverts. Based on the Town's recent Ontario Structures Inspection Manual (OSIM) assessments, 99% of bridges and culverts are in fair or better condition. Some elements or components of these structures may be candidates for replacement or rehabilitation in the medium term and should be monitored for further degradation in condition. At 1% of the total bridges and culverts portfolio, assets in poor or worse condition may require replacement in the immediate or short term.

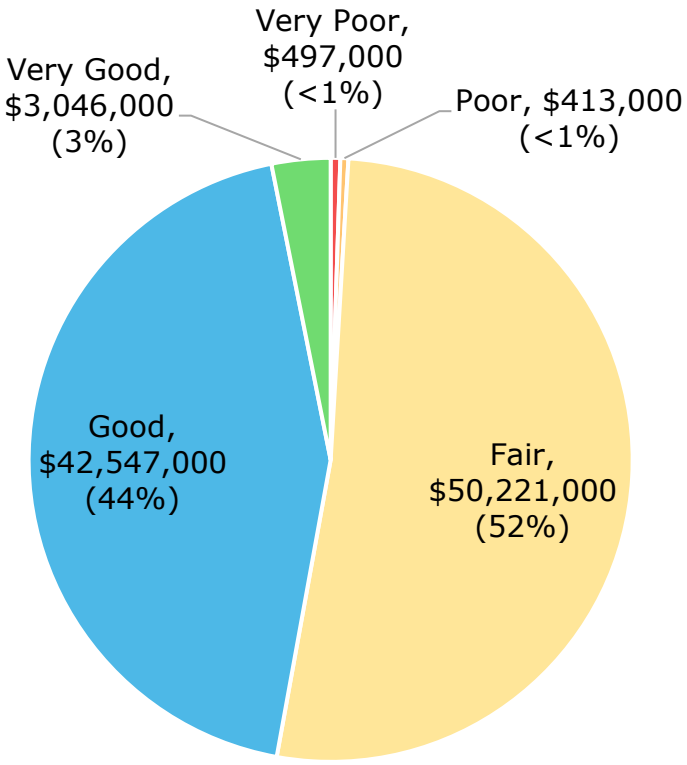


Figure 31 Asset Condition: Bridges & Culverts Overall

As further detailed in Figure 32, based on in-field condition assessments, $413,000 of non-structural culverts (representing 7% of the segment) were assessed as being in poor condition. 1% of bridges, with a current replacement cost of $497,000 were identified as poor or very poor condition. Bridges and structures with a poor or worse rating are not necessarily unsafe for regular use, however, should be monitored and potentially have additional investigation. The OSIM ratings are designed to identify repairs needed to elevate condition ratings to a fair or higher.

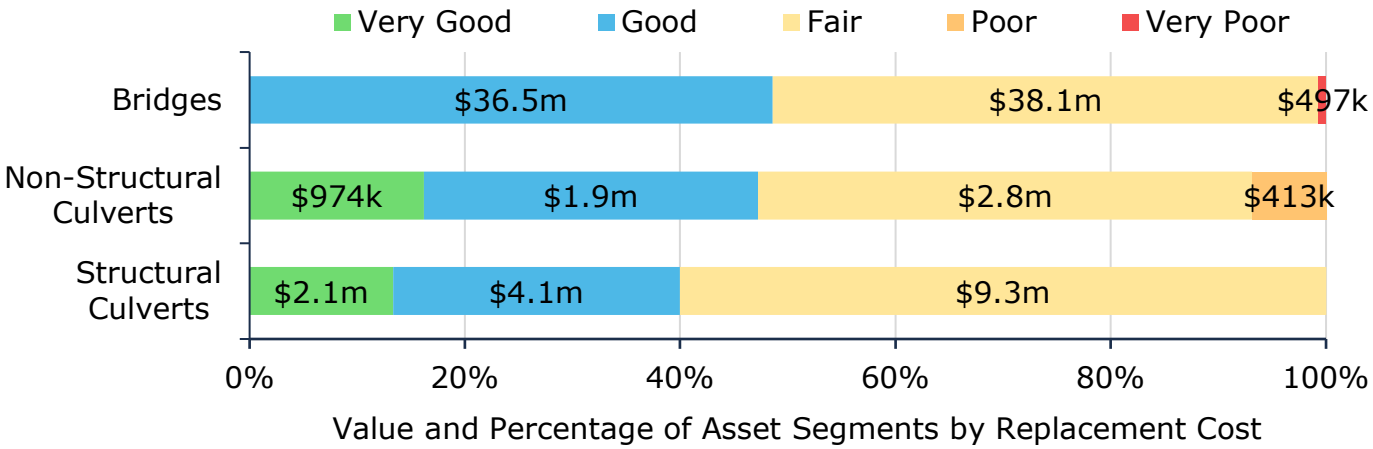


Figure 32 Asset Condition: Bridges & Culverts by Segment

6.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential replacement spikes.

Figure 33 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

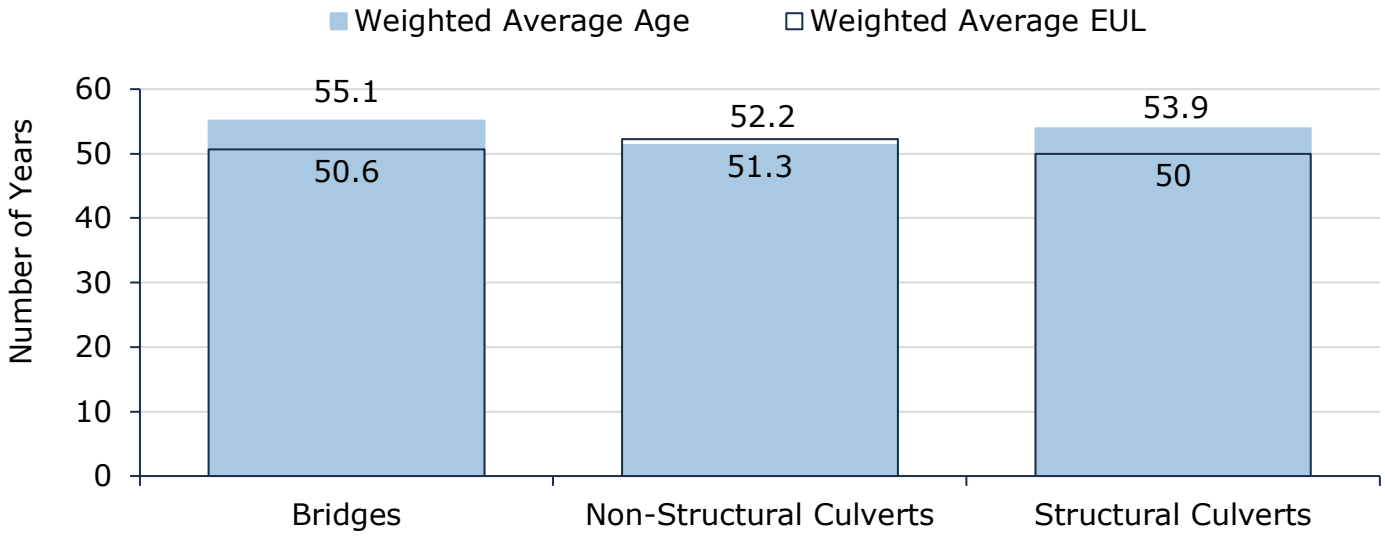


Figure 33 Estimated Useful Life vs. Asset Age: Bridges & Culverts

Age analysis reveals that on average, bridges and culverts have consumed virtually all of their estimated useful life, with an overall average age of 53 years against an average EUL of 50 years. OSIM assessments should continue to be used in conjunction with age and asset criticality to prioritize capital and maintenance expenditures.

6.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Typical maintenance includes: ♦ Obstruction removal ♦ Cleaning/sweeping ♦ Erosion control ♦ Brush/tree removal
	Biennial OSIM inspection reports include a maintenance and capital needs list identifying assets requiring specific maintenance that is used to guide and prioritize capital investment, unless health and safety concerns warrant a different, more immediate intervention.
Rehabilitation / Replacement	Biennial OSIM inspection reports include a Capital Needs List identifying recommended rehabilitation and replacement activities with estimated costs.
Inspection	The most recent Bridge and Culvert inspection reports were prepared in 2024 by Keystone Bridge Management Corp.

Table 18 Lifecycle Management Strategy: Bridges & Culverts

6.5 Forecasted Long-Term Replacement Needs

Figure 34 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Town's bridges and culverts. This analysis was run until 2063 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) for bridges and culverts total $2 million. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

There is a spike in capital needs between 2034 and 2038, with a peak at $73 million. These projections and estimates are based on asset replacement costs, age analysis, and condition data. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

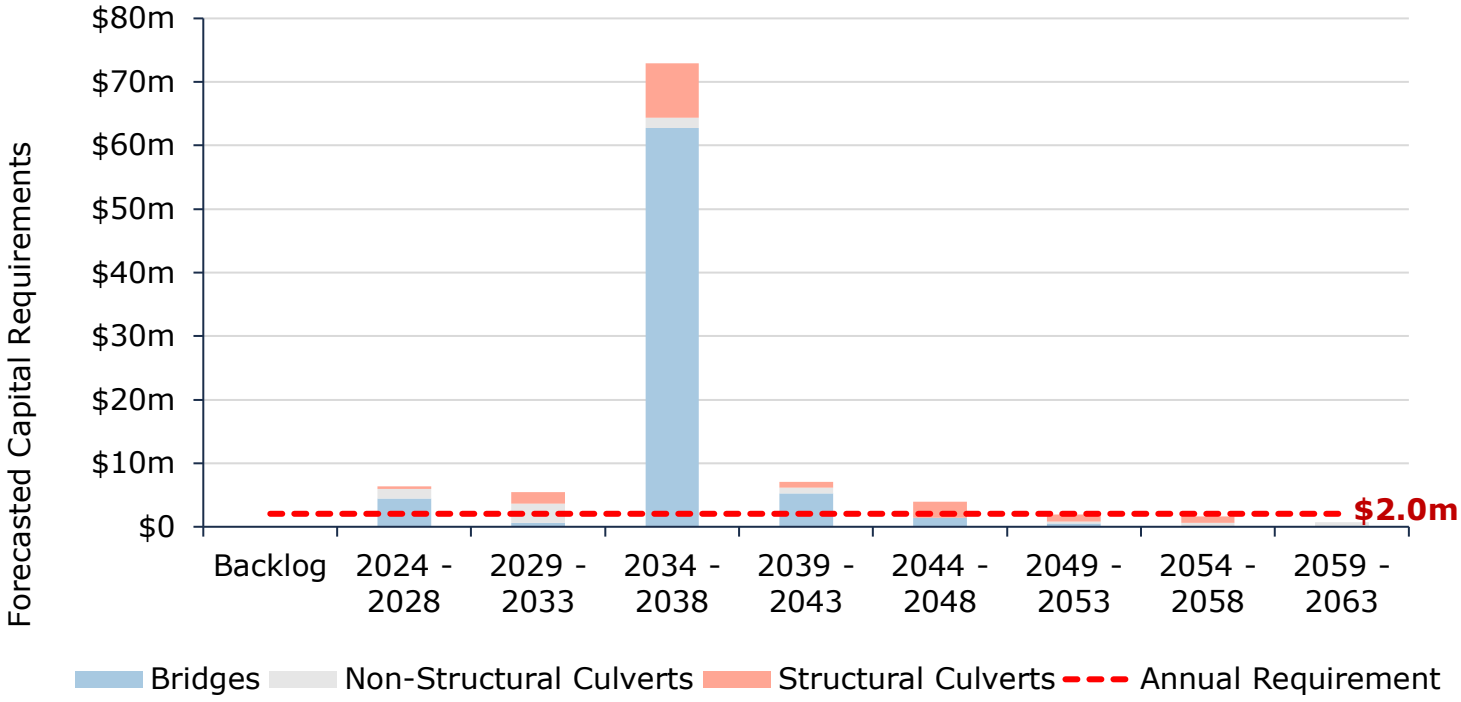


Figure 34 Forecasted Capital Replacement Needs: Bridges & Culverts 2024-2063

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. OSIM condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

6.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition, service life remaining, replacement costs, average daily traffic, speed limit, and total length. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low $21,329,000 (22%)	5 - 7 Low $22,848,000 (24%)	8 - 9 Moderate $32,906,000 (34%)	10 - 14 High $13,804,000 (14%)	15 - 25 Very High $5,837,000 (6%)

Figure 35 Risk Matrix: Bridges & Culverts

6.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17 as well as any additional performance measures that the Town has selected for this AMP.

6.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and Culverts are a critical component of the Town's transportation network. None of the Town's structures have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, motor vehicles, emergency vehicles, pedestrians, and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	**Good (BCI 70-100):** Generally considered to be in good-excellent condition, and repair or rehabilitation work is not usually required within the next 5 years. Routine maintenance, such as sweeping, cleaning, and washing are still recommended. **Fair (BCI 50-70):** Generally considered to be in good-fair condition. Repair or rehabilitation work recommended is ideally scheduled to be completed within the next 5 years. **Poor (BCI Less than 50):** Generally considered poor with lower numbers representing structures nearing the end of their service life. The repair or rehabilitation of these structures is ideally best scheduled to be completed within approximately 1 year. However, if it is determined that the replacement of the structure would be a more viable, the structure can be identified for continued monitoring and scheduled for replacement within the short-term.

Table 19 O. Reg. 588/17 Community Levels of Service: Bridges & Culverts

6.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	% of bridges in the Town with loading or dimensional restrictions	0%
Quality	Average bridge condition index value for bridges in the Town	68%
	Average bridge condition index value for structural culverts in the Town	73%
Performance	Target vs. Actual capital reinvestment rate	2.1% vs. 0.7%

Table 20 O. Reg. 588/17 Technical Levels of Service: Bridges & Culverts

6.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for bridges and culverts. Further PLOS analysis at the portfolio level can be found in section *4. Proposed Levels of Service Analysis.*

6.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Bridge capital funding gradually increases from $651k/year to $1.0m/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Bridge capital funding gradually increases from $651k/year to $1.5m/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Bridge capital funding gradually increases from $651k/year to $2.0m/year over a span of 20 years

Table 21 Bridges & Culverts PLOS Scenario Descriptions

6.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	69%	25%	27%	
	Average Asset Risk	7.8	13.2	12.4	
	Average Annual Investment		$1,023,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		1.1%		
Scenario 2 (75%)	Average Condition	69%	27%	37%	
	Average Asset Risk	7.8	12.9	11.2	
	Average Annual Investment		$1,534,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		1.6%		
Scenario 3 (100%)	Average Condition	69%	29%	46%	
	Average Asset Risk	7.8	12.6	10.4	
	Average Annual Investment		$2,045,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		2.1%		

Table 22 Bridges & Culverts PLOS Scenario Analysis

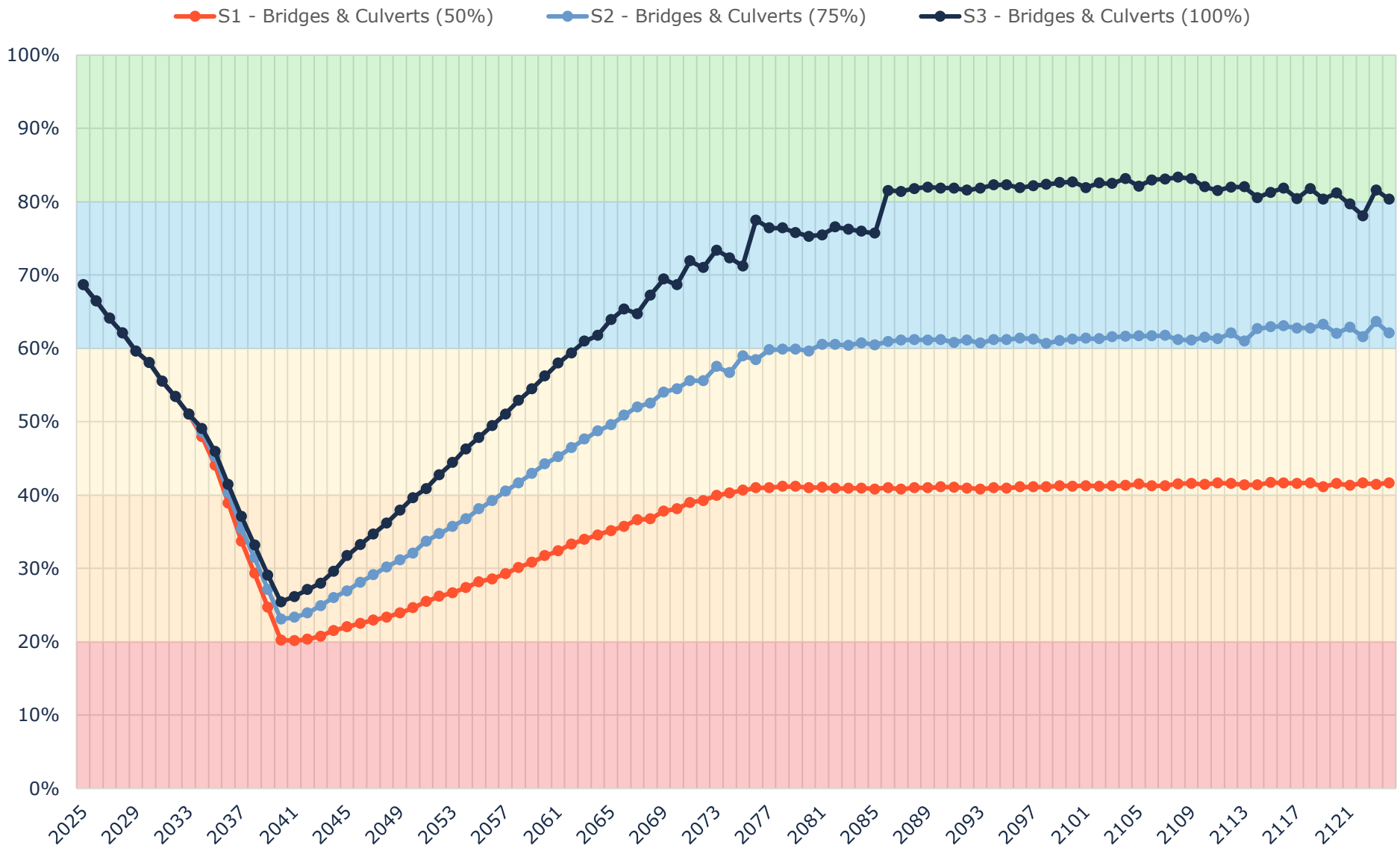


Figure 36 Bridges & Culverts PLOS Scenario Condition Results

6.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis* the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for bridges and culverts if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**	**$1.5m**
Projected Capital Spending	$683k	$716k	$750k	$784k	$846k	$901k	$954k	$991k	$1.0m	$1.1m
Funding Deficit	$851k	$818k	$784k	$750k	$688k	$633k	$580k	$543k	$505k	$454k
Target Reinvestment Rate	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**
Projected Reinvestment Rate	0.7%	0.7%	0.8%	0.8%	0.9%	0.9%	1.0%	1.0%	1.1%	1.1%

Table 23 Bridges & Culverts 10-Year PLOS Financial Projections

7. Water Network

The Environmental Services department is responsible for overseeing the Town's water network with a total current replacement cost of approximately $295 million. The department is responsible for the following major water facilities:

- Harrow Colchester South Water Treatment Plant
- Harrow Colchester Reservoir
- Harrow Colchester South Water Tower
- Ward 3-4 Water Tower
- Water department office/shop

7.1 Inventory & Valuation

Table 24 summarizes the quantity and current replacement cost of the Town's various water network assets as managed in its primary asset management register, Citywide Assets.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Hydrants	725	Assets	$8,337,500	Cost per Unit
Valves	1,615	Assets	$8,075,000	User-Defined
Water Equipment	23	Assets	$2,955,458	CPI
Water Facilities	8	Assets	$23,668,466	CPI
Water Mains	335.3	Length (km)	$252,352,572	Cost per Unit
TOTAL			**$295,388,997**	

Table 24 Detailed Asset Inventory: Water Network

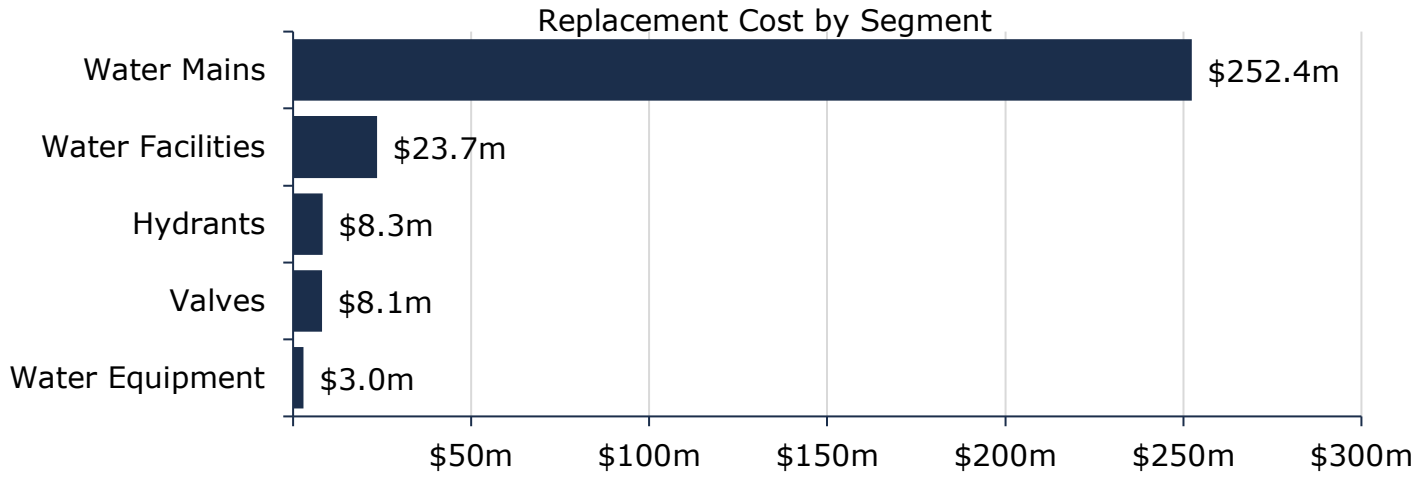


Figure 37 Portfolio Valuation: Water Network

7.2 Asset Condition

Figure 38 summarizes the replacement cost-weighted condition of the Town's water network. Based on a combination of field inspection data and age, 92% of assets are in fair or better condition; the remaining 8% of assets are in poor to very poor condition. Condition assessments were available for 8% of assets, based on replacement cost. This condition data was projected from inspection date to current year to estimate their condition today. Aged-based condition was used for the remaining assets in the water network.

Assets in poor or worse condition may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition. As illustrated in Figure 38, the majority of the Town's water network assets are in fair or better condition.

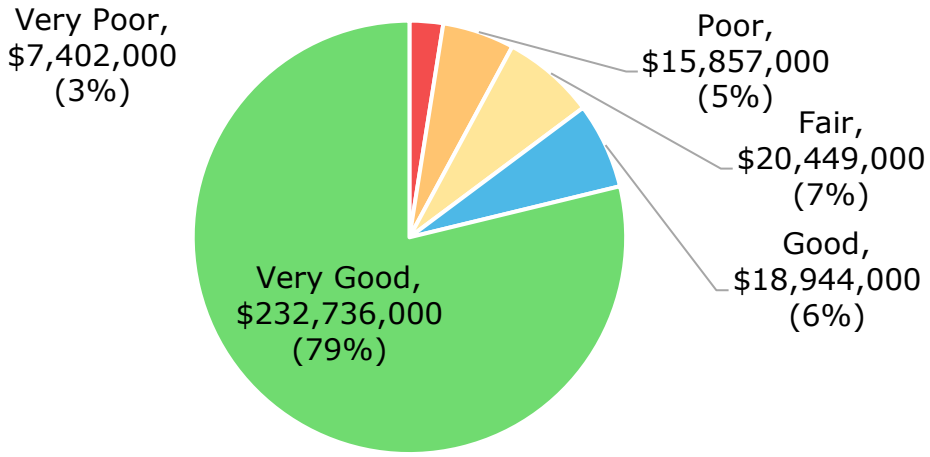


Figure 38 Asset Condition: Water Network Overall

As illustrated in Figure 39, based on condition assessments and age-based conditions, the majority of the Town's water mains and equipment are in very good condition; however, a significant portion of water facilities and valves are in poor or worse condition.

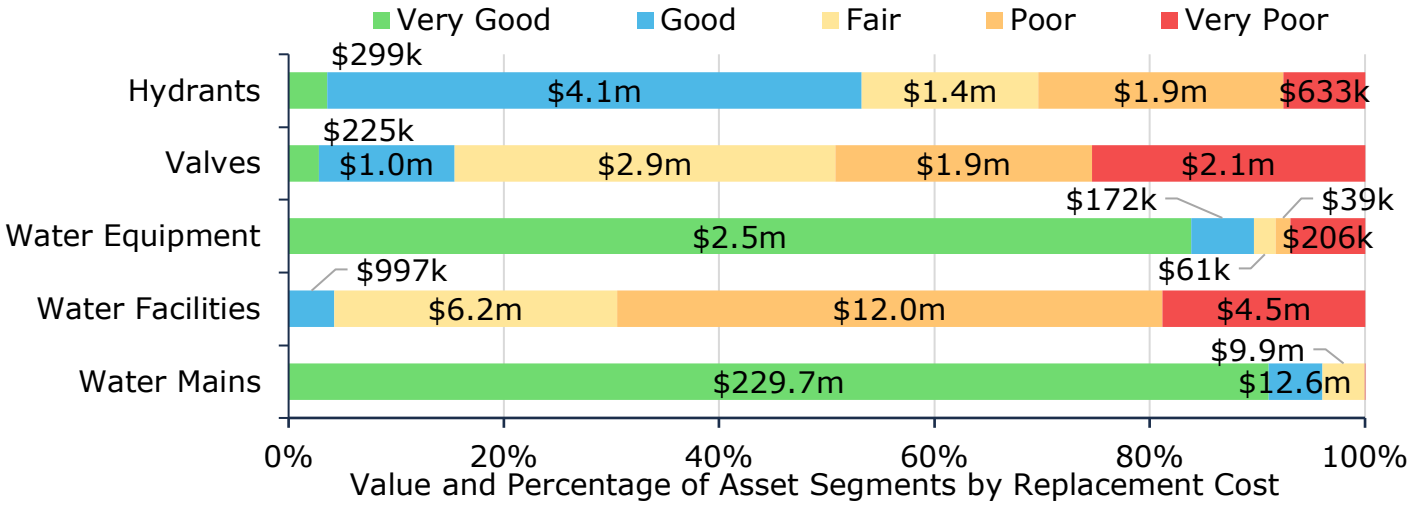


Figure 39 Asset Condition: Water Network by Segment

7.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential long-term replacement spikes.

Figure 40 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

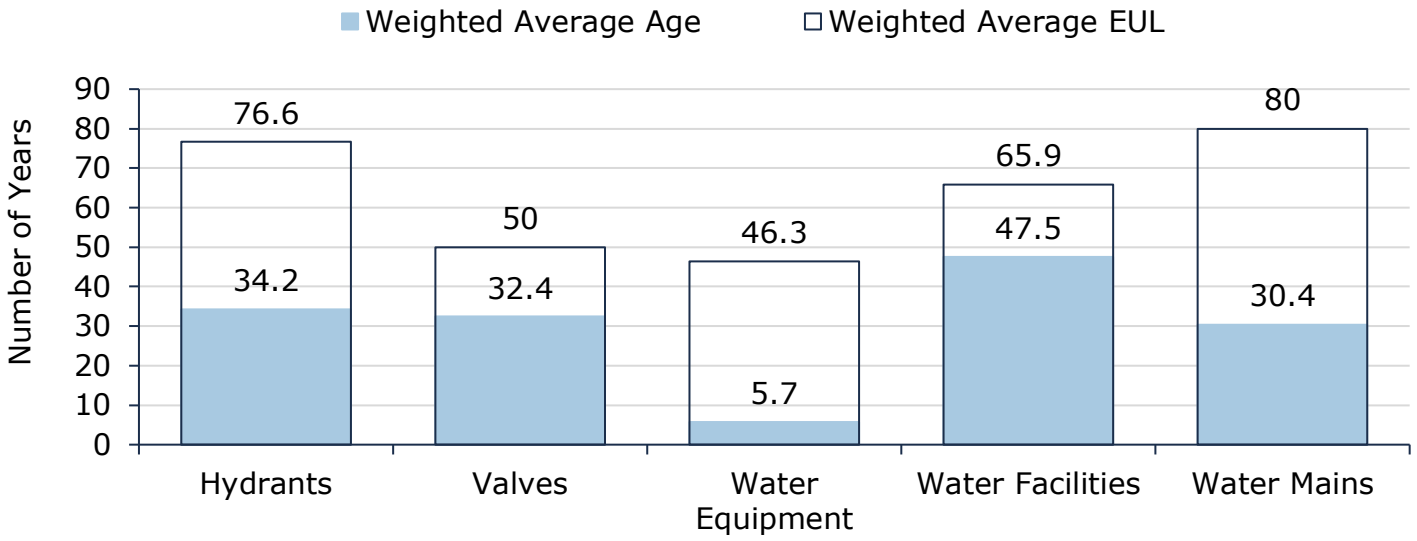


Figure 40 Estimated Useful Life vs. Asset Age: Water Network

Age analysis reveals that on average, water network assets are in the early to moderate stages of their projected useful lives. As assets reach the latter stages of their lifecycle, analysis of lifecycle activities to extend their lifespan should be researched.

7.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of water mains. Instead of allowing the assets to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of assets at a lower total cost.

Water Mains		
Event Name	**Event Class**	**Event Trigger**
Valve Turning	Maintenance	Every 3 Years
Directional Flushing	Maintenance	Every 3 Years
Asset Replacement	Replacement	Condition: 20

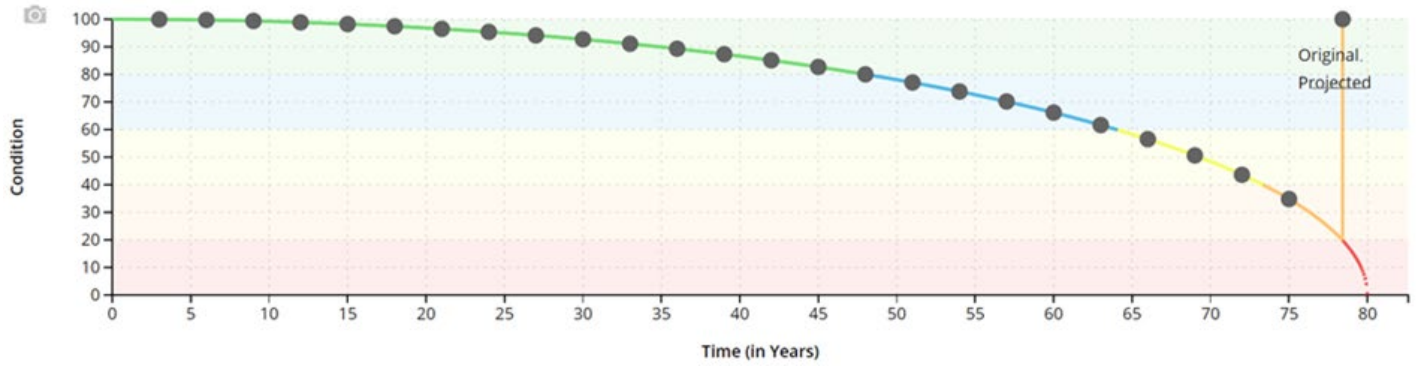


Table 25 Lifecycle Management Strategy: Water Network (Water Mains)

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Water mains are assessed on an as-needed basis and often in coordination with road and/or subsurface construction projects. The OCWA provides the Town with multi-year forecasts on recommended maintenance.
	Directional flushing covering the entire network is conducted every 3 years.
	Hydrants are typically painted every 3-5 years.
	Valves undergo routine maintenance including inspections, cleaning, and valve exercising.
	Water meters are inspected routinely to identify concerns.
Rehabilitation/ Replacement	Multi-year forecasts provided by OCWA and further reviewed by Staff.
	Water main spot repairs are generally coordinated with road capital projects, with prioritization on critical factors such as water main breaks, location, age, material, and diameter.

