2024 ASSET MANAGEMENT PLAN

WOOLWICH TOWNSHIP

A living document providing an overview of municipal asset condition, planned lifecycle activities and current service levels to manage assets in a way that aims to balance risk, cost, and service delivery for its customers.

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This Asset Management Plan was prepared by:

 The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

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DEFINITIONS

Asset

An item, thing or entity that has potential or actual value to an organization. The value can be tangible or intangible, financial or non-financial, and includes consideration of risks and liabilities.

Asset Hierarchy

A classification system that is used to group assets with similar characteristics or functions. In this AMP, it is used to organize asset data/information using a common framework (or “language”) to assist in understanding, communicating and visualizing groups of assets.

Asset Management (AM)

Planned actions and coordinated activities of an organization to optimally and sustainably manage its assets that will enable the assets to provide the desired level of service in a sustainable way, while managing the risk at the lowest life-cycle cost. It encompasses all asset types, tangible or intangible, individual components or complex systems, and all activities involved in the asset’s lifecycle from acquisition/creation, through maintenance to renewal or disposal.

Asset Management Plan (AMP)

A strategic document (long-term) that states how a group of assets is to be managed over a period of time. The plan describes the characteristics and condition of infrastructure assets, the levels of service expected from them, planned actions to ensure the assets are providing the expected level of service, and financial strategies to implement the planned actions. Specific criteria to be included is defined in Ontario Regulation (O. Reg.) 588/17, as amended by O. Reg. 193/21.

Asset Management Policy

Mandated requirements, overall intentions/principles, and framework for control of asset management. An Asset Management Policy guides the overall direction of the asset management system, providing direction to the appropriate focus and level of asset management practice expected. It shall establish key principles, overall vision for the program, and align other municipal plans.

Asset Management System

A management system that includes a series of interrelated processes and documentation that directs and delivers the discipline of asset management within an organization.

Building Together – Guide for Municipal Asset Management Plans

A document, released by the Government of Ontario, which explains the importance and the features of an Asset Management Plan.

Core Municipal Infrastructure Asset (Core Asset)

Any municipal infrastructure asset that is a:

- Water asset that relates to the collection, production, treatment, storage, supply, or distribution of drinking water;
- Wastewater asset that relates to the collection, transmission, treatment, or disposal of wastewater, including any wastewater asset that from time to time manages stormwater;
- Stormwater management asset that relates to the collection, transmission, treatment, retention, infiltration, control, or disposal of stormwater;
- Road; or,
- Bridge or culvert.[1]

Customer/Community Levels of Service (LOS)

Customer Levels of Service (also known as Community Levels of Service) measures are typically expressed in non-technical terms and describe the general public's understanding of services being provided by infrastructure systems. Customer LOS measures are typically related to the service that is provided by the overall system supporting the service delivery, rather than the specific assets.

Estimated Service Life (ESL)

The estimated period of time (usually in years) that an asset is in use or is expected to be available for use, assuming perfect construction and general maintenance is carried out. ESLs may vary according to material type or functional component.

Funding Shortfall

A spending shortfall in comparison to an established need. This can include the accumulated deficit that results year over year due to financial shortfalls.

Infrastructure

The physical structures and associated facilities that form the foundation of development, and by or through which a public service is provided.

[1] O. Reg. 588/17: ASSET MANAGEMENT PLANNING FOR MUNICIPAL INFRASTRUCTURE (ontario.ca)

Level of Service (LOS)

The parameters or combination of parameters that reflect the social, political, economic, and environmental outcomes the organization delivers. Level of service statements describe the outputs or objectives of the organization's activities that are intended to be delivered to the community.

Lifecycle Activity

Activities undertaken with respect to an infrastructure asset over its service life, including constructing, maintaining, renewing, operating, and decommissioning, and all engineering and design work associated with those activities.

Lifecycle Cost

The total cost of ownership over the life of an asset. This may include but is not limited to capital costs, operating costs, maintenance costs, renewal costs, replacement costs, environmental costs, and user delay.

Lifecycle Management Strategy

The set of planned actions that will enable the assets to provide the desired levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost.

Maintenance

Activities that allow assets meet their required performance objectives, including regularly scheduled inspection and activities associated with unexpected or unplanned events.

Non-core Municipal Infrastructure Asset (Non-core Asset)

All other municipally owned assets not included in the definition of a core asset (as per O. Reg 588/17). Within this Asset Management Plan, non-core assets include assets related to fire, fleet, equipment, parks, and facilities.

Non-infrastructure Lifecycle Activities

Actions, studies, master plans or policies that are not capital in nature, which result in the lowering of costs and/or extend the useful life of an asset.

Ontario Regulation (O. Reg.) 588/17

Under the Infrastructure for Jobs and Prosperity Act, 2015, principles are set out by the provincial government to regulate asset management planning for municipalities. On January 1, 2018, O. Reg. 588/17 came into force which regulates asset management planning for municipal infrastructure and later amended the timelines with O. Reg. 193/21 in 2021.

Preventive Maintenance

Regular, routine or regularly scheduled maintenance activities that are intended to keep assets in good working order and prevent or minimize unplanned failures or downtime.

Rehabilitation

Significant repairs designed to extend the life of an asset. Rehabilitation is considered a renewal lifecycle activity.

Replacement

The removal and replacement of an existing asset to an equivalent capacity, function and/or performance. Replacements is considered a renewal lifecycle activity.

Replacement Value/Cost

The amount that an organization would have to pay to replace an asset of the same function and capacity at the present time, according to its current worth, including costs related to removal, installation, excavation, design, engineering, contingencies, disposal, material, and labour.

Risk

The effect of uncertainty on an organization's objectives. It considers financial, socioeconomic, and financial variables and is determined by assigning a numeric rating for the likelihood of an asset failing and the consequence if it does.

Risk Management Strategy

The Township's risk management strategy details the methodology and framework used to assess for the Township's asset portfolio. It details the methodology and results used to assign Likelihood of Failure, Consequence of Failure and Risk Ratings to the Township's assets, which assists the Township in understanding asset criticality, and prioritizing assets for rehabilitation or replacement.

Technical Levels of Service (LOS)

Technical LOS are technical measures applied against assets and overall systems that define the performance requirements to support Community Levels of Service and are used to determine which criteria will be used to drive business decisions. Technical LOS are often expressed in quantitative or numerical terms.

ABBREVIATIONS

AM	Asset Management
AMP	Asset Management Plan
BCA	Building Condition Assessment
BCI	Bridge Condition Index
COF	Consequence of Failure
DAMI	Detailed Asset Management Infrastructure (Reports)
ESL	Estimated Service Life
IT	Information Technology
LOF	Likelihood of Failure
LOS	Levels of Service
O. REG. 588/17	Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure
PCI	Pavement Condition Index
THE TOWNSHIP	The Township of Woolwich

1. EXECUTIVE SUMMARY

1.1. INTRODUCTION

The Township of Woolwich's 2024 Asset Management Plan (AMP) details the Township's proposed plan to address current and future infrastructure needs. Through this AMP, the Township is documenting its process of relying on data to drive decisions that support short-term and long-term planning to manage its assets across their full lifecycles. This ensures that that assets continue to support the chosen level of service and delivery of such by the Township. This 2024 AMP was developed in alignment with the Infrastructure for Jobs and Prosperity Act (2015), and Ontario Regulation (O. Reg.) 588/17, which have legislated the practice of Asset Management in Ontario.

This AMP formally documents the Township's approach to asset management for its portfolio of infrastructure assets, through the following content sections:

1. **Introduction:** provides a brief description of the Township and its Asset Management objectives, as well as the scope of this document.
2. **Alignment to Township Goals:** indicates how the content within this AMP aligns to the Township's strategic vision, as well as other goals and initiatives.
3. **AMP Development:** provides a brief overview of the major content sections of the AMP, including definitions and descriptions of how to interpret content within the AMP.
4. **Detailed Asset Management Infrastructure (DAMI) Reports:** provide details on specific asset groups, organized by major service areas. These sections include the following content.
    - **State of the Infrastructure:** provides key information on the assets, including replacement values, quantities, condition, age, and data confidence.
    - **Levels of Service:** documents the measures and performance indicators that the Township tracks to understand if it is providing adequate service to the community.
    - **Lifecycle Management Strategy:** documents the lifecycle activities the Township enacts to maintain assets in a state of good repair and meet levels of service and performance objectives.
    - **Risk Management Strategy:** details risks associated with the current state of assets, in relation to asset likelihood and consequence of failure.
    - **Lifecycle Forecasting:** details projected asset needs and related financial forecasts to maintain current service levels and/or eliminate backlogs.
5. **Growth Considerations:** details the Township's approach to planning for growth.

6. **Financial Strategy:** provides a financial analysis of the costs required to maintain service levels and eliminate backlogs, as well gaps in funding and strategies to address them.
7. **Improvement Plan:** provides recommendations the Township can undertake to improve its Asset Management system, as well as future iterations of this AMP.

The scope of this AMP includes all infrastructure assets within the Township across all asset-supported service areas. The following asset hierarchy details these service areas and associated asset classes.

Figure 1-1: List of In-scope Assets (Asset Hierarchy)

1.2. STATE OF THE INFRASTRUCTURE

The Township's total asset portfolio is valued at $1.1B. The following table provides a summary of the asset portfolio, including replacement values and average asset condition by subservice.

Table 1-1: Summary of Assets by Subservice

Service	Subservice	Current Replacement Value (2023 $)	Overall Condition	Percentage of Replacement Value
Environmental Services/Utilities	Drinking Water Distribution	$141.9M	Good	13%
	Sanitary Wastewater Collection	$148.3M	Good	13%
	Stormwater Management	$201.8M	Fair	18%
	Cellar Drain Collection System	$16.9M	Good	2%
Transportation	Road Network[1]	$475.8M	Good	42%
Emergency Services	Fire Services	$44.6M	Fair	4%
Recreation and Facilities	Administration and Operations	$12.3M	Fair	1%
	Parks and Recreation	$78.7M	Good	7%

[1]Road Network assets replacement values in this table do not include street signs as they are captured in the operating and maintenance budget. Refer to the Transportation Services DAMI report for details.

The following figure provides a visualization of the total asset replacement value by subservice.

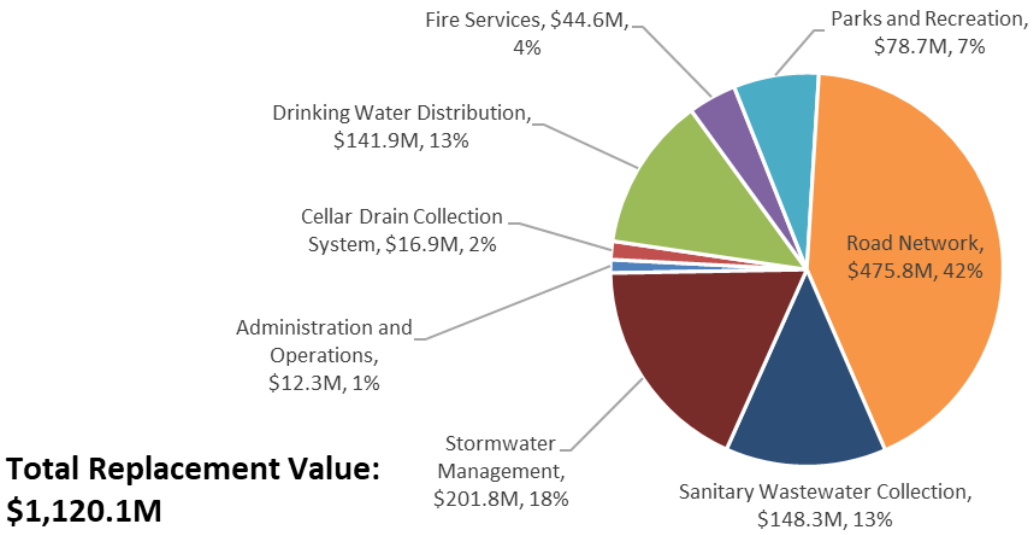


Figure 1-2: Replacement Value Distribution by Subservice

The following figure provides a visualization of the average asset age as a proportion of the average asset estimated service life, by subservice.

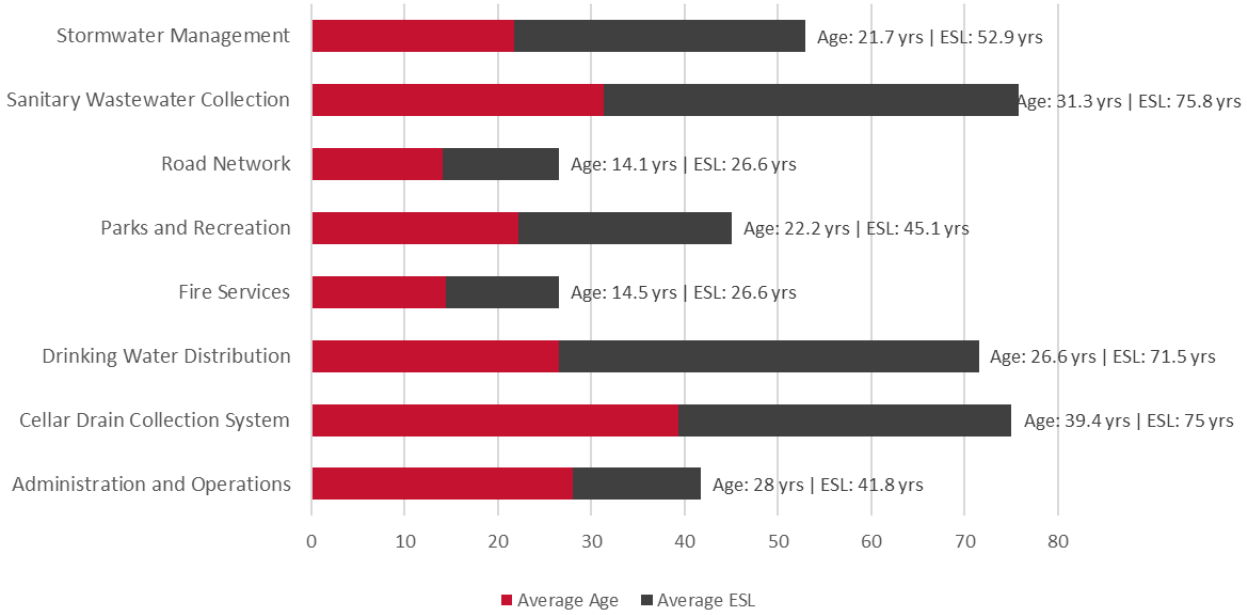


Figure 1-3: Age as a Proportion of Estimated Service Life (ESL) of all Assets

The following figure provides a visualization of the value of major asset construction or procurement, by decade, within each subservice.

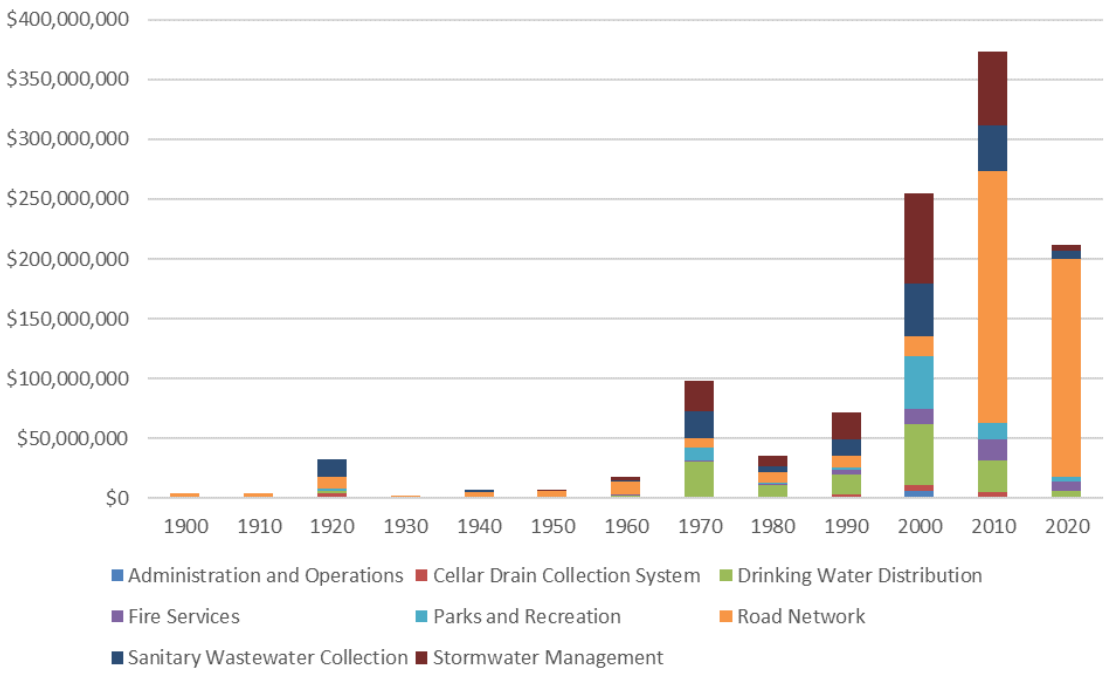


Figure 1-4: Age Distribution by Installation Decade of All Assets

The following figures provide a visualization of the distribution of asset condition over five (5) condition categories for the Township as a whole, and then further subdivided by subservice. Definitions of condition categories are provided in Subsection 4.1.1.3 (Table 4-1).

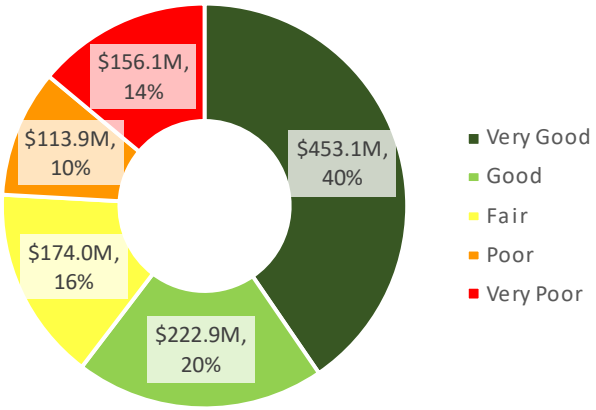


Figure 1-5: Condition Distribution of All Assets

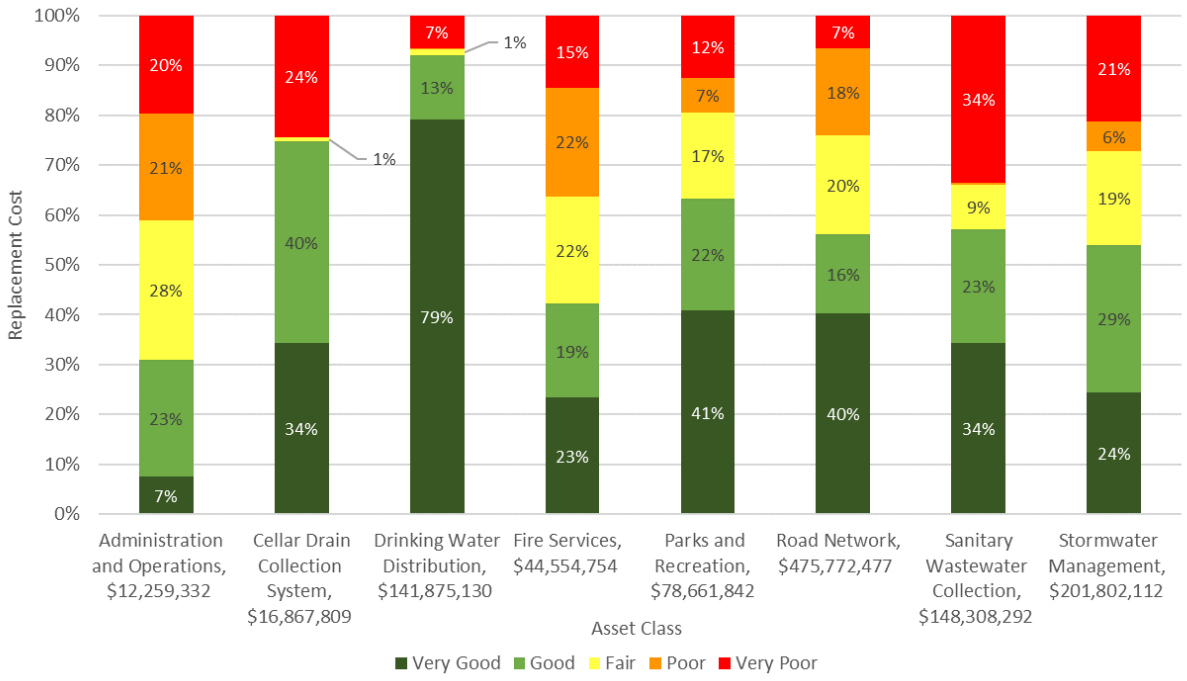


Figure 1-6: Condition Distribution of All Assets by Subservice

1.3. LEVELS OF SERVICE

Levels of service (LOS) are a measure of the degree to which an asset meets functional or user requirements. The Township has developed a LOS strategy, which documents the approach that the Township takes to monitor and report on LOS. Typically, LOS are measured in terms of parameters that reflect social, political, legislative, environmental, and economic outcomes that an organization delivers.