Table 26 Lifecycle Management Strategy: Water Network

7.5 Forecasted Long-Term Replacement Needs

Figure 41 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Town's water network. This analysis was run until 2103 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $4.1 million for all assets in the water network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The chart illustrates substantial capital needs throughout the forecast period. It also shows a backlog of $489,000, dominated by valves. These projections are based on asset replacement costs, age analysis, and condition data when available. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

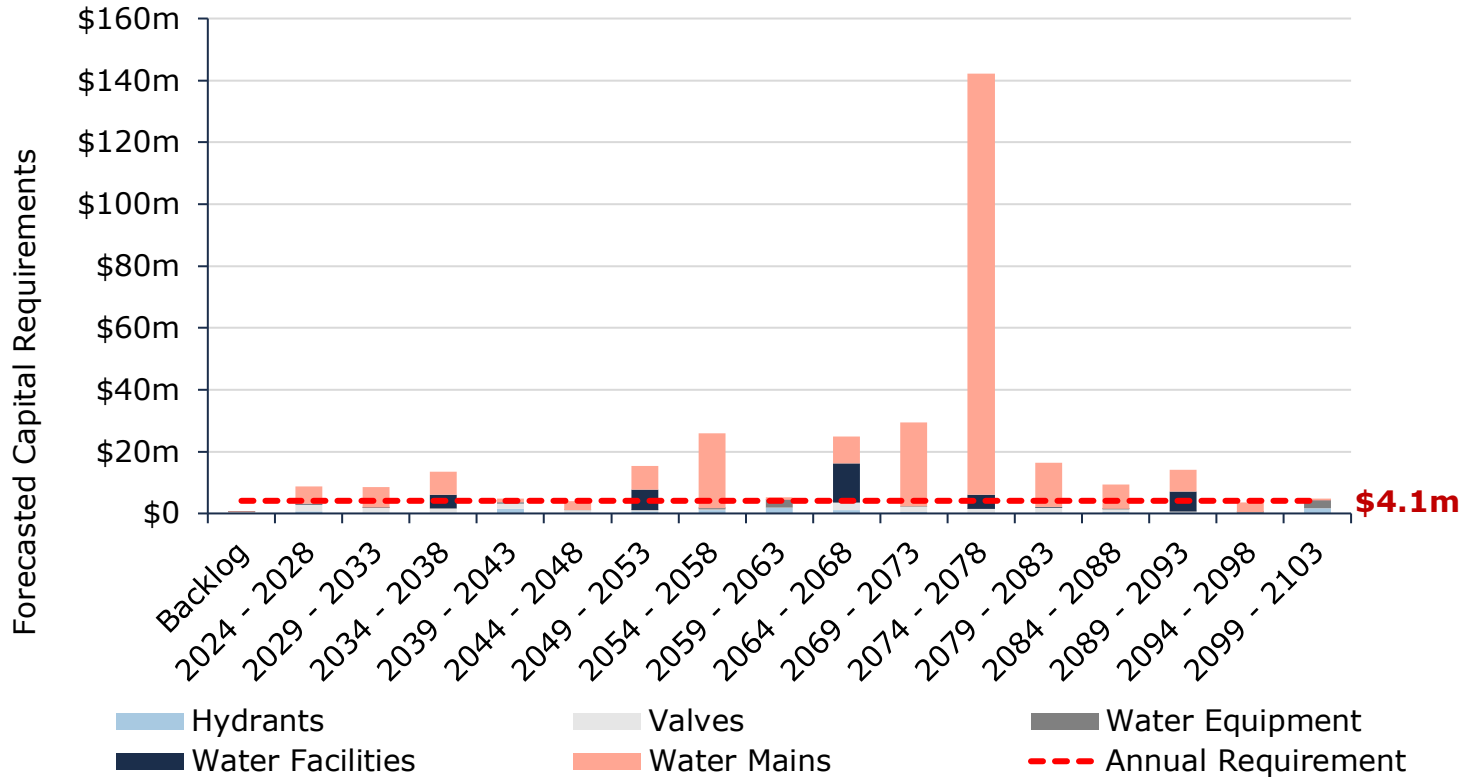


Figure 41 Forecasted Capital Replacement Needs: Water Network 2024-2103

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. Regular condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

7.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition, service life remaining, replacement costs, traffic data, and road class. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low	5 - 7 Low	8 - 9 Moderate	10 - 14 High	15 - 25 Very High
$233,868,975 (79%)	$26,536,672 (9%)	$8,045,353 (3%)	$7,302,458 (2%)	$19,635,539 (7%)

Figure 42 Risk Matrix: Water Network

7.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17 as well as any additional performance measures that the Town has selected for this AMP.

7.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	Refer to Appendix C – Level of Service Maps & Photos
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	Refer to Appendix C – Level of Service Maps & Photos for areas of the Town that have hydrant coverage which can be used to determine areas of the Town that have fire flow.
Reliability	Description of boil water advisories and service interruptions	The Town has not experienced recent boil water advisories and interruptions.

Table 27 O. Reg. 588/17 Community Levels of Service: Water Network

7.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	% of properties connected to the municipal water system	95%
	% of properties where fire flow is available	6%[12]
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0
Quality	Average condition of water network assets	84%
Performance	Target vs. Actual capital reinvestment rate	1.4% vs. 0.7%

Table 28 O. Reg. 588/17 Technical Levels of Service: Water Network

7.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for the water network. Further PLOS analysis at the portfolio level can be found in section *4. Proposed Levels of Service Analysis.*

[12] Percentage of the Municipality area with fire hydrant coverage – 90m radius from hydrant

7.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual water rate increases of ~0.1%/year, stabilizing at 50% funding in 20 years. ♦ Water capital funding gradually increases from $2.01m/year to $2.04m/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual water rate increases of ~1.3%/year, stabilizing at 75% funding in 20 years. ♦ Water capital funding gradually increases from $2.0m/year to $3.1m/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual water rate increases of ~2.2%/year, stabilizing at 100% funding in 20 years. ♦ Water capital funding gradually increases from $2.0m/year to $4.1m/year over a span of 20 years

Table 29 Water Network PLOS Scenario Descriptions

7.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	86%	79%	71%	
	Average Asset Risk	3.7	4.1	4.3	
	Average Annual Investment		$2,043,000		Increase water rates by ~0.1% per year for 20 years
	Average Capital re-investment rate		0.7%		
Scenario 2 (75%)	Average Condition	86%	79%	73%	
	Average Asset Risk	3.7	4.1	4.3	
	Average Annual Investment		$3,065,000		Increase water rates by ~1.3% per year for 20 years
	Average Capital re-investment rate		1.0%		
Scenario 3 (100%)	Average Condition	86%	79%	73%	
	Average Asset Risk	3.7	4.1	4.3	
	Average Annual Investment		$4,087,00		Increase water rates by ~2.2% per year for 20 years
	Average Capital re-investment rate		1.4%		

Table 30 Water Network PLOS Scenario Analysis

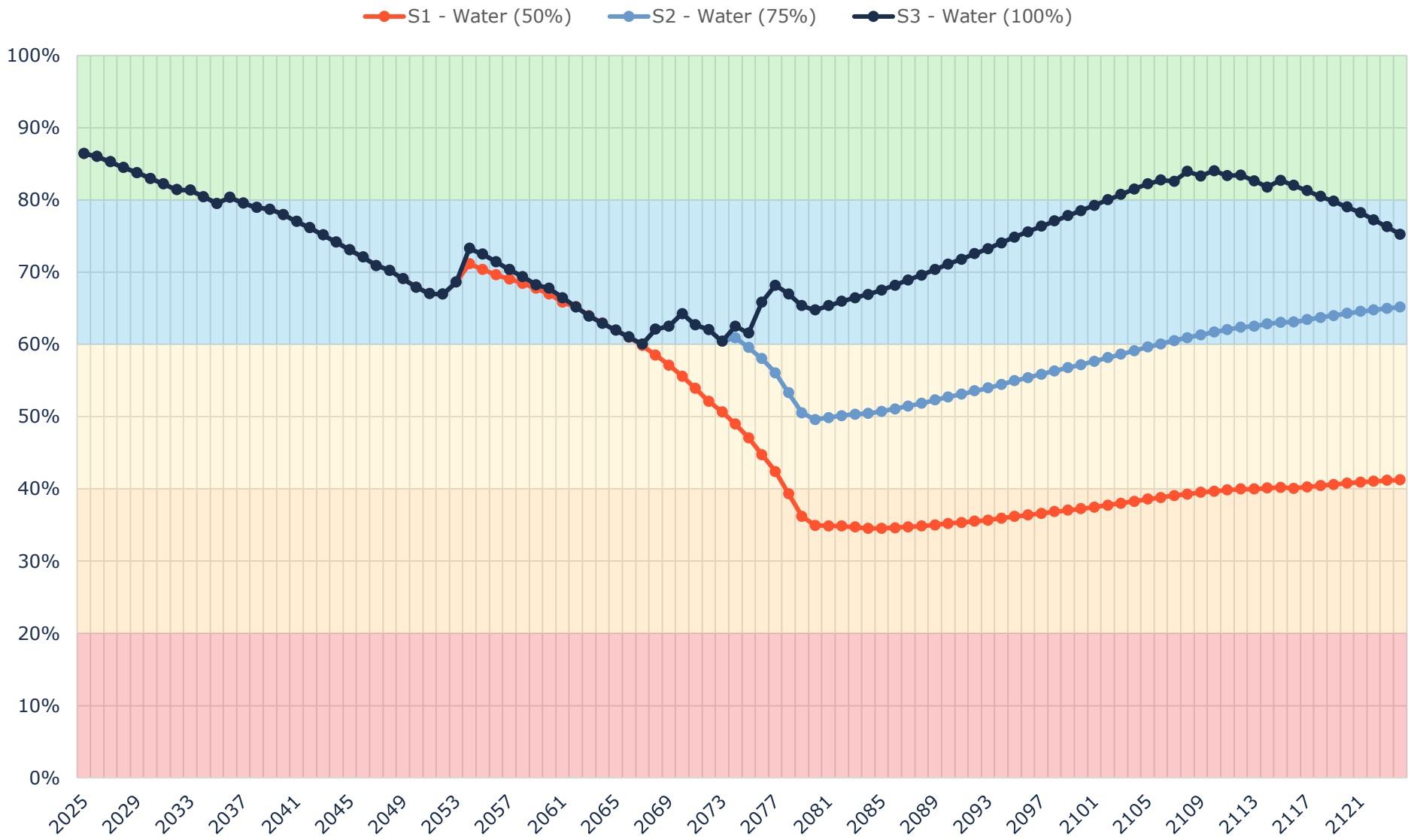


Figure 43 Water Network PLOS Scenario Condition Results

7.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for the water network if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**	**$3.1m**
Projected Capital Spending	$2.1m	$2.1m	$2.2m	$2.2m	$2.3m	$2.3m	$2.4m	$2.4m	$2.5m	$2.5m
Funding Deficit	$1.0m	$954k	$904k	$852k	$800k	$747k	$693k	$639k	$583k	$528k
Target Reinvestment Rate	**1.0%**	**1.0%**	**1.0%**	**1.0%**	**1.0%**	**1.0%**	**1.0%**	**1.0%**	**1.0%**	**1.0%**
Projected Reinvestment Rate	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%

Table 31 Water Network 10-Year PLOS Financial Projections

8. Sanitary Sewer Network

The sanitary sewer network provides the essential service of wastewater collection, disposal, and treatment for the community, and has a current replacement value of over $234 million. Essex is responsible for the following major sanitary facilities:

- Essex Wastewater Treatment Plant
- Colchester South Wastewater Treatment Plant
- Multiple Pumping Stations
- Multiple Wastewater Lagoons

8.1 Inventory & Valuation

Table 32 summarizes the quantity and current replacement cost of the Town's various sanitary sewer network assets as managed in its primary asset management register, Citywide Assets.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Lagoons	3	Assets	$3,269,267	User-Defined
Sanitary Equipment	11	Assets	$237,452	CPI
Sanitary Facilities	13	Assets	$64,190,578	CPI
Sanitary Manholes	1,143	Assets	$13,144,500	Cost per Unit
Sanitary Sewer Mains	98.8	Length (km)	$153,912,873	Cost per Unit
TOTAL			**$234,754,670**	

Table 32 Detailed Asset Inventory: Sanitary Sewer Network

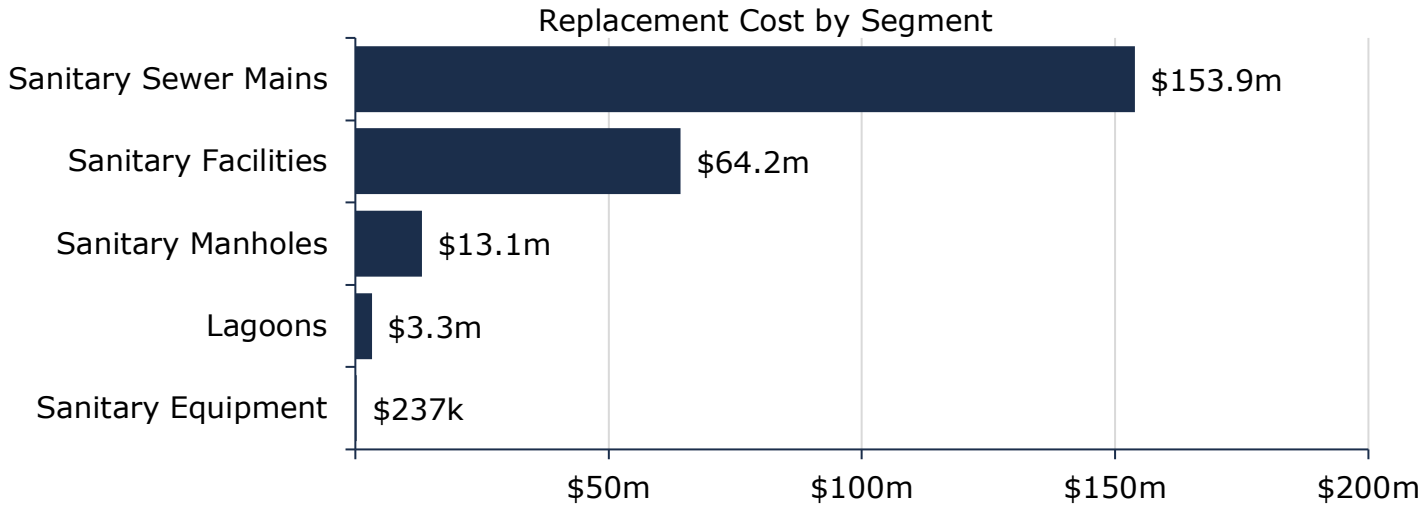


Figure 44 Portfolio Valuation: Sanitary Sewer Network

8.2 Asset Condition

Figure 45 summarizes the replacement cost-weighted condition of the Town's sanitary sewer network. Based on a combination of field inspection data and age, 80% of assets are in fair or better condition; the remaining 20% of assets are in poor to very poor condition. Condition assessments were available for all sanitary facilities, and 13% of sanitary equipment, based on replacement cost. This condition data was projected from inspection date to current year to estimate their condition today. Less than 1% of the remaining assets had assessment data.

Assets in poor or worse condition may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition. As illustrated in Figure 45 the majority of the Town's sanitary sewer network assets are in very good condition.

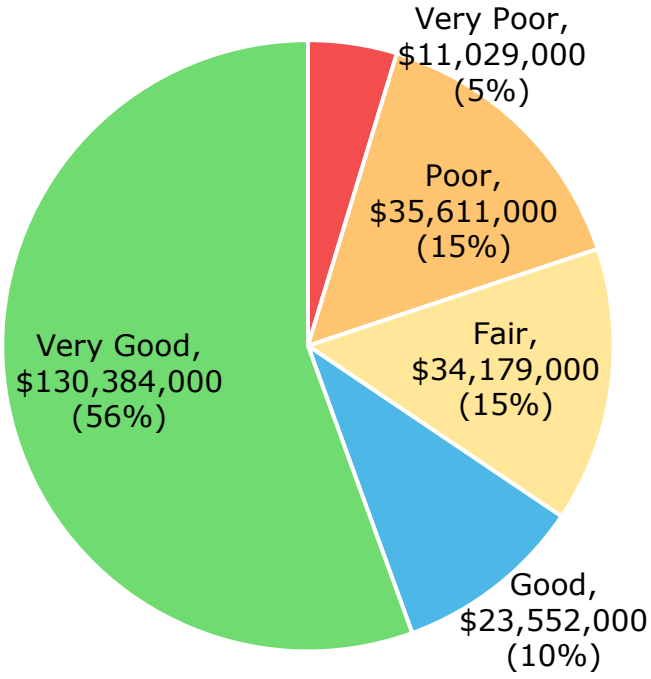


Figure 45 Asset Condition: Sanitary Sewer Network Overall

As illustrated in Figure 46, based on condition assessments and age-based conditions, the majority of the Town's sanitary sewer mains are in very good condition however, 66% of lagoons, 47% of sanitary facilities, and 93% manholes are in poor or worse condition.

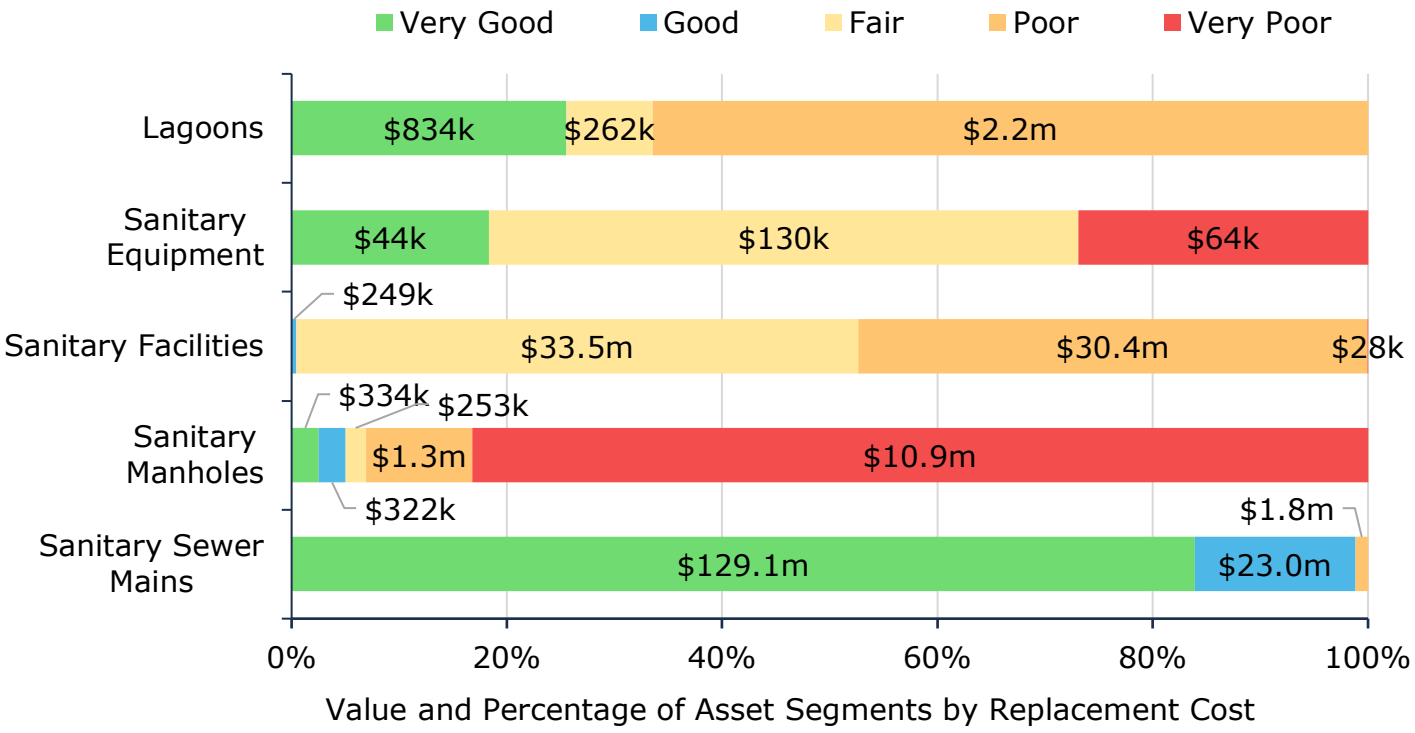


Figure 46 Asset Condition: Sanitary Sewer Network by Segment

8.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential long-term replacement spikes.

Figure 47 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

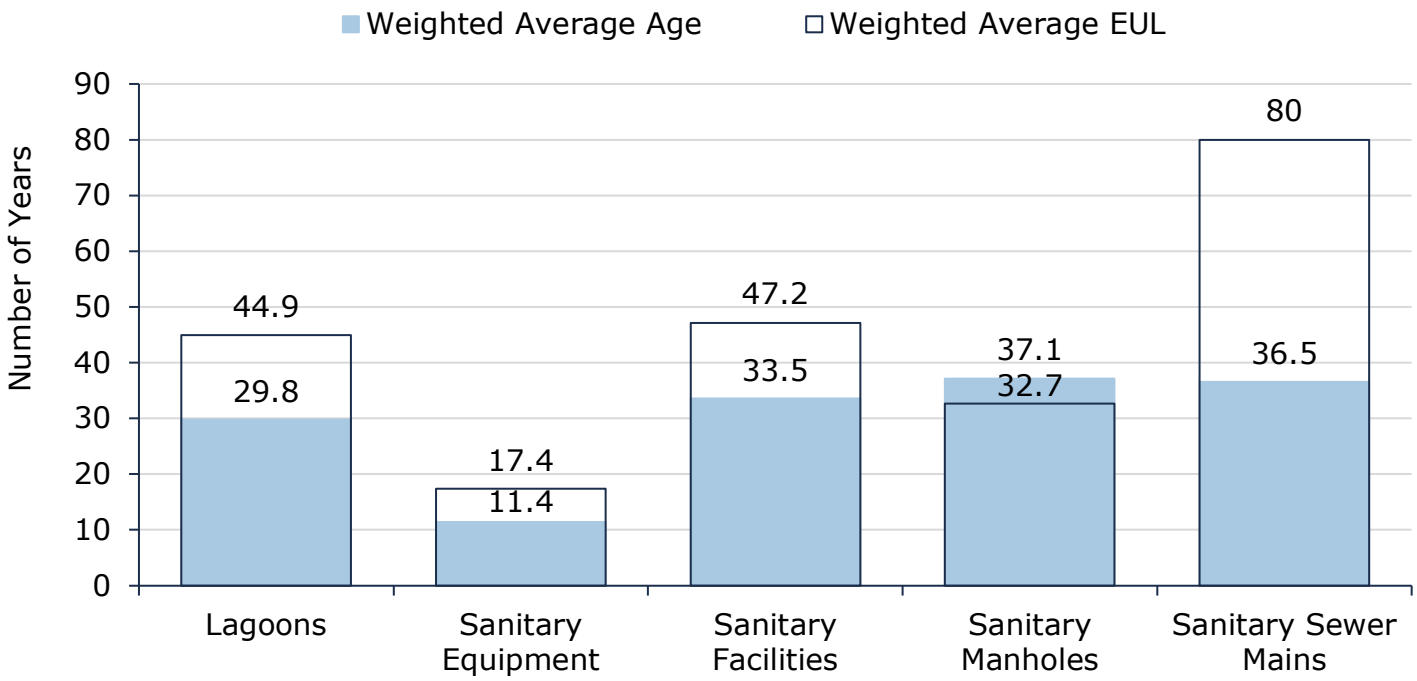


Figure 47 Estimated Useful Life vs. Asset Age: Sanitary Sewer Network

Age analysis reveals that the majority of sanitary network assets are in moderate stages of their projected useful lives, except for manholes which have exceeded their originally intended life. Assets should be monitored for deterioration and lifecycle interventions considered to extend their lifespan.

8.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of sanitary mains. Instead of allowing the assets to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of assets at a lower total cost.

Sanitary Mains		
Event Name	**Event Class**	**Event Trigger**
CCTV Inspection	Maintenance	As Needed
Flushing and Cleaning	Maintenance	Every 3 Years (1/3 of network annually)
Asset Replacement	Replacement	Condition: 20

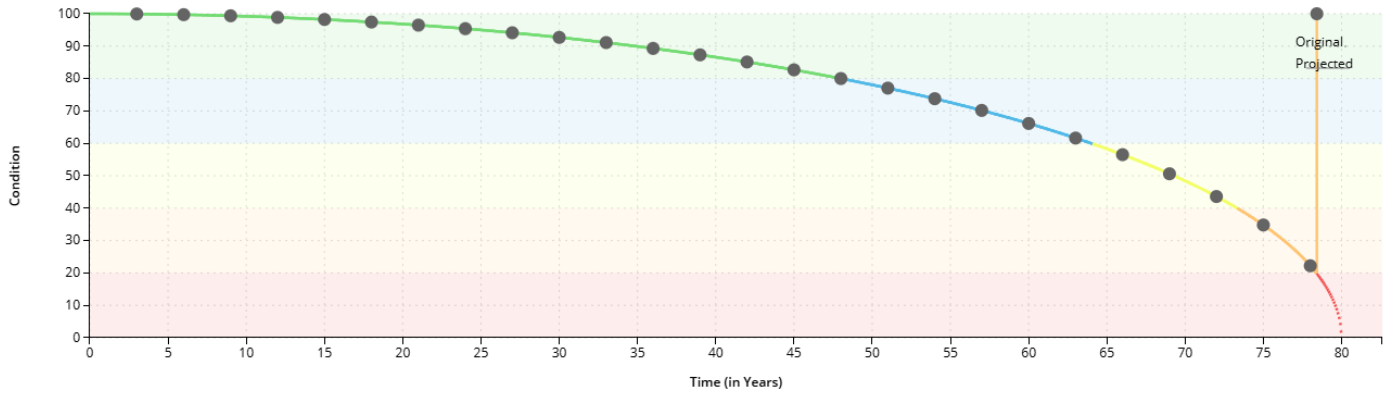


Table 33 Lifecycle Management Strategy: Sanitary Sewer Network (Mains)

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	OCWA provides the Town with multi-year forecasts on recommended maintenance activities which are reviewed by staff.
	Mains are assessed ~every 5 years internally, often in coordination with road and/or subsurface capital projects.
	Annual maintenance of manholes consists of inspection, lid replacements, lining, and grouting.
	Wastewater facilities are inspected annually in partnership with OCWA.
Rehabilitation/ Replacement	Multi-year forecasts for rehabilitation activities provided by OCWA and further reviewed by Staff.
	Project prioritization is based on location, age, material, and diameter.
	Mains undergo spot repairs and trenchless re-lining on as-needed basis.
	Similar to other subsurface infrastructure, Staff coordinate sanitary reconstruction projects with road construction projects to produce cost efficiencies.

Table 34 Lifecycle Management Strategy: Sanitary Sewer Network

8.5 Forecasted Long-Term Replacement Needs

Figure 48 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Town's sanitary sewer network. This analysis was run until 2098 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $4.1 million for all assets in the sanitary sewer network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The chart illustrates substantial capital needs throughout the forecast period. It also shows a backlog of $10.5 million comprised entirely of sanitary manholes. These projections are based on asset replacement costs, age analysis, and condition data when available. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

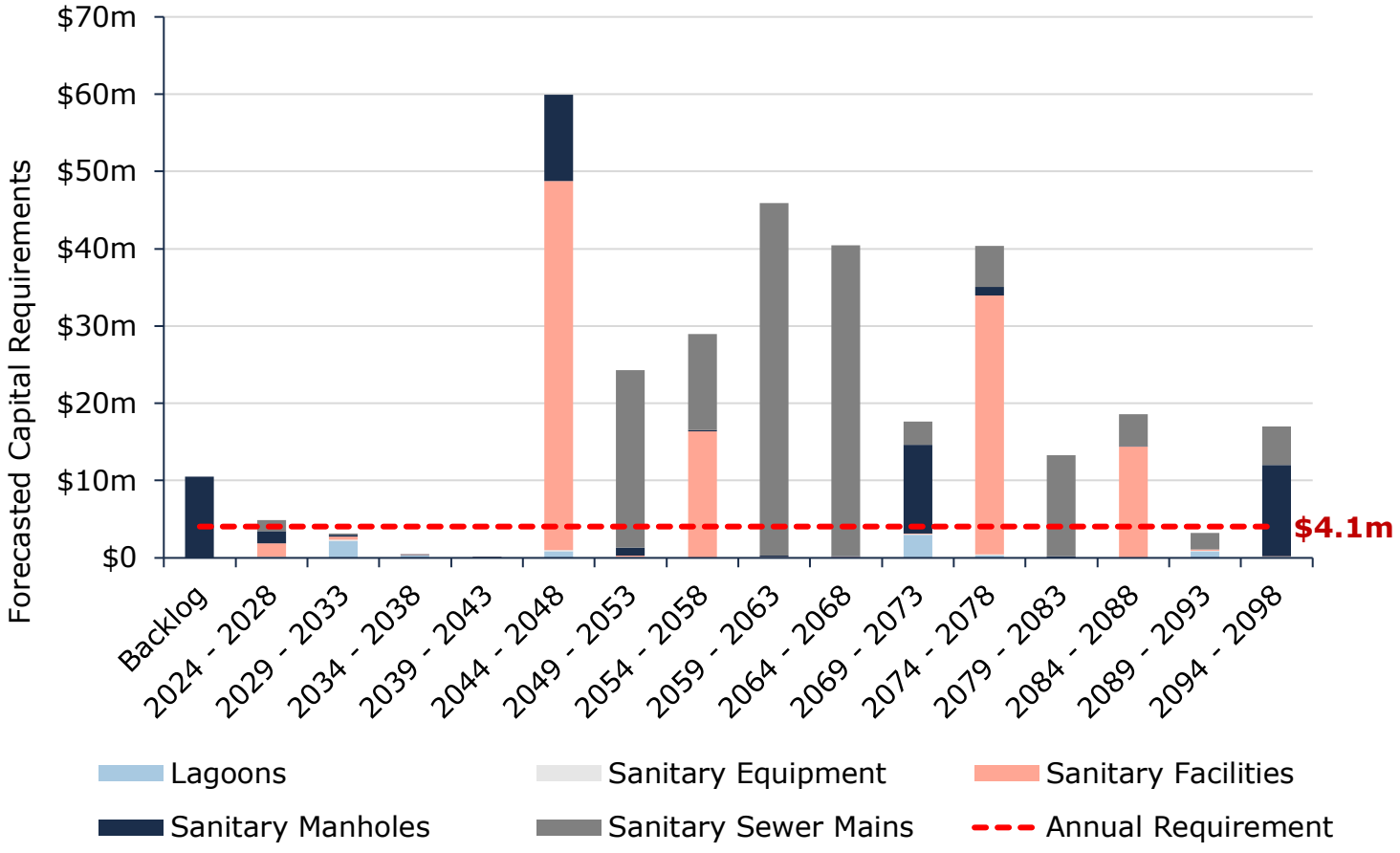


Figure 48 Forecasted Capital Replacement Needs: Sanitary Sewer Network 2024-2098

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. Regular condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

8.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition, service life remaining, replacement costs, traffic data, and road class. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 **Very Low** $102,071,595 (43%)	5 - 7 **Low** $47,075,214 (20%)	8 - 9 **Moderate** $15,774,597 (7%)	10 - 14 **High** $36,121,485 (15%)	15 - 25 **Very High** $33,711,779 (14%)

Figure 49 Risk Matrix: Sanitary Sewer Network

8.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17 as well as any additional performance measures that the Town has selected for this AMP.

8.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	Refer to Appendix C – Level of Service Maps & Photos
Reliability	Description of how combined sewers in the municipal	

Service Attribute	Qualitative Description	Current LOS (2023)
	wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	The Town does not own any combined sewers
	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	Stormwater can enter into sanitary sewers due to damaged sanitary mains or through indirect connections (e.g., weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed capacity. In some cases, this can cause water and/or sewage to overflow backup into homes. The disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits directing stormwater to the storm drain system can help to reduce the chance of this occurring. The Town follows a series of design standards that integrate servicing requirements and land use considerations when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	The design and construction of sanitary sewers is in accordance with the latest design standards issued by the MECP to eliminate or minimize inflow and infiltration within the sanitary sewer system.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorus and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants.

Table 35 O. Reg. 588/17 Community Levels of Service: Sanitary Sewer Network

8.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	% of properties connected to the municipal wastewater system	70%
Reliability	# 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	0
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0
Quality	Average condition of sanitary sewer network assets	70%
Performance	Target vs. Actual capital reinvestment rate	1.7% vs. 0.2%

Table 36 O. Reg. 588/17 Technical Levels of Service: Sanitary Sewer Network

8.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for the sanitary sewer network. Further PLOS analysis at the portfolio level can be found in Section *4. Proposed Levels of Service Analysis.*

8.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual sanitary rate increases of ~1.7%/year, stabilizing at 50% funding in 20 years. ♦ Sanitary capital funding gradually increases from $433k/year to $2.0m/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual sanitary rate increases of ~2.8%/year, stabilizing at 75% funding in 20 years. ♦ Sanitary capital funding gradually increases from $433k/year to $3.0m/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual sanitary rate increases of ~3.6%/year, stabilizing at 100% funding in 20 years. ♦ Sanitary capital funding gradually increases from $433k/year to $4.1m/year over a span of 20 years

Table 37 Sanitary Sewer Network PLOS Scenario Descriptions

8.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	79%	64%	46%	
	Average Asset Risk	4.7	7.5	8.9	
	Average Annual Investment		$2,028,000		Increase sanitary rates by ~1.7% per year for 20 years
	Average Capital re-investment rate		0.9%		
Scenario 2 (75%)	Average Condition	79%	65%	53%	
	Average Asset Risk	4.7	7.5	8.3	
	Average Annual Investment		$3,041,000		Increase sanitary rates by ~2.8% per year for 20 years
	Average Capital re-investment rate		1.3%		
Scenario 3 (100%)	Average Condition	79%	65%	59%	
	Average Asset Risk	4.7	7.5	6.7	
	Average Annual Investment		$4,055,000		Increase sanitary rates by ~3.6% per year for 20 years
	Average Capital re-investment rate		1.7%		

Table 38 Sanitary Sewer Network PLOS Scenario Analysis

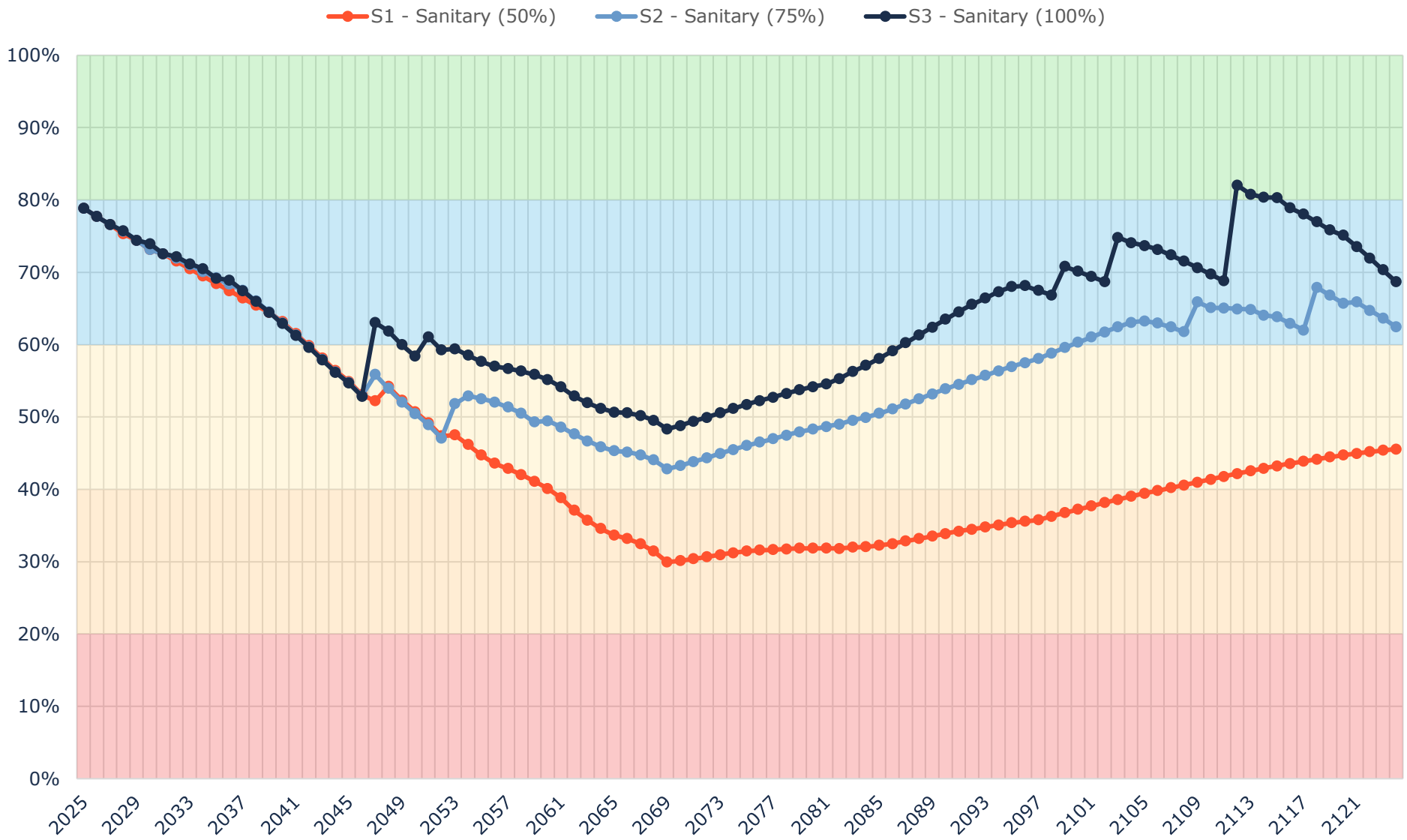


Figure 50 Sanitary Sewer Network PLOS Scenario Condition Results

8.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for the sanitary sewer network if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**	**$3.0m**
Projected Capital Spending	$592k	$753k	$990k	$1.1m	$1.2m	$1.3m	$1.4m	$1.5m	$1.6m	$1.8m
Funding Deficit	$2.4m	$2.3m	$2.1m	$2.0m	$1.8m	$1.7m	$1.6m	$1.5m	$1.4m	$1.3m
Target Reinvestment Rate	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**	**1.3%**
Projected Reinvestment Rate	0.3%	0.3%	0.4%	0.5%	0.5%	0.6%	0.6%	0.6%	0.7%	0.7%

Table 39 Sanitary Sewer Network 10-Year PLOS Financial Projections

9. Stormwater Network

The Town's stormwater network is comprised of 103km of sewer mains and other critical supporting capital assets such as catch basins, manholes, and ponds, with a total current replacement cost of approximately $151 million.

9.1 Inventory & Valuation

Table 40 summarizes the quantity and current replacement cost of all stormwater network assets available in the Town's asset register.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Catch Basins	3,020	Assets	$37,569,268	Cost per Unit
Storm Mains	102.8	Length (km)	$96,160,623	Cost per Unit
Storm Manholes	619	Assets	$7,118,500	Cost per Unit
Storm Management Ponds	20,958	Volume (m^3)	$9,955,050	Cost per Unit
TOTAL			**$150,803,441**	

Table 40 Detailed Asset Inventory: Stormwater Network

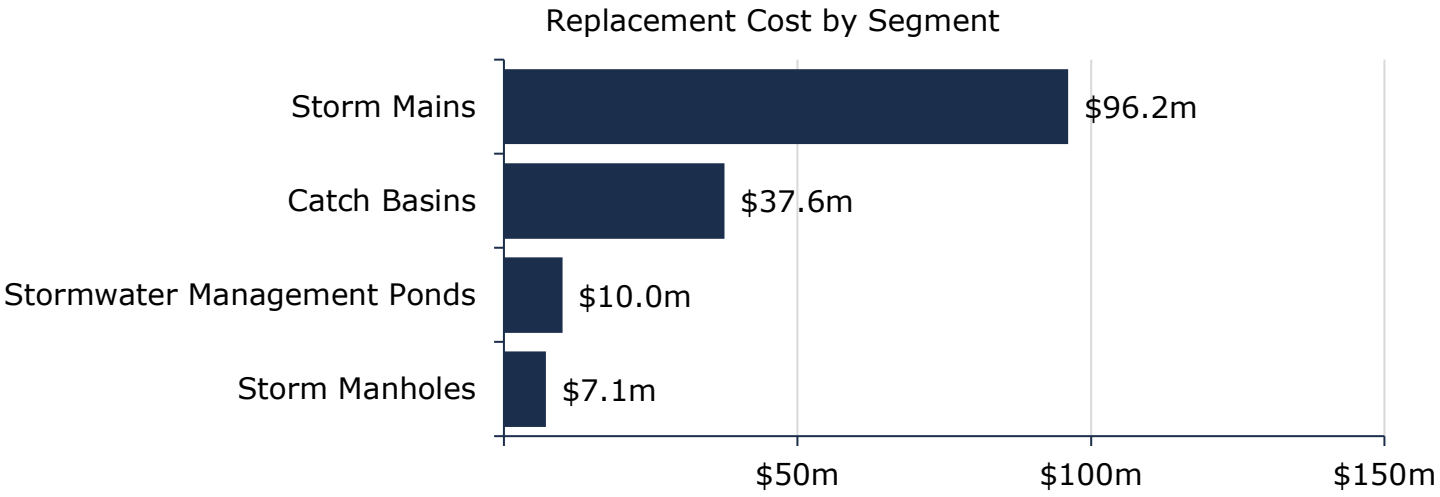


Figure 51 Portfolio Valuation: Stormwater Network

9.2 Asset Condition

Figure 52 summarizes the replacement cost-weighted condition of the Town's stormwater network assets. Based primarily on age data, approximately 39% of assets are in poor to very poor condition. These assets may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

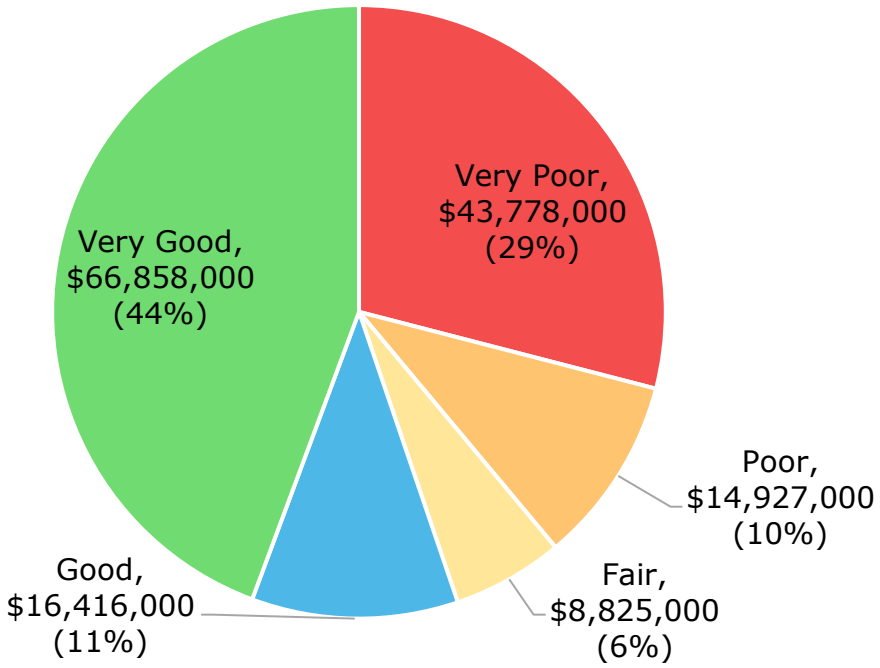


Figure 52 Asset Condition: Stormwater Network Overall

Figure 53 summarizes the age-based condition of stormwater network assets. The analysis illustrates that the majority of stormwater mains are in fair or better condition. However, 71% of catch basins and 75% of manholes are in poor or worse condition.

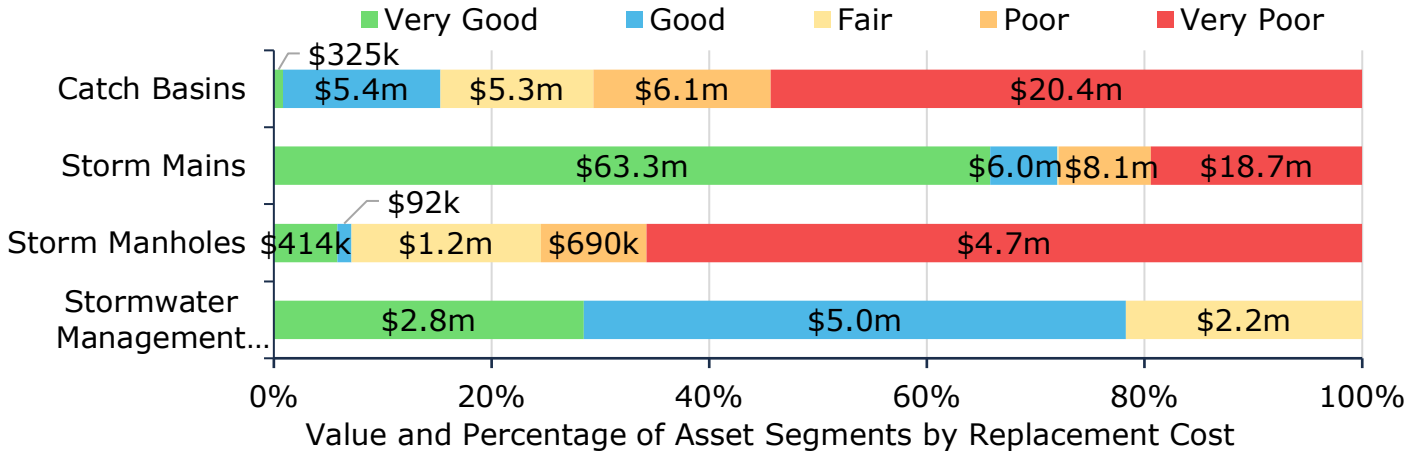


Figure 53 Asset Condition: Stormwater Network by Segment

9.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential replacement spikes.

Figure 54 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

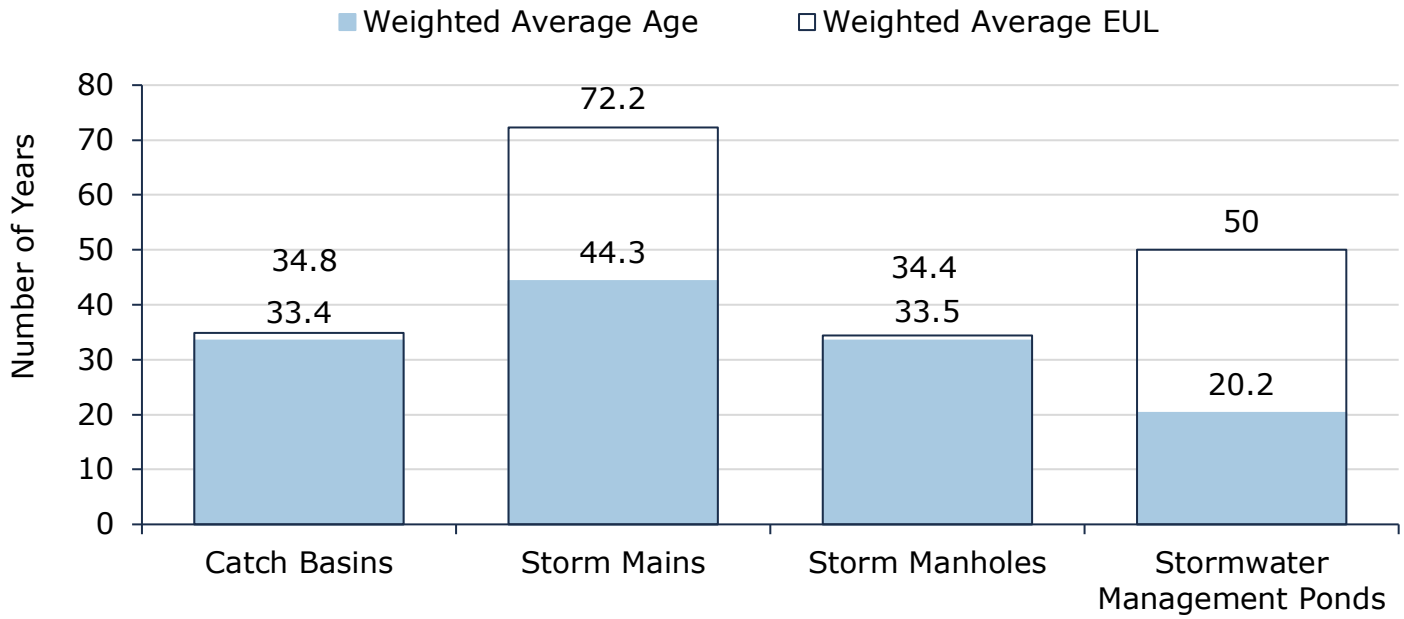


Figure 54 Estimated Useful Life vs. Asset Age: Stormwater Network

Age analysis reveals that on average the majority of catch basins will enter the final stages of their expected lifecycle in the next few years. Age profiles and CCTV inspections will help to identify mains in need of replacements and/or upgrades. Extensions to EULs for mains may also be considered based on performance history to date.

9.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of stormwater mains and storm management ponds. Instead of allowing the assets to

deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of assets at a lower total cost.

Stormwater Mains		
Event Name	**Event Class**	**Event Trigger**
CCTV Inspection	Preventative Maintenance	As Needed
Flushing and Cleaning	Preventative Maintenance	Every 3 Years (1/3 of network annually)
Asset Replacement	Replacement	Condition: 20

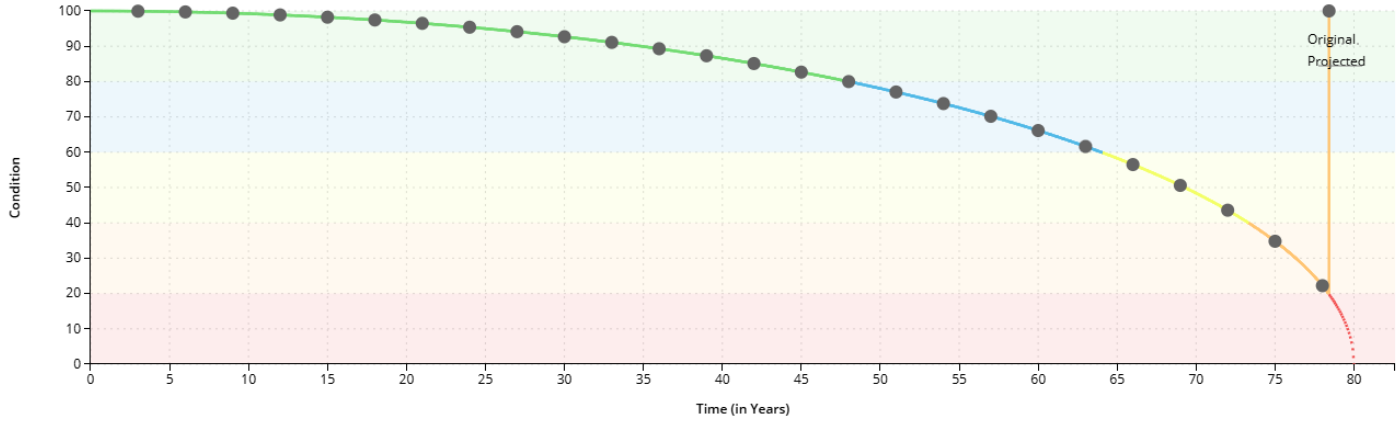


Table 41 Lifecycle Management Strategy: Stormwater Network (Mains)

Stormwater Management Ponds		
Event Name	**Event Class**	**Event Trigger**
Pond Cleanout – 1st Cycle	Maintenance/ Rehabilitation	Age: 20 Years
Pond Cleanout – 2nd Cycle	Maintenance/ Rehabilitation	Age: 40 Years
Asset Replacement	Replacement	Condition 20

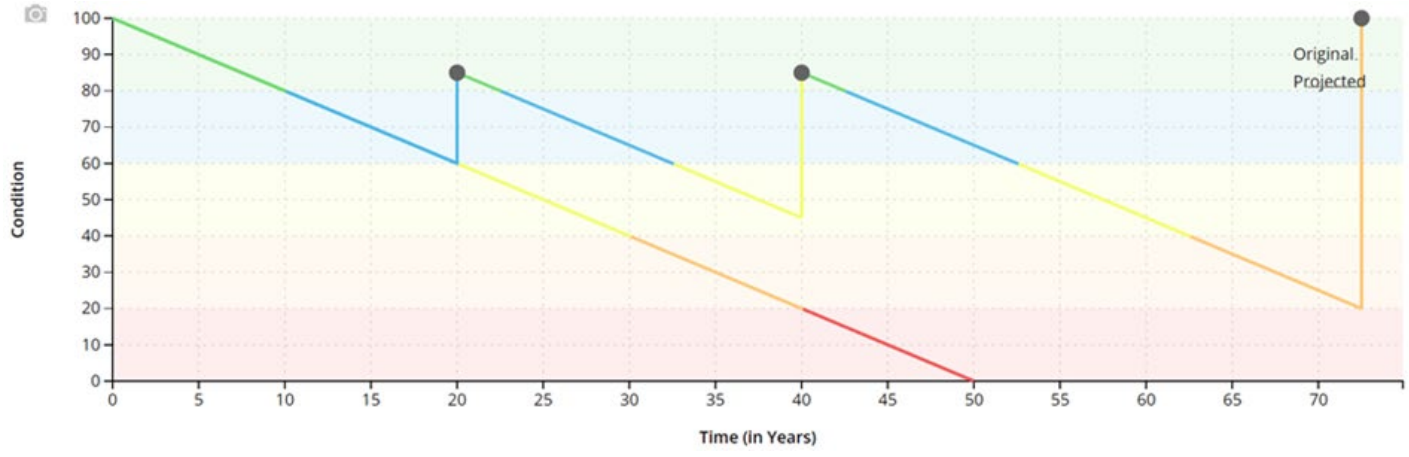


Table 42 Lifecycle Management Strategy: Stormwater Network (Stormwater Management Ponds)

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance / Inspection	Catch basins are assessed every 3 years, while curb and gutter assets are inspected during routine road patrols.
	Stormwater mains are assessed every 5 years. CCTV inspections are completed in a reactive nature.
	Manholes are assessed every 5 years and undergo routine maintenance.
	All other maintenance activities are completed on a reactive basis when operational issues are identified (e.g., blockages, backups), through complaints and service requests.
Rehabilitation	Trenchless re-lining and spot repairs are dependent on the size and scale of the system.
Replacement	Stormwater main replacement occurs generally at the end of an asset's life, or aligned with road reconstruction.

Table 43 Lifecycle Management Strategy: Stormwater Network

9.5 Forecasted Long-Term Replacement Needs

Figure 55 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's stormwater network assets. This analysis was run until 2098 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $3.1 million for all assets in the stormwater network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The chart illustrates an age-based backlog of $21.0 million, dominated by catch basins. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

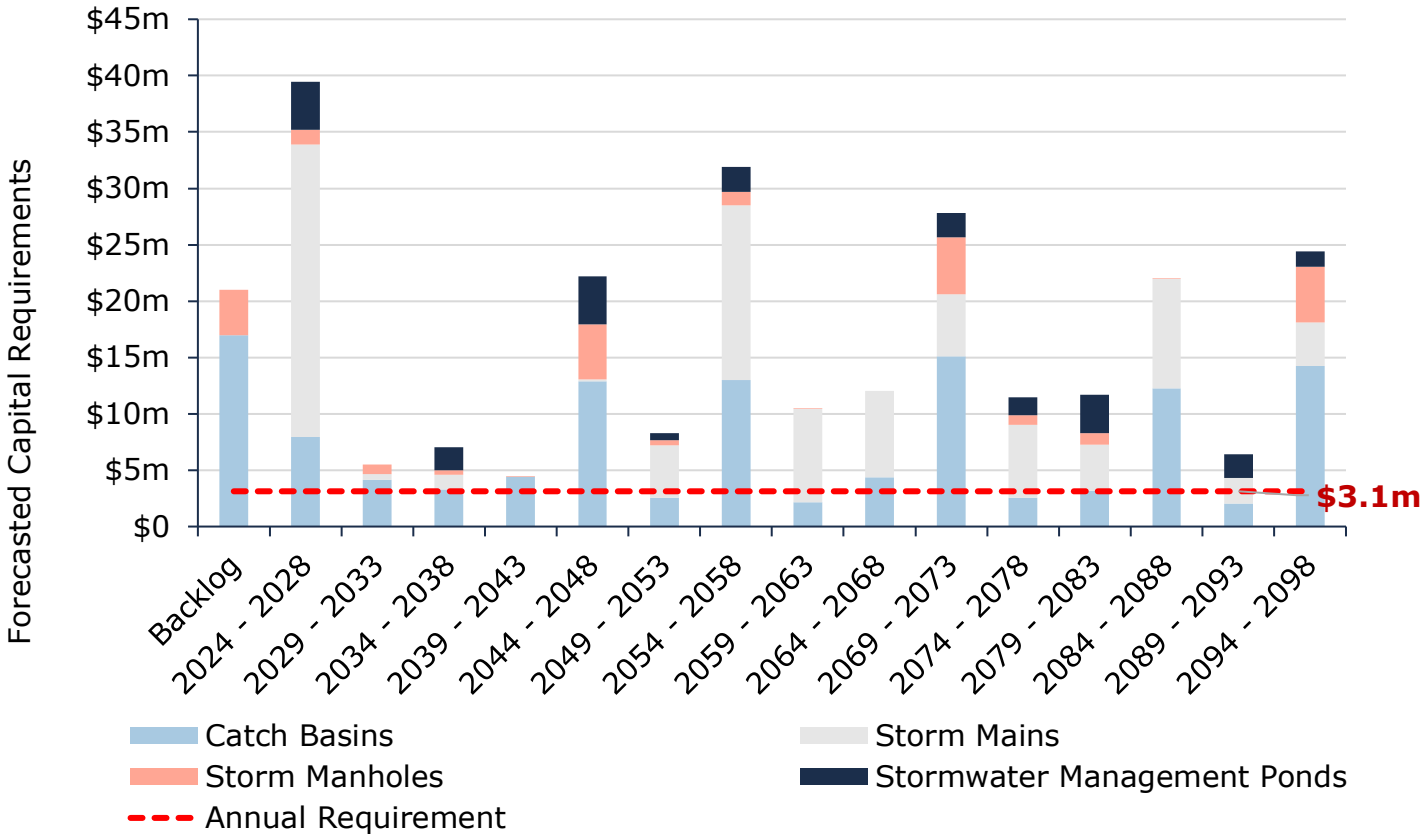


Figure 55 Forecasted Capital Replacement Needs Stormwater Network 2024-2098

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. On-going CCTV inspections may reveal a higher or lower backlog. The inspections may also help reduce long-term projections by providing more accurate condition data for mains than age. In addition, a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

9.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition, service life remaining, and replacement costs. As no attribute data was available for storm assets, the risk ratings for assets were calculated using only these required, minimum asset fields.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low $36,528,167 (24%)	5 - 7 Low $56,335,397 (37%)	8 - 9 Moderate $7,314,724 (5%)	10 - 14 High $25,028,143 (17%)	15 - 25 Very High $25,597,010 (17%)

Figure 56 Risk Matrix: Stormwater Network

9.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17 as well as any additional performance measures that the Town has selected for this AMP.

9.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the user groups or areas of the Town that are protected from flooding, including the extent of protection provided by the municipal stormwater network	Refer to Appendix C – Level of Service Maps & Photos

Table 44 O. Reg. 588/17 Community Levels of Service: Stormwater Network

9.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	% of properties in municipality designed to be resilient to a 100-year storm	5%[13]
	% of the municipal stormwater management system designed to be resilient to a 5-year storm	35%[14]
Quality	Average condition of stormwater network assets	54%
Performance	Target vs. Actual capital reinvestment rate	2.1% vs. 0.4%

Table 45 O. Reg. 588/17 Technical Levels of Service: Stormwater Network

[13] Based on staff estimates
[14] Based on staff estimates

9.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for the stormwater network. Further PLOS analysis at the portfolio level can be found in Section *4. Proposed Levels of Service Analysis.*

9.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Stormwater capital funding gradually increases from $570k/year to $1.6m/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Stormwater capital funding gradually increases from $570k/year to $2.3m/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Stormwater capital funding gradually increases from $570k/year to $3.1m/year over a span of 20 years

Table 46 Stormwater Network PLOS Scenario Descriptions

9.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	55%	47%	42%	
	Average Asset Risk	8.4	9.7	10.9	
	Average Annual Investment		$1,564,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		1.0%		
Scenario 2 (75%)	Average Condition	55%	49%	49%	
	Average Asset Risk	8.4	9.5	10.3	
	Average Annual Investment		$2,346,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		1.6%		
Scenario 3 (100%)	Average Condition	55%	51%	56%	
	Average Asset Risk	8.4	9.3	9.3	
	Average Annual Investment		$3,128,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		2.1%		

Table 47 Stormwater Network PLOS Scenario Analysis

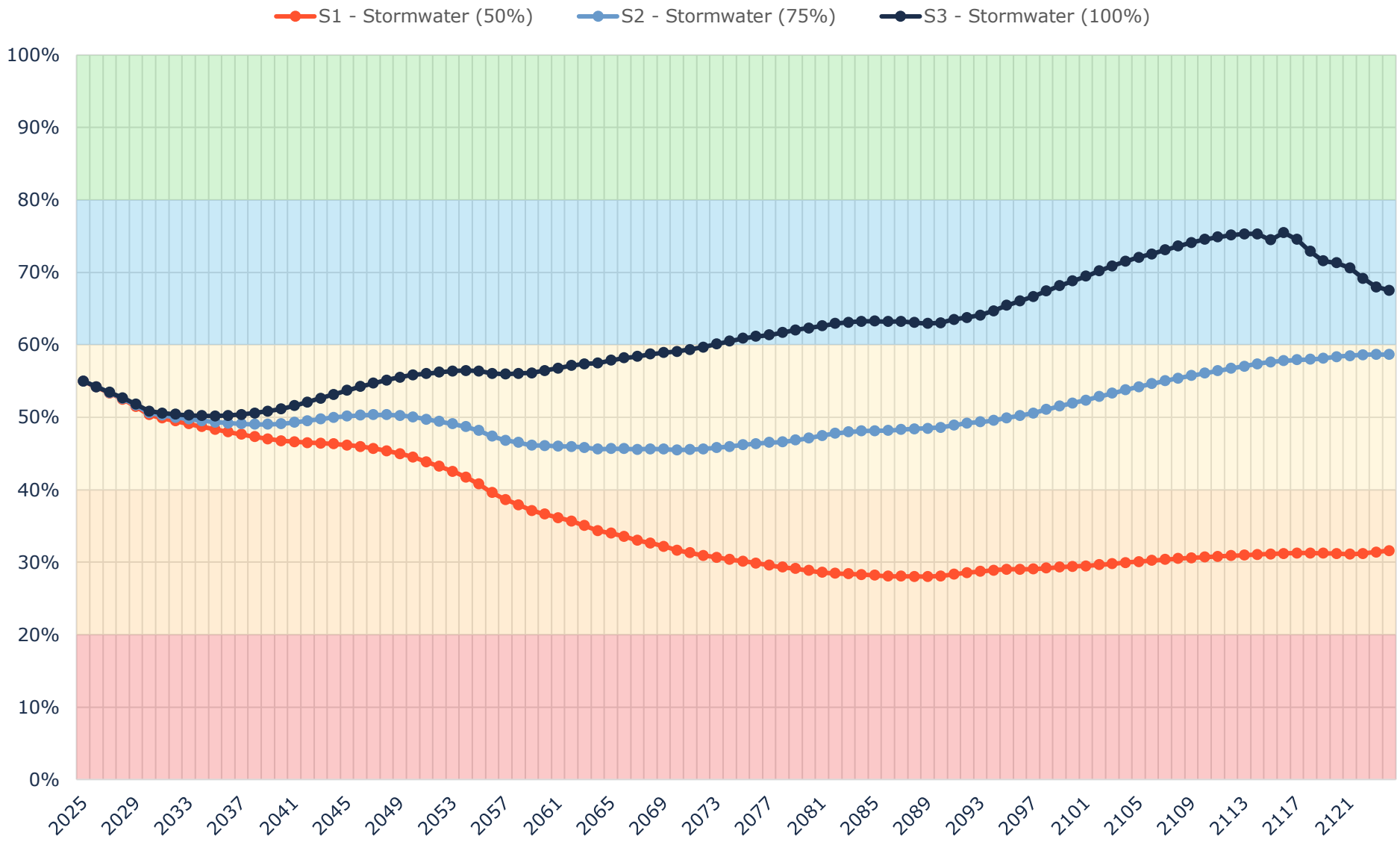


Figure 57 Stormwater Network PLOS Scenario Condition Results

9.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for the stormwater network if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**	**$2.3m**
Projected Capital Spending	$635k	$701k	$769k	$838k	$962k	$1.1m	$1.2m	$1.3m	$1.3m	$1.4m
Funding Deficit	$1.7m	$1.6m	$1.6m	$1.5m	$1.4m	$1.3m	$1.2m	$1.1m	$1.0m	$914k
Target Reinvestment Rate	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**	**1.6%**
Projected Reinvestment Rate	0.4%	0.5%	0.5%	0.6%	0.6%	0.7%	0.8%	0.8%	0.9%	0.9%

Table 48 Stormwater Network 10-Year PLOS Financial Projections

Non-Core Assets

10. Buildings & Facilities

The Town's buildings and facilities portfolio includes a town hall, police station, community centers, sports complexes, fire halls, and various public works facilities. The total current replacement of buildings and facilities is estimated at more than $104 million.

10.1 Inventory & Valuation

Table 49 summarizes the quantity and current replacement cost of all buildings assets available in the Town's asset register. Facility assets in the asset registry are inconsistently componentized, with rehabilitation projects being considered new assets. The quantity listed represents the number of asset records currently available for each department, which does not accurately reflect the total number of facilities.

As all buildings and facilities assets utilized inflation for calculating replacement costs, it is expected that the total replacement cost of $104 million is considerably underestimated.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Administration	12	Asset Records	$11,910,796	CPI
Community Services	149	Asset Records	$76,129,011	CPI
Fire	11	Asset Records	$10,292,485	CPI
Public Works	6	Asset Records	$6,175,934	CPI
TOTAL			**$104,508,226**	

Table 49 Detailed Asset Inventory: Buildings & Facilities

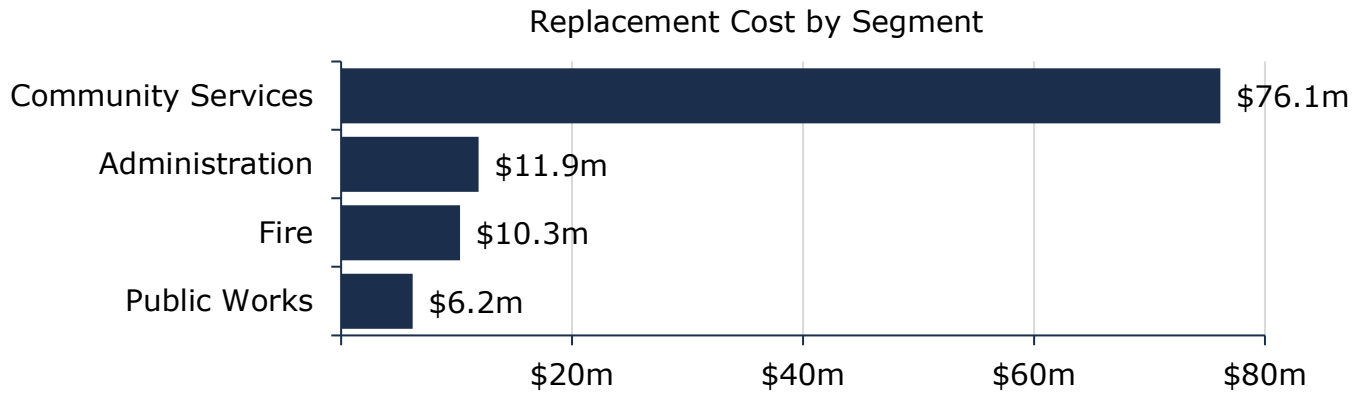


Figure 58 Portfolio Valuation: Buildings & Facilities

10.2 Asset Condition

Figure 65 summarizes the replacement cost-weighted condition of the Town's buildings and facilities portfolio. Based on partially on decade-old condition assessments projected to today (which may not accurately reflect today's condition) weighted by replacement cost, the remainder on asset age, 34% of buildings and facilities assets are in fair or better condition; however, 66%, with a current replacement cost of more than $68 million are in poor or worse condition. These assets may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition. As buildings and facilities are not fully componentized, condition data is presented only at the site level, rather than at the individual element or component level within each building.