The LOS subsections within each DAMI report (i.e. Sections 5 to 8) of this AMP document the established LOS indicators and current performances for each major asset grouping within each service/subservice. The current performance of customer and technical LOS reported in this report are for the year 2023, unless otherwise stated. The Township's LOS framework is presented in two tables within this AMP: the Customer LOS table, which provides a suite of LOS measures that are focused on the customer's (community's) experiences and expectations of the services; and, Technical LOS table, which details measures that the Township uses to understand if it is managing assets to the level appropriate to meet community expectations.

1.4. LIFECYCLE MANAGEMENT STRATEGY

The Township's lifecycle strategy is a set of planned actions performed on assets to provide LOS in a sustainable way, while managing risk, and at the lowest lifecycle cost. Lifecycle activities are categorized into six (6) major groups, which are part of the full lifecycle of an asset. Together, these lifecycle activities work together to extend asset life, reduce overall lifecycle costs, minimize risk, and achieve other objectives such as environmental goals. Definitions of the six (6) asset lifecycle activity categories are provided in Table 1-2.

Table 1-2: Lifecycle Activity Categories and Descriptions

Lifecycle Activity Category	Description
Non-Infrastructure	• Actions or policies that can lower costs or extend asset life.
Operations and Maintenance	• Regularly scheduled maintenance or repair and activities associated with unexpected events.
Renewal (Rehabilitation and Replacement)	• Rehabilitations are significant repairs designed to extend the life of the asset. • Replacements are activities that are expected to occur once an asset has reached the end of its useful life and rehabilitation is no longer an option.
Disposal	• Activities associated with disposing of an asset once it has reached the end of its useful life or is otherwise no longer needed by the municipality. • Costs are typically combined with rehabilitation or replacement activities.
Service Improvements	• Planned activities required to extend services to previously un-serviced areas. • Planned activities to improve an asset's capacity, quality, and system reliability. • Planned activities to address changes in regulations.
Growth	• Planned activities required to construct assets or improve services to accommodate population growth and intensification.

The lifecycle activities for each asset class are detailed in the asset DAMI reports in Sections 5 to 8. These activities are separated by major groupings of assets with similar lifecycle activities and approaches. They are reported using the six (6) asset lifecycle categories detailed above. For each major asset grouping, a description of the lifecycle activity is provided, as well as the frequency at which each activity is performed.

1.5. RISK MANAGEMENT STRATEGY

As part of the development of this 2024 AMP, the Township developed a risk management strategy to assess the risk of each asset by evaluating its likelihood of failure (LOF) and consequence of failure (COF). The risk analysis will help the Township assess and compare the risk assessment commonly across all services and can be incorporated into future operation, maintenance, and capital strategies.

LOF represents the likelihood (or probability) that an asset will fail, relative to a specific failure event. For the purposes of this AMP, LOF represents a failure of an asset due to its condition, and therefore the LOF framework directly relates to the asset condition. COF defines the consequences that may occur if the asset should fail. COF is assessed using a "triple bottom line" analysis, which evaluates the financial, social and environmental consequences of asset failure.

LOF and COF frameworks provide a quantification of asset risk using a 5-point rating scale that when combined, the LOF and COF ratings articulate asset risks. These risks can be documented in a matrix, which details the combinations of LOF and COF ratings that result in low, medium or high-risk assets. Detailed definitions of LOF, COF, risk and the associated frameworks/ratings scales are provided in Subsection 4.1.3.

The following risk matrix documents this for all assets within the scope of this AMP. It details the total replacement value of assets within each combination of LOF and COF ratings.

Table 1-3: Risk Score Distribution for All In-scope Assets

		Likelihood of Failure				
		1	2	3	4	5
Consequence of Failure	1	$12,589,962 (1.1%)	$10,549,508 (0.9%)	$3,162,167 (0.3%)	$929,364 (0.1%)	$1,673,661 (0.1%)
	2	$266,772,781 (23.8%)	$109,031,648 (9.7%)	$95,996,183 (8.6%)	$67,825,495 (6.1%)	$62,002,991 (5.5%)
	3	$152,188,840 (13.6%)	$84,955,267 (7.6%)	$67,180,253 (6.0%)	$42,766,322 (3.8%)	$81,269,379 (7.3%)
	4	$21,592,918 (1.9%)	$18,401,096 (1.6%)	$7,651,000 (0.7%)	$2,411,131 (0.2%)	$11,151,782 (1.0%)
	5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend

- Low risk (1-9)
- Medium risk (10-15)
- High risk (16-25)

1.6. LIFECYCLE FORECASTING

Lifecycle forecasting represents the second component of the Township's lifecycle management strategy. As part of this strategy, a series of lifecycle models were developed that can be used to forecast asset needs into the future. The lifecycle models have been combined with the Township's LOS and risk management strategies in a decision support system (DSS) tool. This DSS tool pairs the Township's asset inventories and current condition state to the lifecycle, risk, and LOS strategies' logic to analyze the relationship between investment and asset performance under a series of forecasting scenarios.

For the purposes of this AMP, two (2) forecasting scenarios were analyzed for the Township's asset portfolio. These forecasts provided insight on the Township's current and forecasted renewal needs, as they relate to the LOS measures that the Township has established. These scenarios only focus on capital renewal expenditures based upon a review of the Township's 2022 capital budget and 5-year forecast. Costs related to growth, operations, and maintenance are provided from other sources and included in the financial strategy (refer to Section 10). The following are the two (2) scenarios that were analyzed:

- **Scenario 1: Cost to Maintain Current LOS** – This scenario determines the cost that would be required to maintain the current performance of the Township's assets (relative to its established LOS) over the 25-year forecast period. The current LOS measure that is used in this analysis is the percentage of assets that are not in very poor condition in the first year (2023). For example, if 90% of the asset portfolio is in poor or better condition in 2023, funding will be spent to keep approximately 90% of the asset portfolio above very poor condition for the next 25 years. Understanding the cost to maintain LOS at current levels is a requirement of the July 1, 2024, milestone of O. Reg. 588/17.
- **Scenario 2: Backlog Analysis** – This scenario determines the costs and associated asset performance to address the current backlog in the first year of the forecast (i.e. replacing all assets that require replacement and addressing all other asset rehabilitation needs). In the remaining 24 years of the analysis, assets are replaced or rehabilitated as they are eligible. This type of analysis is sometimes also referred to as an "unlimited funding" analysis.

At the end of the Lifecycle Forecasting sections of each DAMI report, a summary of each scenario is provided in a section entitled "Scenario Comparison". Each scenario is compared in a table, which illustrates the annual funding for that scenario, and the performance trend that will be experienced by the end of the 25-year forecast period.

1.7. FINANCIAL STRATEGY

The financial strategy in this AMP identifies the funding levels required to continue to maintain service levels currently being provided to the community. It takes into consideration the gross revenues, operating and capital expenditures, debt, and any future commitment for all the asset classes in the plan by analyzing the 2022 5-year Capital Forecast and Operating Budgets.

The financial strategy is summarized by splitting the asset needs and revenues into the following two categories:

- **Rate Funded:** Includes all drinking water distribution and sanitary wastewater collection assets.
- **Tax Funded:** Includes stormwater collection, cellar drain collection system, transportation services, emergency services, and recreation and facilities assets.

In terms of expenditures, the Township categorizes their budgets into one of the following:

- **Operating budget:** Supports the day-to-day activities and functions conducted to provide Township services. Samples of the expenditures funded from the operating budget include equipment maintenance, materials supply, and facilities services. These are expensed within the fiscal year. The total operating activities are the costs of the activities that can be tied directly with the repair and maintenance of the Township's assets.
- **Capital budget:** A comprehensive financial plan that addresses the financial requirements of growth, major rehabilitations, and replacements of existing infrastructure.

As part of its financial strategy, the Township has developed an investment forecast to project asset needs over a 25-year time horizon. The Township's investment forecasts were aligned with each of the lifecycle activities from the Township's lifecycle management strategy, as detailed in Subsection 4.1.2 and Table 4-2. Forecasts from renewal needs were derived from the scenario analyses completed for each of the service areas. Forecasts for the remaining lifecycle activities were derived from the Township's Capital Budget Forecast and Operating Budgets.

The following tables and figures illustrate the investment forecasts for rate and tax funded assets.

Table 1-4: Rate Funded 25-Year Investment Forecast Summary Table

Lifecycle Activity	Scenario 1: Maintain Current LOS		Scenario 2: Backlog Analysis	
	25-Year Total	Equivalent Annual Average Cost	25-Year Total	Equivalent Annual Average Cost
Total Capital Activities	$67.0M	$2.7M	$141.6M	$5.7M
Total Operating Activities	$37.5M	$1.5M	$37.5M	$1.5M
Total Capital and Operating Activities	**$104.5M**	**$4.2M**	**$179.1M**	**$7.2M**

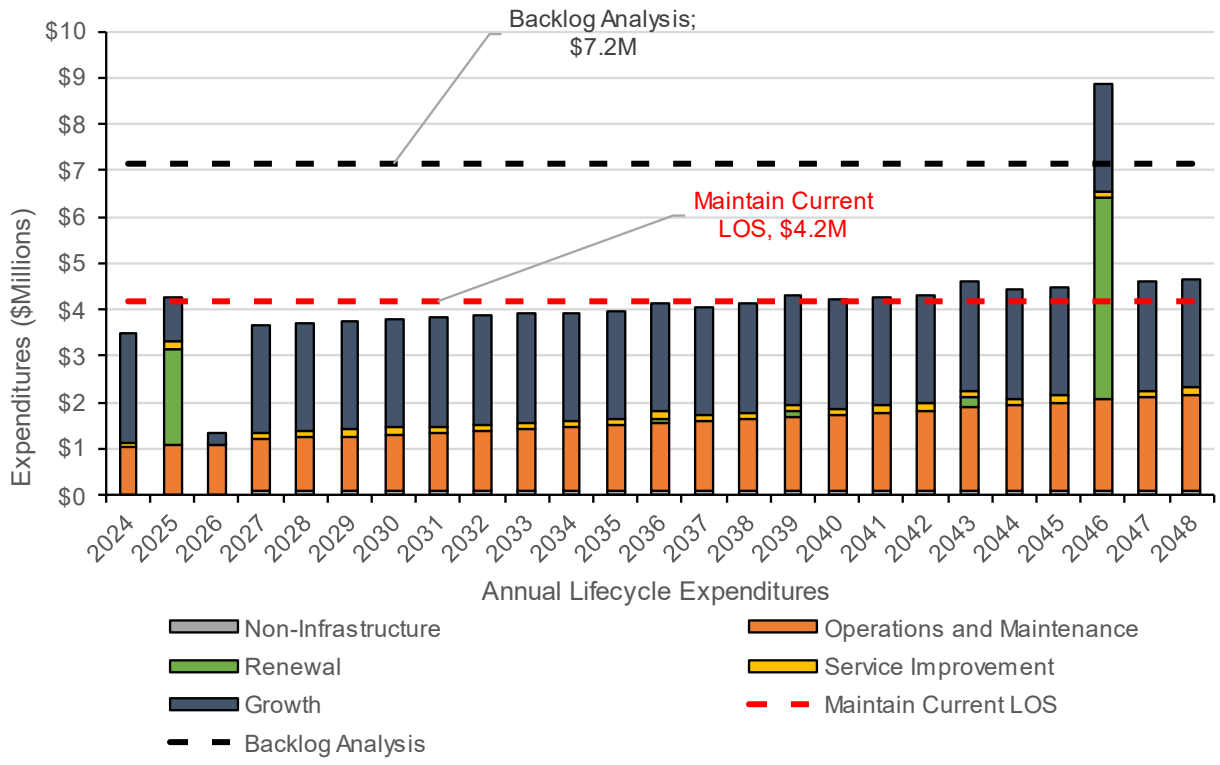


Figure 1-7: Rate Funded 25-Year Investment Forecast Summary Figure

Table 1-5: Tax Funded 25-Year Investment Forecast Summary Table

Lifecycle Activity	Scenario 1: Maintain Current LOS		Scenario 2: Backlog Analysis	
	25-Year Total	Equivalent Annual Average Cost	25-Year Total	Equivalent Annual Average Cost
Total Capital Activities	$367.3M	$14.7M	$559.0M	$22.4M
Total Operating Activities	$92.5M	$3.7M	$92.5M	$3.7M
Total Capital and Operating Activities	**$459.8M**	**$18.4M**	**$651.5M**	**$26.1M**

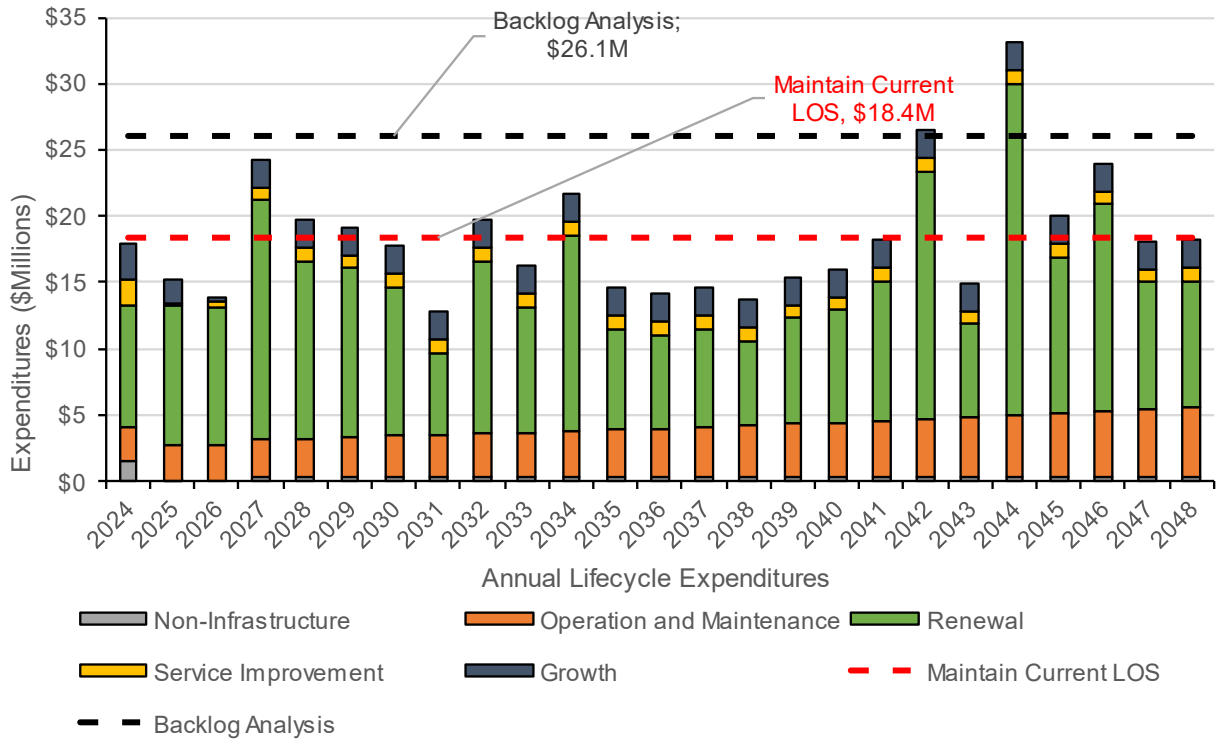


Figure 1-8: Tax Funded 25-Year Investment Forecast Summary Figure

Using the results of these analyses, the Township compared the required investments under both scenarios to available funding to understand a funding gap. The following table summarizes the funding gap.

Table 1-6: Total Capital Activities Summary from the 25-year Forecast (Scenario 1 and Scenario 2)

Category	Annual Average Cost for all Capital Activities (Scenario 1: Maintain Current LOS)	Annual Average Cost for all Backlog Capital Activities (Scenario 2: Backlog Analysis)
Rate Funded	$2.7M	$5.7M
Tax Funded	$14.7M	$22.4M
Total Required	**$17.4M**	**$28.1M**
Total Actual[1]	**$9.6M**	**$9.6M**
Funding Gap	**$7.8M**	**$18.5M**

[1] Actual budget amounts are from Council approved 2024 budgets.

By comparing the results of the scenario analysis to the total sustainable funding available for all capital activities based on the 2024 approved budgets, the Township has identified funding shortfalls of $7.8M annually to maintain current levels of service, and $18.5M annually to address all backlog when looking at the forecasted needs over a 25-year period. Further context around the assumptions and limitations of the financial strategy can be found in Section 10.

Methodologies to address the shortfalls are discussed in Subsection 10.6 and include incremental increases to the tax levy, updating and implementing utility user rates, securing upper government funding, and utilizing reserves and debt financing. As well, adjustments to the service levels being delivered and asset performance expectations might be required by determining an appropriate level of backlog, risk, and maintenance costs over the lifecycle for every asset class.

Risks related to the financial strategy and lifecycle activities can be summarized in three general groups: Lifecycle and Financial Strategies (e.g. risks involved with operating in a state of backlog, ageing infrastructure, and unpredictable funding and resources); Asset Management Analysis and Strategies (e.g. outlining the risks related to data confidence and robust condition data); and External Trends and Influences (e.g. risks arising from the uncertainties from the economic landscape, climate change, unplanned growth, regulatory changes and public expectations). More details are discussed in Subsection 0.

1.8. IMPROVEMENT PLAN

An important part of an asset management plan is to adopt a culture of continual improvement. This means that the Township commits to continually trying to better the data, asset management planning processes and the analyses that support this AMP. This AMP represents the Township's current state, which is dependent on the maturity of the Township's data and asset management processes at the time of writing. In keeping with the philosophy of continual improvement, the Township has identified

twelve initiatives over three categories to increase the maturity of future iterations of this AMP, which are listed in detail in Section 11. The improvement plan recommendations can be summarized within following three categories:

- **Asset Management at the Township** – details improvement initiatives to advance the maturity of the Township's asset management program. Recommended initiatives include:
    1. Completing a detailed formal maturity assessment to identify processes and initiatives that can be implemented to improve the Township's asset management programs.
    2. Developing of a Corporate Asset Management Strategy and Governance Framework.
- **Data and Information** – details improvement initiatives to enhance the Township's asset data and other information that is used to support asset management analyses and this AMP. Recommended initiatives include:
    1. Developing and implementing a data and information strategy that outlines data management standards.
    2. Formalizing condition assessment programs, including expanding data collection and integration to support asset management planning.
    3. Developing a centralized asset register with alignment between databases to reduce redundancies.
- **Asset Management Strategies and Planning** – details improvement initiatives to enhance the processes, logic, and strategies that the Township applies to the asset management analyses that support the content within this AMP. Recommended initiatives include:
    1. Establishing proposed service levels in alignment with the 2025 requirements of O. Reg. 588/17.
    2. Implementing and reviewing established asset management strategies.
    3. Integrating climate change planning into asset management processes and future asset management plans.
    4. Improving the integration of growth planning with operating and capital needs forecasting.
    5. Adopting public engagement processes to support the development of proposed levels of service and other asset management planning processes.
    6. Improving the links between asset data, lifecycle models and budget forecasts to better support lifecycle forecasting analyses.
    7. Implementing the decision support system (DSS) tool developed to complete data processing and forecasting analysis that supported the content of this AMP.

2. INTRODUCTION

The Township of Woolwich (the Township) is a rural municipality located in Southwestern Ontario that covers an area of approximately 326 square kilometres and has an estimated population of 28,310[2]. The Township is a part of the Regional Municipality of Waterloo, bounded by the cities of Kitchener, Waterloo, and Cambridge and the Township of Wellesley to the west and south. The Township also shares boundaries with Wellington County and the Townships of Centre-Wellington, Guelph-Eramosa, and Mapleton to the north and east. The Township is made up of several small settlements including the three largest settlements of Breslau, Elmira, and St. Jacobs. The Township owns and operates a variety of assets that provide services and contributes to the Township's vision to make Woolwich a desirable community to live, work, and play for residents, businesses, and other community partners.

The Infrastructure for Jobs and Prosperity Act (2015), and Ontario Regulation (O. Reg.) 588/17 have legislated the practice of asset management in Ontario. Regulatory requirements specify that each municipality must create an Asset Management Plan (AMP) to encourage evidence-based, long-term planning of municipal infrastructure systems. In 2019, the Township developed its Strategic Asset Management Policy and, in 2022, the Township developed its 2022 Core Asset Management Plan for core assets in alignment with the regulation. The 2024 AMP includes all assets, further develops existing asset management (AM) strategies and was developed in alignment with the 2024 milestone of O. Reg. 588/17.

2.1. OBJECTIVES

The Township's objective in asset management, and through this Asset Management Plan, is to rely on data driven decisions to support short-term and long-term planning of asset lifecycle needs to ensure that assets continue to support the chosen level of service and delivery of such by the Township. Another objective of this AMP is to ensure that the Township meets the requirements of O. Reg. 588/17 and is in alignment with the Township's 2019 Strategic Asset Management Policy.

To support Asset Management planning at the Township, as well as to meet the requirements of O. Reg. 588/17, this Asset Management Plan (AMP) formally documents the state of infrastructure of the Township's asset portfolio, the levels of service (LOS) measures being tracked against each asset class, the lifecycle strategies applied to the assets, and the funding and financial strategy required to balance LOS and risk. This AMP provides a link to the organizational objectives outlined in the Township's Strategic Plan and the current LOS being provided, the asset management

[2] Year-End 2022 Population and House Estimates, Region of Waterloo

activities and processes performed to provide the intended LOS to the community and the cost of implementing those strategies.

2.2. PURPOSE

Asset management (AM) is an integrated set of business processes that support decision making regarding building, operating, maintaining, renewing, replacing, and disposing of infrastructure assets. It is an ongoing practice that is not limited to individual studies or reports. It is a way of doing business that provides the means through which the Township's high-level strategic goals relate to the day-to-day activities of staff. The AMP helps guide the next step in the Township's asset management journey to further develop and mature the Township's AM program.

The purpose of this AMP is to:

- Meet the requirements of O. Reg. 588/17, specifically, the July 1, 2024, milestone.
- Support the line of sight between the organization's strategic objectives, Council approved plans and initiatives, and asset investment needs.
- Report on and understand the current state of the Township's assets.
- Document the Township's current LOS and related performance measures.
- Document lifecycle management strategies that the Township applies to assets to maintain service levels.
- Determine the funding required for the Township to undertake lifecycle management strategies and sustain current levels of service.
- Determine any funding shortfalls between planned spending and required funding.
- Provide recommendations to meet future O. Reg. 588/17 requirements and to continually improve the Township's asset management processes.

2.3. SCOPE

The assets included within the scope of the Township's 2024 AMP are illustrated in Figure 2-1. The assets are organized into an asset hierarchy that details the relationship between the assets and the services that they provide. The first four (4) levels of the hierarchy are illustrated in the following figure, which detail Service, Subservice, Asset Category and Asset Class.

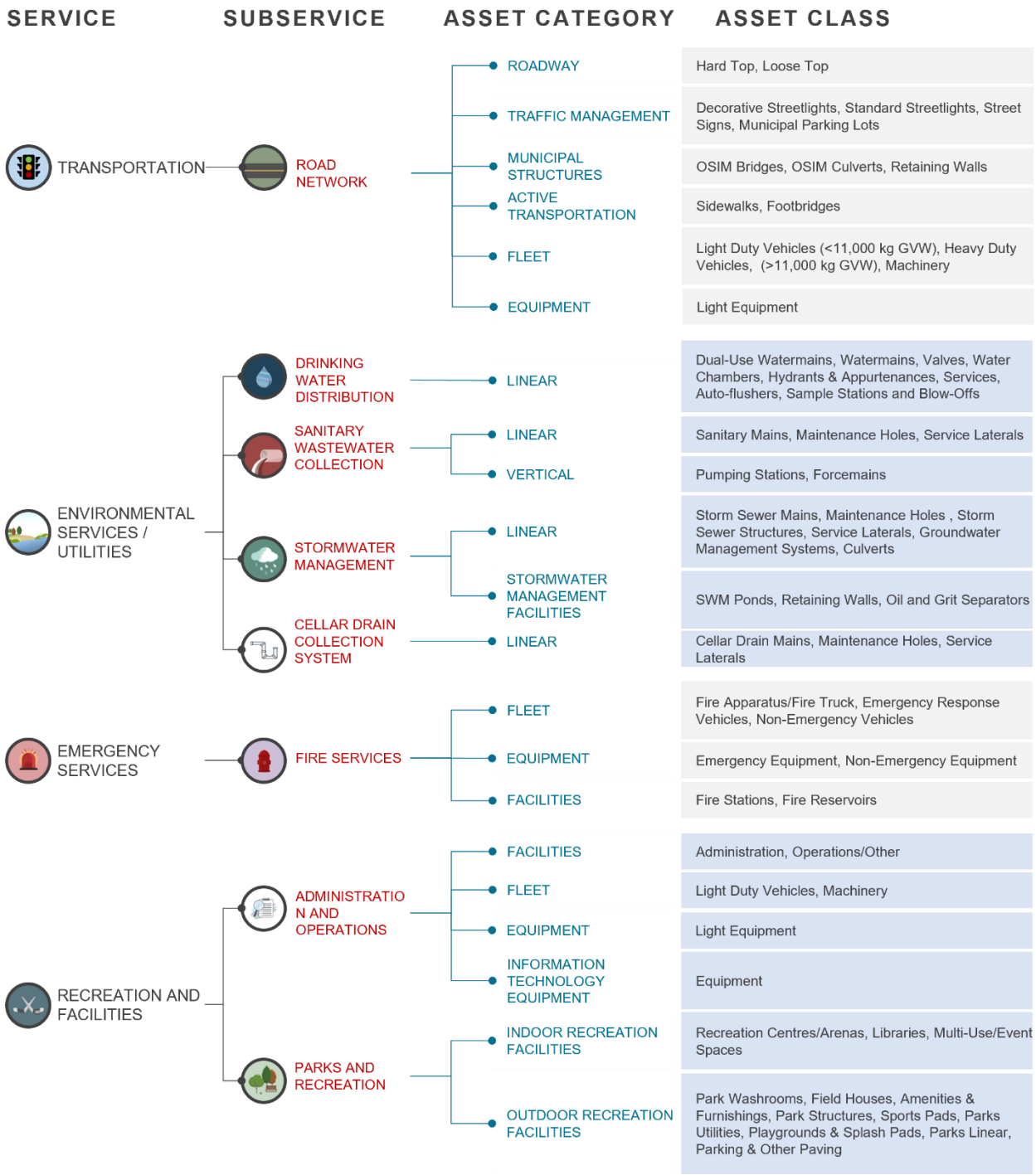


Figure 2-1. List of In-scope Assets (Asset Hierarchy)

2.4. TIMEFRAMES

This AMP covers planning forecasts for a 25-year time horizon. Note that the requirements of O. Reg. 588/17 require asset management plans to cover a 10-year time horizon. This AMP looks beyond the minimums specified by the regulation.

Note that due to the ongoing regulatory milestones of O. Reg. 588/17, a supplementary version of this AMP is required to be developed for July 1, 2025, that will outline proposed levels of service, identify what activities will be required to meet the proposed levels of service, and a financial strategy to fund these activities.

O. Reg 588/17 requires municipalities to prepare an AMP at least once every five (5) years following the completion of its 2025 AMP. As part of the Township's asset management approach, the Township endeavors to review its AM practices on a more regular basis to continually assess appropriate levels of service and integrate improved condition assessment strategies so the AMP can be used to support long-term planning.

3. ALIGNMENT TO TOWNSHIP GOALS

This AMP is an output of several AM processes as well as a guiding document for service delivery and continual improvement for the AM Program.

Relevant documents that support the Asset Management Program include the following and can be made available upon request.

- Township of Woolwich Strategic Plan
- Township of Woolwich Official Plan
- Township of Woolwich Strategic Asset Management Policy
- Township of Woolwich Asset Management Plan
- Township of Woolwich Tangible Capital Assets Policy
- Township of Woolwich Fire Master Plan
- Township of Woolwich 2023 State of the Infrastructure and Asset Management Plan for Roads Summary Report
- Township of Woolwich Ontario Structural Inspection Manual (OSIM) Report
- Township of Woolwich Facilities Condition Assessments

Figure 3-1 below illustrates how the Township's strategic goals are used to develop its Asset Management Policy and AMP. It is important for the asset management approach to have a line of sight between the Township's strategic goals and the AMP to ensure that asset management decisions continue to deliver expected levels of service. These processes are enhanced by a feedback loop, which occurs as the outputs of each AMP become business drivers to improve the asset management processes and become inputs for the next iteration of the AMP.

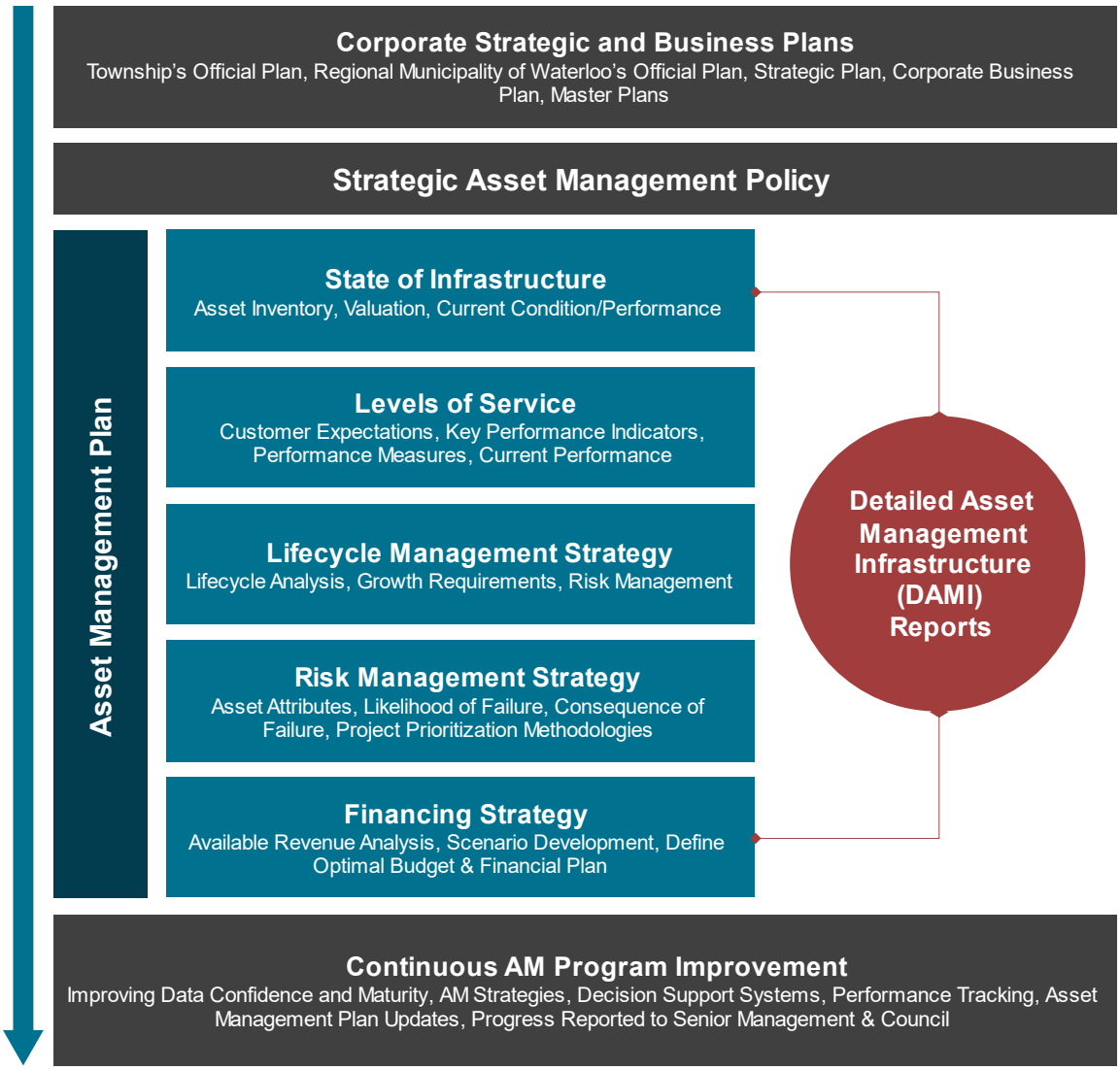


Figure 3-1: Asset Management Processes Line of Sight

3.1. ALIGNMENT WITH TOWNSHIP STRATEGIC PLAN

The existing Strategic Plan to 2020 documents the Township's vision and mission and how the Township will achieve its goals in providing residents and businesses with a community that supports them and grows with them. The Township will be publishing an updated Community Strategic Plan in 2024 that will outline long-term goals and priorities for 2024 to 2034.

The Township of Woolwich has defined a vision of being a Community of Choice in the Province of Ontario through its Strategic Plan. The Township's mission is as follows:

"We believe Woolwich Township citizens deserve responsible community leadership, high quality services and programs, sound financial management and customer service assistance in a courteous, helpful manner. Elected officials, staff and volunteers aim to exceed resident expectations."

Based on feedback from Council, Senior Management, and the community, there were six major areas of focus identified to enhance or improve the municipality:

1. Growth & Economic Development
2. Infrastructure & Transportation Planning
3. Communication & Marketing of Municipal Services
4. Healthy Communities
5. Best Managed & Governed Municipality
6. Fiscally Responsible & Sustainable Community

Each of these focus areas have a series of goals and actions or strategic directions to achieve these goals. This AMP was developed using a service-centric approach, and by doing so it aligns asset management to service delivery, which in turn is connected to the Township's Strategic Plan. All the frameworks and strategies that have been put in place to support this AMP have been completed in alignment with the Strategic Plan.

3.2. ALIGNMENT WITH ASSET MANGEMENT POLICY

In 2019, the Township finalized the AM Policy with the commitment of meeting all O. Reg. 588/17 milestones and to implementing a program based on lifecycle and risk management to achieve the lowest total cost of ownership while meeting desired levels of service. The Township is in the process of updating the policy for 2024.

Along with the Township's AM Policy, this AMP is a major component in the Township's overall AM System. This AMP is aligned with the AM Policy's vision by:

- Providing a service-centric approach to asset management planning.
- Developing standardized and consistent frameworks for understanding LOS, risk, and lifecycle strategies.
- Providing the Township with the information it needs to make infrastructure investment decisions to balance lifecycles, provide service, prioritize needs, and minimize risks at the lowest possible costs.
- Supporting sustainability by taking a risk-centric and full lifecycle approach to financial strategies, lifecycle forecasts and infrastructure investment decisions.
- Providing the information to support prudent financial planning and decision-making.
- Complying with regulatory requirements, including the requirements of O. Reg. 588/17.

3.3. ONTARIO REGULATION 588/17

In January of 2018, Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure came into effect. The regulation sets out requirements for municipal asset management planning to help municipalities better understand their infrastructure needs and inform infrastructure planning and investment decisions.

The regulation will be phased in over six years; and, in 2025, will culminate in the development of an AMP that addresses the investment needs for all infrastructure assets owned by the Township. Key legislative deadlines for all Ontario municipalities are provided in Table 3-1 below.

Table 3-1: O. Reg. 588/17 Milestones and Timelines

Date	Milestone	Township Status
July 1, 2019	Prepare and publish a strategic asset management policy.	Complete
July 1, 2022	Develop an Asset Management Plan that details the cost to maintain current service levels for core infrastructure assets.	Complete
July 1, 2024	Develop an Asset Management Plan that details the cost to maintain current service levels for all other assets (i.e. non-core Assets). Note: The Township is covering all infrastructure assets.	Completed herein
July 1, 2025	Expand the Township's 2024 AMP to provide further details on all infrastructure assets, including proposed levels of service and the revenue and expenditure plan to achieve them.	In progress (2025)

This AMP has been developed in line with the requirements of O. Reg. 588/17 and meets the requirements for the July 1, 2024, milestone. This AMP addresses these requirements as follows:

i. It applies to all assets (and also includes those that are defined as "core assets" in O. Reg. 588/17).
ii. It details the current performance for Community and Technical LOS specified in O. Reg. 588/17 (for core assets).
iii. It details current performance for the Community and Technical LOS established by the Township (for all assets).
iv. It includes a summary, replacement costs, average age, and condition (refer to the Detailed Asset Management Infrastructure (DAMI) Reports in Sections 5 to 8).
v. It includes a description of the Township's approach to assessing the condition of assets (refer to the DAMI reports in Sections 5 to 8).
vi. It includes a description of the lifecycle activities that need to be undertaken in order to maintain current LOS, as well as risks associated with those activities (refer to the DAMI reports in Sections 5 to 8).

vii. It includes population and employment forecasts as set out in the Township's official plan.
viii. It includes the estimated capital expenditures and operating costs related to the lifecycle activities required to maintain current LOS and accommodate growth.
ix. It applies a 25-year horizon to these activities and projections (the regulation requires a 10-year horizon).
x. It is supported by the best available data at the Township.
xi. It will be made available to the public via the Township's website.

Furthermore, several studies and other documents supported the development of this AMP. These can also be made available upon request to the Township.

3.4. CLIMATE CHANGE CONSIDERATIONS

O. Reg. 588/17 requires municipalities to state how they will consider climate change in their Asset Management Policy.

Climate change considerations have been included in the following AM Policy (2019) principles:

Table 3-2. Climate change principle considerations.

Principle	Definition
Environmentally Conscious	The Township shall minimize the impact of infrastructure on the environment by: 1. Respecting and helping maintain ecological and biological diversity; 2. Augmenting resilience to the effects of climate change; and, 3. Endeavoring to make use of acceptable recycled aggregates & materials.

Climate Change Adaptability	The Township is committed to include, as part of its asset management planning:
	• The actions that may be required to address the vulnerabilities that may be caused by climate change to the municipality's infrastructure assets, in respect of such matters, as,
	  ○ Operations, such as increased maintenance schedules
	  ○ Levels of services
	  ○ Lifecycle management
	• The anticipated costs that could arise from the vulnerabilities described in subparagraph above,
	• Adaptation opportunities that may be undertaken to manage the vulnerabilities described above,
	• Mitigation approaches to climate changes, such as previously established greenhouse gas emission reduction goals and targets, and
	• Disaster planning and related funding.

The principles from the Policy have been used to inform the consideration of climate change into the AMP when developing some of the Township's levels of service performance measures. The integration of climate change in the Township's asset management approach is still at its early stages. The Township recognizes the

importance of having climate change considerations integrated with its asset management approach and will be working towards the inclusion of such in future iterations of this plan.

More staffing and funding resources will be required to research and integrate climate change models, adaptation and mitigation strategies, climate change specific risk frameworks for each asset class, and impacts to the delivery of services in the future.

4. AMP DEVELOPMENT

4.1. AMP OVERVIEW AND METHODOLOGY

The AMP is structured to provide consistency and ease of understanding for readers. The structure of this AMP is based on the guidelines of the Province of Ontario Guide: Building Together – Guide for Municipal Asset Management Plans.

The Asset Hierarchy (refer to Figure 2-1) details the relationship between the services that the Township provides (e.g. Transportation, Environmental Services/Utilities, Emergency Services, and Recreation and Facilities) and the assets that support those services. Using the asset hierarchy service categories, the Township has produced Detailed Asset Management Infrastructure (DAMI) reports for each service category of the hierarchy and are further subdivided at the subservice level, as per the hierarchy structure. For example, the Environmental Services/Utilities service has four subservices (e.g. Drinking Water Distribution, Sanitary Wastewater Collection, Stormwater Management, and Cellar Drain Collection System) which are then separated into general asset categories to group together similar asset classes.

As outlined in Figure 3-1 above, there are various sections that are involved in forming the AMP. The DAMI reports are used to assess the state of the assets at a particular point in time and provide a closer look at the asset classes that form the subservice. The DAMI reports have been integrated into this Asset Management Plan in Sections 5 to 8. Each DAMI report provides the following content for each subservice:

- State of Infrastructure
- Levels of Service
- Lifecycle Management Strategies
- Risk Management Strategy
- Lifecycle Forecasting

Sections 9 to 11 of the AMP apply to all in-scope services/asset classes. These sections provide a Township-wide lens on all asset groups and provide recommendations for the plan. These sections include:

- Growth Considerations
- Financial Strategy
- Improvement Plan

The following subheadings provide a summary of the objectives and content contained within each of these major AMP sections. They are intended to guide the reader through

the major content sections of this AMP and provide context to the figures and values reported herein.

4.1.1 State of the Infrastructure

The State of Infrastructure section (located within the DAMI reports) begins with a brief description of the assets within each subservice, along with a figure that illustrates the replacement value of all asset classes within the subservice. This section provides an asset inventory and valuation, age summary, asset condition summary and reflects on data sources and maturity.