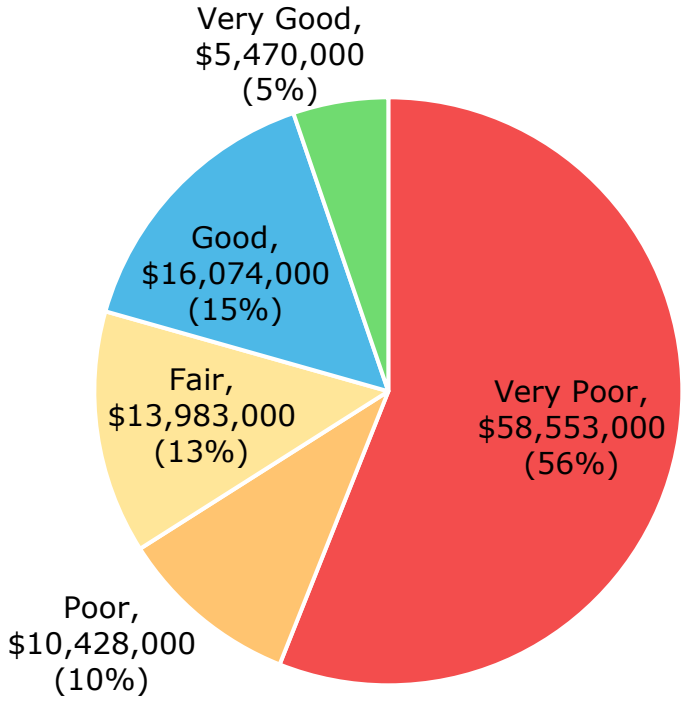


Figure 59 Asset Condition: Buildings & Facilities Overall

Figure 60 summarizes the age-based condition of buildings and facilities by each department. A substantial portion of recreation assets and the majority of library assets are in poor to worse condition. However, in the absence of detailed componentization, this data has limited value. Componentization of assets and integration of condition assessments will provide a more accurate and reliable estimation of the condition of various facilities.

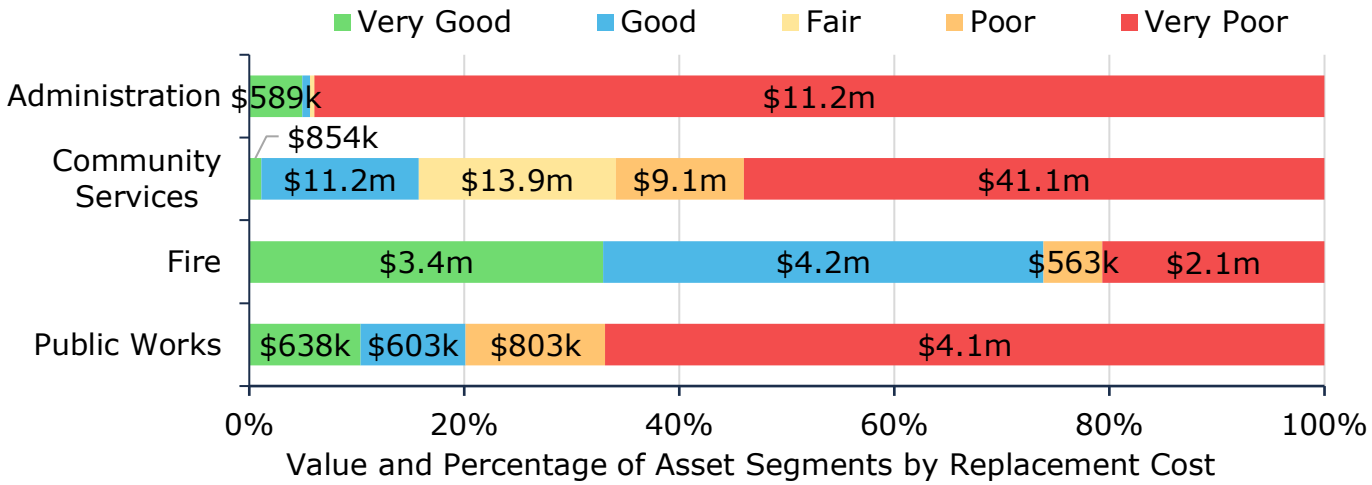


Figure 60 Asset Condition: Buildings & Facilities by Segment

10.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential replacement spikes.

Figure 61 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

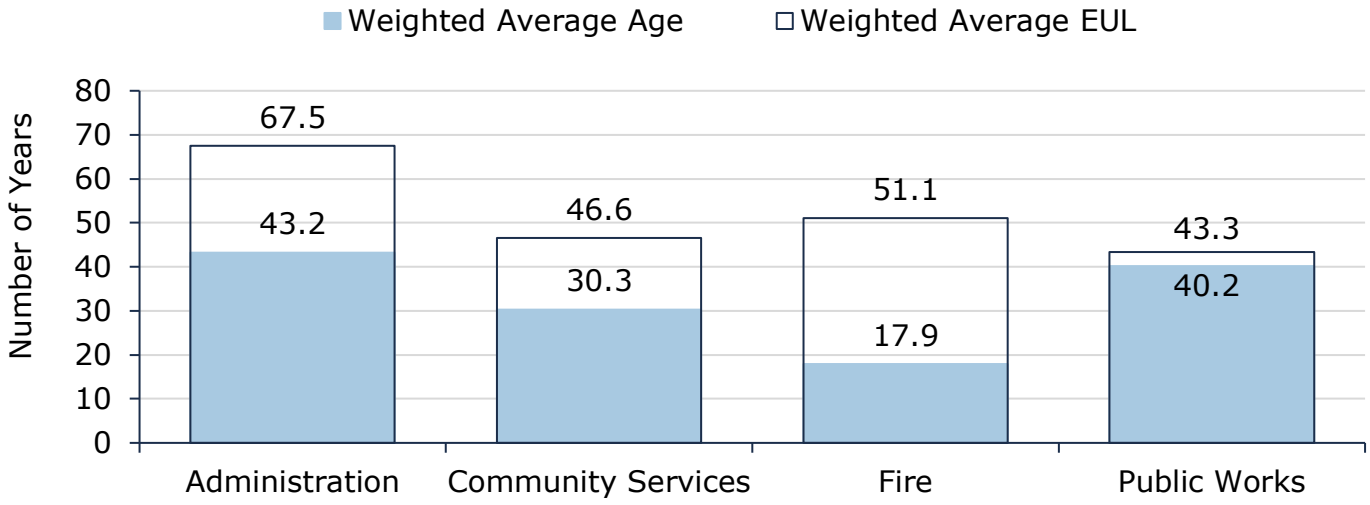


Figure 61 Estimated Useful Life vs. Asset Age: Buildings & Facilities

Age analysis reveals that, on average, buildings and facilities assets are about halfway through their serviceable life with the exception of public works facilities which are nearing the end of their serviceable life. Once again, this analysis is presented only at the site level, rather than at the individual element or component level. Useful and meaningful age analysis for buildings is entirely predicated on effective componentization.

10.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

Table 50 outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Maintenance is triggered by inspections identifying safety, accessibility, or functionality issues.
	Routine/preventative maintenance is performed on assets such as HVAC equipment.
	All other maintenance activities are completed on a reactive basis when operational issues are identified through complaints and service requests.
Rehabilitation/ Replacement	Rehabilitations such as roof replacements or HVAC component replacements are considered on an as needed basis, typically triggered by recommendations in building condition assessments.
	The primary considerations for asset replacement are asset failure, availability or grant funding, safety issues, and community importance.
Inspections	Regular internal inspections are conducted on daily, weekly, monthly, semi-annual, and annual schedules for health and safety compliance, as well as to capture any items requiring maintenance/repair.
	There is no consistent schedule for formalized building condition assessments for the purpose of providing assessed condition ratings.

Table 50 Lifecycle Management Strategy: Buildings & Facilities

10.5 Forecasted Long-Term Replacement Needs

Figure 62 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's buildings and facilities portfolio. This analysis was run until 2083 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $2.8 million for all buildings and facilities. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value

for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Replacement needs are forecasted to two particular spikes in spending over the next half century, reaching $32 million between 2044 and 2048, and $34 million between 2069 and 2073. The chart also illustrates a backlog of more than $43 million, dominated by community services. These projections and estimates are based on current asset records, their replacement costs, and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

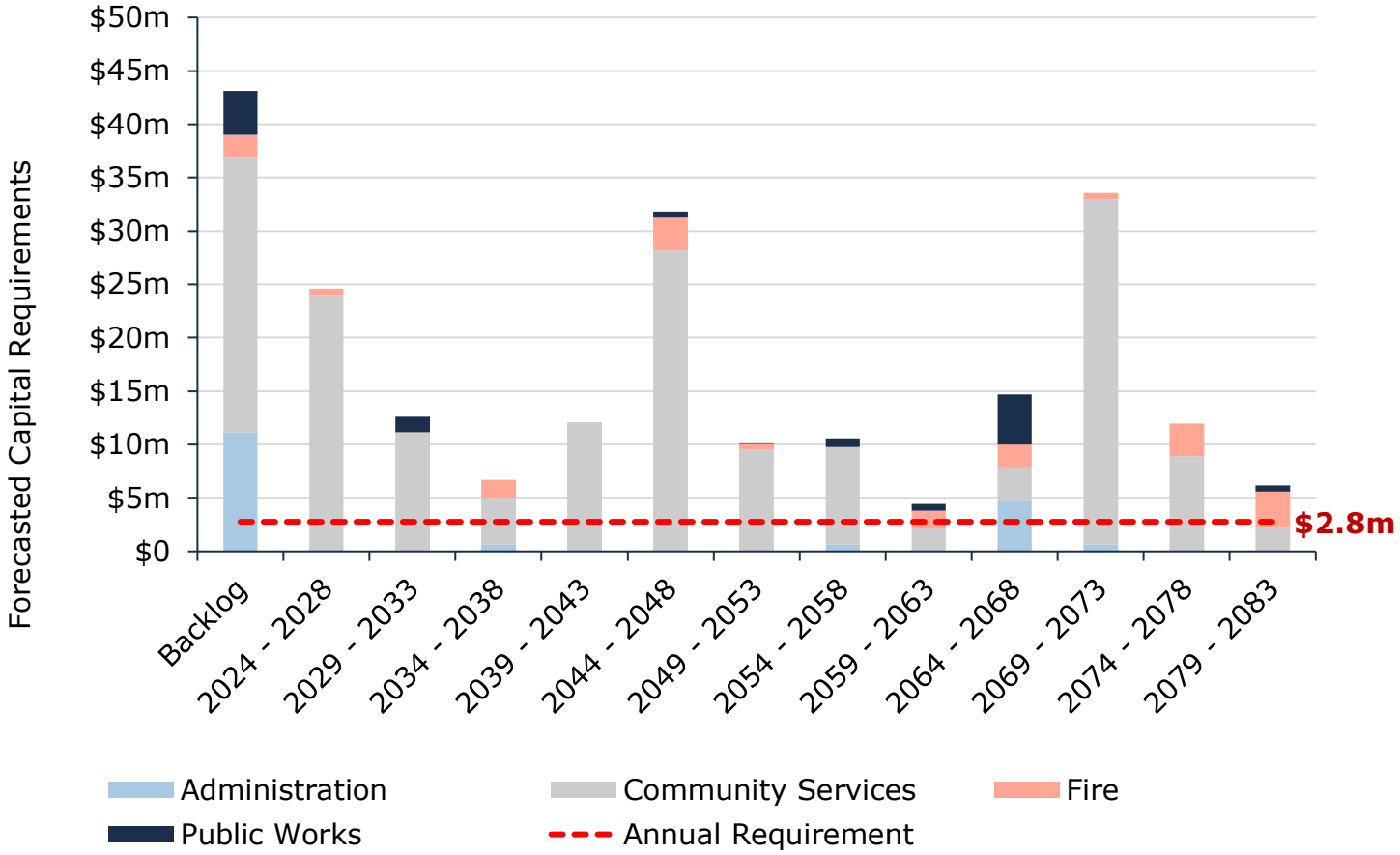


Figure 62 Forecasted Capital Replacement Needs Buildings & Facilities 2024-2083

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. In addition, a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements. In the case of buildings and facilities, detailed componentization is necessary to develop more reliable lifecycle forecasts that reflect the needs of individual elements and components.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

10.6 Risk Analysis

The risk matrix below is generated using available asset data, including service life remaining, replacement costs, and building department. The risk ratings for assets without useful attribute data were calculated using only age, service life remaining, and their replacement costs.

The matrix classifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 **Very Low** $551,679 (<1%)	5 - 7 **Low** $5,354,335 (5%)	8 - 9 **Moderate** $916,116 (<1%)	10 - 14 **High** $16,359,749 (16%)	15 - 25 **Very High** $81,326,347 (78%)

Figure 63 Risk Matrix: Buildings & Facilities

10.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service. There are no specifically prescribed KPIs under Ontario Regulation 588/17 for non-core assets, therefore the KPIs below represent performance measures that the Town has selected for this AMP.

10.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the types of facilities that the municipality operates and maintains	The Town operates a variety of facilities including: ♦ Town Hall ♦ Libraries ♦ Sports complexes ♦ Community centers ♦ Heritage buildings ♦ Outdoor public park facilities ♦ Fire stations ♦ Public works storage facilities and garages
Safe & Reliable	Municipal buildings and facilities are regularly inspected and maintained to ensure safe use for residents	Arenas undergo formal condition assessments every few years by an engineering contractor, whereas other facilities are more ad-hoc and are infrequent. This is supplemented by daily, weekly, monthly, semi-similar and annual staff inspections. Maintenance is performed based upon condition assessment results and prioritized based on community importance and safety. Routine maintenance for safety features such as elevators is performed regularly.

Table 51 Community Levels of Service: Buildings & Facilities

10.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Quality	Average facility condition index value for facilities in the municipality	28%
Performance	Target vs. Actual Capital reinvestment rate	2.7% vs. 0.3%

Table 52 Technical Levels of Service: Buildings & Facilities

10.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for buildings and facilities. Further PLOS analysis at the portfolio level can be found in Section *4. Proposed Levels of Service Analysis.*

10.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Facilities capital funding gradually increases from $285k/year to $1.4m/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Facilities capital funding gradually increases from $285k/year to $2.1m/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Facilities capital funding gradually increases from $285k/year to $2.8m/year over a span of 20 years

Table 53 Buildings & Facilities PLOS Scenario Descriptions

10.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	23%	15%	17%	
	Average Asset Risk	20.3	22.1	21.4	
	Average Annual Investment		$1,386,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		1.3%		
Scenario 2 (75%)	Average Condition	23%	17%	25%	
	Average Asset Risk	20.3	21.7	19.6	
	Average Annual Investment		$2,078,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		2.0%		
Scenario 3 (100%)	Average Condition	23%	18%	31%	
	Average Asset Risk	20.3	21.5	18.4	
	Average Annual Investment		$2,771,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		2.7%		

Table 54 Buildings & Facilities PLOS Scenario Analysis

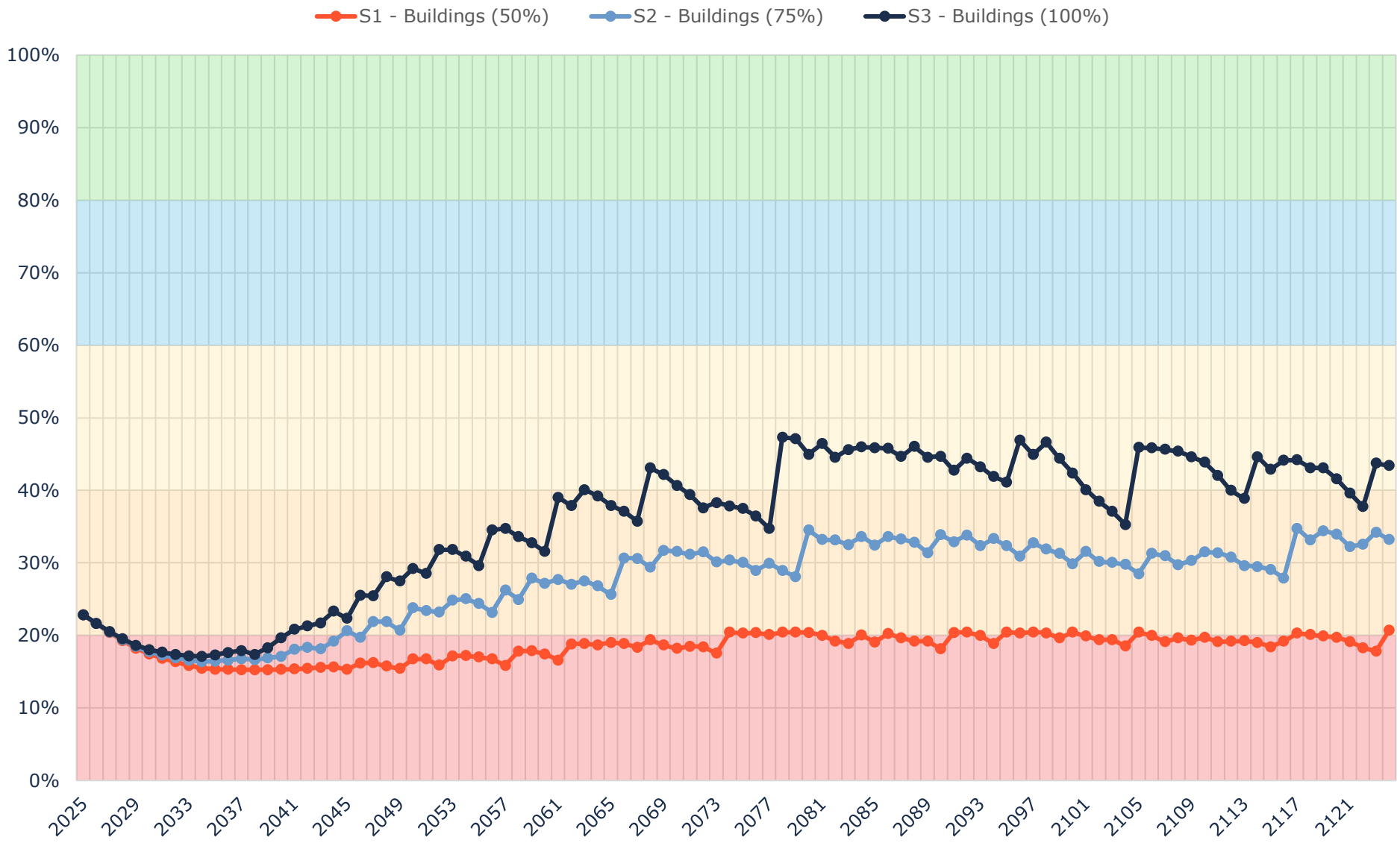


Figure 64 Buildings & Facilities PLOS Scenario Condition Results

10.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for buildings and facilities if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**	**$2.1m**
Projected Capital Spending	$350k	$417k	$485k	$555k	$680k	$793k	$900k	$976k	$1.1m	$1.2m
Funding Deficit	$1.7m	$1.7m	$1.6m	$1.5m	$1.4m	$1.3m	$1.2m	$1.1m	$1.0m	$923k
Target Reinvestment Rate	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**	**2.0%**
Projected Reinvestment Rate	0.3%	0.4%	0.5%	0.5%	0.7%	0.8%	0.9%	0.9%	1.0%	1.1%

Table 55 Buildings & Facilities 10-Year PLOS Financial Projections

11. Parks & Land Improvements

The Town's parks and land improvements portfolio includes parks, sport fields, parking lots, trails, pools, splashpads, and a marina. The total current replacement of parks and land improvements assets are estimated at approximately $16 million.

11.1 Inventory & Valuation

Table 56 summarizes the quantity and current replacement cost of all parks and land improvements assets available in the Town's asset register, Citywide Assets. Parks, sport fields and courts account for the largest share of the parks and land improvements portfolio.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Marina	11	Assets	$1,691,720	CPI
Parking Lots	5	Assets	$4,032,896	CPI
Parks, Sport Fields & Courts	75	Assets	$7,866,937	CPI
Pools & Splashpads	3	Assets	$1,518,060	CPI
Trails	24	Assets	$815,033	CPI
TOTAL			**$15,924,646**	

Table 56 Detailed Asset Inventory: Land Improvements

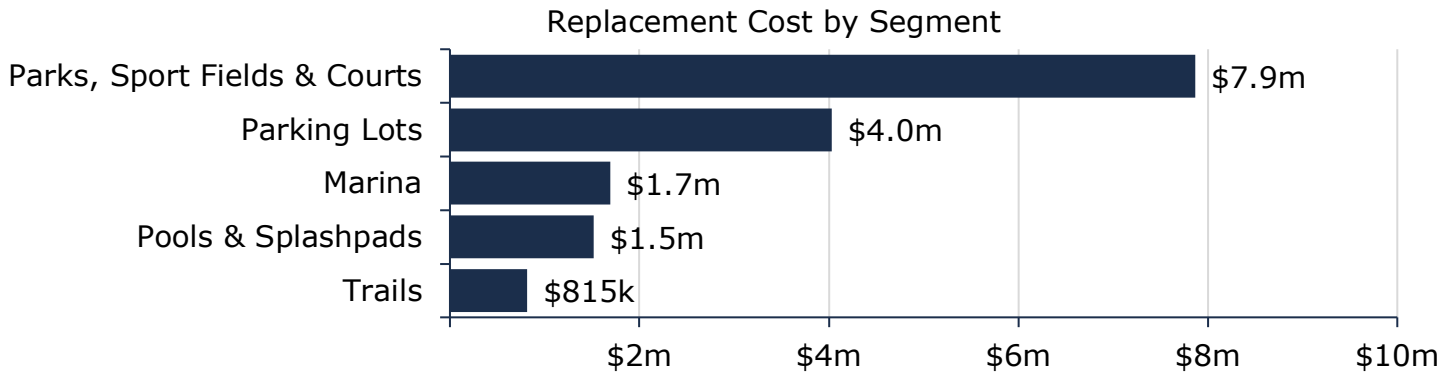


Figure 65 Portfolio Valuation: Parks & Land Improvements

11.2 Asset Condition

Figure 66 summarizes the replacement cost-weighted condition of the Town's parks and land improvements portfolio. Based on age data only, 61% of assets are in fair or better condition, the remaining 39% are in poor or worse condition. These assets may be candidates for

replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

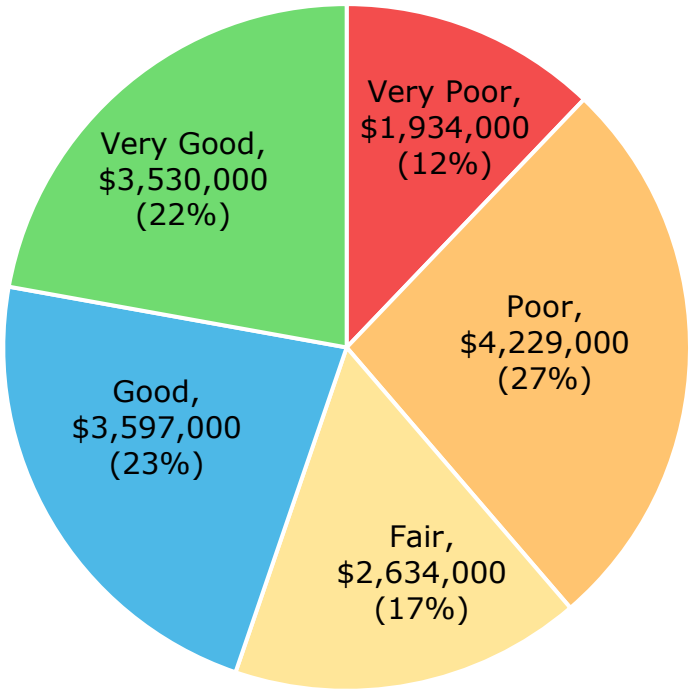


Figure 66 Asset Condition: Parks & Land Improvements Overall

Figure 67 summarizes the condition of parks and land improvements by each department. Assets in poor or worse condition consist mostly of parking lots and associated infrastructure.

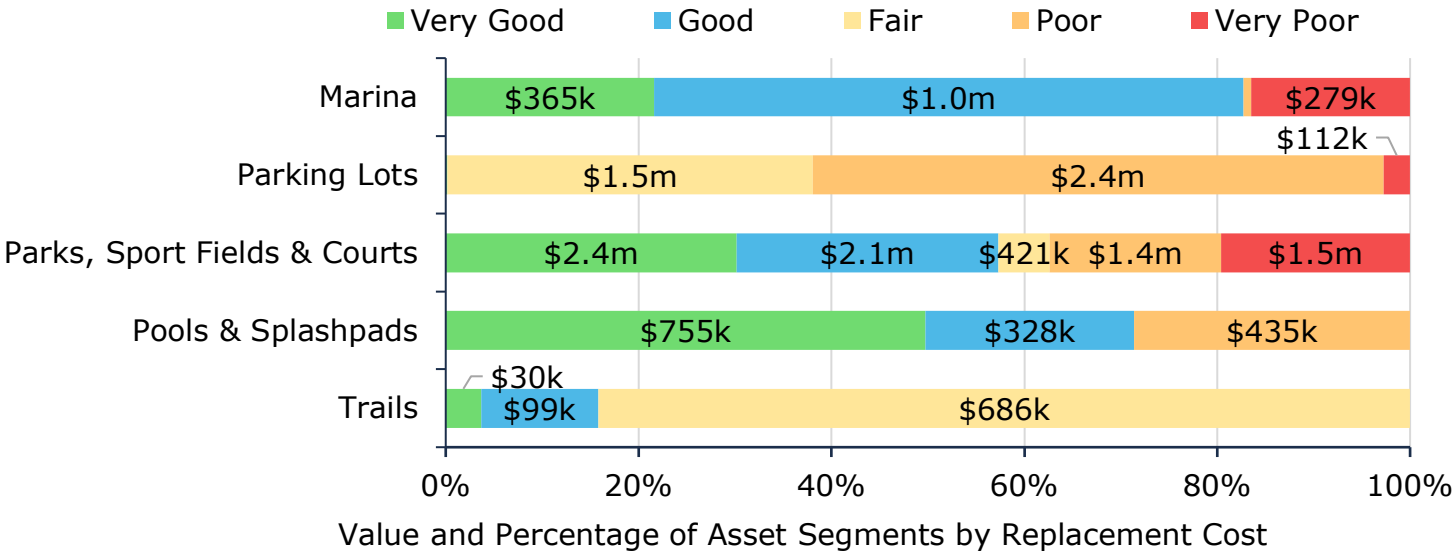


Figure 67 Asset Condition: Parks & Land Improvements by Segment

11.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential replacement spikes.

Figure 68 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

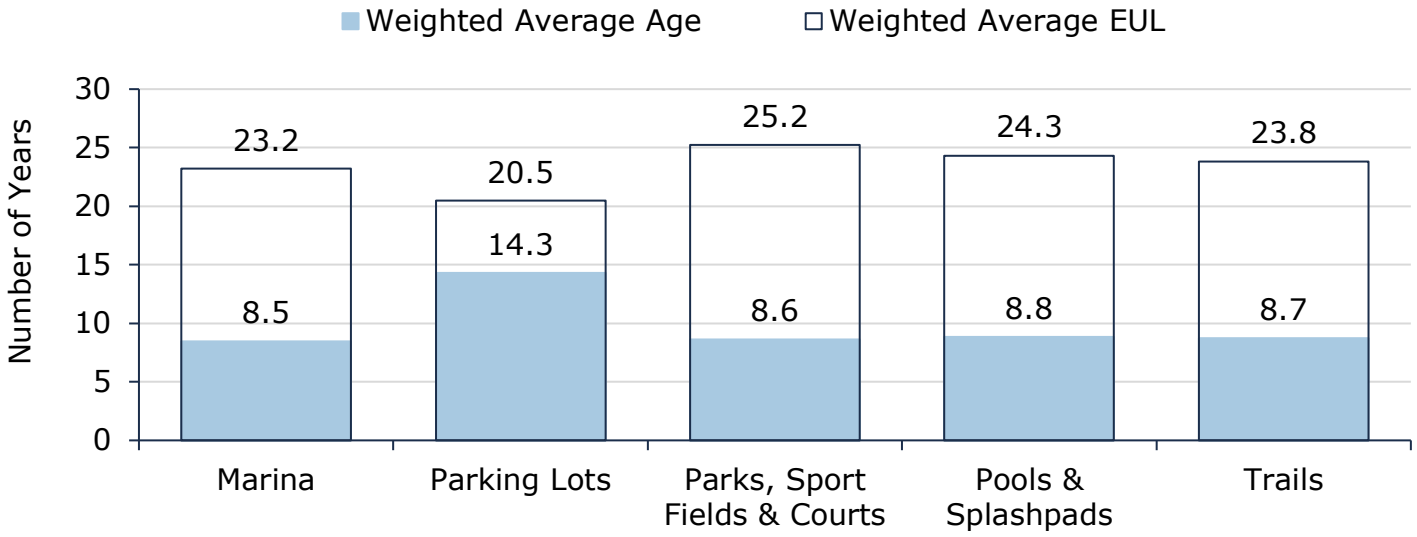


Figure 68 Estimated Useful Life vs. Asset Age: Parks & Land Improvements

Age analysis reveals that, on average, most assets are in the early to mid-stages of their expected life, however, parking lot assets are entering the latter stages of their expected design life.

11.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

Table 57 outlines the Township's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Maintenance activities are completed on a reactive basis when operational issues are identified, through complaints, service requests, or ad-hoc inspections.
	Routine maintenance is completed on an as-needed basis, such as cleaning, garbage collection, vegetation management, and seasonal requirements.
Rehabilitation / Replacement	Rehabilitation and replacements are mainly triggered by asset failure or third-party inspection recommendations.
Inspections	Internal staff conduct weekly visual inspections when on-site, while other assets have more thorough monthly or annual inspections.

Table 57 Lifecycle Management Strategy: Parks & Land Improvements

11.5 Forecasted Long-Term Replacement Needs

Figure 69 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's parks and land improvements portfolio. This analysis was run until 2058 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $841,000 for all parks and land improvements. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Replacement needs are forecasted to fluctuate over the 35-year time horizon, totaling just over $6 million in the next 5 years, and peaking at around $7.6 million between 2039 and 2043 as assets reach the end of their useful life. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

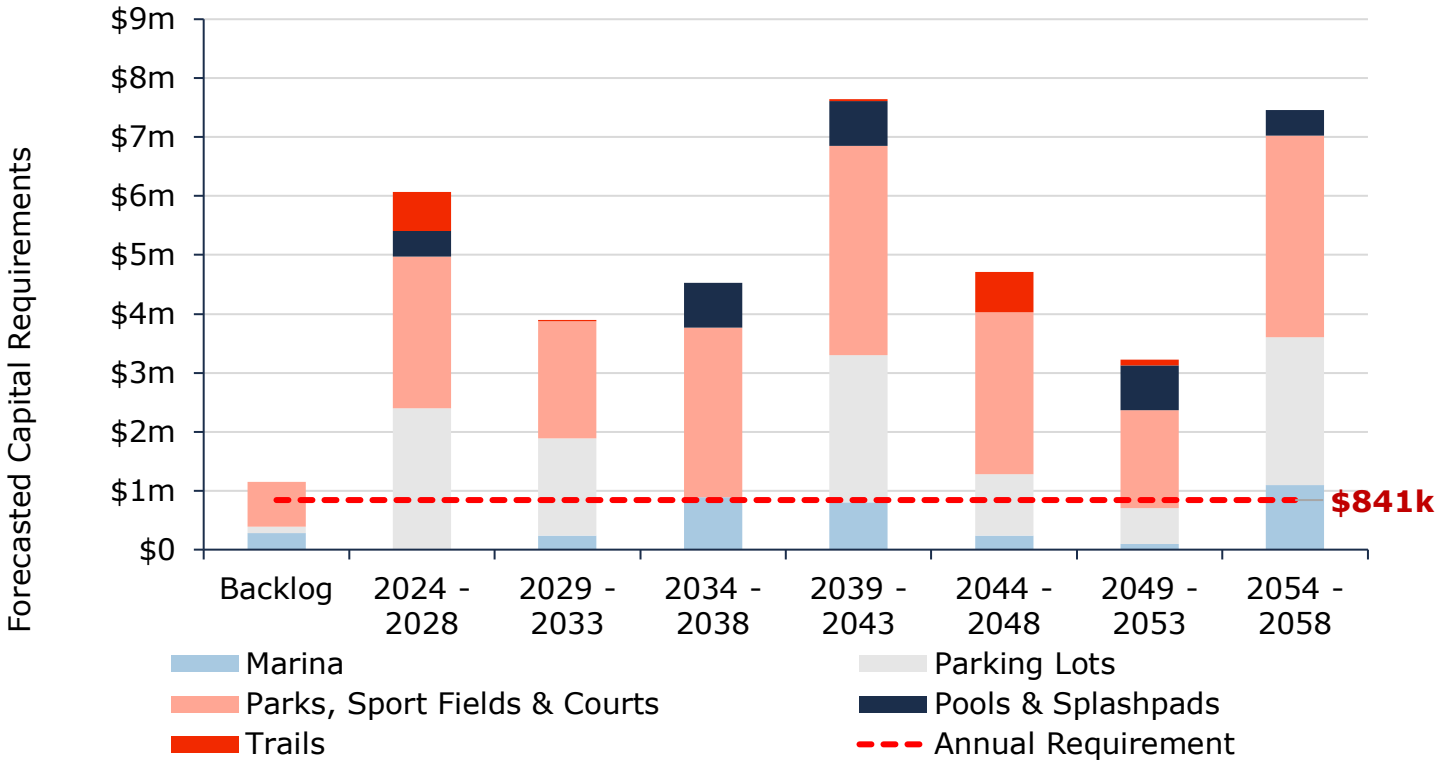


Figure 69 Forecasted Capital Replacement Needs: Parks & Land Improvements 2024-2058

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. In addition, a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

11.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition and replacement costs. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low $1,121,865 (7%)	5 - 7 Low $2,854,294 (18%)	8 - 9 Moderate $2,185,245 (14%)	10 - 14 High $2,118,654 (13%)	15 - 25 Very High $7,644,588 (48%)

Figure 70 Risk Matrix: Parks & Land Improvements

11.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service. There are no specifically prescribed KPIs under Ontario Regulation 588/17 for non-core assets, therefore the KPIs below represent performance measures that the Town has selected for this AMP.

11.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the outdoor recreational facilities that the municipality operates and maintains	The Town operates a variety of parks, sports fields, courts, pools, splashpads, and a marina. There are also multiple trails accommodating both pedestrian and bike travel.
Safe & Reliable	Municipal parks and land improvements are regularly inspected and maintained to ensure safe use for residents	Depending on the type of asset, monthly and/or annual formal inspections are conducted, which can be led by staff or a contractor. These are supplemented by weekly visual staff inspections to ensure safe and reliable community interaction. Routine maintenance such as cleaning and grass cutting are performed by staff daily or weekly.

Table 58 Community Levels of Service: Parks & Land Improvements

11.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Quality	Average condition of outdoor recreation facilities and land improvements in the municipality	54%
Performance	Target vs. Actual Capital reinvestment rate	5.3% vs. 0.4%

Table 59 Technical Levels of Service: Parks & Land Improvements

11.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for parks and land improvements. Further PLOS analysis at the portfolio level can be found in section *4. Proposed Levels of Service Analysis.*

11.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Land Improvements capital funding gradually increases from $68k/year to $421k/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Land Improvements capital funding gradually increases from $68k/year to $631k/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Land Improvements capital funding gradually increases from $68k/year to $841k/year over a span of 20 years

Table 60 Parks & Land Improvements PLOS Scenario Descriptions

11.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	45%	18%	21%	
	Average Asset Risk	14.2	19.6	19.3	
	Average Annual Investment		$421,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		2.6%		
Scenario 2 (75%)	Average Condition	45%	21%	33%	
	Average Asset Risk	14.2	18.9	17.1	
	Average Annual Investment		$631,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		4.0%		
Scenario 3 (100%)	Average Condition	45%	25%	44%	
	Average Asset Risk	14.2	18.3	14.5	
	Average Annual Investment		$841,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		5.3%		

Table 61 Parks & Land Improvements PLOS Scenario Analysis

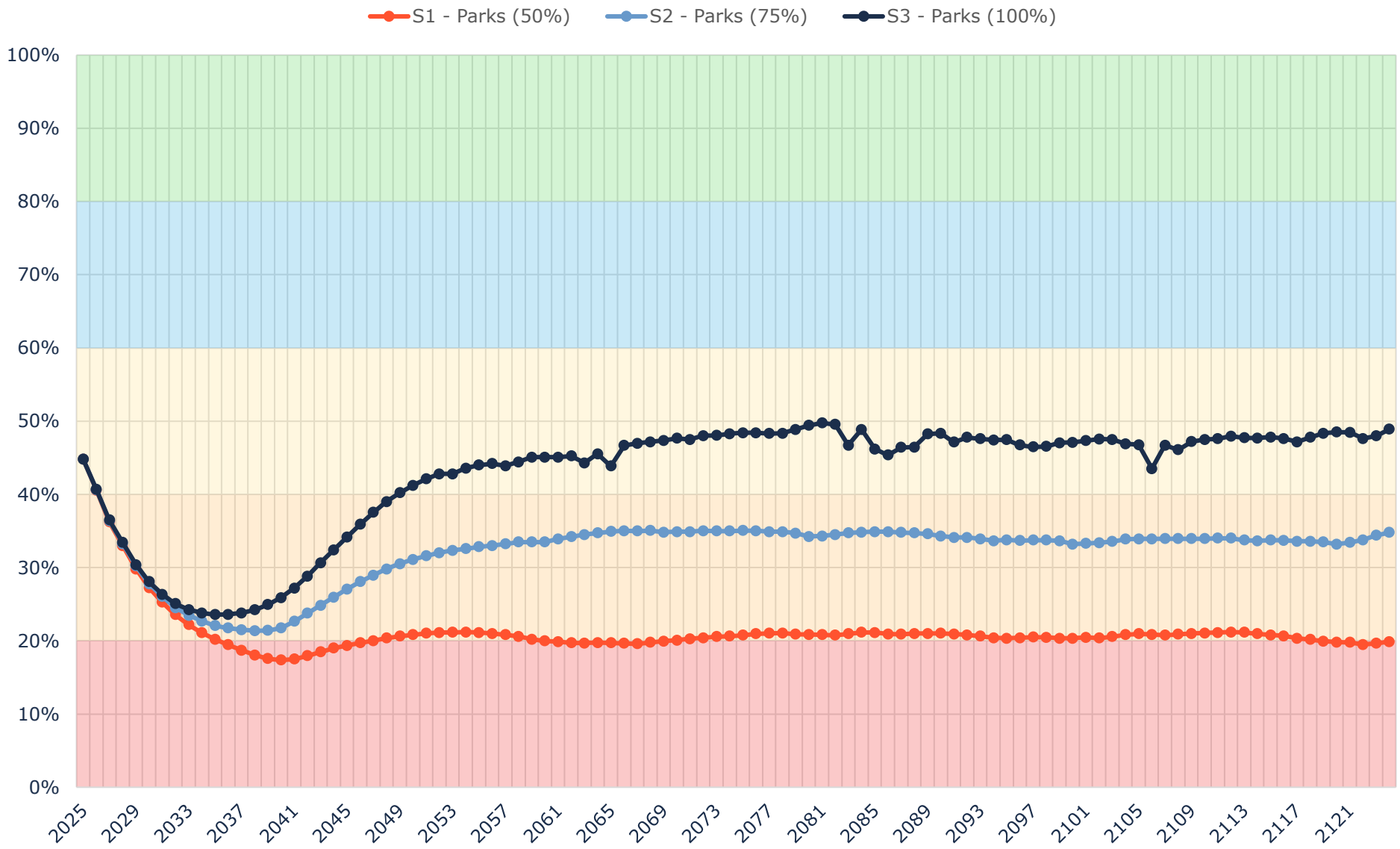


Figure 71 Parks & Land Improvements PLOS Scenario Condition Results

11.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for the parks and land improvements if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$631k**	**$631k**	**$631k**	**$631k**	**$631k**	**$631k**	**$631k**	**$631k**	**$631k**	**$631k**
Projected Capital Spending	$88k	$109k	$131k	$153k	$192k	$228k	$261k	$285k	$309k	$341k
Funding Deficit	$542k	$521k	$500k	$478k	$439k	$403k	$370k	$346k	$322k	$290k
Target Reinvestment Rate	**4.0%**	**4.0%**	**4.0%**	**4.0%**	**4.0%**	**4.0%**	**4.0%**	**4.0%**	**4.0%**	**4.0%**
Projected Reinvestment Rate	0.6%	0.7%	0.8%	1.0%	1.2%	1.4%	1.6%	1.8%	1.9%	2.1%

Table 62 Parks & Land Improvements 10-Year PLOS Financial Projections

12. Vehicles & Heavy Equipment

The Town's vehicles and heavy equipment portfolio includes 57 assets that support a variety of general and essential services, including public works, community services, administration, by-law enforcement, and fire services, totaling approximately $17 million.

12.1 Inventory & Valuation

Table 63 summarizes the quantity and current replacement cost of all vehicles and heavy equipment assets available in the Town's asset register. Public works and fire services account for the largest shares of the vehicles and heavy equipment portfolio.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Administration	1	Assets	$88,884	CPI
Community Services	13	Assets	$2,115,739	CPI
Environmental Services	5	Assets	$571,598	CPI
Fire	13	Assets	$7,068,871	CPI
Public Works	25	Assets	$7,060,395	CPI
TOTAL			**$16,905,487**	

Table 63 Detailed Asset Inventory: Vehicles & Heavy Equipment

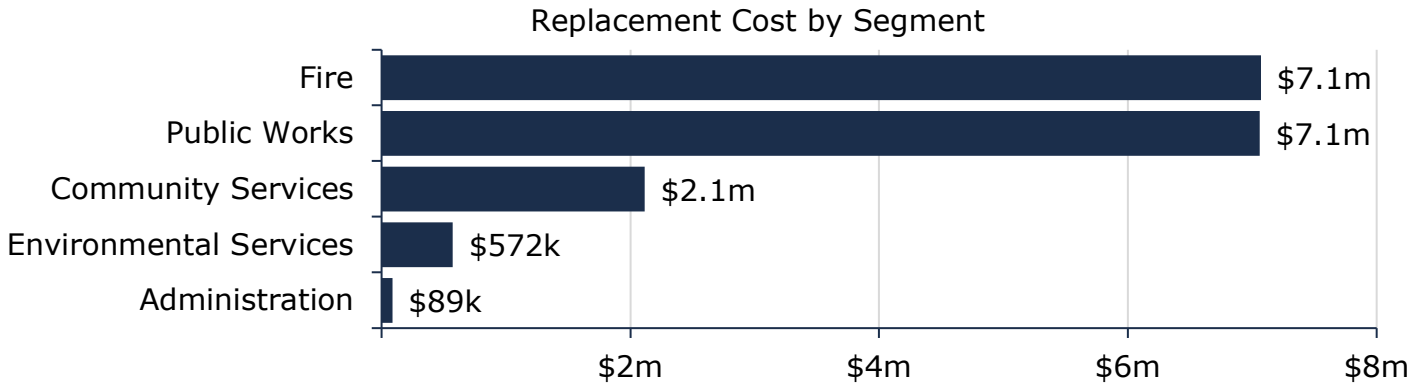


Figure 72 Portfolio Valuation: Vehicles & Heavy Equipment

12.2 Asset Condition

Figure 73 summarizes the replacement cost-weighted condition of the Town's vehicles and heavy equipment portfolio. Based on a combination of assessed condition data and age, 58% of vehicles and heavy equipment are in fair or better condition, with the remaining 42% in poor or

worse condition. These assets may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition. Condition data was available for 43% of vehicles and heavy equipment, however, this assessment information is 8-12 years old, compromising its legitimacy. Age was used to estimate condition for the remaining 57% of assets.

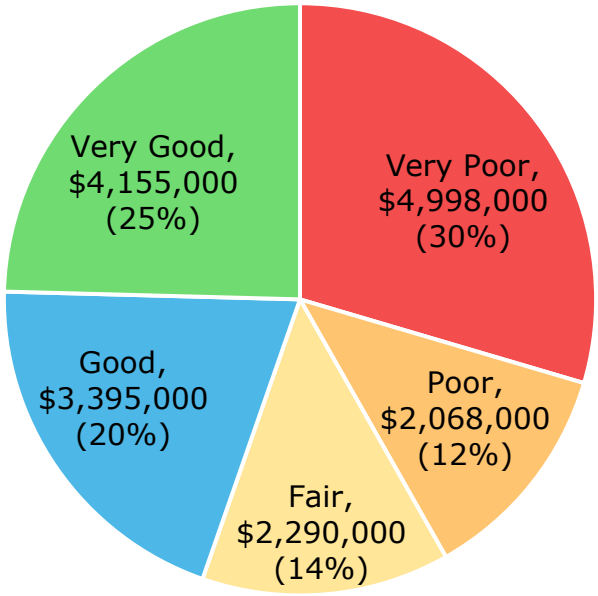


Figure 73 Asset Condition: Vehicles & Heavy Equipment Overall

Figure 74 summarizes the condition of vehicles and heavy equipment by each department. Assets in fair or better condition are concentrated in public works, community services, and environmental services, whereas the majority of assets supporting fire and administration are in poor or worse condition.

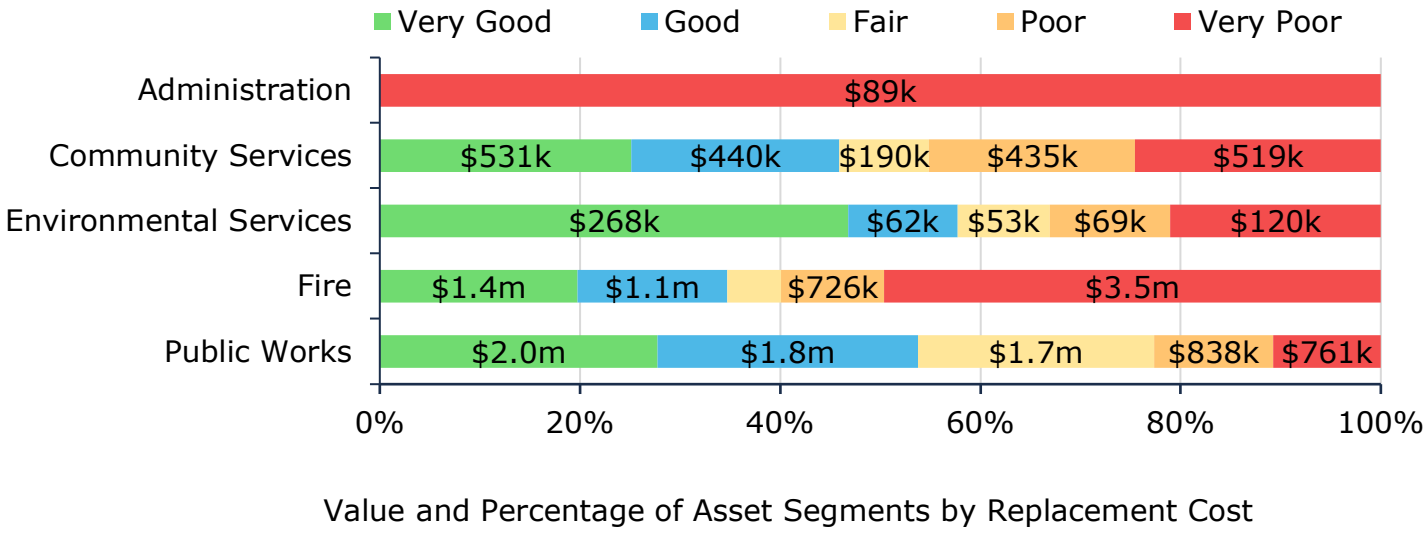


Figure 74 Asset Condition: Vehicles & Heavy Equipment by Segment

12.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential replacement spikes.

Figure 75 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

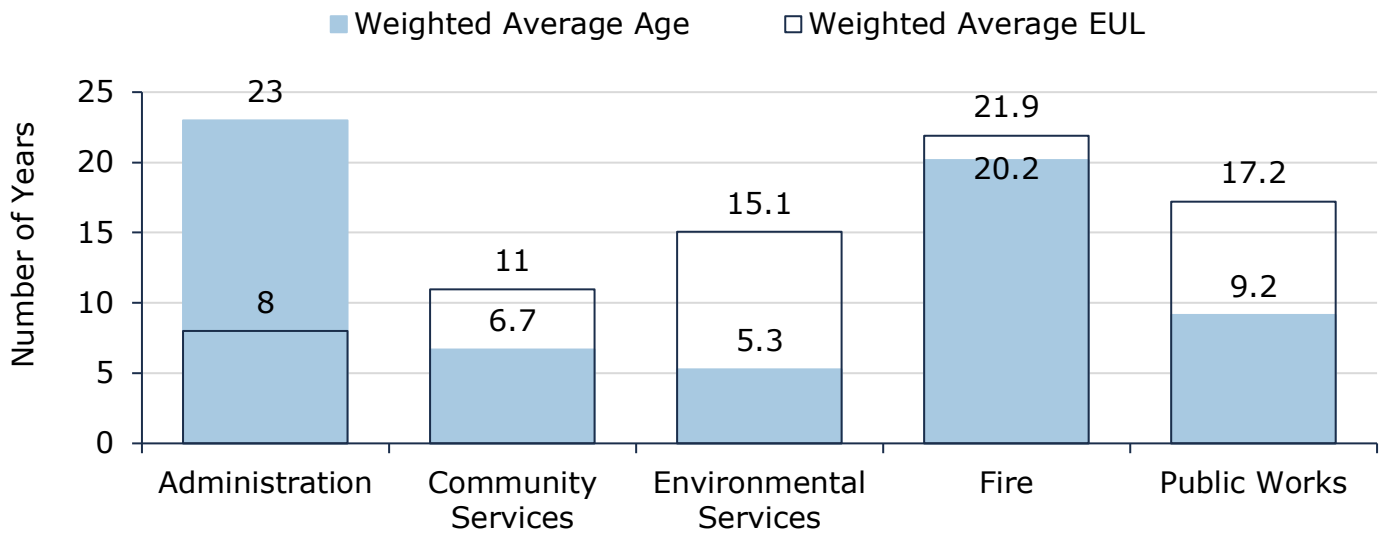


Figure 75 Estimated Useful Life vs. Asset Age: Vehicles & Heavy Equipment

Age analysis reveals that, on average, most vehicles within the fire department are in the latter stages of their expected life. Assets servicing administration have remained in service well beyond their established useful life.

12.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Oil changes and routine maintenance are completed as per manufacturers' recommendations.
	All other maintenance activities are completed on a reactive basis when operational issues are identified (e.g., mechanical breakdown, deficiencies identified during daily inspections)
Replacement	Assets that are nearing the end of their service life or with frequent and costly repairs are considered for replacement during annual budget preparation.
Inspections	Vehicles are inspected by the operator daily before use to identify deficiencies needing repair. Additional inspections are conducted by maintenance staff when vehicles are being repaired.
	Fire vehicles have MTO inspections completed annually and are inspected weekly to ensure all vehicles are ready for response. They are also inspected after every call-out.
	Vehicles are assessed annually by internal staff in advance of annual budget preparations. No formalized condition rating criteria is used during these inspections.

Table 64 Lifecycle Management Strategy: Vehicles & Heavy Equipment

12.5 Forecasted Long-Term Replacement Needs

Figure 76 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's vehicles and heavy equipment portfolio. This analysis was run until 2043 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $1.1 million for all vehicles. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Replacement needs are forecasted to rise considerably in the current decade, peaking at nearly $7 million between 2029 and 2033, as vehicles reach the end of their useful life. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

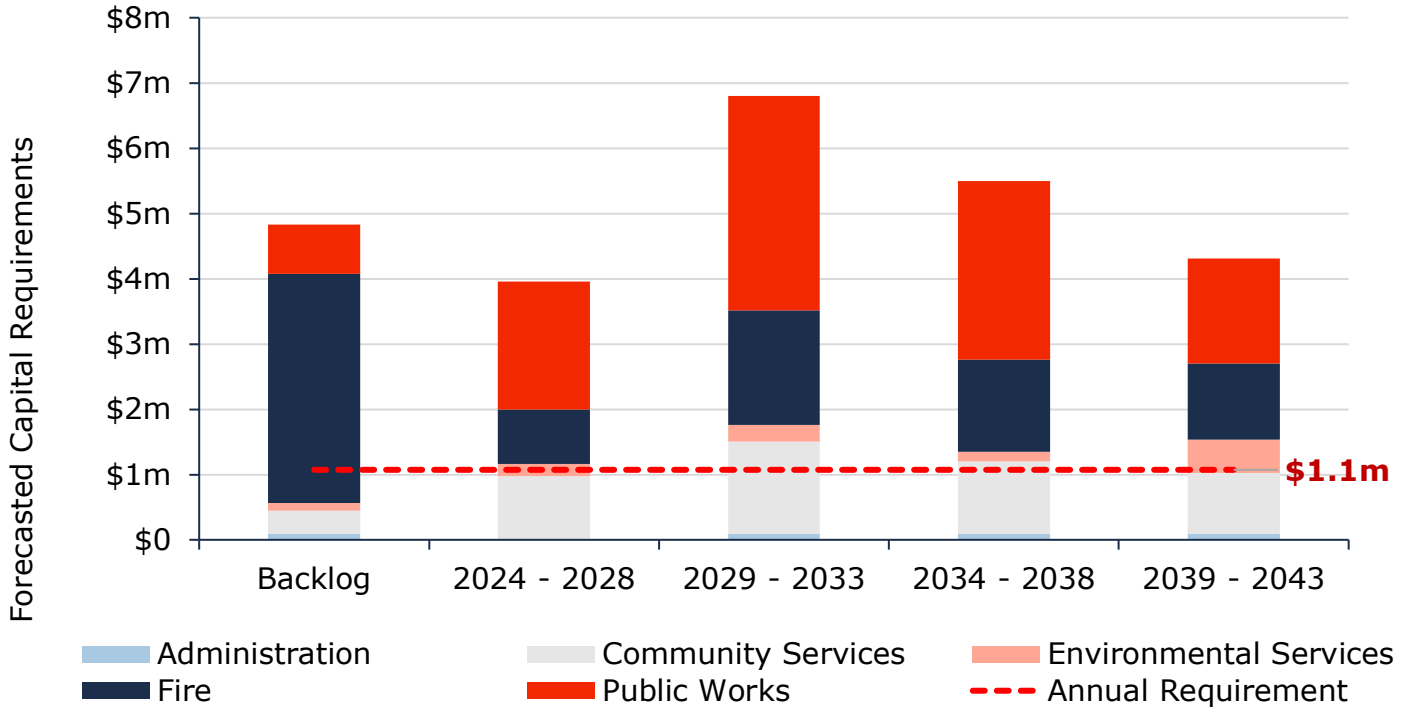


Figure 76 Forecasted Capital Replacement Needs: Vehicles & Heavy Equipment 2024-2043

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. In addition, a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

12.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition, service life remaining, replacement costs, and department or service area. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low $1,664,465 (10%)	5 - 7 Low $2,500,678 (15%)	8 - 9 Moderate $1,171,693 (7%)	10 - 14 High $3,022,409 (18%)	15 - 25 Very High $8,546,242 (51%)

Figure 77 Risk Matrix: Vehicles & Heavy Equipment

12.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service. There are no specifically prescribed KPIs under Ontario Regulation 588/17 for non-core assets, therefore the KPIs below represent performance measures that the Town has selected for this AMP.

12.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description of the vehicles that the municipality operates and the services that they help to provide to the community	General municipal services are supported by a large variety of vehicles such as pick-up trucks, dump trucks, water trucks, loaders, plows, and various other equipment. Fire services are supported by an array of rescue, service, ladder, pumper, and tanker vehicles.

Table 65 Community Levels of Service: Vehicles & Heavy Equipment

12.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Quality	Average condition of vehicles and heavy equipment	46%
Performance	Target vs. Actual capital reinvestment rate	6.3% vs. 0.8%

Table 66 Technical Levels of Service: Vehicles & Heavy Equipment

12.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for vehicles and heavy equipment. Further PLOS analysis at the portfolio level can be found in section *4. Proposed Levels of Service Analysis.*

12.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Vehicles capital funding gradually increases from $135k/year to $537k/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Vehicles capital funding gradually increases from $135k/year to $805k/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Vehicles capital funding gradually increases from $135k/year to $1.1m/year over a span of 20 years

Table 67 Vehicles & Heavy Equipment PLOS Scenario Descriptions

12.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	38%	15%	20%	
	Average Asset Risk	16.2	20.6	20.1	
	Average Annual Investment		$537,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		3.2%		
Scenario 2 (75%)	Average Condition	38%	20%	34%	
	Average Asset Risk	16.2	19.4	16.7	
	Average Annual Investment		$805,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		4.8%		
Scenario 3 (100%)	Average Condition	3%	25%	46%	
	Average Asset Risk	16.2	18.2	14.7	
	Average Annual Investment		$1,073,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		6.3%		

Table 68 Vehicles & Heavy Equipment PLOS Scenario Analysis

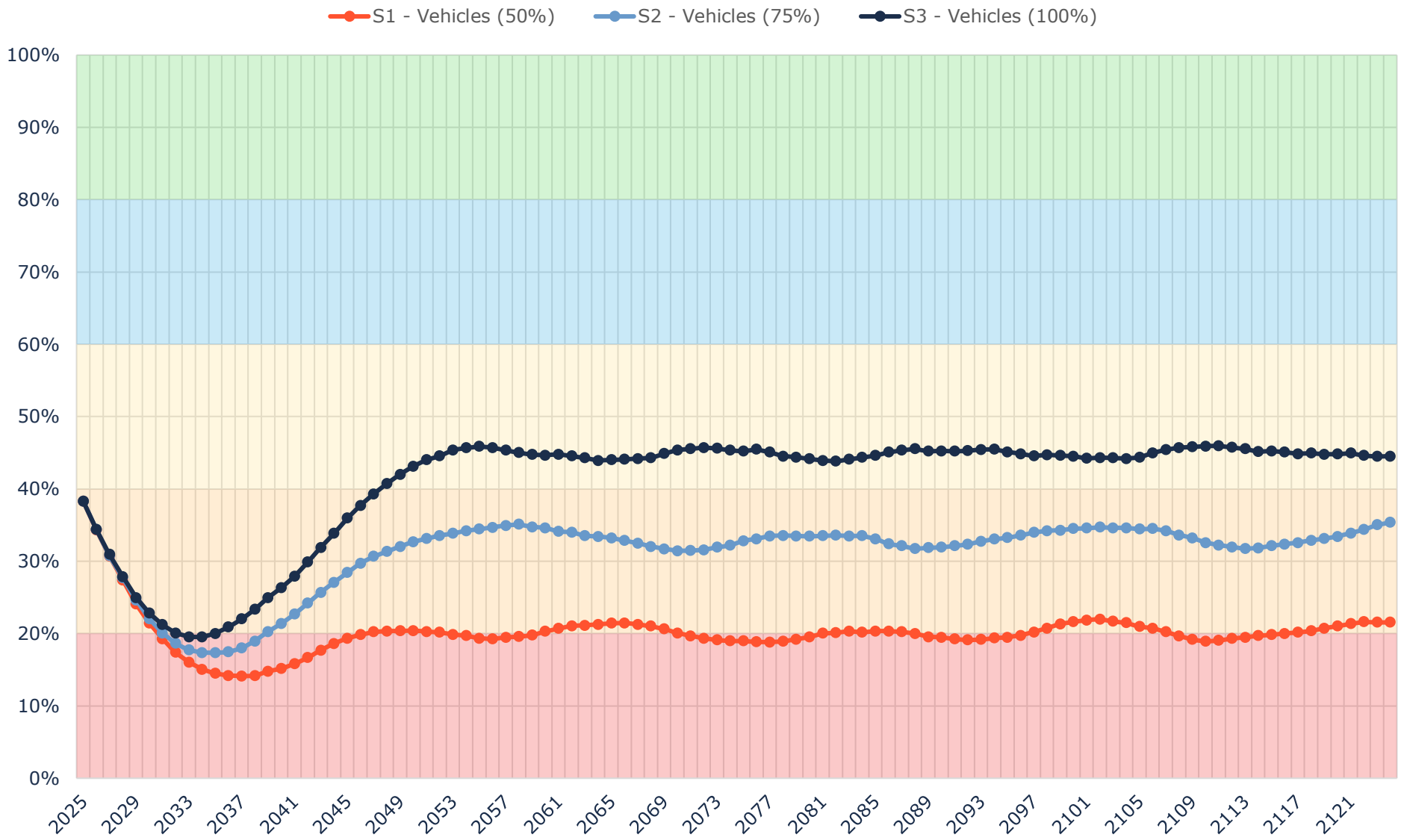


Figure 78 Vehicles & Heavy Equipment PLOS Scenario Condition Results

12.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for vehicles and heavy equipment if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$804k**	**$804k**	**$804k**	**$804k**	**$804k**	**$804k**	**$804k**	**$804k**	**$804k**	**$804k**
Projected Capital Spending	$160k	$185k	$210k	$236k	$283k	$325k	$365k	$393k	$422k	$460k
Funding Deficit	$645k	$620k	$594k	$568k	$522k	$479k	$440k	$411k	$383k	$344k
Target Reinvestment Rate	**4.8%**	**4.8%**	**4.8%**	**4.8%**	**4.8%**	**4.8%**	**4.8%**	**4.8%**	**4.8%**	**4.8%**
Projected Reinvestment Rate	0.9%	1.1%	1.2%	1.4%	1.7%	1.9%	2.2%	2.3%	2.5%	2.7%

Table 69 Vehicles & Heavy Equipment 10-Year PLOS Financial Projections

13. Machinery & Equipment

The Town's machinery and equipment portfolio includes almost 1000 miscellaneous assets that support a variety of general and essential services, including recreation, public works, and fire. These miscellaneous pieces of smaller machinery and equipment include:

- Recreational equipment such as skate sharpeners, player benches, golf carts, and tables/chairs
- IT Hardware such as laptops, computer monitors, and projectors
- Fire equipment such as pagers, hoses, helmets, boots, and bunker gear
- Public works equipment such as mowers, air compressors, and trailers

The total current replacement of the machinery and equipment portfolio is estimated at approximately $6.5 million.

13.1 Inventory & Valuation

Figure 79 summarizes the quantity and current replacement cost of all machinery and equipment assets available in the Town's asset register.

Segment	Quantity	Unit of Measure	Replacement Cost	Primary RC Method
Administration	9	Assets	$357,506	CPI
Community Services	712	Assets	$4,599,092	CPI
Environmental Services	7	Assets	$455,532	CPI
Fire	202	Assets	$764,755	CPI
Public Works	27	Assets	$353,053	CPI
TOTAL			**$6,529,938**	

Table 70 Detailed Asset Inventory: Machinery & Equipment

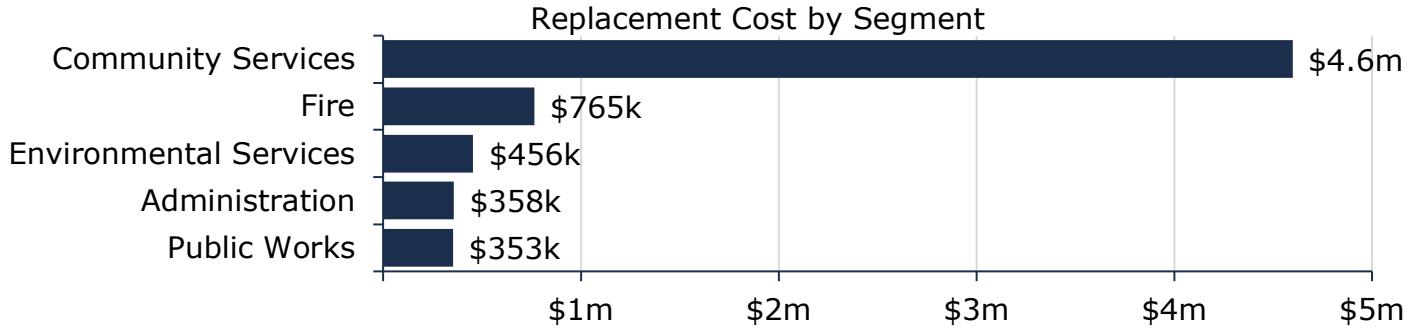


Figure 79 Portfolio Valuation: Machinery & Equipment

13.2 Asset Condition

Figure 80 summarizes the replacement cost-weighted condition of the Town's machinery and equipment portfolio. Based on and combination of assessments and age data, 53% of assets are in fair or better condition; the remaining 47% are in poor or worse condition. These assets may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

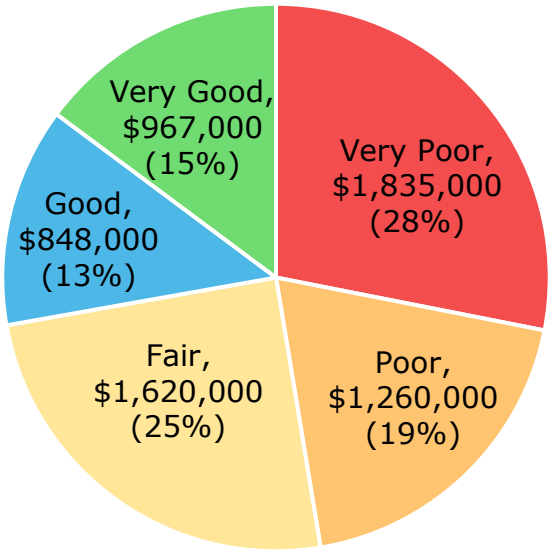


Figure 80 Asset Condition: Machinery & Equipment Overall

Figure 81 summarizes the age-based condition of machinery and equipment by each category. The majority of assets that support public works and community services are in poor or worse condition; however, assessment data is outdated and likely unreliable. Assets in fair or better condition are concentrated primarily in administration and environmental services.

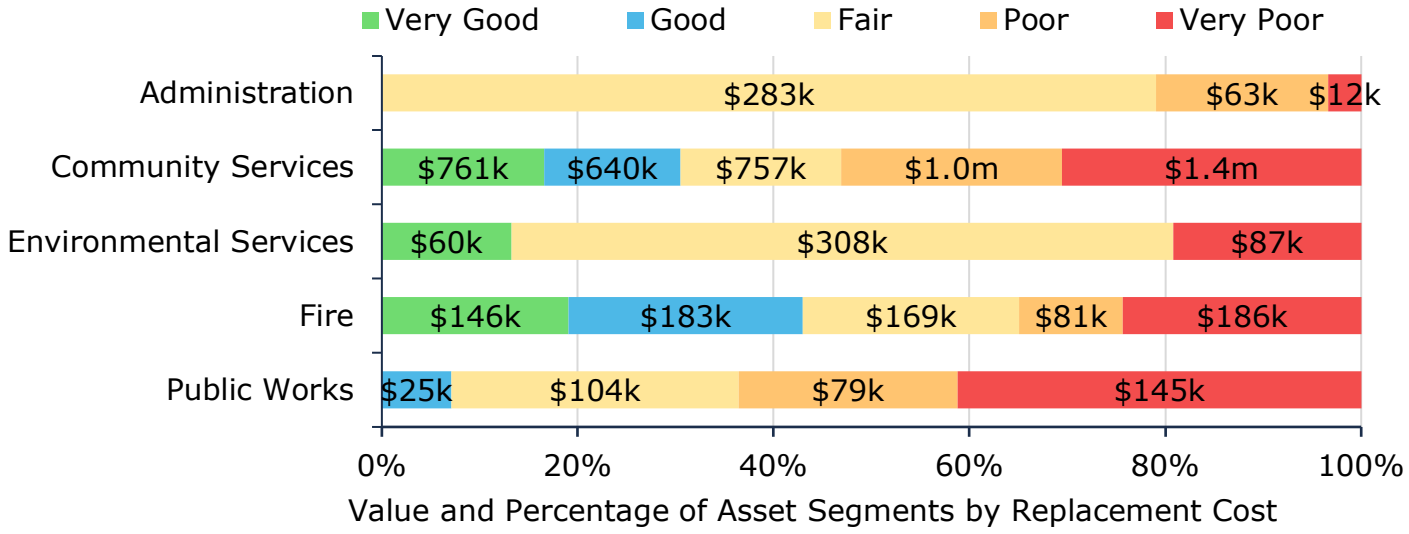


Figure 81 Asset Condition: Machinery & Equipment by Segment

13.3 Age Profile

An asset's age profile comprises two key values: estimated useful life (EUL), or design life; and the percentage of EUL consumed. The EUL is the serviceable lifespan of an asset during which it can continue to fulfil its intended purpose and provide value to users, safely and efficiently. As assets age, their performance diminishes, often more rapidly as they approach the end of their design life.