4.1.1.1 Asset Inventory and Valuation

The first subsection within the State of Infrastructure section reports on the inventory and valuation of the in-scope assets. This is documented in a table with the following columns:

- **Asset Category** details the general category of assets that is being reported within each subservice, as per the Township's Asset Hierarchy (refer to Figure 2-1). Examples of asset categories include roadway (e.g. within the road network subservice), fleet (e.g. within administration and operations subservice) or facilities (e.g. within the parks and recreation subservice)
- **Asset Class** groups together similar types of assets that are organized within each asset category that is being reported, as per the Township's Asset Hierarchy (refer to Figure 2-1). Examples of types of asset classes include loose top or hard top roads associated with the roadway asset category, light duty vehicles or machinery associated with the fleet asset category and libraries associated with the facilities asset category.
- **Replacement Value** details the total estimated replacement value (replacement cost) of the assets for the given asset class in 2023 dollars. This value represents the full project cost of replacing an asset on a like-for-like, including construction costs, material costs, design/engineering, project management and contingencies.
- **Inventory** details the total amount of assets for the given asset class.
- **Overall Condition** details the average condition of the assets for the given asset class. This condition is a weighted average that is weighted by replacement value (see below for more details on condition and condition categories)

4.1.1.2 Age Summary

A summary of asset age and installation dates is reported through two figures. The first reports on average age and average estimated service life (ESL) by asset class, an example of which is provided below. The average age in this figure is represented by the horizontal red bar, and the average ESL is represented by the horizontal dark grey bar. Average age and ESLs are weighted by replacement value for each asset class. The red hatched bar illustrates cases where average age exceeds average ESL. This figure is useful to provide context to the reader regarding the average state of the network in terms of its age. While age is not always a predictor of an asset's condition, in general, most assets begin to deteriorate and require replacement or rehabilitations as they advance in age. This figure gives the reader an idea of which asset classes are advanced in age (on average), and which are not.

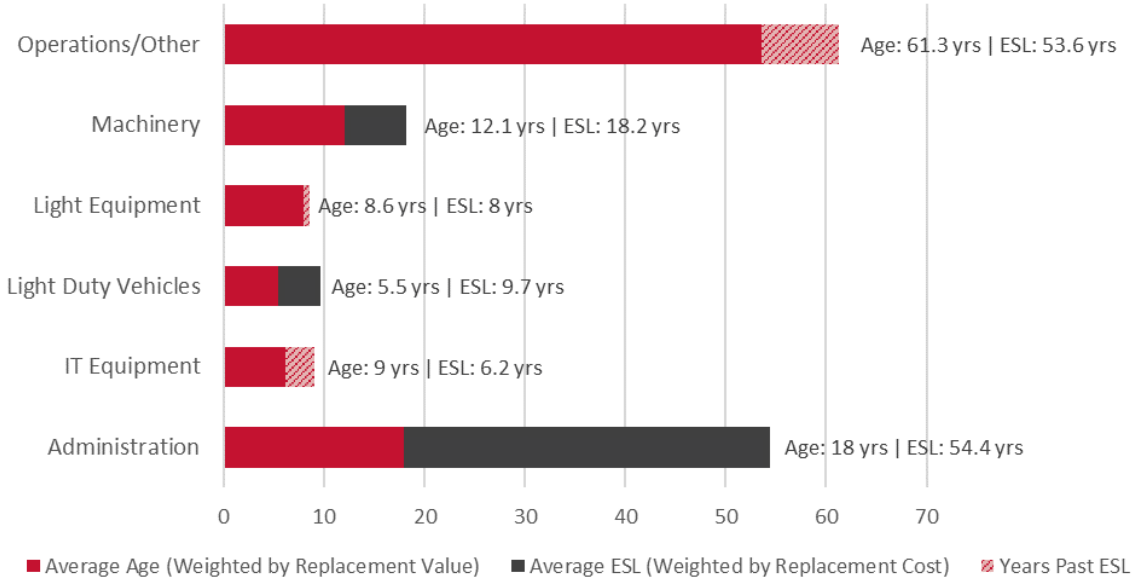


Figure 4-1: Example of the Average Age/Average Estimated Service Life Figure

A figure reporting on installation dates follows, an example of which is provided below. The years are separated into installation decades, which helps to visualize the value of assets by the decade that they were constructed/installed or procured. This provides a visualization of large increases in construction or procurement activities. It is important to keep in mind that each decade of installation will have a corresponding decade in the future where the infrastructure will reach its end of life and will result in a large financial burden for replacement needs. In decades with significant construction, the Township can expect significant renewal needs to occur in the future once these assets become aged and near the end of their service lives. For assets with long lifecycles, many of these needs are beyond the 25-year forecast included in this AMP. Note that asset

condition and performance will drive the need for major rehabilitation or replacement activities regardless of installation year.

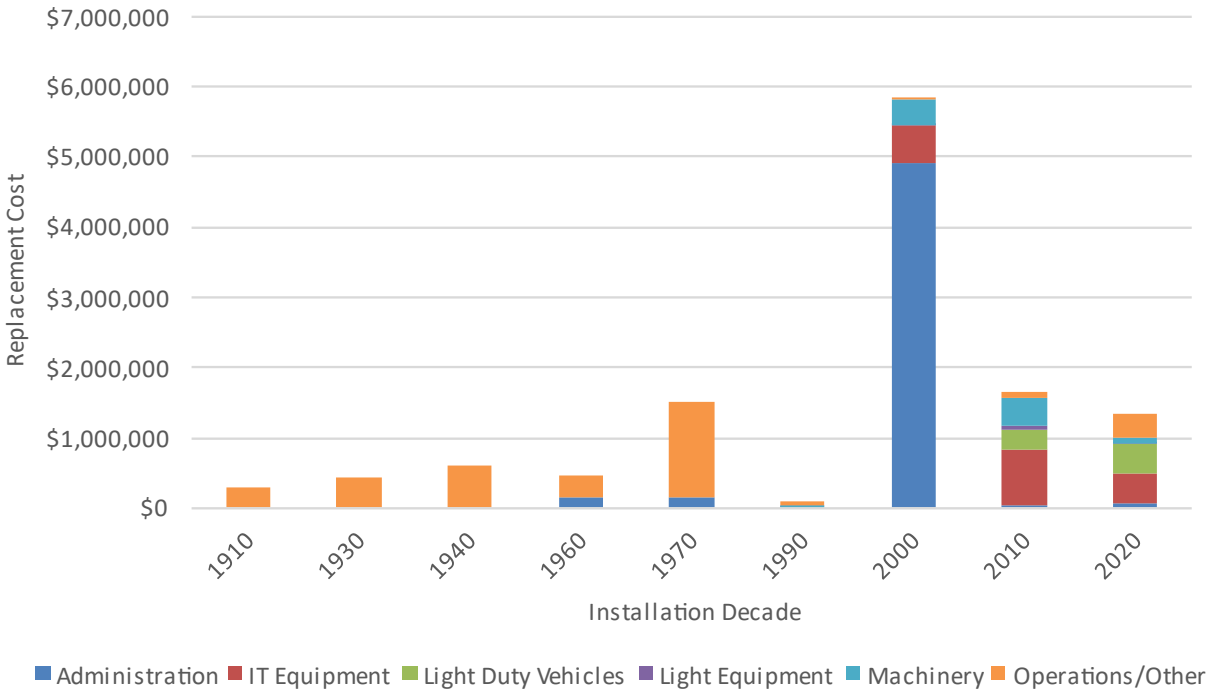


Figure 4-2. Example of the Age Distribution Figure

4.1.1.3 Asset Condition

Condition ratings were assigned to all assets across each service area using a common 5-point categorical rating scale. Since methods for determining asset condition vary amongst different asset classes, all existing condition scores were converted to the common 5-point categorical scale for a standardized and consistent basis for understanding asset condition within the AMP. The numbered scale also includes one- and two-word category descriptors (e.g. Very Good, Good, Fair, Poor, Very Poor) to provide a common reference when describing condition in this AMP.

Where available, asset condition data was used to assign condition ratings and each DAMI report links the specific asset rating to the common 5-point rating scale by comparing them in a table. In cases where condition data was not available, the asset's consumed life (based on its age and ESL) was utilized to determine the condition categories. A sample methodology used to convert life consumed and condition ratings to the common 5-point scale is provided in Table 4-1. Similar tables are provided for each major asset class/grouping, to illustrate how condition ratings and asset age were converted to this standardized scale.

Table 4-1: Overall Condition Rating Scale with Examples

Category	Description	Example Life Consumed	Example Condition Rating
Very Good	• Asset is typically new or recently rehabilitated.	0% to 25%	1
Good	• Asset condition is acceptable and generally in the mid-stage of its service life. Asset may show preliminary signs of deterioration requiring attention or minor maintenance.	25% to 50%	2
Fair	• Asset shows general signs of deterioration that requires attention and may require immediate maintenance.	50% to 75%	3
Poor	• Asset is below the standard condition and is approaching the end of its service life. Ongoing monitoring and significant maintenance may be required.	75% to 100%	4
Very Poor	• Asset is at or beyond its service life and shows signs of advanced deterioration. Asset may exhibit signs of imminent failure that can affect service or increase risk. Condition may be critical. Extensive monitoring, rehabilitation and/or replacement may be required.	>100%	5

For each DAMI report, the condition distribution as a proportion of the total replacement value is reported for each subservice via a donut chart and for each asset class via a bar graph.

In each asset condition subsection, a table (in alignment with Table 4-1 above) also provides the methodology used to establish each condition category for various asset types within the subservice and relates it to their consumed life. Life consumed is expressed as a percentage, which represents the assets age as a proportion of its ESL. If the asset's condition is documented using a condition rating, such as a pavement condition index (PCI) or bridge condition index (BCI) rating, the relationship between that rating, the life consumed, and each condition category is detailed in this table. This section includes general descriptions on the approach the Township uses to obtain condition data, which is also summarized in the Data Sources and Maturity section for each asset class.

4.1.1.4 Data Sources and Maturity

Data maturity and confidence was assessed as part of the state of the infrastructure exercise. By doing so, the Township provides context describing its current understanding of key attributes of each asset from its asset data inventories. This provides context not only to the state of the infrastructure reporting that is contained

herein, but also to the other asset management analyses that are supported by data, such as lifecycle forecasting.

As with most asset inventories, data is not always complete, and may contain gaps. As a result, for each asset class, data completion of the four (4) key asset fields was documented to provide context around the information that was used in the asset management analyses for this AMP. These data fields are installation date (which is used to calculate asset age), ESL, condition, and replacement cost. Data completeness is reported as a percentage, which represents the proportion of data fields that were available and filled in when collecting the inventory data.

Additional details regarding the Township's approach to addressing data gaps and examples of potential actions are outlined. Identifying areas of low data confidence (e.g. assets utilizing historical data or age and ESL to inform condition) offers an opportunity for the Township to work towards building a more comprehensive and accurate asset inventory which will improve the overall asset management process.

4.1.2 Lifecycle Management Strategy

The Township's lifecycle strategy is a set of planned actions performed on assets to provide LOS in a sustainable way, while managing risk, and at the lowest lifecycle cost. This section of the AMP provides descriptions of the specific lifecycle activities applied to each asset. It is articulated in two sections in the DAMI reports: the Lifecycle Management Strategy Section, and the Lifecycle Forecasting Section (refer to Subsection 4.1.5 for details on the lifecycle forecasts).

Lifecycle activities are categorized into six (6) major groups, which are part of the full lifecycle of an asset. Together, these lifecycle activities work together to extend asset life, reduce overall lifecycle costs, minimize risk, and achieve other objectives such as environmental goals. Definitions of the six (6) asset lifecycle activity categories are provided in Table 4-2.

Table 4-2: Lifecycle Activity Categories and Descriptions

Lifecycle Activity Category	Description
Non-Infrastructure	• Actions or policies that can lower costs or extend asset life.
Operations and Maintenance	• Regularly scheduled maintenance or repair and activities associated with unexpected events.
Renewal (Rehabilitation and Replacement)	• Rehabilitations are significant repairs designed to extend the life of the asset. • Replacements are activities that are expected to occur once an asset has reached the end of its useful life and rehabilitation is no longer an option.
Disposal	• Activities associated with disposing of an asset once it has reached the end of its useful life or is otherwise no longer needed by the municipality. • Costs are typically combined with rehabilitation or replacement activities.
Service Improvements	• Planned activities required to extend services to previously un-serviced areas. • Planned activities to improve an asset's capacity, quality, and system reliability. • Planned activities to address changes in regulations.
Growth	• Planned activities required to construct assets or improve services to accommodate population growth and intensification.

The lifecycle activities for each asset class are detailed in Sections 5 to 8. These activities are separated by major groupings of assets with similar lifecycle activities and approaches. They are reported using the six (6) asset lifecycle categories detailed above. For each major asset grouping, a description of the lifecycle activity is provided, as well as the frequency at which each activity is performed.

4.1.3 Levels of Service

Levels of service are a measure of the degree to which an asset meets functional or user requirements. The Township has developed a LOS strategy, which documents the approach that the Township takes to monitor and report on LOS. Typically, LOS are measured in terms of parameters that reflect social, political, legislative, environmental, and economic outcomes that an organization delivers.

The LOS subsections within each DAMI report (i.e. Sections 5 to 8) of this AMP document the established LOS indicators for each service. The LOS framework is developed to align with the Township's strategic objectives as well as local and

provincial best practices and regulations, including O. Reg. 588/17. As part of the development of its LOS strategy, the Township identified current measures to be reported in this AMP based on existing data, and more advanced measures that the Township may not currently have established processes in place to collect and report on. The current performance of customer and technical LOS reported in this report are for the year 2023, unless otherwise stated. As the Township's asset management program evolves over time, a periodic review of the LOS measures will be needed to ensure that the measures being reported on in future AMP documents continue to be specific, measurable, achievable, relevant, and time-based (SMART).

The Township's LOS framework is presented in two tables within this AMP: the Customer LOS table and the Technical LOS table. Each of these tables follow a slightly different structure but contain common elements that link them together. The structure of each table is as follows:

The **Customer LOS** table consists of the following headings:

1. ***Customer Measures*** sometimes referred to as "Community Measures", identify specific areas of focus that can be measured to support each *Subservice*. The customer measures were developed to describe key features of each service that may be important to customers and are qualitative in nature. The customer measures are linked to the Technical Measures that are provided in the Technical LOS table through the *Service Attributes* column. These also include the community (i.e. customer) measures that are prescribed by O. Reg. 588/17.
2. ***Service Attributes*** consist of a word or phrase to describe an important characteristic of the service by linking it to the customer measure. Examples of the Service Attributes key words are: Safe, Reliable, Accessible, Quality and Environmental Stewardship. The listed *Service Attributes* are meant to cover important aspects of the service and be easy for the community/public to understand and recognize.
3. ***Current Performance*** are descriptions that indicate the current performance for each Customer Measure for the most recently completed calendar year. These descriptions of current performance are qualitative and are supported by data found in the related Technical LOS measures.

The **Technical LOS** table consists of the following headings:

1. ***Service Attributes*** are the same *Service Attributes* that are listed in the Customer LOS table. These attributes link the Customer to the Technical LOS. For every Service Attribute identified in the Customer LOS table, there is one or more performance measures. As with the Customer LOS table, the *Service Attributes* detail specific characteristics of each subservice that will be measured to support each service and *Service Statement*.

2. ***Technical Measures*** identify specific areas of focus that can be measured to support each Service Attribute and are typically performance (i.e. condition) based. One or more technical measures can be listed for each Service Attribute. These also include the technical metrics that are prescribed by O. Reg. 588/17.
3. ***Current Performance*** are values that indicate the current performance for each technical measure using the best available data. These values are quantitative, in contrast to the performance measures of the customer LOS table, which are qualitative.

4.1.4 Risk Management Strategy

As part of the 2024 AMP development, the Township included a risk management strategy to assess the risk of each asset by evaluating its likelihood of failure (LOF) and consequence of failure (COF). The risk analysis will help the Township assess and compare the risk assessment commonly across all services and can be incorporated into future operation, maintenance, and capital strategies.

LOF represents the probability (or likelihood) that an asset will fail, relative to a specific failure event. For the purposes of this AMP, LOF represents a failure of an asset due to its condition, and therefore the LOF framework directly relates to the asset condition. Simply put, it is assumed that an asset in poorer condition is more likely to fail than an asset in better condition. The LOF framework is defined in the following table.

Table 4-3: Likelihood of Failure Framework

Condition Category	Likelihood of Failure Rating	Description
Very Good	1	Failure Almost Impossible
Good	2	Failure Unlikely
Fair	3	Failure Possible
Poor	4	Failure Likely
Very Poor	5	Failure Imminent/Failed

COF of an asset is assessed using a “triple bottom line” analysis to evaluate consequence of failure based on the three following characteristics of risk:

- **Financial**– the direct costs (such as costs associated with replacing failed assets) and indirect costs (such as loss of revenue) of the failure that are borne by the Township.
- **Socio-Economic**– the impacts to the community.
- **Environmental**– the impacts to the natural environment or the environmental objectives of the Township.

These consequence of failure categories are intended to capture the range of considerations that account for the consequence of an asset failing to provide its intended service level.

COF ratings were developed for each category on a 5-point scale with one (1) being minimal, and five (5) being extreme. The maximum rating among each of the three categories was taken as the overall COF rating. This assessment was completed for individual assets throughout the Township and paired to the asset data. Table 4-4 below illustrates the Township's COF framework, which details the definitions for assigning COF Ratings for each category.

Table 4-4: Consequence of Failure Framework

Rating	Consequence of Failure Category		
	Financial	Environmental	Socio-Economic
1 – Minimal	Cost to Township: < $5k	• Trivial • No remedial action required	• No injuries • Minimal impact to critical customers • Routine claims • Minimal negative impact on Township reputation, minimal media coverage • Less than 1 day disruption to local businesses or transportation routes • Less than 10 people/businesses affected
2 – Minor	Cost to Township: $5k – $50k	• Minor non-permanent damage • Minor clean-up effort required	• Minor injuries • Minor impact to critical customers • Potential lawsuits • Minor negative impact on Township reputation, some media coverage • 1 to 7 day(s) disruption to local businesses or transportation routes • 10 to 100 people/businesses affected
3 – Moderate	Cost to Township: $50k - $500k	• Important non-permanent damage • Important clean-up efforts required	• Moderate injuries • Moderate impact to critical customers • Continuous litigation • Moderate negative impact on Township reputation, important local media coverage • 1 to 4 week(s) disruption to local businesses or transportation routes • 100 to 500 people/businesses affected
4 – Major	Cost to Township: $500k - $5M	• Some permanent damage • Major and extensive clean-up efforts required	• Serious injuries • Major impact to critical customers • Criminal charges or public trial • Major negative impact on Township reputation, national media coverage • 1 to 3 month(s) disruption to local businesses or transportation routes • 500 to 2,000 people/businesses affected
5 – Extreme	Cost to Township: > $5M	• Irreparable damage	• Death • Severe impact to critical customers • Public inquiry/inquest • Severe negative impact on Township reputation, international media coverage • Greater than 3-month disruption to local businesses or transportation routes • More than 2,000 people/businesses affected

An overall risk rating can be determined using each asset's LOF and COF ratings. The asset risk rating is calculated as follows:

$$Risk\ Rating = LOF\ Rating \times COF\ Rating$$

The risk ratings are presented in the DAMI reports in a final summary matrix (Table 4-5). This matrix plots the various combinations of LOF and COF ratings, as well as the total replacement value of the assets within each combination. It categorizes the final risk ratings into three categories: low, medium, and high risk assets. Low risk assets represent a risk rating of 1 to 9. Medium risk assets represent a risk rating of 10-15. High risk assets represent a risk rating of 16-25.

Assets in the low risk categories are generally in good standing and existing maintenance and performance monitoring should be continued but may also include assets that are likely to fail and have a low consequence of failure. Assets in the medium risk categories might be approaching the end of service life or show declining performance and should be reviewed to identify renewal and maintenance strategies to mitigate risk. High risk assets should be identified and validated to confirm if they are truly high risk. If so, priority planning should be implemented to minimize risk through actions such as comprehensive monitoring and maintenance management programs, implementing redundancy strategies, and identifying renewal strategies.

The following matrix in Table 4-5 provides an example of the way that risk is reported in the DAMI reports. It illustrates the combinations of LOF and COF, and the total replacement value of assets within each combination. This gives an understanding of the total value of assets that are high, medium and low risk (based on their current LOF and COF).

Table 4-5: Sample Risk Score Distribution Summary

		Likelihood of Failure				
		1	2	3	4	5
Consequence of Failure	1	$12,589,962 (1.1%)	$10,549,508 (0.9%)	$3,162,167 (0.3%)	$929,364 (0.1%)	$1,673,661 (0.1%)
	2	$266,772,781 (23.8%)	$109,031,648 (9.7%)	$95,996,183 (8.6%)	$67,825,495 (6.1%)	$62,002,991 (5.5%)
	3	$152,188,840 (13.6%)	$84,955,267 (7.6%)	$67,180,253 (6.0%)	$42,766,322 (3.8%)	$81,269,379 (7.3%)
	4	$21,592,918 (1.9%)	$18,401,096 (1.6%)	$7,651,000 (0.7%)	$2,411,131 (0.2%)	$11,151,782 (1.0%)
	5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend

- Low risk (1-9)
- Medium risk (10-15)
- High risk (16-25)

4.1.5 Lifecycle Forecasting

Lifecycle forecasting represents the second component of the lifecycle management strategy. As part of this strategy, a series of lifecycle models were developed that can be used to forecast asset needs into the future. The lifecycle models have been combined with the LOS and risk management strategies in a decision support system (DSS) tool. This DSS tool pairs the Township's asset inventories and current condition state to the lifecycle, risk, and LOS strategies' logic to analyze the relationship between investment and asset performance under a series of forecasting scenarios.

For the purposes of this AMP, two (2) forecasting scenarios were analyzed for the Township's asset portfolio. These forecasts provided insight on the Township's current and forecasted renewal needs, as they relate to the LOS measures that the Township has established. These scenarios only focus on capital renewal expenditures. Costs related to growth, operations, and maintenance are provided from other sources and included in the financial strategy (refer to Section 10). The following are the two (2) scenarios that were analyzed:

- **Scenario 1: Cost to Maintain Current LOS** – This scenario determines the cost that would be required to maintain the current performance of the Township's assets (relative to its established LOS) over the 25-year forecast period. The current LOS measure that is used in this analysis is the percentage of assets that are not in very poor condition in the first year (2023). For example, if 90% of the asset portfolio is in poor or better condition in 2023, funding will be spent to keep approximately 90% of the asset portfolio above very poor condition for the next 25 years. Understanding the cost to maintain LOS at current levels is a requirement of the July 1, 2024, milestone of O. Reg. 588/17.
- **Scenario 2: Backlog Analysis** – This scenario determines the costs and associated asset performance to address the current backlog in the first year of the forecast (i.e. replacing all assets that require replacement and addressing all other asset rehabilitation needs). In the remaining 24 years of the analysis, assets are replaced or rehabilitated as they are eligible. This type of analysis is sometimes also referred to as an "unlimited funding" analysis and may not reflect a realistic approach to addressing system backlog.

At the end of the Lifecycle Forecasting sections of each DAMI report, a summary of each scenario is provided in a section entitled "Scenario Comparison". Each scenario is compared in a table, which illustrates the annual funding for that scenario, and the performance trend that will be experienced by the end of the 25-year forecast period. Performance trends are illustrated as follows.

- An "up arrow" (↑) indicates an improvement in performance. This indicates that the percentage of assets in very poor condition will have decreased from current levels by the end of the 25-year forecast period resulting in an increase in service levels.

- A “down arrow” (↓) indicates a decrease in performance. This indicates that the percentage of assets in very poor condition will have increased from current levels by the end of the 25-year forecast period resulting in a decrease in service levels.
- An “equals sign” (=) indicates performance will be maintained. This indicates that the percentage of assets in very poor condition will remain approximately the same as current levels by the end of the 25-year forecast period resulting in service levels being maintained.

The results of these scenarios provide information to support the Township’s financial strategy.

4.1.6 Financial Strategy

Financial strategies are one of the key components within the AMP, as it puts the AMP into action. The financial plan provides a way for municipalities to integrate asset management planning with financial budgeting.

The financial strategy forecasts the required annual expenditures for the Township to perform the lifecycle activities in alignment with the lifecycle management strategies to maintain desired LOS:

- Non-infrastructure Activities
- Operations & Maintenance Activities
- Renewal Activities
- Disposal Activities
- Service Improvement Activities
- Growth Activities

Each category includes the Township’s projected expenditures from its capital budget forecast to understand the full cost of maintaining service levels over the 25-year forecast period. Forecasts for lifecycle activities will be compared to the actual approved funding based on 2024 approved budgets to determine if an infrastructure gap is present. Strategies to address this gap and risks associated with the lifecycle strategies and funding analyses are also included.

4.1.7 Improvement Plan

Ontario Regulation 588/17 encourages municipalities to put an emphasis on a continuous improvement in the implementation of the Township’s asset management program. Aligned with this concept, the Township has provided an improvement plan

within the scope of this AMP, which details initiatives to improve the Township's asset management program as well as future iterations of this AMP.

The improvement plan is organized according to the following sections:

- Asset Management at the Township – details improvement initiatives to advance the maturity of the Township's asset management program.
- Data and Information – details improvement initiatives to enhance the Township's asset data and other information that is used to support asset management analyses and this AMP.
- Asset Management Strategies and Planning – details improvement initiatives to enhance the processes, logic, and strategies that the Township applies to the asset management analyses that support the content within this AMP.

4.2. ASSUMPTIONS AND LIMITATIONS

Part of any best practice asset management program is the recognition that asset management is a journey, and not something that is limited to individual studies or reports. As a result, this AMP was developed with the best available information and most up to date asset management processes that the Township has in place at the time of writing. The following subsections details some limitations of the AMP, as well as assumptions that were made in the preparation of the content within this AMP.

4.2.1 Asset Inventories and Data

This AMP is founded on the Township's asset inventory data – the digital documentation of assets and key characteristics of those assets that support asset management analyses. Data completeness and confidence are reported for asset inventories in this AMP (refer to Subsection 4.1.1.4 and the individual DAMI reports for details). Where incomplete data was identified, assumptions were made to fill gaps in the data and support the asset management analyses completed by the Township. Data gaps were filled using some of the following logic:

- Using the average values of an asset group (e.g. installation dates or replacement costs).
- Applying common values obtained from similar asset (e.g. ESL data).
- Supplementing data gaps with professional judgement of Township experts.

The Township understands that continual improvement is at the heart of good asset management planning. Therefore, a commitment to improve its data and asset knowledge on a consistent basis is important. Improving the maturity of data is crucial to identifying future needs and managing a more accurate plan. Refer to Section 11 for more information on the Township's improvement plan.

4.2.2 Asset Management Strategies

As part of the development of this 2024 AMP, the Township has adopted several asset management strategies, including its lifecycle management strategy, levels of service strategy and risk management strategies, and can be made available to the public upon request to the Township. These strategies define the processes and logic that have been used to complete the analyses and develop the content that is reported in this AMP (and in future iterations of the Township's AMP).

These strategies represented the Township's first endeavor into formalizing the processes that it uses to assist in decision-making. Much of what is now included in the AMP were practices and processes that that the Township was previously relying on but may not be formalized or documented.

As a result, several initiatives have been developed to support this AMP, but also may be improved for future versions of this AMP. For example, the Township may have identified consequences of failure for its assets as part of its risk management strategy, but some data that could be collected to inform asset criticality (and COF) may not yet be available or recorded. Additionally, the Township has identified several levels of service that will report on the performance of its asset portfolio and the ability of its assets to provide services to the community. The Township's improvement plan details initiatives it can undertake to improve future iterations of its AMP.

4.2.3 Forecasting Analysis

The Township has completed a lifecycle forecasting analysis to understand the future needs associated with maintaining its assets in a state of good repair. For the majority of assets, this analysis was based on age and ESL. While age and ESL is able to provide a preliminary understanding of future needs, using asset condition to plan provides much more accurate results. Traditionally, age-based analyses of assets may overestimate asset needs as some assets may be considered 'very poor' by age and estimated service life but they may still be providing adequate service. Only when condition is fully understood, can a better understanding of forecasted needs be available. It also neglects to identify assets that have issues due to poor condition, which have occurred earlier than expected in their service life, sometimes a result of factors such as improper construction, material defects or environmental conditions.

For many asset groups, condition information was not yet available. In some cases, condition information had been obtained by the Township (e.g. sewer CCTV inspections information) but had not yet been processed and paired to asset data in time for use in this AMP.

The Township recognizes the importance for condition data to dictate appropriate renewal or replacements and is working towards improving condition information and incorporating condition metrics on all applicable assets to ensure the right intervention is applied at the right time.

4.2.4 Scope of the Asset Management Plan

Note that this 2024 Asset Management Plan was developed to meet the requirements of the July 1, 2024, milestone of O. Reg. 588/17. The regulation provides an approach to implementing an asset management system and developing asset management plans that are detailed over a series of milestones. The next, and final milestone of the regulation (for July 1, 2025) will contain additional information that this AMP does not.

The primary difference between this AMP and the 2025 version of this AMP pertains to the Township's approach to reporting on the costs required to meet service levels. The regulation requires this AMP to report on the costs required to maintain current levels of service, and in 2025 the Township will be required to report on proposed service levels and the cost to achieve them.

This AMP has also included an analysis on the costs to address current backlog, which also includes costs to address forecasted asset needs. In a sense, similar to proposed level of service, once the Township decides on the levels of service it proposes to provide, it will need to make a decision on how much of the backlog it intends to address (which may or may not be all of it), and in what timeframe. For the purposes of this AMP, the backlog analysis represents an upper boundary of the range in which the Township could address asset-related needs and is a theoretical scenario rather than a practical one.

Once the Township has decided on its proposed levels of service, it will also need to report on whether funding is available to achieve those service levels, as well as what risks may be associated with not being able to fund the proposed performance. Future iterations of the Township's AMP (beyond 2025) will continue to report on proposed levels of service in a format consistent with the upcoming 2025 AMP.

5. DETAILED ASSET MANAGEMENT INFRASTRUCTURE REPORT – ENVIRONMENTAL SERVICES/UTILITIES

5.1. DRINKING WATER DISTRIBUTION

The Township of Woolwich's drinking water distribution services contain assets that are critical to providing safe, secure, and reliable drinking water to residents. Drinking water services in the Township is a shared responsibility with the Region of Waterloo. The Region is responsible for supply, which includes treatment, pressure, and transmission, while the Township is responsible for the distribution of water to properties through Township owned local watermains (herein after referred to as watermains) and appurtenances, as well as through dual-use watermain and appurtenances, which the Township operates and maintains but is under shared ownership with the Region of Waterloo. Water testing is also a shared responsibility with the Region of Waterloo and ensures that the Township is meeting or exceeding the standards set out by the Ministry of Environment, Conservation and Parks (MECP).

SERVICE AT A GLANCE

Replacement Value

$141.9 Million

Overall Condition

Good

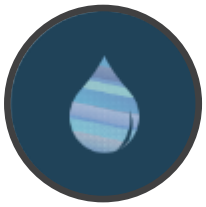
Quantity

129.0 km of watermains
2,008 valves
6,650 water services
768 hydrants and appurtenances

WHAT'S INCLUDED IN DRINKING WATER DISTRIBUTION SERVICES?

The Township of Woolwich's drinking water distribution system consists of the linear watermain assets and appurtenances which contribute to distributing potable water throughout the Township to its customers, including homes, businesses, and other properties. The Township owns and maintains a total value of approximately $141.9M of drinking water assets which represents 13% of the Township's total asset replacement value.

The Township water distribution system includes Township owned watermains and dual-use watermains. Dual-use watermains are owned and maintained in conjunction with the Region of Waterloo and are used when it is more efficient to have one watermain that services both as a local distribution system and a Regional supply main. Due to this coordination, the Township is only responsible for a portion (50%) of the renewal needs, which has been reflected in the lifecycle forecast. It is important to note that the drinking water distribution system also supports fire suppression by maintaining sufficient fire flows with hydrants and appurtenances in most of the distribution network. Fire reservoirs are another key piece to fire suppression in the Township and have been categorized under Emergency Services as they operate separately from the distribution system.



DRINKING WATER DISTRIBUTION

LINEAR

- Dual-Use Watermains
- Watermains
- Valves
- Hydrants and Appurtenances
- Services

5.1.1 State of the Infrastructure

The water distribution network includes watermains, dual-use watermains, services, valves, hydrants and appurtenances. Note that for all watermains, the lifecycle and valuation strategies for associated assets, including valves, services, hydrants and appurtenances are combined with the watermain assets themselves. As a result, the associated replacement values and condition ratings have been included in the watermain asset reporting. These associated assets are documented from an inventory perspective only. Figure 5-1, Figure 5-2, and Figure 5-3 illustrate the replacement value and length distribution of drinking water distribution assets, respectively.

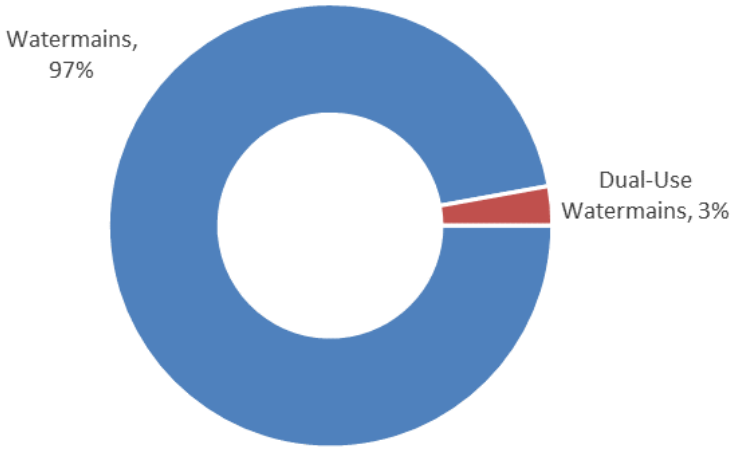


Figure 5-1: Replacement Value Distribution of Drinking Water Distribution Assets

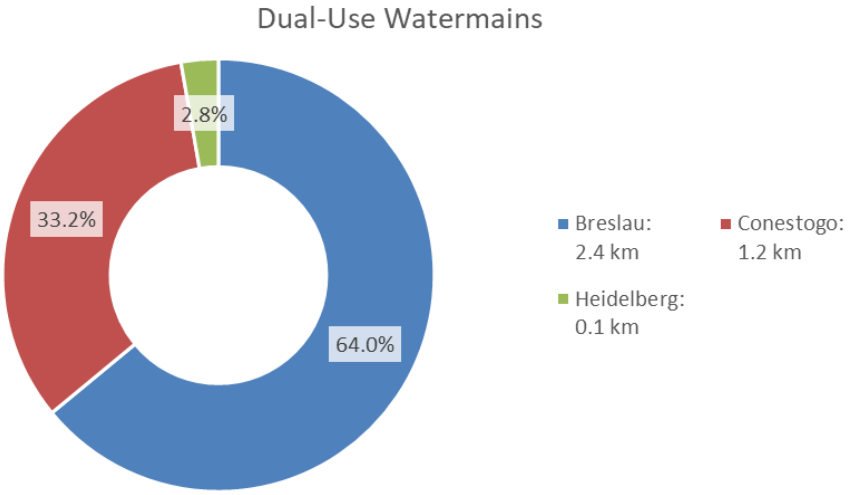


Figure 5-2: Replacement Value and Linear Length Distribution of Dual-Use Watermains by Settlement

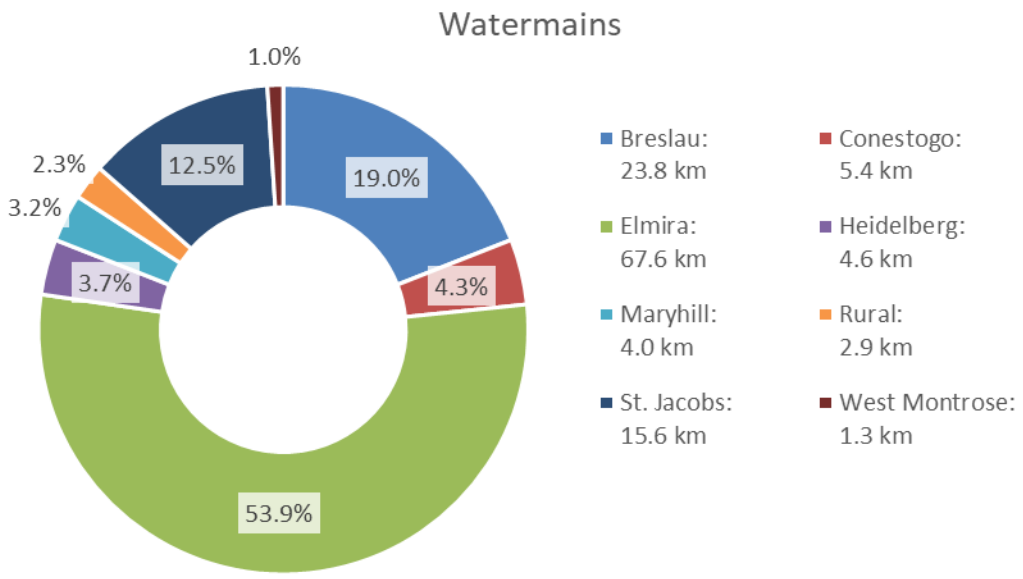


Figure 5-3: Replacement Value and Linear Length Distribution of Watermains by Settlement

5.1.1.1 Asset Inventory and Valuation

Table 5-1 below summarizes the asset valuation, quantities, and condition for each asset category. Replacement costs for all watermains were calculated using a per metre unit rate that also includes valves, services, hydrants and appurtenances assets. Drinking water distribution assets are a user rate funded utility.

Table 5-1: Inventory and Valuation of Drinking Water Distribution Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Linear	Dual-Use Watermains	$141,875,130*	3.7 km	Good
	Watermains		125.3 km	
	Valves	*Included**	2,008 assets	
	Services		6,650 services	
	Hydrants & Appurtenances		768 assets	

*Notes: Watermain replacement values include the replacement of valves, services, hydrants, and appurtenances. Inventory lengths are rounded to nearest one hundred metre (i.e., 0.1 kilometre). Watermain lengths include hydrant leads.

5.1.1.2 Age Summary

Figure 5-4 and Figure 5-5 illustrate the age of drinking water distribution assets as a proportion of their estimated service life, as well as value of assets acquired by decade. Generally, watermains are on average a third through their estimate service life, which indicates that they are relatively young.

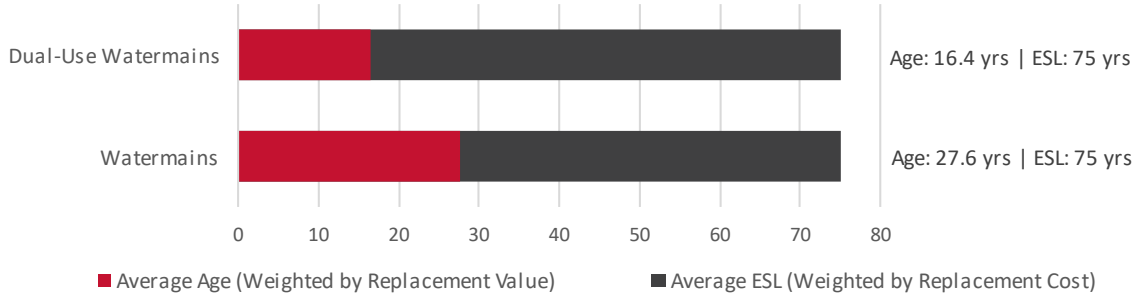


Figure 5-4: Age as a Proportion of Estimated Service Life (ESL) of Drinking Water Distribution Assets

When looking at the installation of watermains by decade, the majority of watermains were installed in the 1970s, 2000s and 2010s which are connected to the growth and development in the Township, particularly in Breslau, Elmira, and St. Jacobs. It is important to keep in mind that each decade of installation will have a corresponding decade in the future where the infrastructure will reach its end of life and will result in a large financial burden for replacement needs. However, condition information will ultimately be the driver for asset intervention, regardless of installation year.

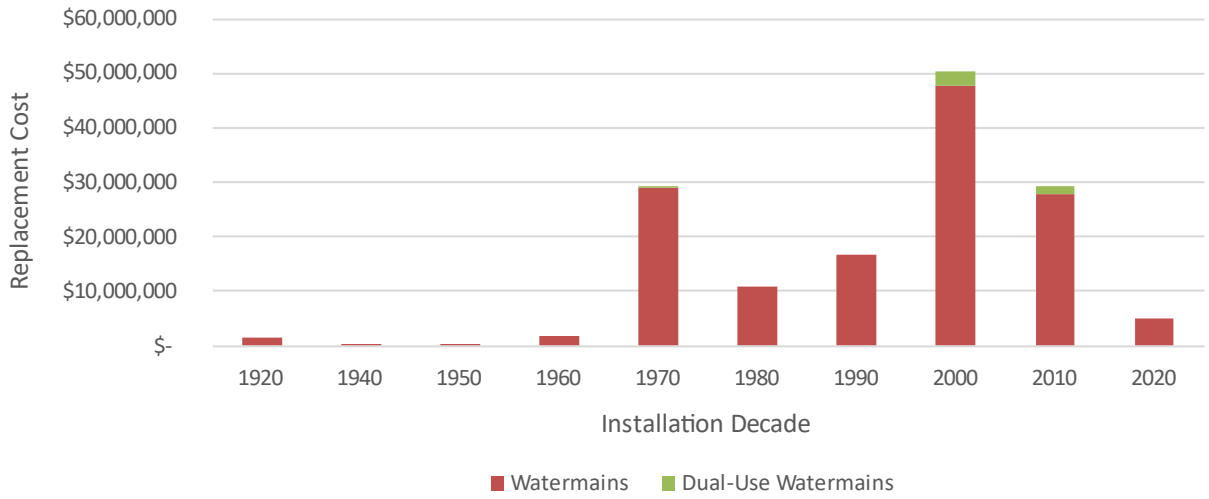


Figure 5-5: Age Distribution by Installation Decade of Drinking Water Distribution Assets

5.1.1.3 Asset Condition

The Township reports on watermain condition using a condition metric that incorporates watermain age as a proportion of service life and breaks. Watermain breaks are recorded by the Township and are incorporated into this metric. Tracking the frequency and location of watermain breaks plays an important role in assessing how a particular length of pipe is performing according to an expected lifecycle curve and material type. There are always unpredictable variables that can affect the performance of an asset and lead to poor performance, which can result in unexpected costs from early replacement or increased cost of maintenance and service interruptions to residents. For watermains, one variable that can affect the performance is the influence of the soil type and its corrosivity on metallic connections, fittings, and pipe degradation. Another variable is the reality that perfect construction and high-quality workmanship is not always achievable or predictable despite best efforts; and finally, there are technological changes in the industry that occur over the years, where materials do not perform as expected over time. Figure 5-6 and Figure 5-7 show the condition distribution of all drinking water distribution assets. Table 5-2 summarizes how condition ratings are determined.