In conjunction with condition data, an asset's age profile provides a more complete summary of the state of infrastructure. It can help identify assets that may be candidates for further review through condition assessment programs; inform the selection of optimal lifecycle strategies; and improve planning for potential replacement spikes.

Figure 82 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

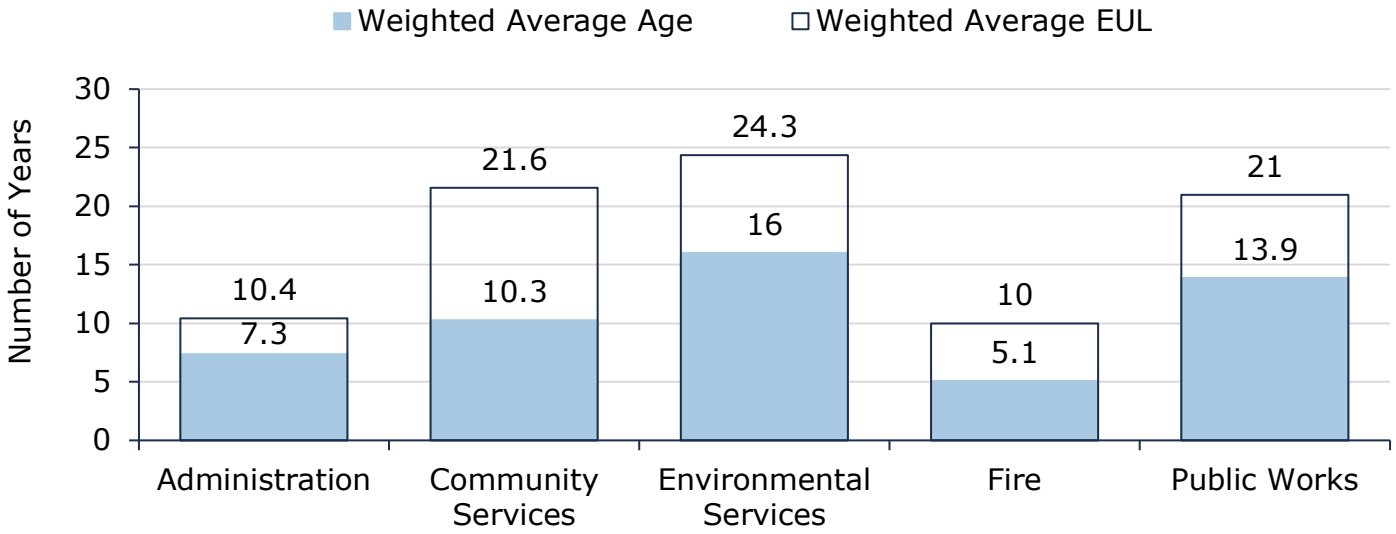


Figure 82 Estimated Useful Life vs. Asset Age: Machinery & Equipment

Age analysis reveals that, on average, most machinery and equipment assets are in the early or mid-stages of their expected lives.

13.4 Current Approach to Lifecycle Management

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Oil changes and routine maintenance is completed as per manufacturers' recommendations.
	All other maintenance activities are completed on a reactive basis when operational issues are identified (e.g., mechanical breakdown, deficiencies identified during inspections)
Replacement	Without the availability of up-to-date condition assessment information, replacement activities are purely reactive in nature.
Inspections	Certain assets (such as safety devices) must adhere to regulated inspection intervals. Other assets are inspected by staff prior to use.

Table 71 Lifecycle Management Strategy: Machinery & Equipment

13.5 Forecasted Long-Term Replacement Needs

Figure 83 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's machinery and equipment portfolio. This analysis was run until 2088 to capture at least one iteration of replacement for the longest-lived asset in Citywide Assets, the Town's primary asset management system and asset register. The Town's average annual requirements (red dotted line) total $532,000 for all machinery and equipment. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Replacement needs are forecasted to remain relatively consistent over the 65-year projection period. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

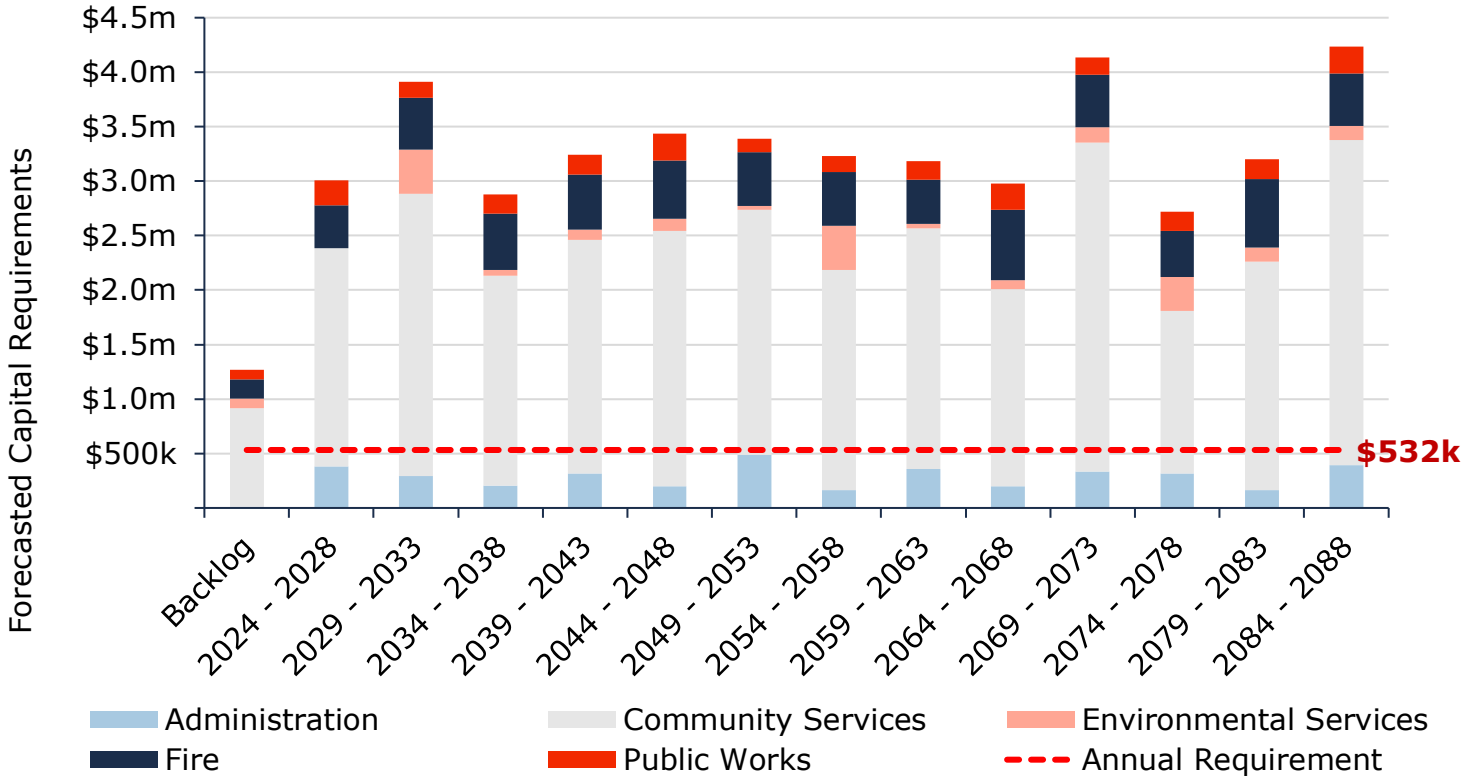


Figure 83 Forecasted Capital Replacement Needs: Machinery & Equipment 2024-2088

Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. In addition, a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

A summary of the 10-year replacement forecast can be found in Appendix B – 10-Year Capital Requirements.

13.6 Risk Analysis

The risk matrix below is generated using available asset data, including condition and replacement costs. The risk ratings for assets without useful attribute data were calculated using only condition, service life remaining, and their replacement costs.

The matrix stratifies assets based on their individual probability and consequence of failure, each scored from 1 to 5. Their product generates a risk index ranging from 1-25. Assets with the highest criticality and likelihood of failure receive a risk rating of 25; those with lowest probability of failure and lowest criticality carry a risk rating of 1. As new data and information is gathered, the Town may consider integrating relevant information that improves confidence in the criteria used to assess asset risk and criticality.

These risk models have been built into the Town's Asset Management Database (Citywide Assets). See *Risk & Criticality* section for further details on approach used to determine asset risk ratings and classifications.

1 - 4 Very Low $867,995 (13%)	5 - 7 Low $1,139,025 (17%)	8 - 9 Moderate $1,248,369 (19%)	10 - 14 High $1,171,671 (18%)	15 - 25 Very High $2,102,878 (32%)

Figure 84 Risk Matrix: Machinery & Equipment

13.7 Current Levels of Service

The tables that follow summarize the Town's current levels of service. There are no specifically prescribed KPIs under Ontario Regulation 588/17 for non-core assets, therefore the KPIs below represent performance measures that the Town has selected for this AMP.

13.7.1 Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description of the types of equipment that the municipality operates.	Community services is supported by equipment such as skate sharpeners, player benches, golf carts, and tables/chairs. All departments are supported by IT equipment such as laptops, computer monitors, and projectors. The fire department is supported by equipment such as pagers, hoses, helmets, boots, and bunker gear. Public works is supported by equipment such as mowers, air compressors, and trailers.
Safe & Reliable	Municipal machinery and equipment are regularly inspected and maintained to ensure safe use for residents	Regulations regarding inspections and maintenance are regularly followed for service and safety devices and equipment. Ensuring safe and reliable access to staff and residents.

Table 72 Community Levels of Service: Machinery & Equipment

13.7.2 Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Quality	Average condition of equipment	40%
Performance	Target vs. Actual Capital reinvestment rate	8.2% vs. 0.7%

Table 73 Technical Levels of Service: Machinery & Equipment

13.8 Proposed Levels of Service

As per O. Reg. 588/17, by July 1, 2025, municipalities are required to consider proposed levels of service (PLOS), discuss the associated risks and long-term sustainability of these service levels, and explain the Town's ability to afford the PLOS.

The below tables and graphs explain the proposed levels of service scenarios that were analyzed for machinery and equipment. Further PLOS analysis at the portfolio level can be found in Section *4. Proposed Levels of Service Analysis.*

13.8.1 PLOS Scenarios Analyzed

Scenario	Description
Scenario 1: Achieving 50% Funding in 20 Years	This scenario assumes gradual tax increases of ~1.1%/year, stabilizing at 50% funding across all tax-funded asset categories in 20 years. ♦ Equipment capital funding gradually increases from $42k/year to $266k/year over a span of 20 years
Scenario 2: Achieving 75% Funding in 20 Years	This scenario assumes gradual tax increases of ~2.1%/year, stabilizing at 75% funding across all tax-funded asset categories in 20 years. ♦ Equipment capital funding gradually increases from $42k/year to $399k/year over a span of 20 years
Scenario 3: Achieving Full Funding in 20 Years	This scenario assumes gradual tax increases of ~2.9%/year, stabilizing at 100% funding across all tax-funded asset categories in 20 years. ♦ Equipment capital funding gradually increases from $42k/year to $532k/year over a span of 20 years

Table 74 Machinery & Equipment PLOS Scenario Descriptions

13.8.2 PLOS Analysis Results

Scenario	Technical LOS Outcomes	Initial Value (2025)	15 Year Projection (2039)	30 Year Projection (2054)	Comments
Scenario 1 (50%)	Average Condition	31%	20%	25%	
	Average Asset Risk	12.5	13.4	13.1	
	Average Annual Investment		$266,000		Increase taxes by ~1.1% per year for 20 years
	Average Capital re-investment rate		4.1%		
Scenario 2 (75%)	Average Condition	31%	25%	40%	
	Average Asset Risk	12.5	12.9	11.0	
	Average Annual Investment		$399,000		Increase taxes by ~2.1% per year for 20 years
	Average Capital re-investment rate		6.1%		
Scenario 3 (100%)	Average Condition	31%	29%	47%	
	Average Asset Risk	12.5	12.1	10.3	
	Average Annual Investment		$532,000		Increase taxes by ~2.9% per year for 20 years
	Average Capital re-investment rate		8.1%		

Table 75 Machinery & Equipment PLOS Scenario Analysis

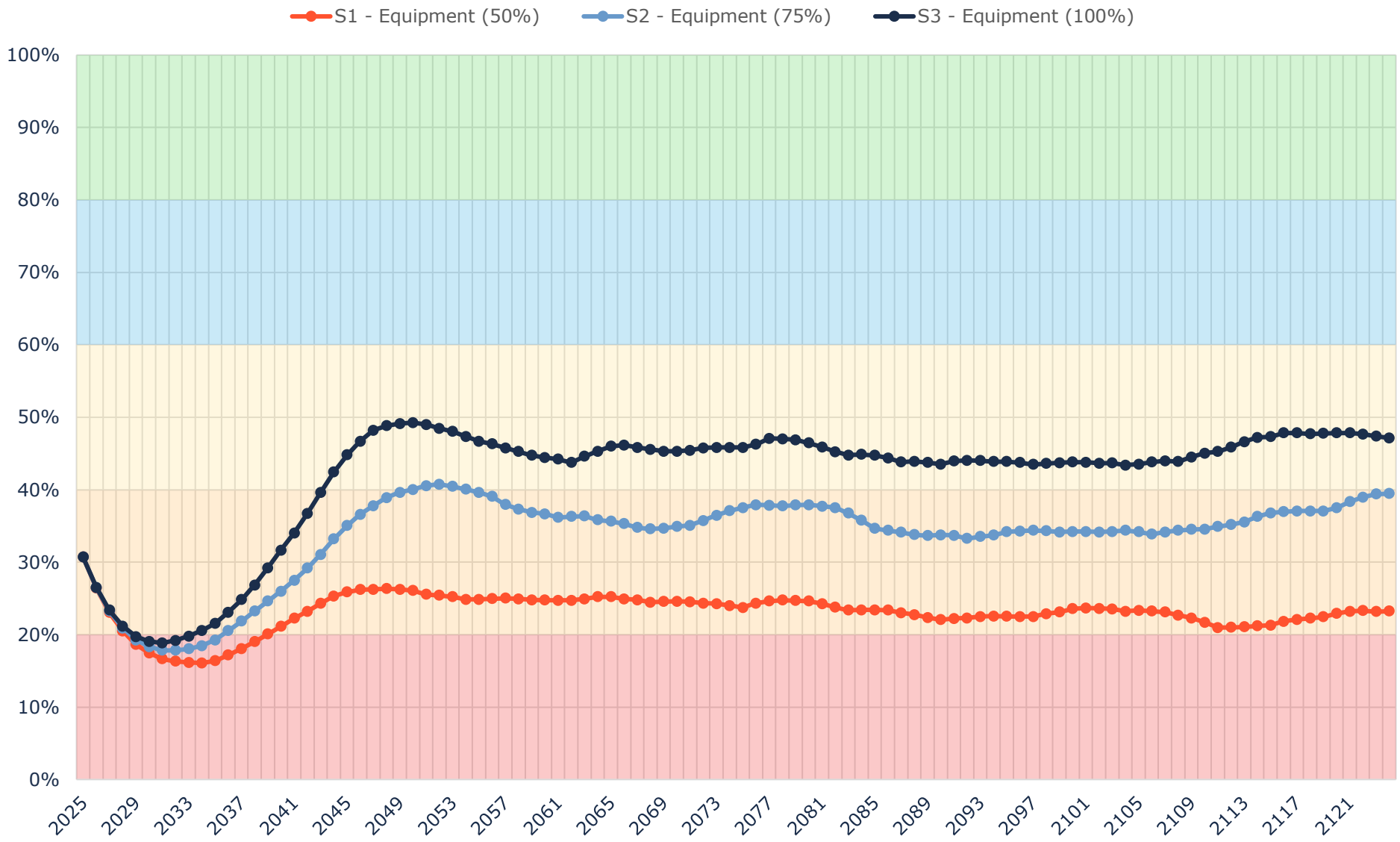


Figure 85 Machinery & Equipment PLOS Scenario Condition Results

13.8.3 10-Year PLOS Financial Projections

As outlined in Section *4. Proposed Levels of Service Analysis*, the Town of Essex selected Scenario 2 as their preferred proposed levels of service. The main objective is to increase spending gradually to reach a more sustainable funding level to manage the Town's current inventory of assets. The following table outlines the funding trajectory over the next 10 years for machinery and equipment if the financial strategy for Scenario 2 is implemented.

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Targeted Capital Spending	**$399k**	**$399k**	**$399k**	**$399k**	**$399k**	**$399k**	**$399k**	**$399k**	**$399k**	**$399k**
Projected Capital Spending	$55k	$68k	$82k	$96k	$121k	$143k	$165k	$180k	$195k	$215k
Funding Deficit	$344k	$331k	$317k	$303k	$278k	$256k	$234k	$219k	$204k	$184k
Target Reinvestment Rate	**6.1%**	**6.1%**	**6.1%**	**6.1%**	**6.1%**	**6.1%**	**6.1%**	**6.1%**	**6.1%**	**6.1%**
Projected Reinvestment Rate	0.8%	1.0%	1.3%	1.5%	1.9%	2.2%	2.5%	2.8%	3.0%	3.3%

Table 76 Machinery & Equipment 10-Year PLOS Financial Projections

Strategies

14. Growth

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Town to plan for new infrastructure more effectively, and the upgrade or disposal of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

14.1 Growth Assumptions

The Town of Essex, located within Essex County, has a population of 21,216 according to the Canadian 2021 census. However, the Town has been experiencing steady growth since 2011. Increasing by nearly 4% in the last 8 years compared to the provincial increase of 5.8% since 2016. The majority of the population falls within the working age of 15 to 64 years old, increasing the demand for housing, employment, and services.

The demand for new housing has been increasing steadily since 2001 with a near 4% increase in the last 8 years, aligning with the population increase. In 2022 alone, the Town issued 141 new residential building permits for a total of $146 million in residential construction value.

The 2023-2027 Strategic Action Plan published by the Town of Essex, outlines the residents desire for:

- Designing for future transportation network requirements
- New water and wastewater plans to accommodate growth
- Reviewing land use to optimize future employment and investments
- Attracting new businesses, supporting local businesses, and job creation
- Promoting agricultural tourism, and attracting tournaments and events
- Reviewing commercial opportunities to develop more hotel and accommodation facilities
- Reviewing land zoning to encourage mixed commercial/residential development

14.2 Impact of Growth on Lifecycle Activities

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Town's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Town will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

It is strongly recommended to commission a dedicated infrastructure growth study that encompasses all asset categories to review capacity, funding models, and future levels of service regarding impacts of growth on existing infrastructure.

15. Financial Strategy

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

This report develops such a financial plan by presenting several scenarios for consideration and culminating with final recommendations. As outlined below, the scenarios presented model different combinations of the following components:

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels as indicated in Section *4. Proposed Levels of Service Analysis*
    d. Requirements of anticipated growth (none identified for this plan)
2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Debt
    d. Development charges
3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods
4. Use of Senior Government Funds:
    a. Canada Community-Building Fund (CCBF)
    b. Annual grants

Note: Periodic grants are normally not included due to Provincial requirements for firm commitments. 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 the net of such grant being received.

If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Township'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.

15.1 Annual Requirements & Capital Funding

15.1.1 Annual Requirements

The annual requirements represent the amount the Town should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the Town would need to allocate approximately $28.3 million annually to address all capital requirements for the assets included in this AMP. As discussed in Section 4. Proposed Levels of Service Analysis, the Town of Essex has selected a funding scenario where the target investment is 75% of 'full funding', which requires an annual capital investment of $21.2 million[15].

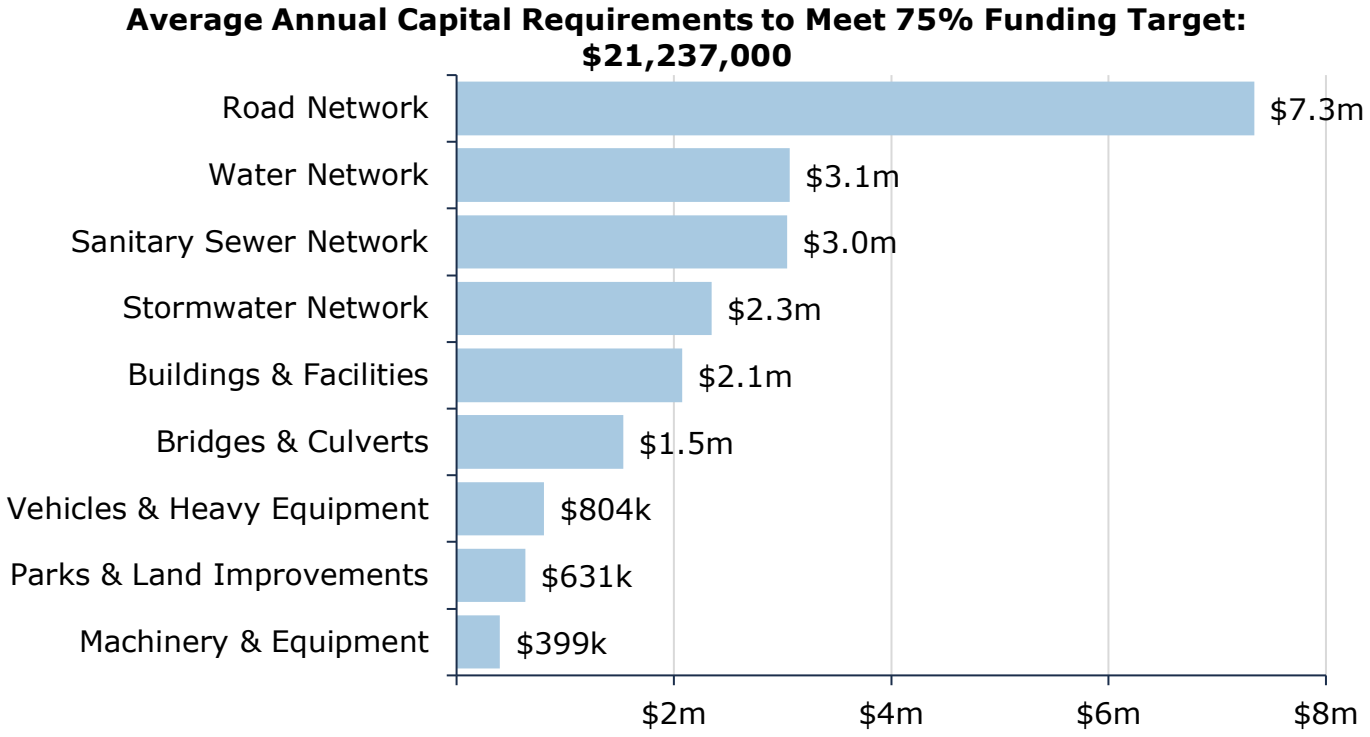


Figure 86 Annual Capital Funding Requirements by Asset Category

For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

However, for the Road Network lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Town's roads. The development of these strategies allows for a comparison of potential cost avoidance if the

[15] This calculated annual requirement utilizes the reduced cost of implementing mid-lifecycle interventions for the road network.

strategies were to be implemented. The following table compares two scenarios for the Road Network:

1. **Replacement Only 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 strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network Lifecycle – Full Funding	$14,492,000	$9,784,000	$4,708,000
Road Network Lifecycle – Proposed LOS (75% Funding)	$10,869,000	$7,338,000	$3,531,000

Table 77 Lifecycle Strategies Annual Savings

The implementation of a proactive lifecycle strategy for roads leads to potential annual cost avoidance of $4.7 million in ideal funding circumstances. In the proposed 75% funding modelling, this cost avoidance is reduced to $3.5 million. This represents an overall reduction of the annual requirements of 32%. As the lifecycle strategy scenario represents the lowest cost option available to the Town, we have used these annual requirements in the development of the financial strategy.

15.1.2 Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Town is committing approximately $6.9 million towards asset management related capital projects per year. Given the proposed LOS of 75% funding requiring an annual capital investment of $21.2 million, there is currently a funding gap of $14.3 million annually.

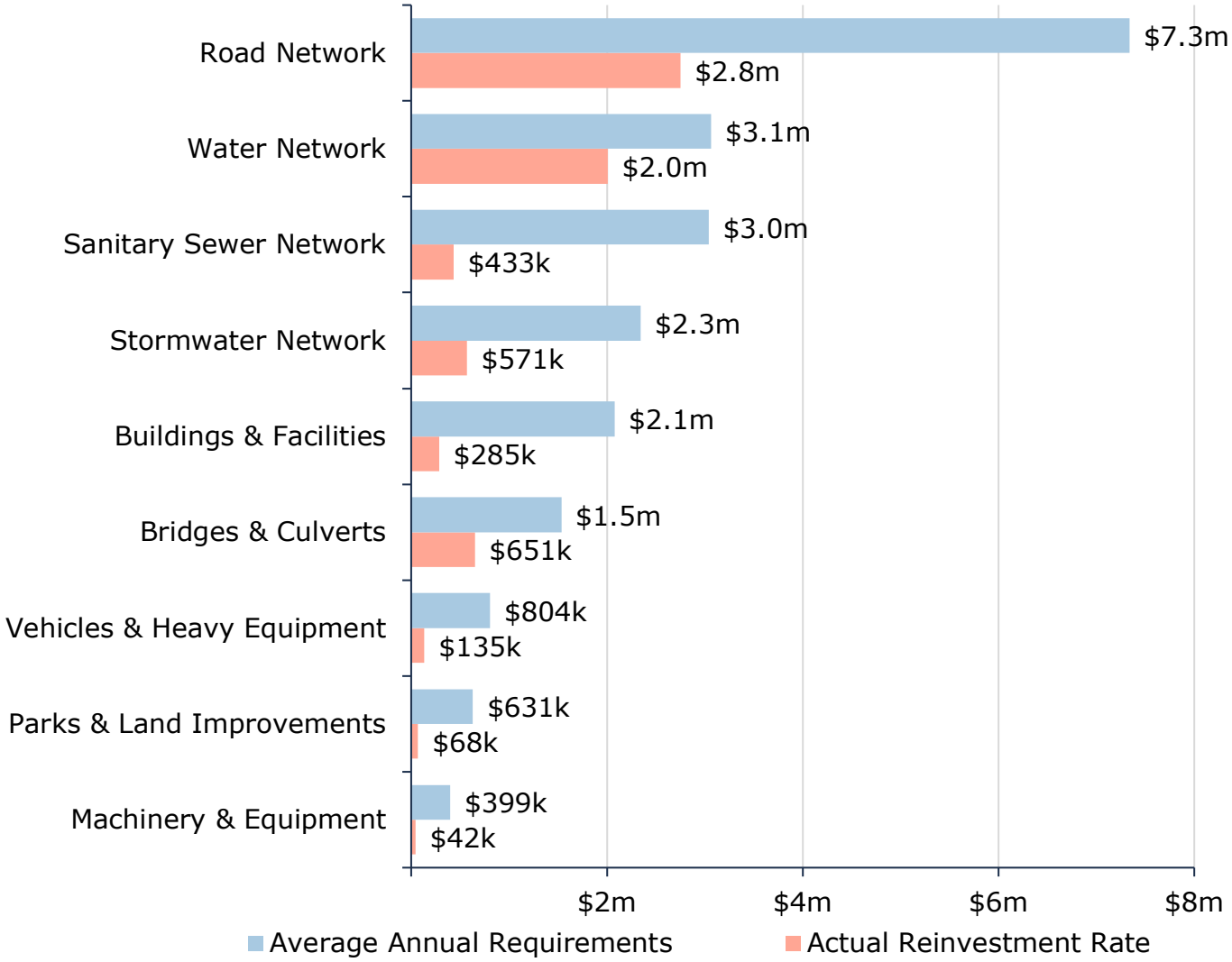


Figure 87 75% Annual Requirements vs. Capital Funding Available

15.2 Funding Objective

We have developed a scenario that would enable Town of Essex to achieve 75% of full funding within 20 years for the following assets:

1. **Tax Funded Assets:** Road Network, Stormwater Network, Bridges & Culverts, Buildings & Facilities, Machinery & Equipment, Parks & Land Improvements, Vehicles & Heavy Equipment

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

For each scenario developed we have included strategies, where applicable, regarding the use of cost containment and funding opportunities.

15.3 Financial Profile: Tax Funded Assets

15.3.1 Current Funding Position

The following tables show, by asset category, Essex's average annual asset investment requirements, current funding positions, and funding increases required to achieve the proposed level of service of 75% funding for assets funded by taxes.

Asset Category	75% Avg. Annual Require-ment	Annual Funding Available				Annual Deficit
		Taxes	CCBF	OCIF	Total Available	
Road Network	7,338,362[16]	797,835	844,640	1,110,857	2,753,332	4,585,030
Bridges & Culverts	1,534,009	162,464	211,160	277,714	651,338	882,671
Stormwater Network	2,345,909	570,659	0	0	570,659	1,775,250
Buildings & Facilities	2,078,419	284,854	0	0	284,854	1,793,565
Parks & Land Improve-ments	630,900	68,068	0	0	68,068	562,833
Vehicles & Heavy Equipment	804,455	135,480	0	0	135,480	668,974
Machinery & Equipment	399,047	42,262	0	0	42,262	356,784
Total	**15,131,101**	**2,061,622**	**1,055,800**	**1,388,571**	**4,505,993**	**10,625,108**

Table 78 Annual Available Funding for Tax Funded Assets[17]

The average annual investment requirement for the above categories is $15.1 million to meet the 75% funding target. Annual revenue currently allocated to these assets for capital purposes is $4.5 million leaving an annual deficit of $10.6 million. Put differently, these infrastructure categories are currently funded at 22% of their long-term/ideal requirements, while targeting 75% within 20 years.

[16] This calculated annual requirement utilizes the reduced cost of implementing mid-lifecycle interventions for the road network.
[17] Historical funding allocations are based on a combination of year-end 2023 data and budget 2024 data. These allocations may look different from present funding allocations, including the addition of supplementary levies.

15.3.2 Proposed LOS Funding Requirements

In 2024, the Town of Essex had budgeted annual tax revenues of approximately $18.3 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, increasing funding to a target of 75% would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding	Tax Change Required for 75% Funding (Proposed LOS)
Road Network	38.4%	25.0%
Bridges & Culverts	7.6%	4.8%
Stormwater Network	14.0%	9.7%
Buildings & Facilities	13.6%	9.8%
Parks & Land Improvements	4.2%	3.1%
Vehicles & Heavy Equipment	5.1%	3.7%
Machinery & Equipment	2.7%	1.9%
Total	**85.6%**	**58.0%**

Table 79 Tax Increase Requirements for Full Funding vs. PLOS

The following changes in costs and/or revenues over the next number of years should also be considered in the financial strategy:

a) Essex took on an additional $5.6 million in debt in 2025 for the Essex Streetscape project. This will result in annual payments of $511,000. Overall, Essex's total annual debt payments for the above asset categories will increase by $430,000 in 2025.
b) Essex's overall debt payments for all above asset categories will decrease $1.8 million by 2039, and decrease a further $773,000 by 2044.

Our scenario modeling include capturing the above changes and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents several options:

	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	10,625,108	10,625,108	10,625,108	10,625,108
50% of Change in Debt Costs[18]	-93,064	-681,597	-875,469	-1,261,966
Resulting Infrastructure Deficit:	**10,532,045**	**9,943,511**	**9,749,639**	**9,363,142**
Tax Increase Required	57.5%	54.3%	53.2%	51.1%
Annually:	**9.5%**	**4.4%**	**2.9%**	**2.1%**

Table 80 Tax Increase Options 5-20 Years

[18] Town staff indicated that Council would prefer to have flexibility to use debt in the future and therefore wanted only 50% of completed debt payments to be reallocated towards reducing future tax/rate increases.

15.3.3 Financial Strategy Recommendations

Considering all the above information, we recommend the 20-year option. This involves 75% of full funding being achieved over 20 years by:

a) when realized, reallocating 50% of the debt cost reductions ($1.3 million) to the infrastructure deficit as outlined above.
b) increasing tax revenues by 2.1% each year for the next 20 years solely for the purpose of phasing in the target of 75% full funding to the asset categories covered in this section of the AMP.
c) allocating the current CCBF and OCIF revenue as outlined previously.
d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. This plan only accounts for capital investments in capital infrastructure related to the asset management Plan. It does not include any operational costs or address any additional staffing needs to meet the service levels outlined in the plan.
2. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable, since this funding is a multi-year commitment[19].
3. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves 75% of recommended funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $19.1 million for the Road Network, $21.0 million for the Stormwater Network, $43.1 million for Buildings & Facilities, $1.1 million for Parks & Land Improvements, $1.3 million for Machinery & Equipment, and $4.8 million for Vehicles & Heavy Equipment.

Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

[19] The Town should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. Depending on the outcome of this review, there may be changes that impact its availability.

15.4 Financial Profile: Rate Funded Assets

15.4.1 Current Funding Position

The following tables show, by asset category, Essex's average annual asset investment requirements, current funding positions, and funding increases required to achieve the proposed level of service of 75% funding for assets funded by rates.

Asset Category	75% Avg. Annual Require-ment	Annual Funding Available			Annual Deficit
		Rates	To Operating	Total Available	
Water Network	3,064,924	3,821,100	-1,810,656	2,010,444	1,054,480
Sanitary Sewer Network	3,041,370	3,320,500	-2,887,616	432,884	2,608,486
Total	**6,106,293**	**7,141,600**	**-4,698,272**	**2,443,328**	**3,662,965**

Table 81 Annual Available Funding for Rate Funded Assets[20]

The average annual investment requirement for the above categories is $6.1 million to meet the 75% funding target. Annual revenues currently allocated to these assets for capital purposes is $2.4 million leaving an annual deficit of approximately $3.7 million. Put differently, these infrastructure categories are currently funded at 30% of their long-term/ideal requirements, while targeting 75% within 20 years.

15.4.2 Proposed LOS Funding Requirements

In 2024, Essex budgeted annual water revenues of $3.8 million and annual sanitary revenues of $3.3 million. As illustrated in the table below, without consideration of any other sources of revenue, increasing funding to a target of 75% would require the following changes over time:

Asset Category	Rate Change Required for Full Funding	Rate Change Required for 75% Funding (PLOS)
Water Network	54.3%	27.6%
Sanitary Sewer Network	109.1%	78.6%

Table 82 Rate Increase Requirements for Full Funding vs. PLOS

In the following tables, we have expanded the above scenario to present multiple options. Due to the significant increases required, we have provided phase-in options of up to 20 years:

[20] Historical funding allocations are based on budget 2024 data. These allocations may look different from present funding allocations, including the addition of supplementary levies.

	Water Network			
	5 Years	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	1,054,480	1,054,480	1,054,480	1,054,480
Decrease in Debt Payments	0	0	0	0
Resulting Infrastructure Deficit	**1,054,480**	**1,054,480**	**1,054,480**	**1,054,480**
Rate Increase Required	27.6%	27.6%	27.6%	27.6%
Annually:	**5.0%**	**2.5%**	**1.7%**	**1.3%**

Table 83 Water Rate Increase Options 5-20 Years

	Sanitary Sewer Network			
	5 Years	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	2,608,486	2,608,486	2,608,486	2,608,486
50% of Change in Debt Costs[21]	-270,479	-270,479	-270,479	-270,479
Resulting Infrastructure Deficit	**2,338,006**	**2,338,006**	**2,338,006**	**2,338,006**
Rate Increase Required	70.4%	70.4%	70.4%	70.4%
Annually:	**11.3%**	**5.5%**	**3.7%**	**2.8%**

Table 84 Sanitary Rate Increase Options 5-20 Years

15.4.3 Financial Strategy Recommendations

Considering all of the above information, we recommend the 20-year option. This involves 75% of full funding being achieved over 20 years by:

a) when realized, reallocating 50% of the debt cost reductions ($270,000) for sanitary services to the applicable infrastructure deficit.
b) increasing rate revenues by 1.3% for water services and 2.8% for sanitary sewer services each year for the next 20 years solely for the purpose of phasing in the target of 75% of full funding to the asset categories covered in this section of the AMP.
c) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

[21] Town staff indicated that Council would prefer to have flexibility to use debt in the future and therefore wanted only 50% of completed debt payments to be reallocated towards reducing future tax/rate increases.

Notes:

1. This plan only accounts for capital investments in capital infrastructure related to the asset management Plan. It does not include any operational costs or address any additional staffing needs to meet the service levels outlined in the plan.
2. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
3. We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.
4. Any increase in rates required for operations would be in addition to the above recommendations.

Although this option achieves 75% of recommended funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $489,000 for the Water Network and $10.5 million for the Sanitary Sewer Network.

Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

15.5 Use of Debt

Debt can be strategically utilized as a funding source with in the long-term financial plan. The benefits of leveraging debt for infrastructure planning include:

a) the ability to stabilize tax & user rates when dealing with variable and sometimes uncontrollable factors
b) equitable distribution of the cost/benefits of infrastructure over its useful life
c) a secure source of funding
d) flexibility in cash flow management

Debt management policies and procedures with limitations and monitoring practices should be considered when reviewing debt as a funding option. In efforts to mitigate increasing commodity prices and inflation, interest rates have been rising. Sustainable funding models that include debt need to incorporate the now current realized risk of rising interest rates. The following graph shows the historical changes to the lending rates:

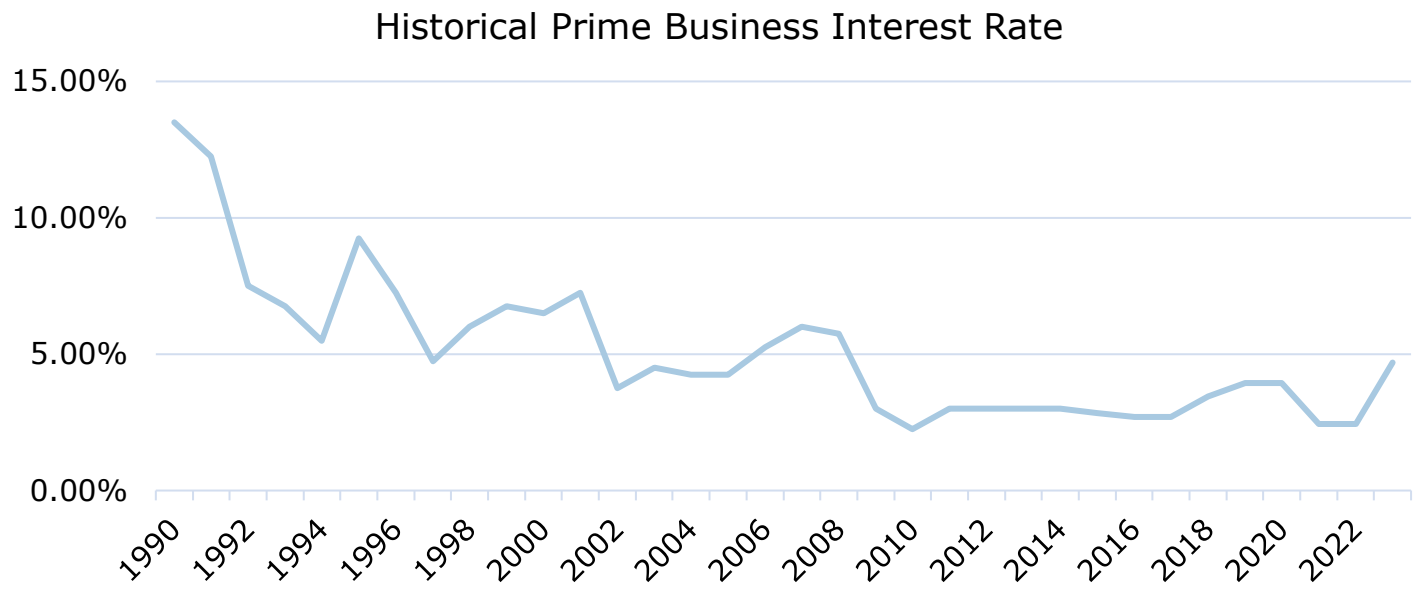


Figure 88 Historical Prime Rate

A change in 15-year rates from 5% to 7% would change the premium from 45% to 65%. Such a change would have a significant impact on a financial plan.

The following tables outline how Essex has historically used debt for investing in the asset categories as listed. As of year-end 2023, there is currently $17.6 million of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $2.8 million, well within its provincially prescribed maximum of $8.1 million.

Asset Category	Current Debt Outstanding (Dec 2024)	Use of Debt in the Last Five Years				
		2020	2021	2022	2023	2024
Road Network	2,329,244	0	0	2,291,500	0	0
Bridges & Culverts	0	0	0	0	0	0
Stormwater Network	2,154,008	0	0	0	2,209,578	0
Buildings & Facilities	9,695,820	0	3,160,705	0	0	0
Parks & Land Improvements	362,236	0	0	0	0	0
Vehicles & Heavy Equipment	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Total Tax Funded	**14,541,308**	**0**	**3,160,705**	**2,291,500**	**2,209,578**	**0**
Water Network	0	0	0	0	0	0
Sanitary Sewer Network	667,496	0	0	0	0	0
Total Rate Funded	**667,496**	**0**	**0**	**0**	**0**	**0**

Table 85 Essex Use of Debt 2020-2024[22]

[22] Debt in this table only reflects debt incurred in relation to assets included within this AMP. Any debt related to development, operational costs, or land are excluded from this summary. It is expected that this debt summary will not align with the municipal financial statements, as those statements include all debt.

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2024	2025	2026	2027	2028	2029	2034
Road Network	362,300	919,170	912,677	906,185	899,870	773,184	740,741
Bridges & Culverts	0	0	0	0	0	0	0
Stormwater Network	322,273	322,273	322,273	322,273	322,273	279,608	0
Buildings & Facilities	1,700,240	1,639,204	1,639,204	1,639,204	1,639,204	1,285,013	419,998
Parks & Land Improvements	126,644	126,644	126,644	126,644	126,644	0	0
Vehicles & Heavy Equipment	12,475	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0	0
Total Tax Funded	**2,323,932**	**3,007,291**	**3,000,798**	**2,994,306**	**2,987,991**	**2,337,805**	**1,160,739**
Water Network	0	0	0	0	0	0	0
Sanitary Sewer Network	540,958	409,394	277,830	0	0	0	0
Total Rate Funded	**540,958**	**409,394**	**277,830**	**0**	**0**	**0**	**0**

Table 86 Essex Principal and Interest Payments

The revenue options outlined in this plan allow the Town of Essex to fully fund its long-term infrastructure requirements without further use of debt.

15.6 Use of Reserves

15.6.1 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, the table below outlines the details of the reserves currently available to Essex.

Asset Category	Balance at December 31, 2023[23]
Road Network	$8,477,621
Bridges & Culverts	$1,869,191
Stormwater Network	$3,023,000
Buildings & Facilities	$1,730,148
Parks & Land Improvements	$525,183
Vehicles & Heavy Equipment	$669,656
Machinery & Equipment	$332,180
Total Tax Funded:	**$16,626,980**
Water Network	$24,372,778
Sanitary Sewer Network	$7,131,523
Total Rate Funded:	**$31,504,301**

Table 87 Essex Reserve Balances[24]

There is considerable debate in the municipal sector as to the appropriate level of reserves that a Town should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should take into account 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.

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Essex's 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.

[23] Reserve allocations to each asset category are estimated based on information provided by Essex staff. Reserve structure includes AMP Reserve, CCBF Reserve, and OCIF Reserve. Water and Sanitary Reserve amounts include both capital replacement funding as well as capital lifecycle event funding, as per the Town's 2024 Water and Wastewater Rate Study.
[24] Reserves in this table only reflect funds in reserve in relation to assets included within this AMP. Any reserves related to development, operational costs, or land are excluded from this summary. It is expected that this summary will not align with the municipal financial statements, as those statements include all reserves.

16. Recommendations & Key Considerations

16.1 Financial Strategies

1. Review the feasibility of adopting a full-funding scenario to achieve 75% of average annual funding requirement for the asset categories analyzed. This includes:
    a. Increasing taxes by 2.1% per year over a period of 20 years;
    b. Increasing water rates by 1.3% per year over a period of 20 years; and
    c. Increasing sanitary rates by 2.8% per year over a period of 20 years.

2. Continued allocation of OCIF and CCBF funding as previously outlined.

3. Reallocation of debt payments towards capital projects once debt is paid off.

4. Increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

5. Continue to apply for project specific grant funding to supplement sustainable funding sources.

16.2 Asset Data

1. Development of data governance policies and procedures to ensure year-end processes are followed. There is currently significant variation within the asset inventory as to how asset data is reported.

2. Data clean-up of previous incorrect data entries and outdated data including (but not limited to):
    a. Disposal of assets which are no longer active, have been replaced, or have been sold.
    b. Improvement of asset descriptions
    c. Inclusion of accurate quantities (many assets have a quantity of 0)
    d. Consolidation or clarification of asset additions/rehabilitations that have been added as new asset records (specifically in the facilities category)

3. Consider consolidation of assets into 'pooled assets', such as pagers, bunker gear, etc.

4. Develop condition assessment strategies for key asset categories, including inspection/assessment schedules. It is worth noting that Table 6 Source of Condition Data shows that asset condition data is outdated and contributes to inaccurate capital forecasting.

5. Facility assets are managed slightly differently than other asset categories because, for the majority of facilities, the structure will last a considerable amount of time, whereas, the components within the facility will deteriorate at drastically different rates. It is recommended to consider a comprehensive inventory/componentization report in order to

accurately understand the timing of significant financial investments required for facilities in the coming decades.

6. Continuously review, refine, and calibrate lifecycle and risk profiles to better reflect actual practices and improve capital projections. In particular:
    a. the timing of various lifecycle events, the triggers for treatment, anticipated impacts of each treatment, and costs
    b. the various attributes used to estimate the likelihood and consequence of asset failures, and their respective weightings

7. Asset management planning is highly sensitive to replacement costs. Periodically update replacement costs based on recent projects, invoices, or estimates, as well as condition assessments, or any other technical reports and studies. Material and labour costs can fluctuate due to local, regional, and broader market trends, and substantially so during major world events. Accurately estimating the replacement cost of like-for-like assets can be challenging. Ideally, several recent projects over multiple years should be used. Staff judgement and historical data can help attenuate extreme and temporary fluctuations in cost estimates and keep them realistic.

8. Like replacement costs, an asset's established serviceable life can have dramatic impacts on all projections and analyses, including condition, long-range forecasting, and financial recommendations. Periodically reviewing and updating these values to better reflect in-field performance and staff judgement is recommended.

16.3 Risk & Levels of Service

1. Risk models and matrices can play an important role in identifying high-value assets, and developing an action plan which may include repair, rehabilitation, replacement, or further evaluation through condition assessments. As a result, project selection and the development of multi-year capital plans can become more strategic and objective. Initial models have been built into Citywide for all asset groups. These models reflect current data, which was limited. As the data evolves and new attribute information is obtained, these models should also be refined and updated.

2. Available data on current performance should be centralized and tracked to support any calibration of service levels, and to facilitate the on-going O. Reg. 588's annual reporting requirements.

3. Staff should monitor evolving local, regional, and environmental trends to identify factors that may shape the demand and delivery of infrastructure programs. These can include population growth, and the nature of population growth; climate change and extreme weather events; and economic conditions and the local tax base. This data can also be used to review service level targets.

4. Commission an infrastructure growth impact study to determine future infrastructure needs or adjustments to maintain suitable levels of service.

Appendices

Appendix A – Infrastructure Report Card

Asset Category	Replacement Cost	Average Condition	Financial Capacity[25]		% Funded
Road Network	**$222.1 m**	**Fair**	Annual Requirement:	$9,784,000	**28%**
			Funding Available:	$2,753,000	
			Annual Deficit:	**$7,031,000**	
Bridges & Culverts	**$96.7 m**	**Fair**	Annual Requirement:	$2,045,000	**32%**
			Funding Available:	$651,000	
			Annual Deficit:	**$1,394,000**	
Water Network	**$299.6 m**	**Very Good**	Annual Requirement:	$4,087,000	**49%**
			Funding Available:	$2,010,000	
			Annual Deficit:	**$2,076,000**	
Sanitary Sewer Network	**$380.3 m**	**Good**	Annual Requirement:	$4,055,000	**11%**
			Funding Available:	$433,000	
			Annual Deficit:	**$3,622,000**	
Stormwater Network	**$253.4 m**	**Fair**	Annual Requirement:	$3,128,000	**18%**
			Funding Available:	$571,000	
			Annual Deficit:	**$2,557,000**	
Buildings & Facilities	**$104.5 m**	**Poor**	Annual Requirement:	$2,771,000	**10%**
			Funding Available:	$285,000	
			Annual Deficit:	**$2,486,000**	
Parks & Land Improvements	**$15.9 m**	**Fair**	Annual Requirement:	$841,000	**8%**
			Funding Available:	$68,000	
			Annual Deficit:	**$773,000**	
Vehicles & Heavy Equipment	**$16.9 m**	**Fair**	Annual Requirement:	$1,073,000	**13%**
			Funding Available:	$135,000	
			Annual Deficit:	**$938,000**	
Machinery & Equipment	**$ 6.5 m**	**Fair**	Annual Requirement:	$532,000	**8%**
			Funding Available:	$42,000	
			Annual Deficit:	**$490,000**	

[25] Annual Requirement is based on ideal funding scenarios. Note that the Town has selected a proposed level of service of 75% of ideal funding levels.

Appendix B – 10-Year Capital Requirements

Capital Requirements for Current Levels of Service

The tables below summarize the projected cost of lifecycle activities (rehabilitation and replacements) that may be undertaken over the next 10 years to support current levels of service. They do not consider any proposed levels of service, or available funding, and are projected based on ideal conditions. ***Note: These projections do not consider the availability of funding.***

These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for roads. For all remaining assets, only age was used to determine forthcoming replacement needs.

The projections can be different from actual capital forecasts. Consistent data updates, particularly condition, replacement costs, and regular upkeep of lifecycle models, will improve the alignment between the system generated expenditure requirements, and the Town's capital expenditure forecasts.

Road Network

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Asphalt Roads	$9.6m	$25.5m	$5.4m	$5.9m	$1.8m	$573k	$2.0m	$161k	$0	$1.2m	$166k
Gravel Roads	$2.5m	-	-	-	-	-	-	-	-	-	-
Pedestrian Infra.	$599k	$1.5m	$181k	$67k	$206k	$270k	$0	$285k	$564k	$674k	$728k
Signalized Intersections	$1.5m	-	-	-	-	-	-	-	-	-	$8k
Streetlights & Signage	$1.5m	$11.6m	-	-	-	$25k	$9k	$36k	$9k	-	-
Surface Treated	$3.4m	$42.9m	$2.3m	$3.8m	-	$544k	$14.3m	$1.5m	$2.3m	$3.8m	-
Total	**$19.1m**	**$81.4m**	**$7.9m**	**$9.7m**	**$2.0m**	**$1.4m**	**$16.4m**	**$2.0m**	**$2.8m**	**$5.6m**	**$903k**

Table 88 System Generated 10-Year Capital Replacement Forecast: Road Network

Bridges & Culverts

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Bridges	-	$771k	$411k	$1.7m	$1.6m	-	-	-	-	$662k	-
Non-Structural Culverts	-	$210k	$262k	$275k	$345k	$458k	$260k	$1.7m	$602k	$369k	-
Structural Culverts	-	-	$126k	$108k	-	$132k	-	-	$899k	$482k	$469k
Total	-	**$981k**	**$799k**	**$2.1m**	**$1.9m**	**$590k**	**$260k**	**$1.7m**	**$1.5m**	**$1.5m**	**$469k**

Table 89 System Generated 10-Year Capital Replacement Forecast: Bridges & Culverts

Water Network

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Hydrants	-	$713k	-	-	-	-	$81k	$12k	-	$35k	$138k
Valves	$385k	$1.7m	$70k	$55k	$110k	$140k	$410k	$265k	$415k	$425k	$35k
Water Equipment	$22k	$186k	-	$37k	-	-	$10k	-	-	$23k	-
Water Facilities	$18k	$222k	-	-	-	-	-	$18k	-	-	-
Water Mains	$63k	$812k	$939k	$1.1m	$1.2m	$1.4m	$1.6m	$2.0m	-	-	$3.1m
Total	**$489k**	**$3.6m**	**$1.0m**	**$1.2m**	**$1.3m**	**$1.5m**	**$2.1m**	**$2.2m**	**$415k**	**$483k**	**$3.3m**

Table 90 System Generated 10-Year Capital Replacement Forecast: Water Network

Sanitary Sewer Network

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Lagoons	-	$15k	$106k	$14k	$11k	$11k	$12k	$2.2m	-	-	-
Sanitary Equipment	-	-	$7k	-	-	-	-	$195k	-	-	-
Sanitary Facilities	-	$162k	$1.2m	$156k	$124k	$126k	$129k	$168k	-	$55k	-
Sanitary Manholes	$10.5m	$598k	$173k	$495k	$46k	$276k	$58k	$196k	-	-	-
Sanitary Sewer Mains	-	$73k	$1.2m	$71k	$66k	$67k	$69k	$70k	-	-	-
Total	**$10.5m**	**$849k**	**$2.6m**	**$737k**	**$248k**	**$481k**	**$268k**	**$2.8m**	**-**	**$55k**	**-**

Table 91 System Generated 10-Year Capital Replacement Forecast: Sanitary Sewer Network

Stormwater Network

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Catch Basins	$17.0m	$5.6m	$1.0m	$46k	$366k	$906k	$1.5m	$376k	$463k	$1.2m	$600k
Storm Mains	-	$297k	-	-	$159k	$25.5m	-	-	-	$374k	$124k
Storm Manholes	$4.0m	$828k	$127k	-	$184k	$150k	$12k	$334k	$81k	$276k	$115k
Storm Management Ponds	-	$1.4m	-	-	$2.9m	-	-	-	-	-	-
Total	**$21.0m**	**$8.1m**	**$1.1m**	**$46k**	**$3.6m**	**$26.6m**	**$1.5m**	**$710k**	**$544k**	**$1.9m**	**$839k**

Table 92 System Generated 10-Year Capital Replacement Forecast: Stormwater Network

Buildings & Facilities

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Administration	$11.2m	-	$3k	-	-	$40k	-	$6k	-	$4k	$70k
Community Services	$25.7m	$15.6m	$2.5m	$5.4m	$44k	$416k	$9.1m	$660k	$422k	$803k	$122k
Fire	$2.1m	-	$548k	-	-	$15k	-	-	-	-	$16k
Public Works	$4.1m	-	-	-	-	-	$803k	-	-	$593k	$11k
Total	**$43.1m**	**$15.6m**	**$3.1m**	**$5.4m**	**$44k**	**$470k**	**$9.9m**	**$666k**	**$422k**	**$1.4m**	**$219k**

Table 93 System Generated 10-Year Capital Replacement Forecast: Buildings & Facilities

Note: These projections are generated in Citywide and rely on the data available in the asset register. As assessed condition data was not available for many buildings assets, age was used to determine forthcoming replacement needs. Buildings and facilities often contain thousands of assets, each with its own estimated useful life. Over time, with improved and effective componentization, the alignment between the system generated expenditure requirements, and the Town's capital expenditure forecasts will also increase.

Parks & Land Improvements

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Marina	$279k	$13k	-	-	-	-	$1k	-	-	$235k	-
Parking Lots	$112k	-	-	$2.4m	-	-	$627k	$293k	$614k	$112k	-
Parks, Sport Fields & Courts	$754k	$799k	$80k	$91k	$1.6m	$49k	$606k	$770k	$27k	$420k	$166k
Pools & Splashpads	-	-	$435k	-	-	-	-	-	-	-	-
Trails	-	-	-	-	$665k	-	-	$21k	-	-	-
Total	**$1.1m**	**$812k**	**$515k**	**$2.5m**	**$2.2m**	**$49k**	**$1.2m**	**$1.1m**	**$641k**	**$767k**	**$166k**

Table 94 System Generated 10-Year Capital Replacement Forecast: Parks & Land Improvements

Vehicles & Heavy Equipment

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Administration	$89k	-	-	-	-	-	-	$89k	-	-	-
Community Services	$354k	$481k	$119k	$148k	$42k	$184k	$196k	$127k	$296k	$501k	$295k
Environmental Services	$120k	$69k	-	$53k	-	$62k	-	$36k	$70k	$153k	-
Fire	$3.5m	$726k	-	-	-	$109k	$58k	$356k	$380k	$134k	$830k
Public Works	$761k	$250k	$588k	$99k	$52k	$978k	$116k	$1.5m	$438k	$642k	$563k
Total	**$4.8m**	**$1.5m**	**$707k**	**$300k**	**$94k**	**$1.3m**	**$370k**	**$2.1m**	**$1.2m**	**$1.4m**	**$1.7m**

Table 95 System Generated 10-Year Capital Replacement Forecast: Vehicles & Heavy Equipment

Machinery & Equipment

Segment	Back-log	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Administration	$12k	$22k	$172k	$1k	$152k	$34k	$130k	-	$1k	$32k	$132k
Community Services	$904k	$716k	$598k	$203k	$255k	$230k	$825k	$289k	$289k	$920k	$265k
Environmental Services	$87k	-	-	-	-	-	-	$311k	$16k	$79k	-
Fire	$175k	$38k	$87k	$49k	$124k	$99k	$40k	$57k	$63k	$247k	$67k
Public Works	$89k	$80k	$11k	$44k	$16k	$74k	-	$13k	-	$126k	$11k
Total	**$1.3m**	**$856k**	**$868k**	**$298k**	**$546k**	**$437k**	**$995k**	**$670k**	**$369k**	**$1.4m**	**$475k**

Table 96 System Generated 10-Year Capital Replacement Forecast: Machinery & Equipment

Capital Requirements for Proposed Levels of Service

The following capital forecasts are based on gradually increasing funding over the next 20 years to reach a target of 75% of ideal funding levels. ***Note: These projects do consider the availability of funding.***

Category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Road Network	$2.8m	$2.9m	$3.1m	$3.3m	$3.5m	$3.8m	$4.1m	$4.3m	$4.5m	$4.7m
Bridges & Culverts	$799k	$480k	$345k	$1.0m	$260k	$2.7m	$602k	$1.5m	$1.5m	$1.9m
Water Network	$8.7m	$11.8m	$11.1m	$7.3m	$11.7m	$12.0m	$6.3m	$10.0m	$13.1m	$6.1m
Sanitary Sewer Network	$2.8m	$828k	$1.2m	$1.5m	$607k	$543k	$2.3m	$2.4m	$1.6m	$1.8m
Stormwater Network	$730k	$723k	$757k	$930k	$924k	$1.0m	$1.1m	$1.3m	$1.3m	$1.4m
Buildings & Facilities	$284k	$349k	$417k	$485k	$555k	$676k	$795k	$903k	$975k	$1.1m
Parks & Land Improvements	$67k	$89k	$110k	$131k	$152k	$192k	$227k	$258k	$290k	$304k
Vehicles & Heavy Equipment	$124k	$168k	$170k	$226k	$234k	$276k	$322k	$373k	$390k	$430k
Machinery & Equipment	$42k	$55k	$68k	$82k	$96k	$120k	$143k	$165k	$180k	$195k
Total	**$16.3m**	**$17.4m**	**$17.2m**	**$15.0m**	**$17.9m**	**$21.3m**	**$15.8m**	**$21.2m**	**$23.9m**	**$17.8m**

Table 97 System Generated Proposed LOS 10-Year Capital Replacement Forecast: All Categories