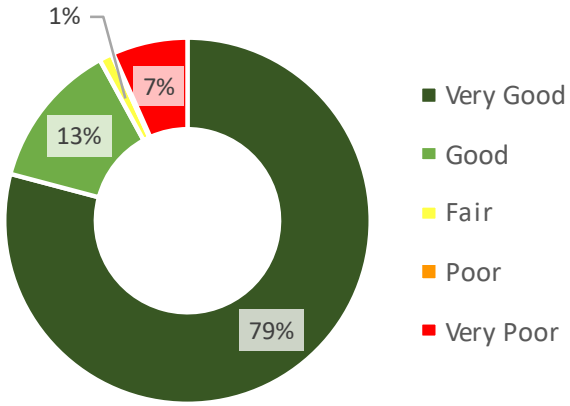


Figure 5-6: Condition Distribution of Drinking Water Distribution Assets

Table 5-2: Condition Ratings for Drinking Water Distribution Assets

Condition Category	Life Consumed	Watermains
Very Good	0% to 25%	85 to 100
Good	25% to 50%	75 to 85
Fair	50% to 75%	60 to 75
Poor	75% to 100%	50 to 60
Very Poor	>100%	0 to 50

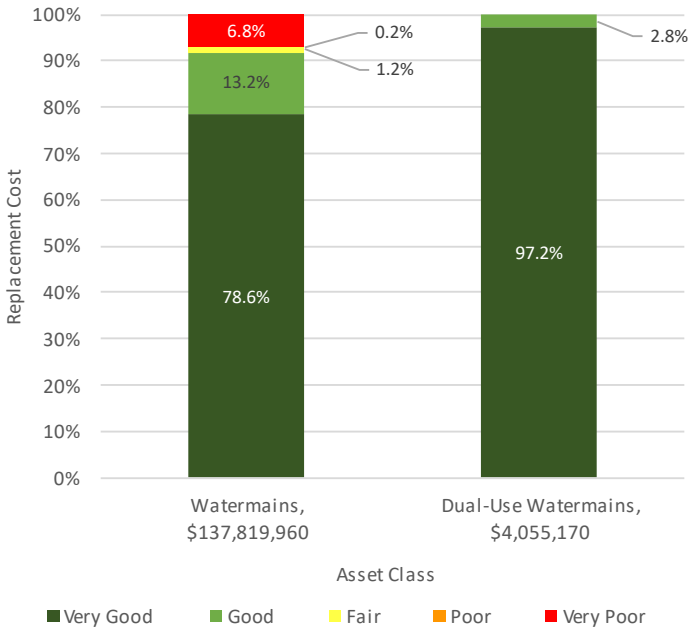


Figure 5-7: Condition Distribution of Drinking Water Distribution Assets by Asset Class

5.1.1.4 Data Sources and Maturity

Table 5-3 and Table 5-4 summarize the data completeness and confidence of the Township's asset data.

Table 5-3: Data Completeness for Drinking Water Distribution Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost	Diameter	Material	Length
Watermains and Dual-Use Watermains	100%	100%	100%	100%	97%	80%	100%

Table 5-4: Approach to Assessing Condition for Drinking Water Distribution Assets

Asset Class	Approach to Assessing Condition
Watermains and Dual-Use Watermains	Watermain breaks are recorded by the Township. The number of breaks is used to adjust the watermain's condition along with age and ESL. The estimated service life for watermain assets is 75 years, with valves at 38 years.

5.1.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as completing additional condition assessments, conducting spatial analysis to verify inventory data and identify missing information, creating data links between data sources (e.g. watermain break data) and filling data gaps where required (e.g. diameter and material). Since watermains are a pressure conduit, there are other condition rating metrics that the Township can utilize such as leak detection, flow and pressure measurements, acoustic testing, electromagnetic testing and corrosivity assessments. In 2023, the Township conducted leak detection for certain areas of the distribution system to inform operations and maintenance activities; however, this data has not yet been linked to inform the condition of the watermain. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional improvement recommendations can be found in the improvement plan (Section 11).

5.1.2 Levels of Service

The Township's goal is to provide drinking water distribution services that provide safe drinking water, uninterrupted service, and keep the community safe with fire flow protection. Table 5-5 and Table 5-6 provide a summary of the customer and technical LOS metrics that have been established by the Township and required by O. Reg. 588/17 for drinking water distribution assets.

Table 5-5: Drinking Water Distribution Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance
Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.*	Scope	The Township has four separate distribution systems: 1) the Breslau Distribution System receives water from Kitchener Well Supply and is part of the Integrated Urban System owned and operated by the Region of Waterloo; 2) the Heidelberg Distribution System receives water from the Heidelberg Well Supply System owned and operated by the Region of Waterloo; 3) the Maryhill Distribution System receives water from the Maryhill Well Supply that is owned and operated by the Region of Waterloo; and 4) the Woolwich North Distribution System receives water from the Waterloo Well Supply, part of the Integrated Urban System owned and operated by the Region of Waterloo, and services parts of Elmira, St. Jacobs, Conestogo and West Montrose. Rural areas and some older areas within the distribution system are serviced by private wells.

Customer Measures	Service Attributes	Current Performance
Description, which may include maps, of the user groups or areas of the municipality that have fire flow.*	Scope	Approximately 66% of properties within the distribution system have access to fire flow which include the settlements of Elmira, St. Jacobs, Conestogo, and Breslau.
Description of boil water advisories and service interruptions.*	Reliable	There have been no boil water advisories in 2023 and few service interruptions due to Township responsibilities. Boil water advisories exist when an adverse water quality sample is taken and watermain flushing alone is unable to resolve the issue.
Water is available when needed.	Reliable	Technical LOS measures indicate that the system has a high reliability and is kept in a state that provides safe drinking water with limited interruptions.
Water meets provincial safety and quality regulations.	Safe, Quality	The Township meets the requirements set under the Drinking Water Quality Management Standard and Safe Drinking Water Act.
Water has acceptable taste, odour and colour.	Quality	The Region of Waterloo is responsible for treatment and water quality. Watermains are flushed as needed.

*Customer levels of service required by O. Reg. 588/17

Table 5-6: Drinking Water Distribution Services Technical Levels of Service

Service Attributes	Technical Measures	Current Performance
Scope	Percentage of properties connected to the municipal water system.*	70.8%
Scope	Percentage of properties where fire flow is available.*	65.8%
Reliable	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system.*	0
Reliable	The number of connection-days per year due to watermain breaks compared to the total number of properties connected to the municipal water system.*	7.5
Reliable	Annual number of watermain breaks per 100 km	0.023
Reliable	Percentage of all watermains in poor or better condition	93%
Safe	Approximate length of system potentially containing lead joint mains and/or services	2.3km
Safe, Quality	The number of annual major nonconforming Drinking Water Quality Management Standard (DWQMS) incidences	0

*Technical levels of service required by O. Reg. 588/17

5.1.3 Lifecycle Management Strategies

For the Township to provide drinking water distribution services and maintain LOS, various lifecycle activities are performed on the assets. These include non-infrastructure solutions such as developing plans and performing condition assessments; preventative and reactive maintenance activities to repair assets; refurbishing assets; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. Table 5-7 summarizes the lifecycle activities performed on drinking water distribution assets.

Table 5-7: Lifecycle Management Activities for Drinking Water Distribution Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, User Rate Study, capacity studies, AMPs, Drinking Water Quality Management Standard (DWQMS) Compliance, Form 1 Authorization) • Policies, procedures/standards and by-laws (e.g. municipal servicing connection policy; Break History Mapping; Back Flow Prevention By-Law) • Geographic Information System (GIS) data analysis and mapping	As required
	Water usage reduction incentives (Region)	Ongoing
	Condition Assessment Program	Future Initiative
Operations and Maintenance	Repairs (watermains, services, chambers, valves, curb stops, hydrants, appurtenances)	As required
	Exercise valves (mainline/curb stops)	Annually/As Required
	Valve replacements	As required
	Watermain flushing (unidirectional) Hydrant inspection (pressure, open/close, drain, operation, stem valve (lead valve), check shut down)	Annually
	Leak Detection Program	Ongoing
Renewal (Rehabilitation and Replacement)	Lining	Future Initiative
	Replacement of watermains, services, chambers, valves, curb stops, hydrants, appurtenances	When asset reaches poor condition, when relining not undertaken
Disposal	Removed as part of the project or abandoned	Coordinated with watermain replacement
	Pipe upsizing	Based on growth, modelling and studies

Lifecycle Activity	Description	Frequency
Expansion and Service Improvements	Expansion – new subdivisions	Based on growth, modelling and studies
	Special Service Levy	Ratepayer Request and Council Approval/Provincial Authority Order

5.1.4 Risk Management Strategy

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all drinking water distribution assets. The results from the risk analysis are provided in Table 5-8. The distribution table illustrates the amount of assets within each risk score (1-25). There are no high-risk assets in the Township's water distribution portfolio. Approximately $9.4M (7%) of assets are medium risk and the remainder are low risk. Approximately $9.4M of assets have a high likelihood of failure (LOF score of 5) and of these assets, COF scores range from 2 to 3.

Table 5-8: Risk Score Distribution of Drinking Water Distribution Assets

		Likelihood of Failure				
		1	2	3	4	5
Consequence of Failure	1	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
	2	$92,897,278 (65.5%)	$13,546,938 (9.5%)	$1,327,528 (0.9%)	$224,712 (0.2%)	$8,287,996 (5.8%)
	3	$18,839,939 (13.3%)	$3,153,058 (2.2%)	$279,401 (0.2%)	$0 (0.0%)	$1,147,101 (0.8%)
	4	$516,273 (0.4%)	$1,654,906 (1.2%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
	5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium (10-15)
- High risk (16-25)

5.1.5 Lifecycle Forecasting

5.1.5.1 Scenario 1: Maintain Current LOS

Scenario 1 forecasts asset performance by maintaining current service levels. A total of $229.7k (annual average of $9.2k) is anticipated to be spent over the next 25 years. In 2023, approximately 7% of assets are in very poor condition or approximately 93% of

the portfolio is in poor to very good condition. The average annual spending identified maintains this distribution over the next 25 years. There is a large expenditure occurring in 2043 due to replacement of a number of assets in that year. The performance and spending forecasts are provided in Figure 5-8 and Figure 5-9.

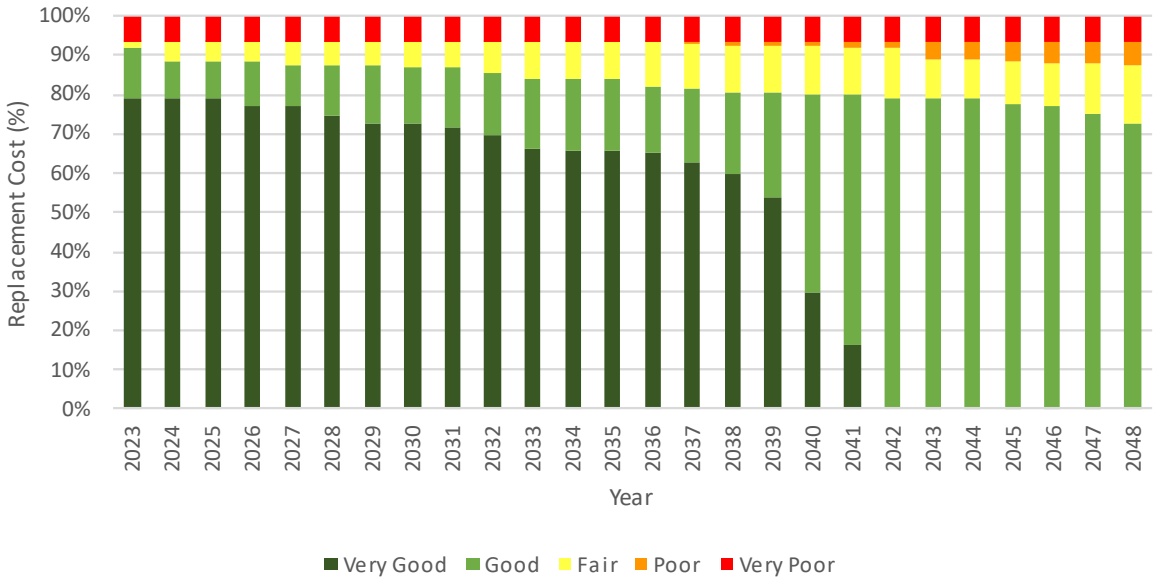


Figure 5-8: Scenario 1 – Maintain Current LOS Performance Distribution for Drinking Water Distribution Assets

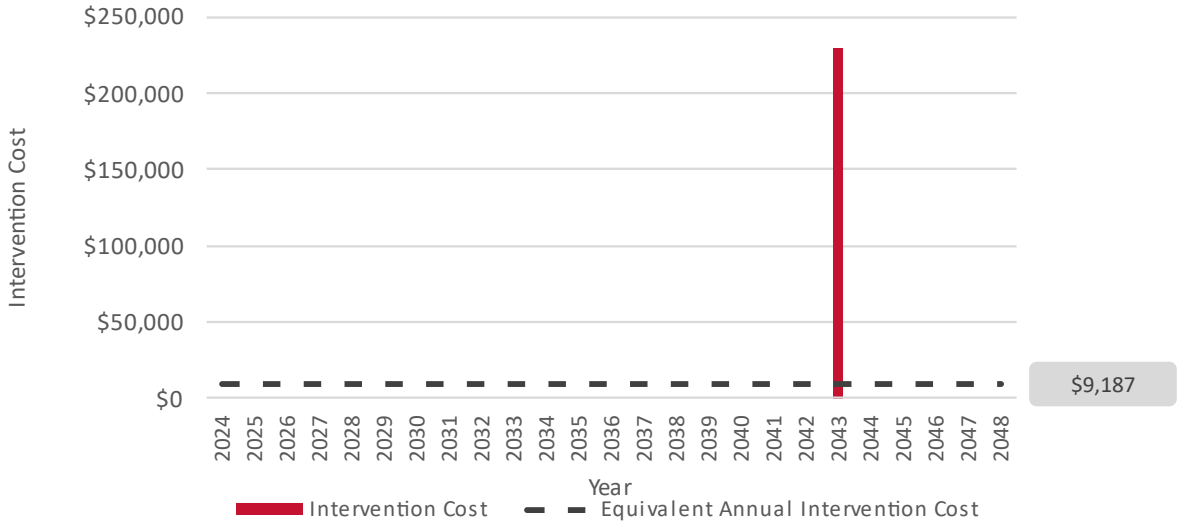


Figure 5-9: Scenario 1 – Maintain Current LOS Intervention Costs for Drinking Water Distribution Assets

5.1.5.2 Scenario 2: Backlog Analysis

In Scenario 2, the model predicts a total of $9.7M total needs occurring over the 25-year forecast (an annual average of $386.6k). In 2024, approximately $9.4M will be required to address the current backlog which the forecast spends an average annual amount of $386.6K over 25 years to address the current and future backlog and maintain the asset portfolio to ensure that no assets are in very poor condition within this forecast period. This does not account for future needs of the system from year 26 and beyond that will be placing additional demands on funding due to age and condition. The performance and spending forecasts are provided in Figure 5-10 and Figure 5-11.

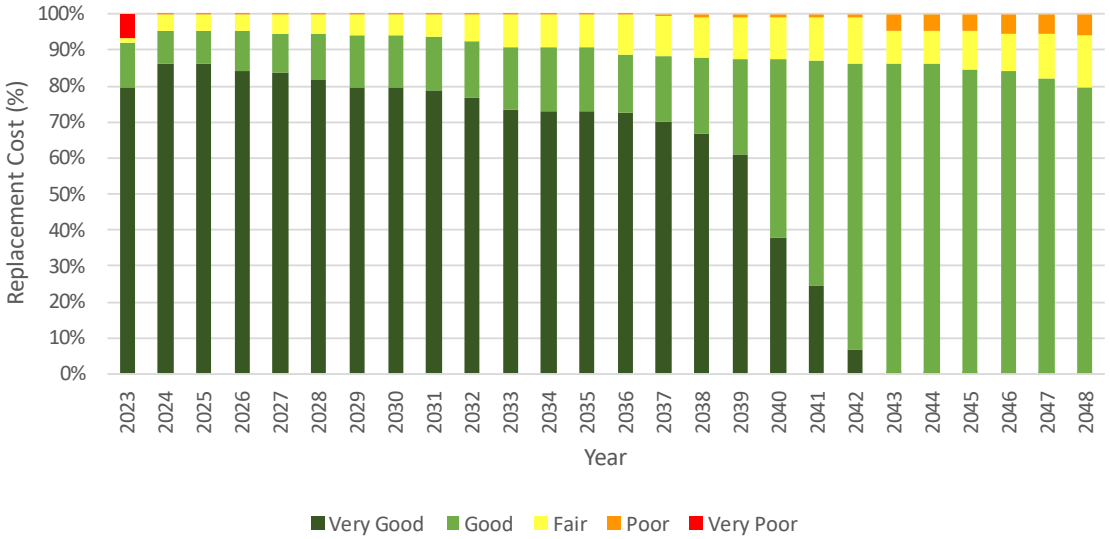


Figure 5-10: Scenario 2 – Backlog Analysis Performance Distribution for Drinking Water Distribution Assets

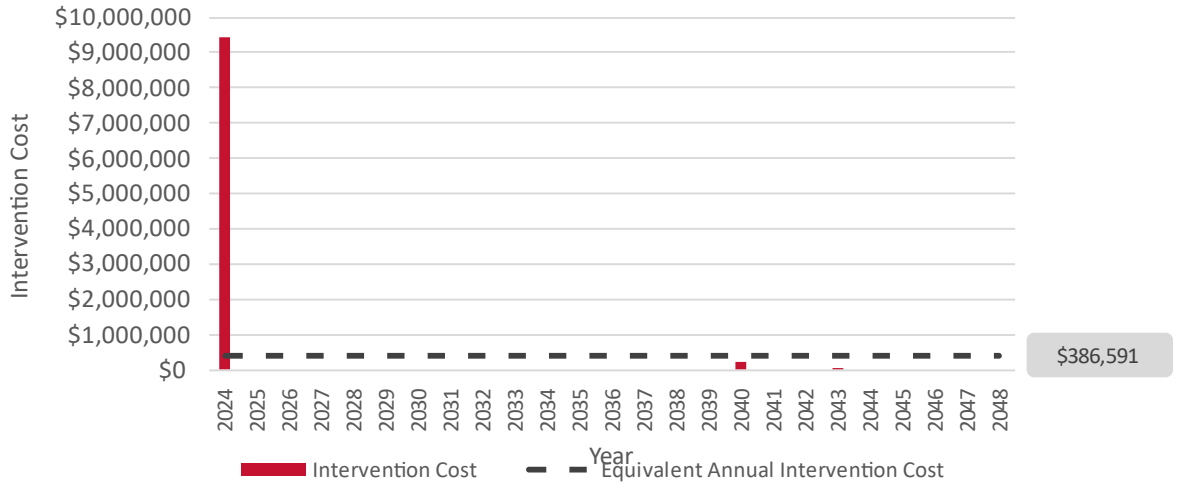


Figure 5-11: Scenario 2 – Backlog Analysis Intervention Costs for Drinking Water Distribution Assets

5.1.5.3 Scenario Comparison

Table 5-9 provides a comparison of the scenarios.

Table 5-9: Lifecycle Scenario Comparison for Drinking Water Distribution Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	$16.8k	=
Scenario 2: Backlog Analysis	$386.6k	↑

The scenario analysis revealed that the majority of needs in the drinking water service area are related to addressing current backlog (i.e. approximately $9.4M of backlog needs). Only a relatively small amount of additional asset needs will arise over the 25-year forecast period. This means that as the Township continues to invest in watermain replacements, it should see an increase in service levels, as most of that investment will go towards eliminating backlog, especially in the near-term. The required funding in this scenario comparison addresses the state of existing assets within the 25-year forecast and does not consider future needs arising from age or condition beyond this forecast period as drinking water distribution assets are long-lived assets and the system is only about a third of the way through its service life, on average. The Township also expects to experience additional demands from growth which will require further funding. Refer to the financial strategy (Section 10) for more information on the Township's full lifecycle costs, including growth. Although watermain breaks have been factored into the condition, there is additional condition information that can be gathered and applied to the system which will help improve the accuracy of the forecasted information. Further calibration to the models, and the decision support system tool in general, will be required to better align forecasts with the realities of decision making; however, there will always be limitations and trade-offs to understand when modelling is used. It is important to keep in mind that the models and forecasts are only intended to provide a high-level snapshot of the system under differing theoretical scenarios.