Appendix C – Level of Service Maps & Photos

Road Network Map

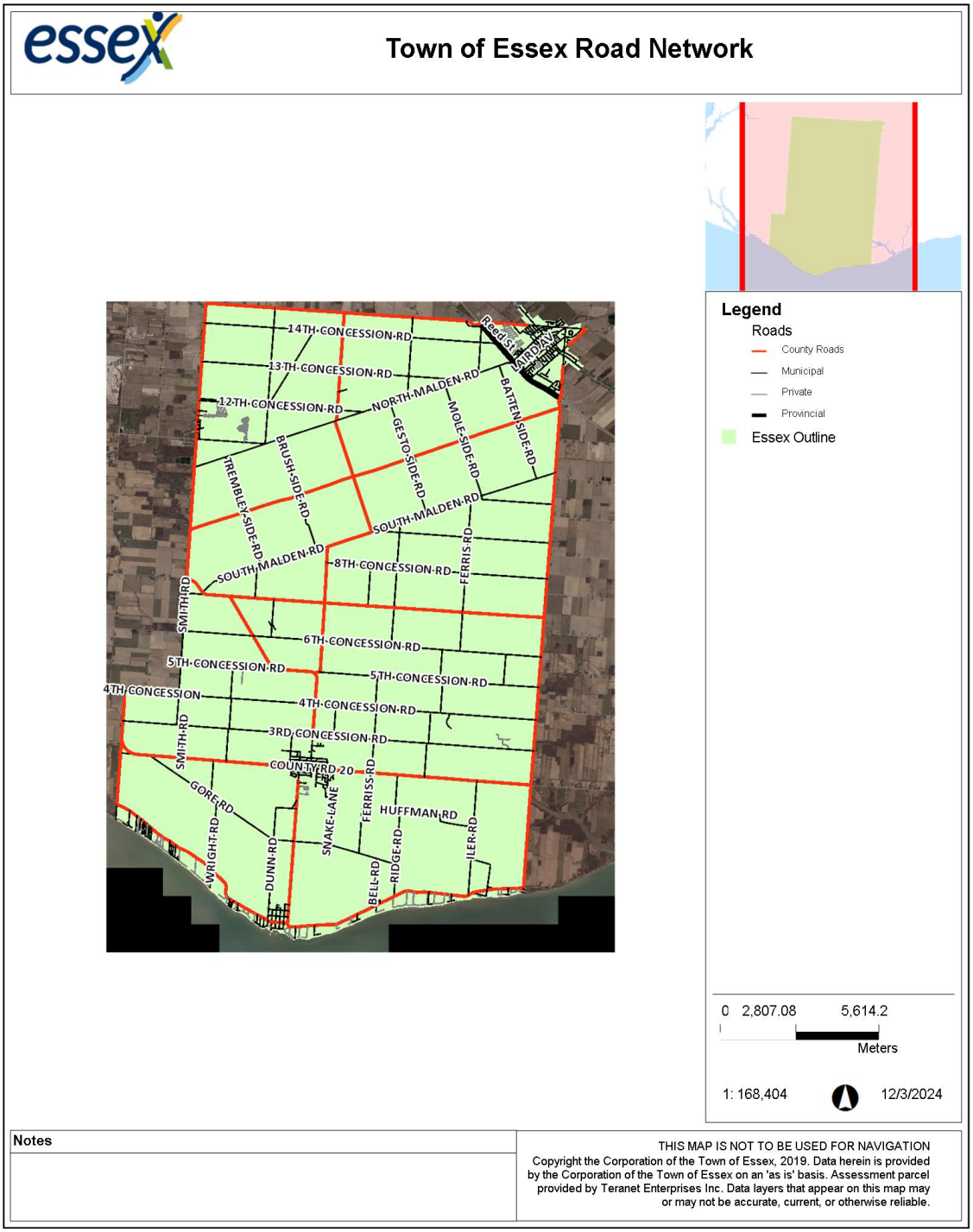


Figure 89 Road Network Map

Bridges and Culverts Map

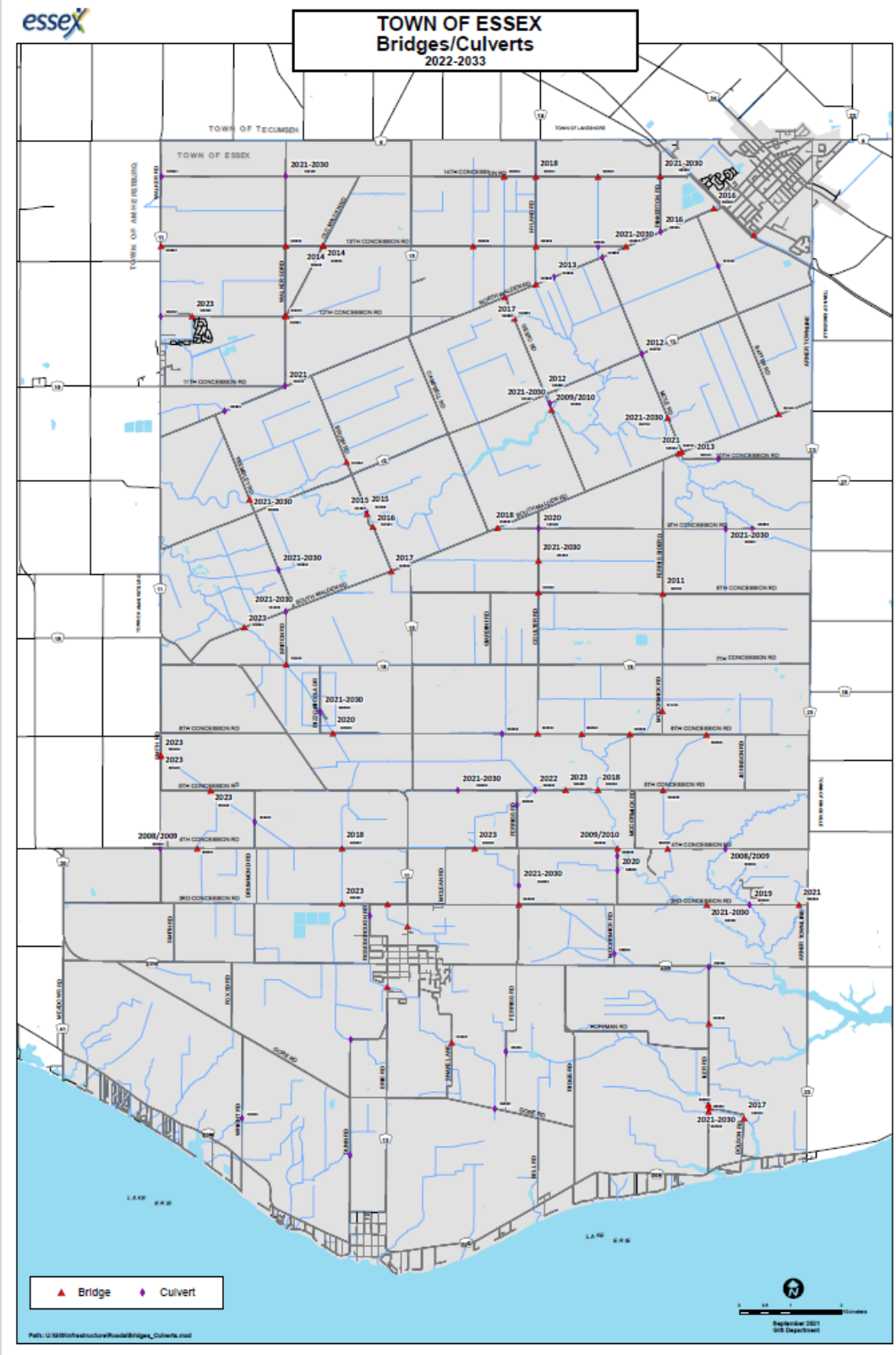


Figure 90 Bridges and Culverts Map

Water Distribution Map

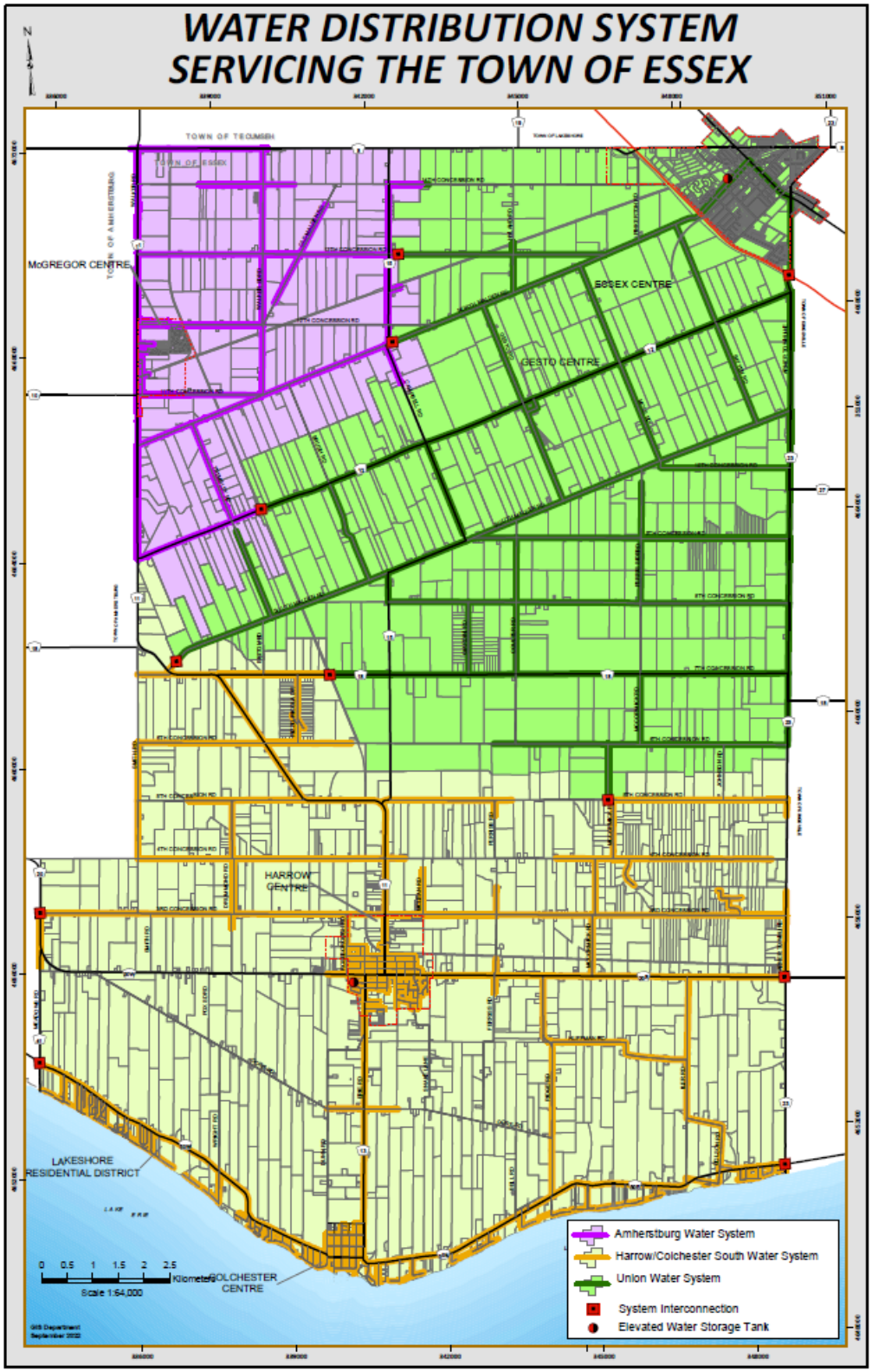


Figure 91 Water Distribution Map

Hydrant Map

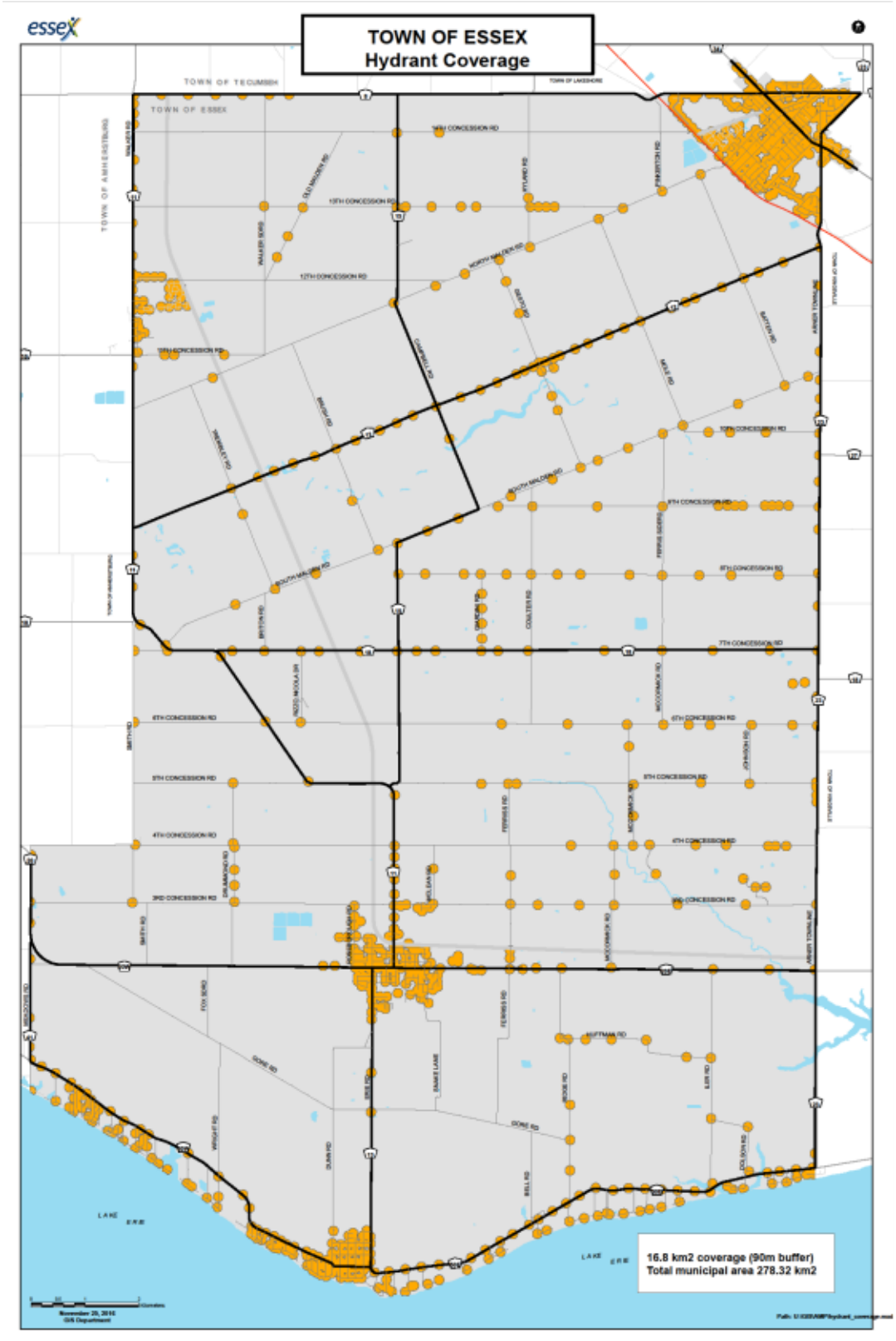


Figure 92 Hydrant Map

Sanitary Map

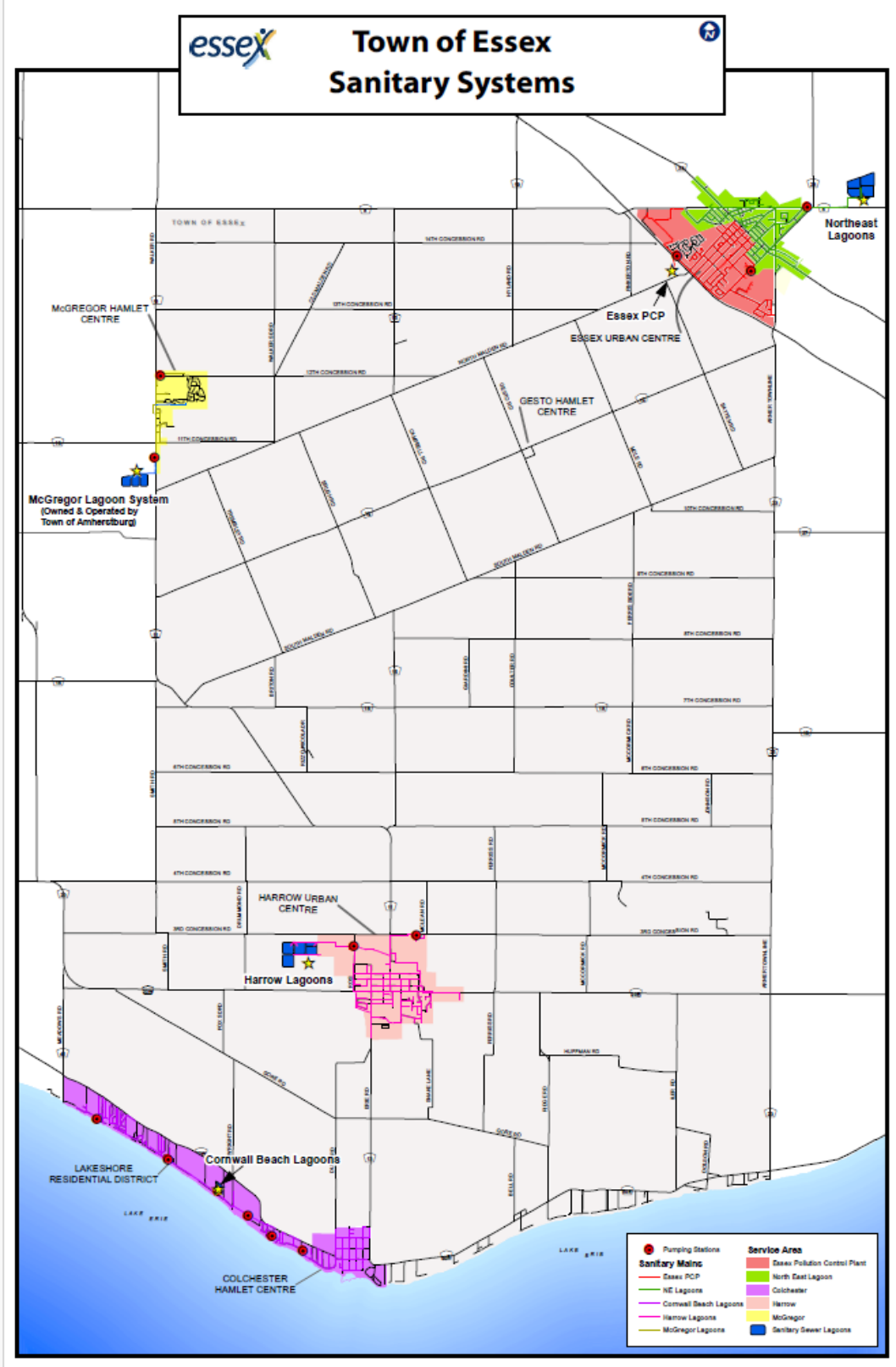


Figure 93 Sanitary Map

Storm Sewer Map

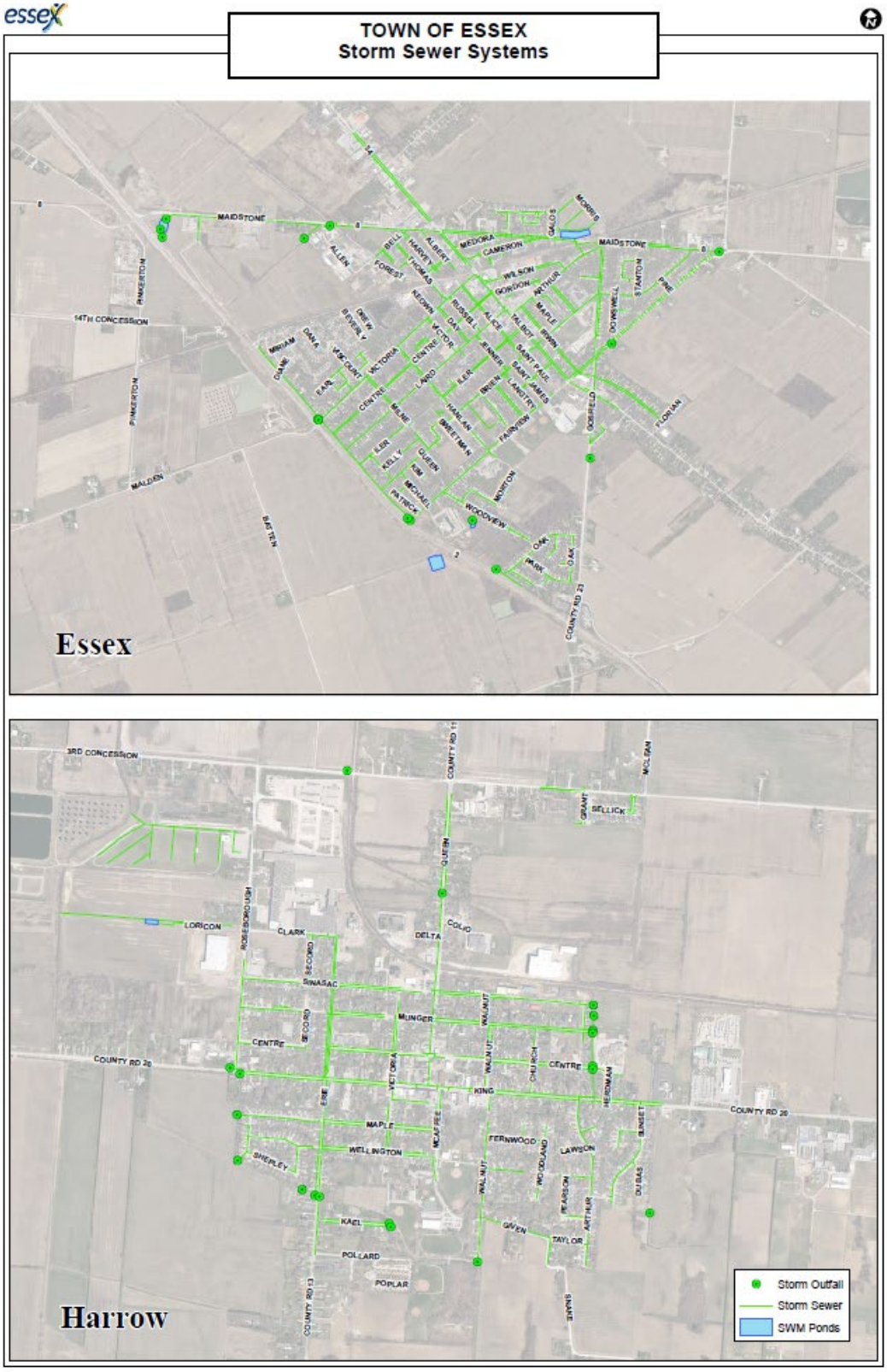


Figure 94 Storm Sewer Map

Drainage Map

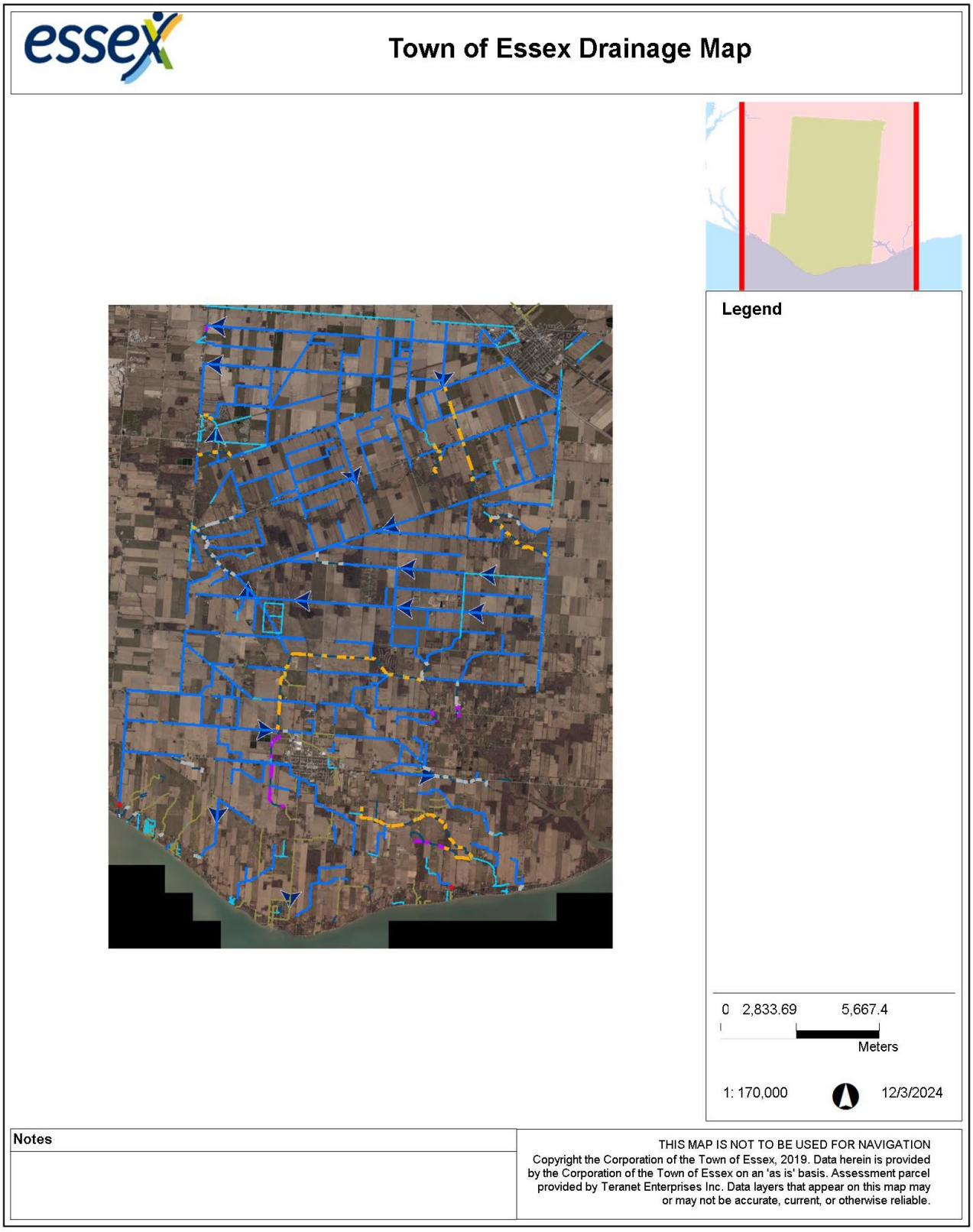


Figure 95 Drainage Map

Trail Map

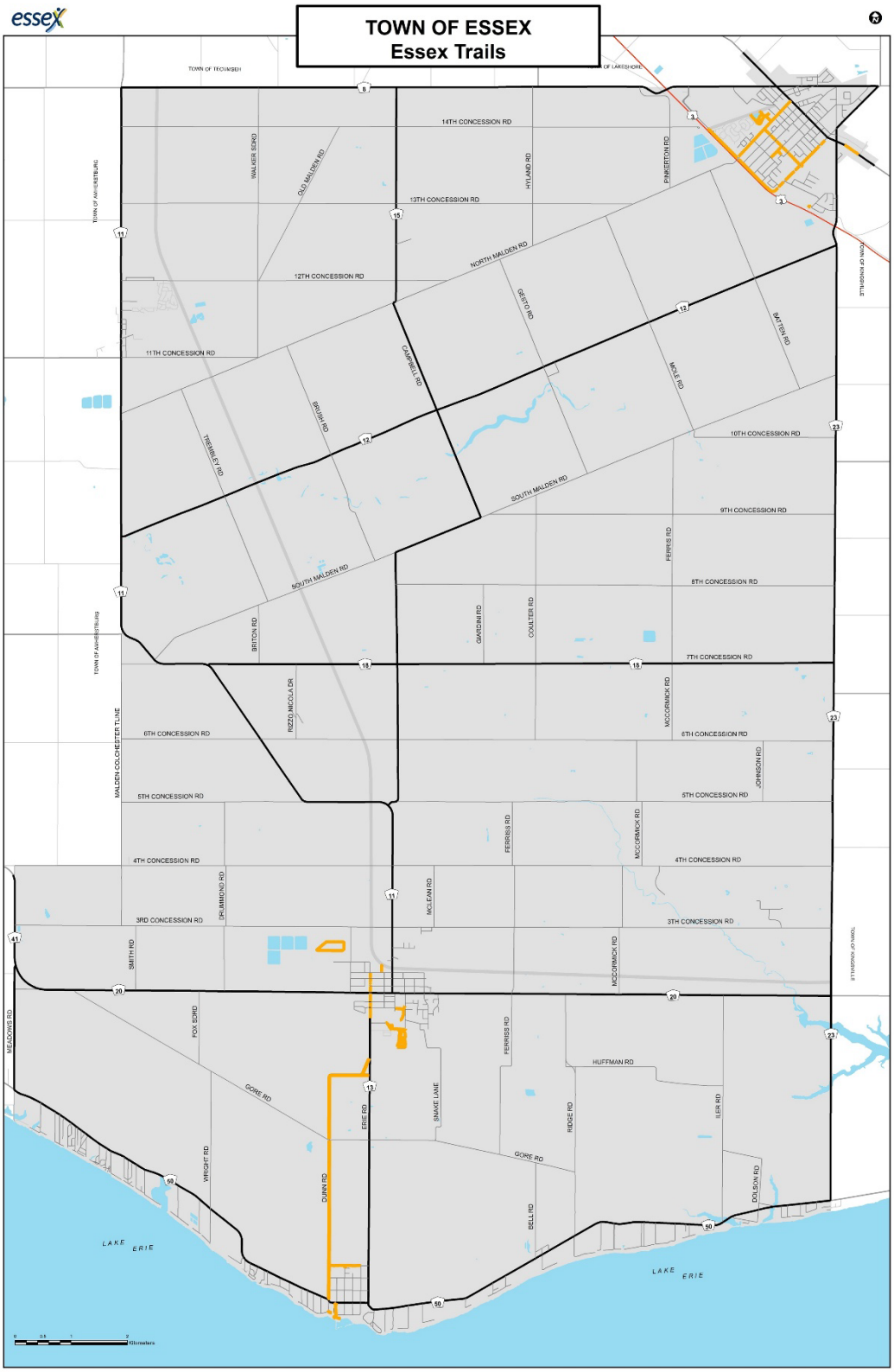


Figure 96 Trail Map

Appendix D – Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Network (HCB and LCB Roads)	Asset Condition	85%	85-100	1
			70-84	2
			50-69	3
			30-49	4
			0-29	5
	% Service Life Remaining	15%	85-100	1
			70-84	2
			50-69	3
			30-49	4
			0-29	5
Road Network (All non-road segments)	Asset Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	% Service Life Remaining	20%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Bridges & Culverts	Condition	85%	90-100	1
			70-89	2

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
			50-69	3
			30-49	4
			0-29	5
	Operational % Service Life Remaining	15%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Water Network (Linear Assets)	Asset Condition	20%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	# Line Breaks	32%	0	1
			1-2	2
			3-4	3
			5-6	4
			7+	5
	Pipe Material	48%	PVC	1
			AC, DI	3
			CI	4
			Unknown	5
Water Network (Non-Linear Assets)	Asset Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
			0-19	5
	% Service Life Remaining	20%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Sanitary Sewer Network (Linear Assets)	Asset Condition	10%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	% Service Life Remaining	68%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	22%	PVC	1
			Concrete	3
			AC	4
			Unknown	5
Sanitary Sewer Network (Non-Linear Assets)	Asset Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
		20%	80-100	1

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
	% Service Life Remaining		60-79	2
			40-59	3
			20-39	4
			0-19	5
Stormwater Network (Linear Assets)	Asset Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	% Service Life Remaining	16%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	4%	PVC	1
			HDPE	2
			Concrete	3
			Steel, AC	4
			Unknown, RCT	5
Stormwater Network (Non-linear Assets)	Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	% Service Life Remaining	20%	80-100	1
			60-79	2

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
			40-59	3
			20-39	4
			0-19	5
Buildings & Facilities, Parks & Land Improvements, Vehicles & Heavy Equipment, Machinery & Equipment	Asset Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Table 98 Risk Rating Criteria: Probability of Failure

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (HCB and LCB Roads)	Financial (10%)	Replacement Cost	<$125,000	1
			$125,000 - $250,000	2
			$250,000 - $500,000	3
			$500,000 - $1,000,000	4
			$1,000,000+	5
	Operational (50%)	Road Class (75%)	Local	2
			Collector	3
			Arterial	4
		Land Use (25%)	Urban	1
			Rural	3
	Strategic (20%)	AADT	<50	1
			50 - 200	2
			200 - 1000	3
			1000 - 1500	4
			1500+	5
	Health and Safety (20%)	Speed Limit (km/h)	<40	1
			40	2
			50	3
			60	4
			80+	5
Road Network (Gravel Roads)	Financial (20%)	Replacement Cost	<$125,000	1
			$125,000 - $250,000	2
			$250,000 - $500,000	3
			$500,000 - $1,000,000	4
			$1,000,000+	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
	Strategic (50%)	AADT	<50	1
			50 - 200	2
			200 - 1000	3
			1000 - 1500	4
			1500+	5
	Health and Safety (30%)	Speed Limit (km/h)	<40	1
			40	2
			50	3
			60	4
			80+	5
Road Network (All non-road segments)	Financial (80%)	Replacement Cost	<$25,000	1
			$25,000 - $100,000	2
			$100,000 - $300,000	3
			$300,000 - $500,000	4
			$500,000+	5
	Strategic (20%)	Asset Type	Bike lanes & trails, paved shoulders	3
			Sidewalks, Streetlights	4
			Signage, Traffic Signals	5
Bridges & Culverts	Financial (70%)	Replacement Cost	< $150,000	1
			$150,000 - $500,000	2
			$500,000 - $1,000,000	3
			$1,000,000 - $2,000,000	4
			$2,000,000 +	5
	Strategic (15%)	Speed Limit (km/h) (50%)	<40	1
			40	2

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
			50	3
			60	4
			80+	5
		Total Deck Length (m) (25%)	0-4	1
			5-9	2
			10-24	3
			25-49	4
			50-100	5
		Total Culvert Length (m) (25%)	0-4	1
			5-9	2
			10-24	3
			25-49	4
			50-100	5
	Health & Safety (15%)	AADT	<50	1
			50 - 200	2
			200 - 1000	3
			1000 - 1500	4
			1500+	5
Water Network (Linear Assets)	Financial (50%)	Replacement Cost	$0 - $125,000	1
			$125,000 - $250,000	2
			$250,000 - $500,000	3
			$500,000 - $1,000,000	4
			$1,000,000+	5
	Operational (20%)	Pipe Diameter (mm)	<125	1
			125-149	2
			150-199	3

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
			200-299	4
			300+	5
	Strategic (30%)	Location	Residential	1
			Industrial, Commercial, Institutional	3
Water Network (Non-Linear Assets)	Financial (60%)	Replacement Cost	< $50,000	1
			$50,000 - $150,000	2
			$150,000 - $300,000	3
			$300,000 - $500,000	4
			$500,000+	5
	Strategic (40%)	Asset Type	Machinery and Equipment	1
			Hydrants, Sampling Station	2
			Water Facilities Valves & Meters, Water Tower	3
			Treatment Plant	5
Sanitary Sewer Network (Linear Assets)	Financial (50%)	Replacement Cost	< $125,000	1
			$125,000 - $250,000	2
			$250,000 - $500,000	3
			$500,000 - $1,000,000	4
			$1,000,000+	5
	Operational (20%)	Pipe Diameter	<250	1
			250-499	2
			500-799	3
			800-1,149	4
			1,150+	5
	Strategic (30%)	Wastewater Main Type	Gravity Main	2
			Forcemain	4

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Sanitary Sewer Network (Non-Linear Assets)	Financial (60%)	Replacement Cost	<$50,000	1
			$50,000 - $150,000	2
			$150,000 - $300,000	3
			$300,000 - $500,000	4
			$500,000+	5
	Strategic (40%)	Asset Type	Sanitary Manholes	1
			Lagoons	3
			Pumping Stations	4
			Treatment Plant	5
Sanitary Sewer Network (Linear Assets)	Financial (50%)	Replacement Cost	< $125,000	1
			$125,000 - $250,000	2
			$250,000 - $500,000	3
			$500,000 - $1,000,000	4
			$1,000,000+	5
	Operational (20%)	Pipe Diameter	<250	1
			250-499	2
			500-799	3
			800-1,149	4
Stormwater Network (Linear Assets)	Financial (60%)	Replacement Cost	< $10,000	1
			$10,000 - $25,000	2
			$25,000 - $50,000	3
			$50,000 - $100,000	4
			$100,000+	5
	Operational (40%)	Pipe Diameter (mm)	< 250	1
			250-499	2
			500-799	3

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
			800-1,149	4
			1,150+	5
Stormwater Network (Wet and Dry Ponds)	Financial (100%)	Replacement Cost	$0 - $50,000	1
			$50,000 - $150,000	2
			$150,000 - $300,000	3
			$300,000 - $500,000	4
			$500,000+	5
Stormwater Network (Non-Linear Assets)	Financial (60%)	Replacement Cost	$0 - $25,000	1
			$25,000 - $100,000	2
			$100,000 - $300,000	3
			$300,000 - $500,000	4
			$500,000+	5
	Strategic (40%)	Asset Type	Manhole, Pond	1
			Catch Basin	2
Buildings & Facilities Parks & Land Improvements Vehicles & Heavy Equipment Machinery & Equipment	Economic (100%)	Replacement Cost	<$5,000	1
			$5,000 - $10,000	2
			$10,000 - $50,000	3
			$50,000 - $300,000	4
			$300,000+	5

Table 99 Risk Rating Criteria: Consequence of Failure

Appendix E – Estimated Useful Lives Summary

Estimated Useful Lives (EULs) can be used for a variety of applications including financial reporting of amortization/depreciation (looking back), asset management planning may require slightly different EULs for long-term planning (looking forward), and comparing lifecycle strategies (what interventions are scheduled to extend an asset's life). Within the Town's primary Asset Management System, Citywide, these EULs may differ for the same asset. For financial reporting purposes, the original EUL should remain unchanged to ensure past year-end audits are not affected. Profile EULs and EUL Overrides can be an effective way of adjusting expectations for future planning without affecting financial amortization reporting.

Note: The AMP may follow a slightly different classification structure/asset categorical breakdown than a Tangible Capital Assets Policy.

Category / Segment	Estimated Useful Lives		
	Original EUL	Profile EUL (without lifecycle events)	Profile EUL (per lifecycle strategy)
Road Network			
Asphalt Roads	55 Years	25 Years	51 Years
Surface Treated Roads	7 Years	7 Years	49 Years
Gravel Roads	55 Years	55 Years	132 Years
Pedestrian Infrastructure	15-40 Years	N/A	N/A
Streetlights & Signage	10-75 Years	N/A	N/A
Bridges & Culverts			
Bridges	50-80 Years	N/A	N/A
Structural Culverts	50 Years	N/A	N/A
Non-Structural Culverts	50-70 Years	N/A	N/A
Water Network			
Water Facilities	8-80 Years	8-80 Years	N/A
Water Mains	80 Years	80 Years	78 Years
Hydrants	60-80 Years	N/A	N/A
Valves & Meters	50 Years	N/A	N/A
Water Equipment	7-50 Years	N/A	N/A

Category / Segment	Estimated Useful Lives		
	Original EUL	Profile EUL (without lifecycle events)	Profile EUL (per lifecycle strategy)
Sanitary Sewer Network			
Sanitary Facilities	15-70 Years	N/A	N/A
Sanitary Sewer Mains	60-100 Years	80 Years	78 Years
Sanitary Manholes	30-80 Years	N/A	N/A
Lagoons	30-50 Years	N/A	N/A
Sanitary Equipment	5-25 Years	N/A	N/A
Stormwater Network			
Storm Mains	20-90 Years	80 Years	78 Years
Storm Manholes	30-100 Years	N/A	N/A
Catch Basins	30-80 Years	N/A	N/A
Stormwater Management Ponds	50-100 Years	50 Years	72 Years
Buildings & Facilities			
All (includes components)	5-85 Years	N/A	N/A
Parks & Land Improvements			
Parking Lots	10-25 Years	N/A	N/A
Miscellaneous	2-50 Years	N/A	N/A
Vehicles & Heavy Equipment			
All	5-25 Years	N/A	N/A

Figure 97 Estimated Useful Lives Summary