5.2. SANITARY WASTEWATER COLLECTION

The Township of Woolwich owns and operates a sanitary wastewater collection system composed of sanitary sewer mains and appurtenances (i.e. service laterals, maintenance holes), pumping stations and forcemains. It is important to note that the Township's sanitary system operates in a two-tier system with the Region of Waterloo. The Region is responsible for treatment of sanitary sewage at wastewater treatment facilities and the Township is responsible for conveyance of wastewater from homes and businesses to Regional treatment facilities.

SERVICE AT A GLANCE

Replacement Value

$148.3 Million

Overall Condition

★★★★☆

Good

Quantity

96.0 km of sewers
6,037 service laterals
1,498 maintenance holes
4.3 km of forcemains
6 pumping stations

WHAT'S INCLUDED IN SANITARY WASTEWATER COLLECTION SERVICES?

The Township of Woolwich's sanitary wastewater collection system consists of linear and vertical assets. The Township owns and maintains a total value of $148.3M of sanitary wastewater collection assets which all contribute to collecting and conveying wastewater to wastewater treatment facilities for the settlements of Breslau, Conestogo, Elmira, Heidelberg, and St. Jacobs. This represents 13% of the Township's total assets replacement value.

SANITARY WASTEWATER COLLECTION

LINEAR

- Sewer Mains
- Maintenance Holes
- Service Laterals

VERTICAL

- Pumping Stations
- Forcemains

5.2.1 State of the Infrastructure

The sanitary wastewater collection network includes the gravity sewer system composed of linear sanitary sewer mains, maintenance holes and service laterals, as well as vertical pumping stations, and related pressurized forcemains that transport wastewater from pumping stations to gravity systems. Note that for the sanitary sewers, the lifecycle and valuation strategies for associated assets, including service laterals and maintenance holes, are combined with the sanitary sewer assets themselves. As a result, the associated replacement values and condition ratings have been included in the sanitary sewer asset reporting. These associated assets are documented from an inventory perspective only. This also applies to forcemains, which are a component of pumping stations. Figure 5-12 illustrates the distributions of replacement values and length of linear assets of sanitary wastewater collection assets by asset type and community. The majority of the asset portfolio by replacement value are sanitary mains, located in the settlement of Elmira.

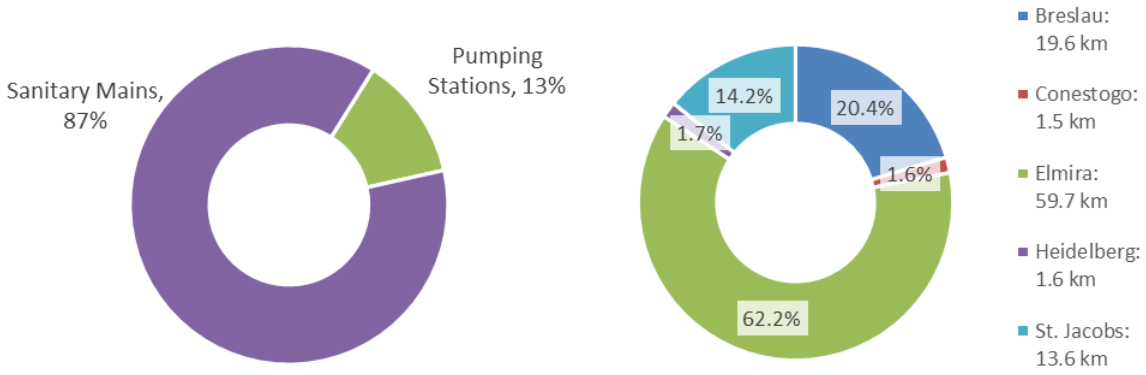


Figure 5-12: Replacement Value Distribution (left) and Linear Length Distribution of Sanitary Wastewater Collection Assets by Asset Type and Settlement (right)

5.2.1.1 Asset Inventory and Valuation

Table 5-10 below summarizes the asset valuation, quantities, and condition for each asset category. Replacement costs for the linear wastewater network were calculated using a per metre unit rate for the sewer main that also captures the replacement of maintenance holes and service laterals. Funding for the wastewater system is a rate supported system that requires a customer to be connected to the water distribution system as it is the water meter reading that is used to calculate the billing charge.

Table 5-10: Inventory and Valuation of Sanitary Wastewater Collection Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Linear	Sewers	$129,608,292*	96.0 km	Fair
	Service Laterals	*Included**	6,037 laterals	
	Maintenance Holes		1,498 assets	
Vertical	Pumping Stations	$18,700,000*	6 facilities	Good
	Forcemains	*Included**	4.3 km	

*Notes: Sanitary main replacement values include the replacement of service laterals and maintenance holes. Pumping Station values include the replacement of associated forcemains. Inventory lengths are rounded to nearest one hundred metre (i.e., 0.1 kilometre).

5.2.1.2 Age Summary

Figure 5-13 and

Figure 5-14 illustrate the age of sanitary wastewater collection assets as a proportion of their estimated service life, as well as the value of assets acquired by decade. The sanitary asset profile is relatively young, on average, with the majority of assets less than half of their average ESL.

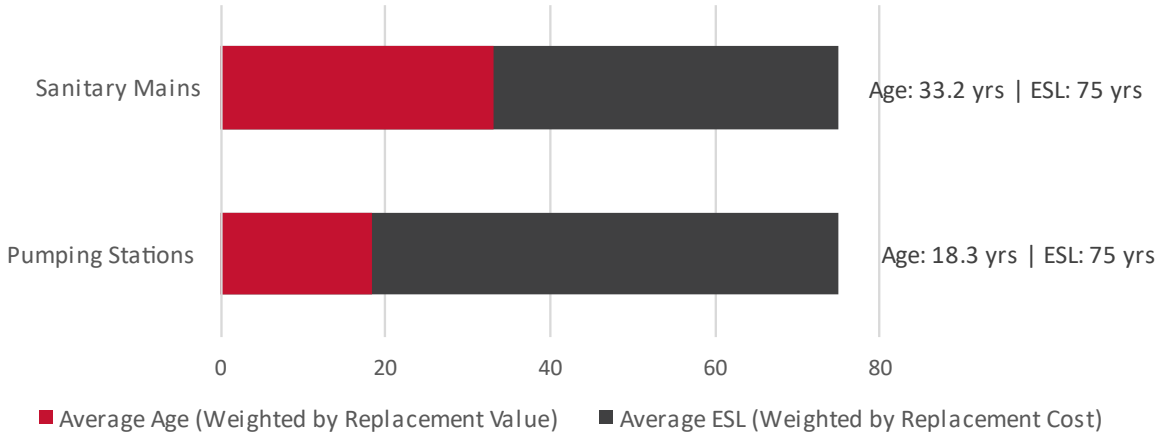


Figure 5-13: Age as a Proportion of Estimated Service Life (ESL) of Sanitary Wastewater Collection Assets

The majority of the sanitary wastewater network was constructed in the 1970s, 2000s and 2010s, driven by growth and development within the Township. It is important to keep in mind that these assets will place a large demand on funding and replacement needs as they approach the end of their useful life and their condition deteriorates in the future, which is beyond the 25-year forecast in this AMP.

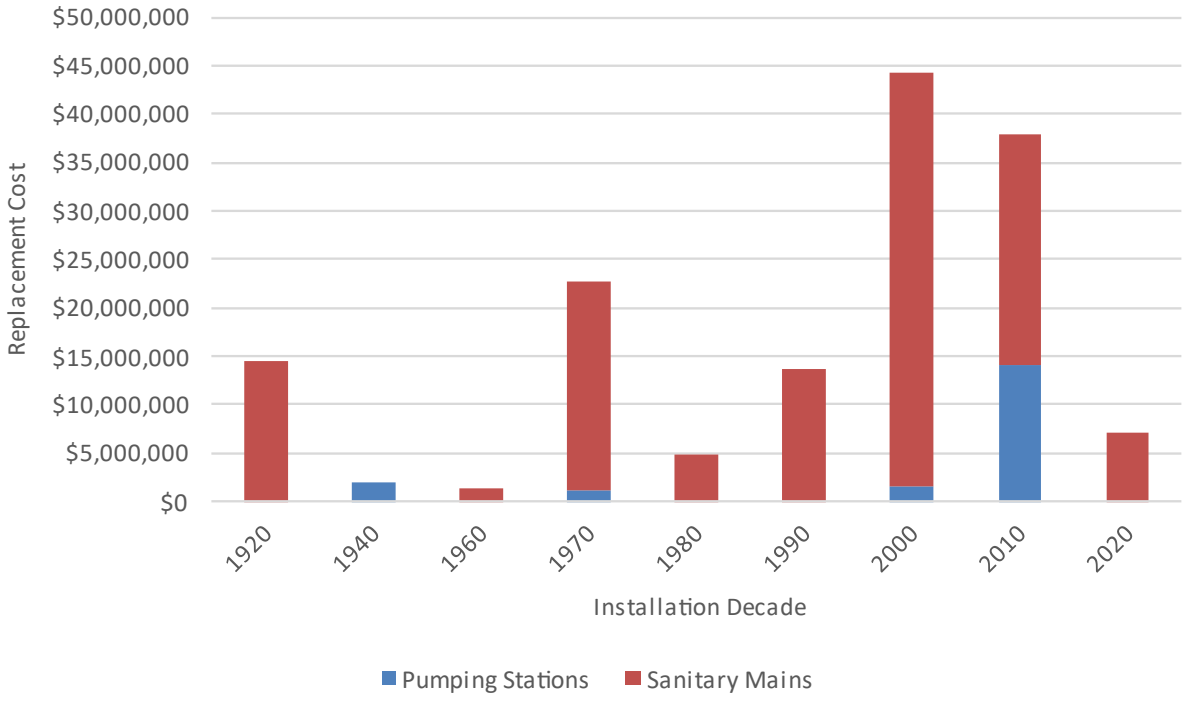


Figure 5-14: Age Distribution by Installation Decade of Sanitary Wastewater Collection Assets

5.2.1.3 Asset Condition

The Township completes a closed-circuit television (CCTV) inspection program for its sanitary sewer mains using NASSCO's Lateral, Maintenance Hole, and Pipeline Assessment Certification Program inspection (i.e. LACP, MACP, and PACP, respectively); however, the resulting condition ratings were not in a format that could be applied to the data at the time of development of this AMP. As a result, the Township utilizes age and estimated service life to approximate condition for these assets. The Township has a robust flow monitoring program that provides important data related to inflow and infiltration (I&I) within the wastewater collection network. Determining areas with I&I is another important tool in identifying the condition of the system and has been used historically by the Township to guide the lining program and pipe replacements.

Pumping stations are inspected regularly by Township Staff; however, condition data is not recorded formally against asset inventories. For assets within these facilities, age and estimated service life are used to approximate condition. Figure 5-15 and Figure 5-16 show the condition distribution of sanitary wastewater collection assets. Overall, 57% of assets are good to very good condition, based on age and ESL. Table 5-11 summarizes how condition ratings are determined.

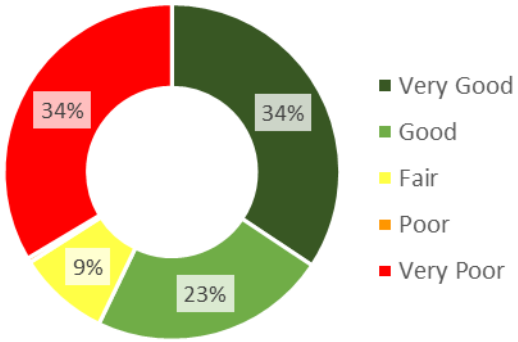


Figure 5-15: Condition Distribution of Sanitary Wastewater Collection Assets

Table 5-11: Condition Ratings for Sanitary Wastewater Collection Assets

Condition Category	Life Consumed	Condition Rating (All Assets)
Very Good	0% to 25%	Life Consumed is the metric used to evaluate condition for all asset classes.
Good	25% to 50%	
Fair	50% to 75%	
Poor	75% to 100%	
Very Poor	>100%	

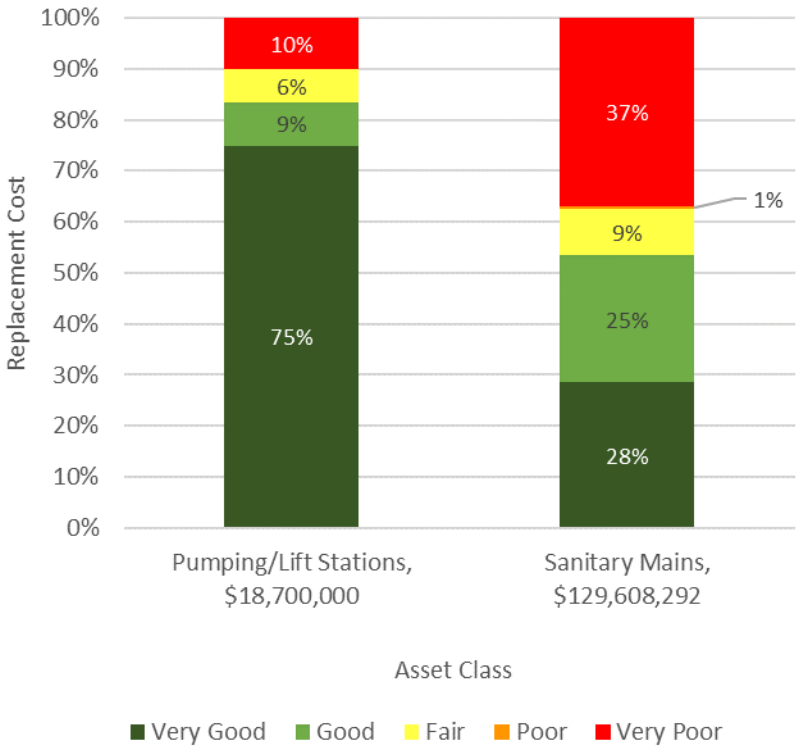


Figure 5-16: Condition Distribution of Sanitary Wastewater Collection Assets by Asset Class

5.2.1.4 Data Sources and Maturity

Table 5-12 and Table 5-13 summarize the data completeness and confidence of the Township's asset data for the sanitary wastewater collection system.

Table 5-12: Data Completeness for Sanitary Wastewater Collection Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost	Diameter	Material	Length
Sanitary Mains	100%	100%	0%	100%	100%	99%	100%
Pumping/Lift Stations	100%	100%	0%	100%	N/A	N/A	N/A

Table 5-13: Approach to Assessing Condition for Sanitary Wastewater Collection Assets

Asset Class	Approach to Assessing Condition
Sanitary Mains	Although the Township completes CCTV inspections of its sanitary sewer mains, the resulting condition ratings were not calculated in a format that could be applied to the data at this time. As a result, the Township relies on historical data. The Township is working towards incorporating CCTV condition scores for its sanitary network in the future. The estimated service life for all sanitary sewer main assets is 75 years. Condition was adjusted for known sanitary sewer mains with a high degree of inflow and infiltration to account for relining interventions.
Pumping Stations	These facilities are inspected by staff regularly; however, the condition data is not recorded formally against asset inventories. The Township relies on historical data and age. The estimated service life for pumping stations and forcemains is 75 years.

5.2.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as completing additional condition assessments (e.g. LACP, MACP, PACP), conducting spatial analysis to verify inventory data and identify missing information, developing an inventory of CCTV condition data by reviewing historic condition reports, creating data links between data sources (e.g. flow monitoring and I&I) and filling data gaps where required. Since inflow and infiltration can affect the capacity and function of the sanitary wastewater collection system, it is important to create workflows and processes to integrate results from flow monitoring and the Township's I&I program to better inform the condition of the system. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset management planning improvement recommendations can be found in the improvement plan (Section 11).

5.2.2 Levels of Service

The Township's goal is to provide functional and reliable sanitary wastewater collection services that minimize sewer backups and has a minimal impact on the environment. Table 5-14 and Table 5-15 provide a summary of the customer and technical LOS metrics that have been established by the Township and required by O. Reg. 588/17 for sanitary wastewater collection assets.

Table 5-14: Sanitary Wastewater Collection Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance
Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.*	Scope	Properties that are connected to the municipal wastewater system are in Breslau, Elmira, Conestogo, Heidelberg, and St. Jacobs. Rural areas outside the collection network and some older subdivisions in urban areas are serviced by private septic systems.
Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.*	Reliable	There are no combined sewers allowed in new construction design. The Township has a sufficient overflow network that collects excess flow to ensure that backups into homes are minimized or prevented.
Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.*	Reliable	The Township has not experienced any overflows 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.*	Reliable	Some Inflow and Infiltration (I&I) into the collection system exists. Infiltration occurs when groundwater enters the system through cracks, joints, and deficiencies in the infrastructure. Inflow occurs when stormwater enters the system through direct connections, such as roof drains, floor drains, foundation drains and other connections.
Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above*	Reliable	Design and construction criteria for sanitary sewers are in place to ensure consistent and industry-accepted performance requirements, materials, and installation methods are used. The Township conducts flow monitoring, I&I reduction program and is expanding its pipe lining program to target known areas of I&I.
Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.*	Reliable	The Region of Waterloo is responsible for the treatment of wastewater at sewage treatment facilities.
Adverse odours are minimized.	Operational	Odour complaints are addressed on a case-by-case basis. Sanitary mains are flushed as needed.

Customer Measures	Service Attributes	Current Performance
Sewer backups and flooding are minimized.	Reliable, Operational, Environmental Stewardship	The Township is meeting related service attributes by maintaining the sanitary network in a state of overall good condition where backups and flooding are minimized. More information is required to report on supporting technical metrics for operational and environmental stewardship measures to truly inform service levels.
The sewer system reliably collects and removes wastewater from properties.	Reliable	The technical LOS measures for reliability indicate that the system has high reliability and the overall system kept in a state that minimizes disruptions.

*Customer levels of service required by O. Reg. 588/17

Table 5-15: Sanitary Wastewater Collection Services Technical Levels of Service

Service Attributes	Technical Measures	Current Performance
Scope	Percentage of properties connected to the municipal wastewater system*	67.2%
Scope	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.*	0
Scope	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.*	0
Scope	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.*	N/A - Effluent discharge from wastewater treatment facilities is under the jurisdiction of the Region of Waterloo, including monitoring, reporting and response.
Reliable	Percentage of sanitary sewers in poor or better condition	63%
Reliable	Percentage of sanitary pumping station assets (including forcemains) in poor or better condition	90%
Reliable, Operational	Percentage of sanitary sewer network with sufficient capacity	100%
Reliable, Operational	Percentage of pumping stations with sufficient capacity	100%
Operational	Annual number of odour complaints	1

*Technical levels of service required by O. Reg. 588/17

5.2.3 Lifecycle Management Strategies

For the Township to provide sanitary wastewater collection services and maintain LOS, various lifecycle activities are performed on the sanitary wastewater collection assets. These include non-infrastructure solutions such as developing plans and performing condition assessments; preventative and reactive maintenance activities to repair assets; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. The Township is currently undertaking an area wide servicing capacity study, which will help identify existing areas of needs regarding renewals and growth-related improvements. Table 5-16 summarizes the lifecycle activities performed on sanitary mains, maintenance holes, service laterals, pumping stations, and forcemains.

Table 5-16: Lifecycle Management Activities for Sanitary Wastewater Collection Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, User Rate Study, financial plans, capacity studies, AMPs, models) • Consolidated Linear Infrastructure Environmental Compliance Approval, sewer modelling, I & I reduction initiatives • Policies, standards/procedures and by-laws (Service Lateral Policy) • Geographic Information System (GIS) data analysis and mapping	As required
Operations and Maintenance	Condition assessments (CCTV inspections)	Annual program
	Reactive and preventive maintenance • Spot repair • Service lateral repairs • Appurtenances repairs • Flushing • Pumping station maintenance	Following preventative maintenance programs, or as needed
Renewal (Rehabilitation and Replacement)	Main and service Lining	Based on inspections and condition assessments
	Pumping station upgrades • Minor Rehabilitation (e.g., programable logic control replacement, pump replacement, valving) • Major Rehabilitation – any time the system needs to be bypassed (e.g., structural repairs, motor control cabinet, valving, header system)	As required
	Major equipment or structural building component replacement.	When assets reach end of service life

Lifecycle Activity	Description	Frequency
	Open cut replacement of mainline pipe and connected assets	
Disposal	Building and equipment disposal	Coordinated with asset replacement
	Equipment re-use	As required where possible
Expansion and Service Improvements	Pump/Equipment Upsizing	As identified in the Master Plan and Capacity Studies/Analysis
	Expansion and upsizing	Through development
	Supervisory Control and Data Acquisition (SCADA) system and software upgrades	As needed
	Special Service Levy	Ratepayer Request and Council Approval/Provincial Authority Order

5.2.4 Risk Management Strategy

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all sanitary wastewater collection assets. The results from the risk analysis are provided in Table 5-17. The distribution table illustrates the amount of assets within each risk score (1-25).

Approximately $49.8M of assets have a high likelihood of failure (LOF score of 5) and of these assets, approximately $2.8M (2% of the asset portfolio) are high-risk assets due to a higher COF score. Approximately 33% of assets are medium risk and the remainder are low risk. Assets identified as high risk should be validated, reviewed and prioritized in capital planning to reduce the overall risk of the sanitary network.

Table 5-17: Risk Score Distribution of Sanitary Wastewater Collection Assets

Consequence of Failure	Likelihood of Failure 1	2	3	4	5
1	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
2	$23,496,684 (15.8%)	$18,738,344 (12.6%)	$6,455,474 (4.4%)	$214,653 (0.1%)	$27,392,239 (18.5%)
3	$16,731,250 (11.3%)	$15,094,583 (10.2%)	$5,461,039 (3.7%)	$433,855 (0.3%)	$19,628,263 (13.2%)
4	$10,700,524 (7.2%)	$0 (0.0%)	$1,200,000 (0.8%)	$0 (0.0%)	$2,761,384 (1.9%)
5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium (10-15)
- High risk (16-25)

5.2.5 Lifecycle Forecasting

5.2.5.1 Scenario 1: Maintain Current LOS

Scenario 1 forecasts asset performance by maintaining current service levels. A total of $6.7M (annual average of $266.8k) is predicted to be spent over the next 25 years. In this scenario, the distribution of approximately 33% of assets that are in very poor condition in 2023 is maintained over the next 25 years, or 66% of the asset portfolio will continue to be in poor or better condition. The performance and spending forecasts are provided in Figure 5-17 and Figure 5-18.

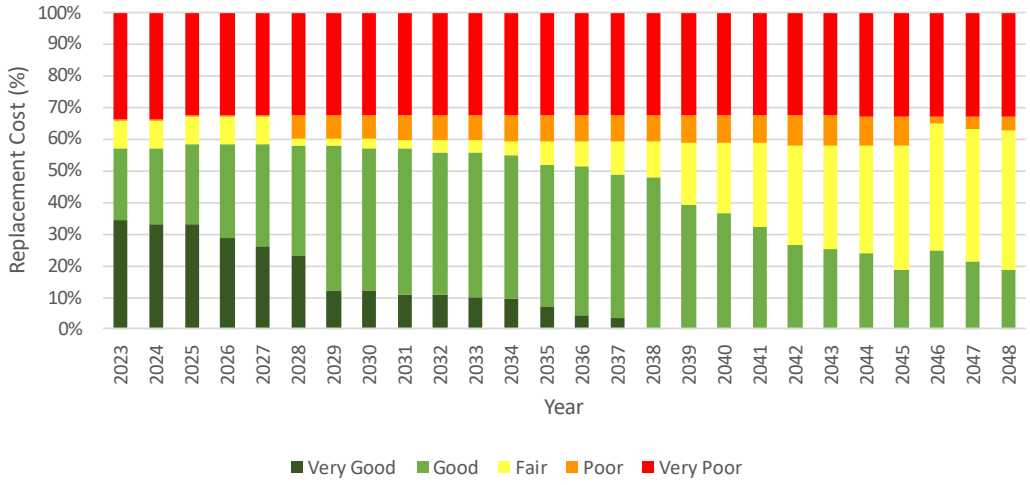


Figure 5-17: Scenario 1 – Maintain Current LOS Performance Distribution for Sanitary Wastewater Collection Assets

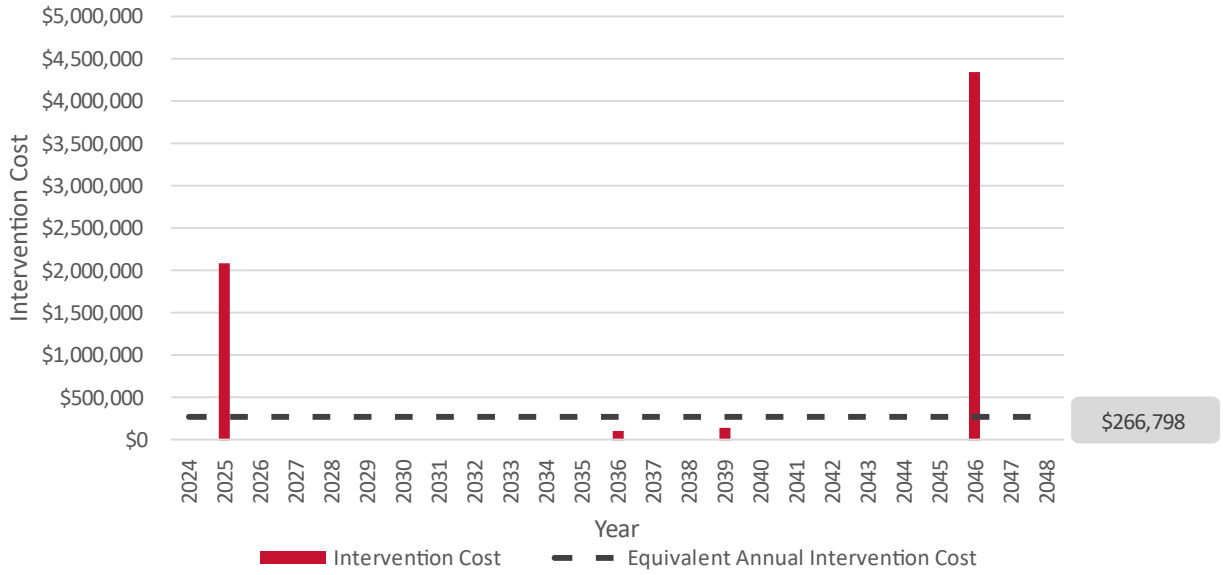


Figure 5-18: Scenario 1 – Maintain Current LOS Intervention Costs for Sanitary Wastewater Collection Assets

5.2.5.2 Scenario 2: Backlog Analysis

In Scenario 2, a total of $71.9M or an annual average of approximately $2.9M, is forecasted to be spent to address the backlog and maintain the asset portfolio to ensure that no assets are in very poor condition over the next 25 years. There is approximately $36.2M required to address the backlog needs of the current system with additional intervention costs of $35.7M that will be required to address needs from 2046 to 2048.

This does not account for future needs of the system from year 26 and beyond that will be placing additional demands on funding due to age and condition. The performance and spending forecasts are provided in Figure 5-19 and Figure 5-20.

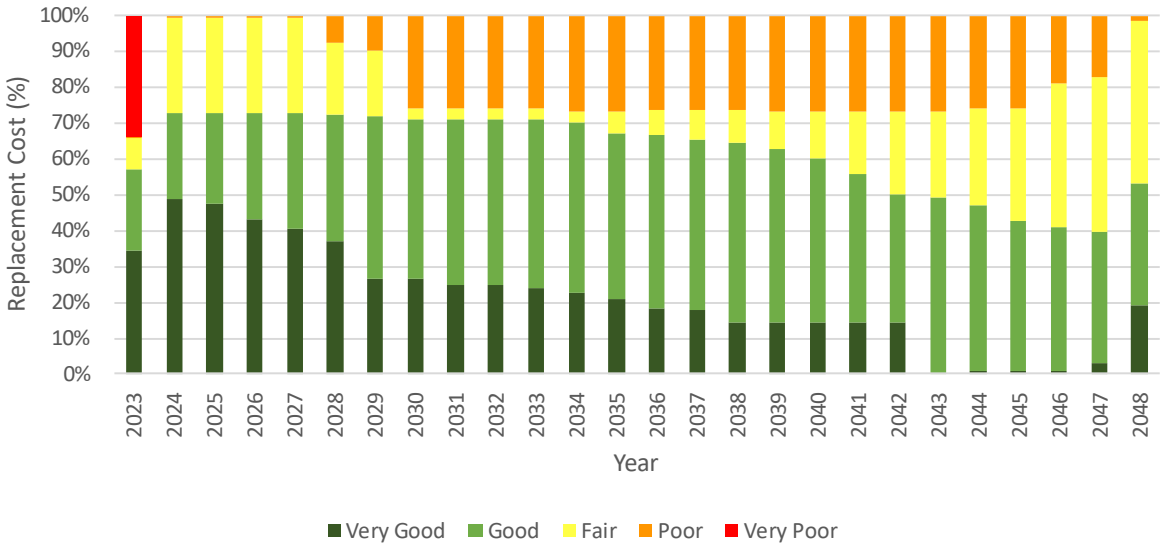


Figure 5-19: Scenario 2 – Backlog Analysis Performance Distribution for Sanitary Wastewater Collection Assets

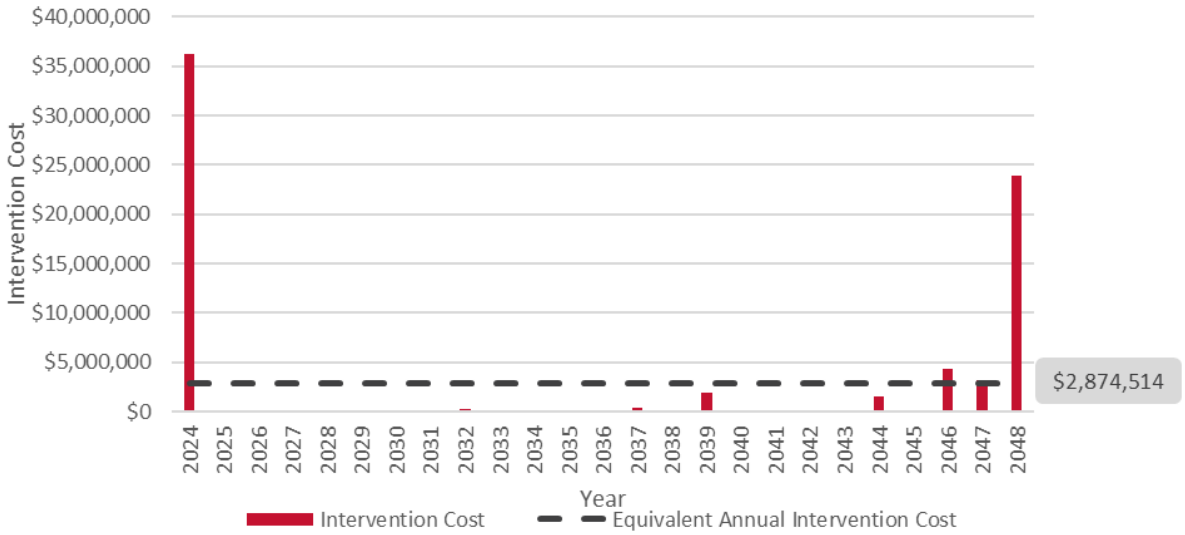


Figure 5-20: Scenario 2 – Backlog Analysis Intervention Costs for Sanitary Wastewater Collection Assets

5.2.5.3 Scenario Comparison

Table 5-18 provides a comparison of the scenarios.

Table 5-18: Lifecycle Scenario Comparison for Sanitary Wastewater Collection Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	$266.8k	=
Scenario 2: Backlog Analysis	$2.9M	↑

The majority of the asset needs are derived from current backlog of sanitary linear assets (i.e. sewer mains), which represents the largest share of current backlogged ($36.3M) asset needs. As the Township continues to invest in renewals for the sanitary linear assets, it should expect to see a near-term improvement in service levels, however, more needs are anticipated for both vertical and linear assets over the 25-year forecast period. The required funding in this scenario comparison addresses the state of existing assets and the Township also expects to experience additional demands from growth which will require further funding. Refer to the financial strategy (Section 10) for more information on the Township's full lifecycle costs, including growth. Note that sanitary wastewater collection assets were primarily assessed using an age and service-life based analysis. The Township has collected CCTV condition data for some of its sanitary sewer network; however, condition scores have not yet been assigned to the sanitary sewer data for use in this analysis and AMP. Once the Township leverages this condition data, in combination with integrating I&I metrics, it will advance the maturity of its analysis of current and forecasted asset needs.

5.3. STORMWATER MANAGEMENT

The Township of Woolwich owns and operates stormwater management (SWM) collection systems through the use of sewers, quality and quantity control devices, temperature mitigation measures, maintenance holes and an array of SWM pond facilities. Stormwater management systems can be complex; however, at its basic function, SWM systems collect rainwater and convey this runoff through sewers to either infiltration facilities that are designed to promote groundwater recharge or to attenuation basins/ponds designed to control discharge rates as erosion and flood mitigation measures. Generally, stormwater runoff collects sediment and other potentially harmful substances based on the nature of the land usage within the drainage or catchment area whether an industrial, commercial, institutional, residential, or agricultural land use. These accumulations of sediments are intended to be collected and stored within the stormwater management facility. The land use within the drainage area will affect the type and the amount of accumulation within the catchment, which helps define the cleanout or disposal frequency associated with the SWM asset.

SERVICE AT A GLANCE

Replacement Value

$201.8 Million

Overall Condition

Fair

Quantity

7.0 km of culverts
7.4 km of groundwater management systems
501 maintenance holes
99.5 km of storm sewer mains
2,824 storm sewer structures
3,400 service laterals
7 oil grit separators
369 m of retaining walls
24 SWM ponds

WHAT'S INCLUDED IN STORMWATER MANAGEMENT SERVICES?

The Township of Woolwich's stormwater management system consists of linear assets and SWM facilities. The Township owns and maintains a total value of $201.8M of stormwater management collection assets which all contribute to the conveyance of stormwater to protect homes, businesses, and other properties from flooding as well as treating runoff before discharging the flow back to the natural environment. This represents 18% of the Township's total assets replacement value.

Linear stormwater infrastructure is comprised of sewer mains and related assets (i.e. maintenance holes, service laterals and structures), culverts and groundwater management systems. Storm sewer structures include catch basins, catch basin maintenance holes, and storm outlets (i.e. headwalls). Stormwater culverts are those

that are less than 3m span and cross a roadway; any culvert structure that is greater than 3m span is inspected following the Ontario Structure Inspection Manual (OSIM) and can be found under the Transportation services section along with bridges. Groundwater management systems are a series of perforated and closed sewer mains with maintenance holes and individual service laterals designed to maintain groundwater fluctuations at an acceptable level to support residential and other forms of development. Stormwater management facilities can be complex and elaborate depending on the sensitivity of the downstream receiving water course or stormwater infrastructure. Some of the assets that can be found in a SWM facility include quantity and/or quality control ponds, oil grit separators, temperature control measures, such as cooling trenches, inlet and outlet flow structures and retaining walls. Note that there are additional retaining wall assets that are listed under the Transportation services section. Groundwater Management Systems (GWMS) expand the SWM Facilities section to also include temperature control measures and inlet/outlet control structures.

STORMWATER MANAGEMENT

LINEAR

- Storm Sewer Mains
- Stormwater Maintenance Holes
- Stormwater Service Laterals
- Storm Sewer Structures
- Groundwater Management Systems
- Culverts

SWM FACILITIES

- Oil Grit Separators
- Retaining Walls
- SWM Ponds

5.3.1 State of the Infrastructure

The Township owns and maintains storm sewer mains, groundwater management systems (GWMS), culverts, oil grit separators, SWM ponds and associated infrastructure, and retaining walls. Note that for storm sewer mains, the lifecycle and valuation strategies for associated assets, including service laterals, maintenance holes and storm sewer structures are combined with the storm sewer assets. As a result, the associated replacement values and condition ratings have been included in the storm sewer asset reporting. These associated assets are documented from an inventory perspective only. Figure 5-21 and Figure 5-22 illustrates the replacement value distribution of stormwater management assets and of linear storm sewer mains by settlement, respectively. Storm sewer mains and SWM ponds account for the majority of the asset portfolio.

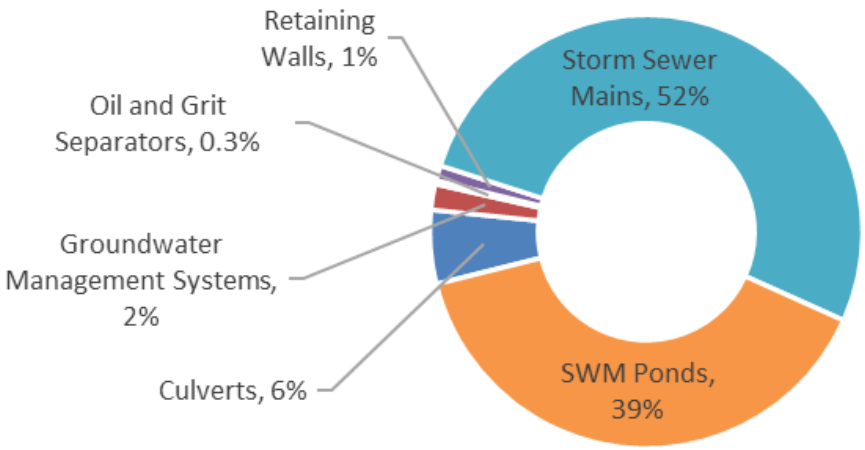


Figure 5-21: Replacement Value Distribution of Stormwater Management Assets

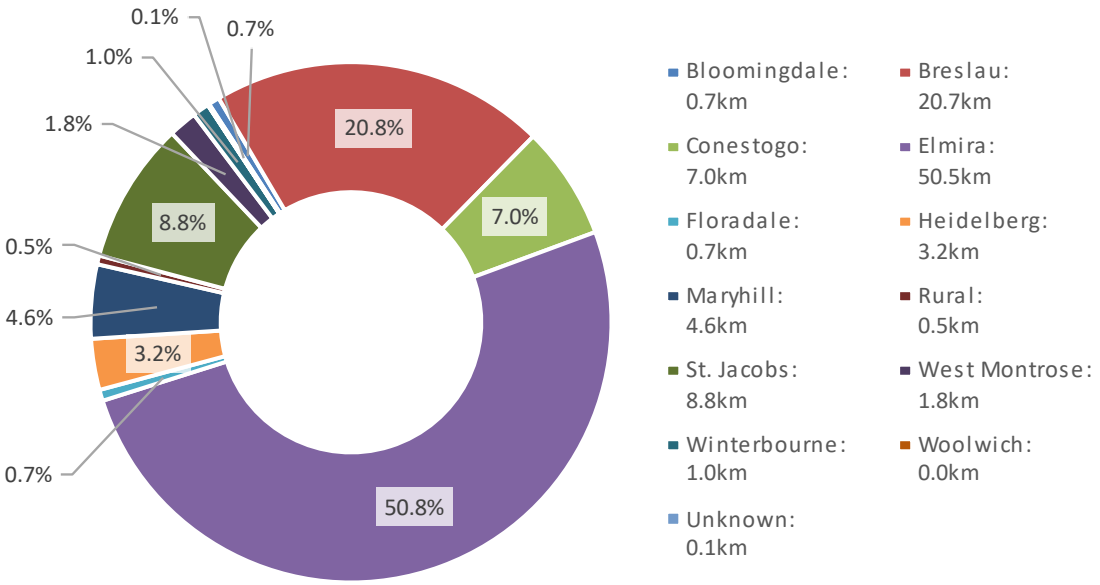


Figure 5-22: Linear Length Distribution of Storm Sewer Mains by Settlement

5.3.1.1 Asset Inventory and Valuation

Table 5-19 below summarizes the asset valuation, quantities, and condition for each asset category. Replacement costs for the linear storm sewer network were calculated using a per metre unit rate for the storm sewer main that also captures the replacement of associated assets (e.g. service laterals, maintenance holes and storm sewer structures like headwalls, catch basins and catch basin maintenance holes).

Table 5-19: Inventory and Valuation of Stormwater Management Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Linear	Storm Sewer Mains	$104,479,054*	99.5 km	Good
	Service Laterals	*Included**	3,400 laterals	
	Maintenance Holes		501 assets	
	Storm Sewer Structures		2,824 assets	
	Groundwater Management Systems	$3,871,560	7.4 km	Good
	Culverts	$11,115,738	7.0 km	Fair
SWM Facilities	Oil Grit Separators	$546,000	7 units	Very Good
	SWM Ponds	$79,513,000	24 ponds	Poor
	Retaining Walls	$2,276,760	369 m	Very Good

*Notes: Storm sewer main replacement values include the replacement values of services, maintenance holes, and storm sewer structures (e.g. catch basins, catch basin maintenance holes and headwalls). Inventory lengths are rounded to nearest one hundred metre (i.e., 0.1 kilometre).

5.3.1.2 Age Summary

Figure 5-23 and Figure 5-24 illustrate the age of stormwater management assets as a proportion of their estimated service life, as well as the value of these assets that were installed by decade. A large proportion of the stormwater infrastructure has been installed in the 1990s can be associated with subdivision growth experienced in the Township. It is important to keep in mind that each decade of installation will have a corresponding decade in the future where the infrastructure will reach its end of life and will result in a large financial burden for replacement needs.

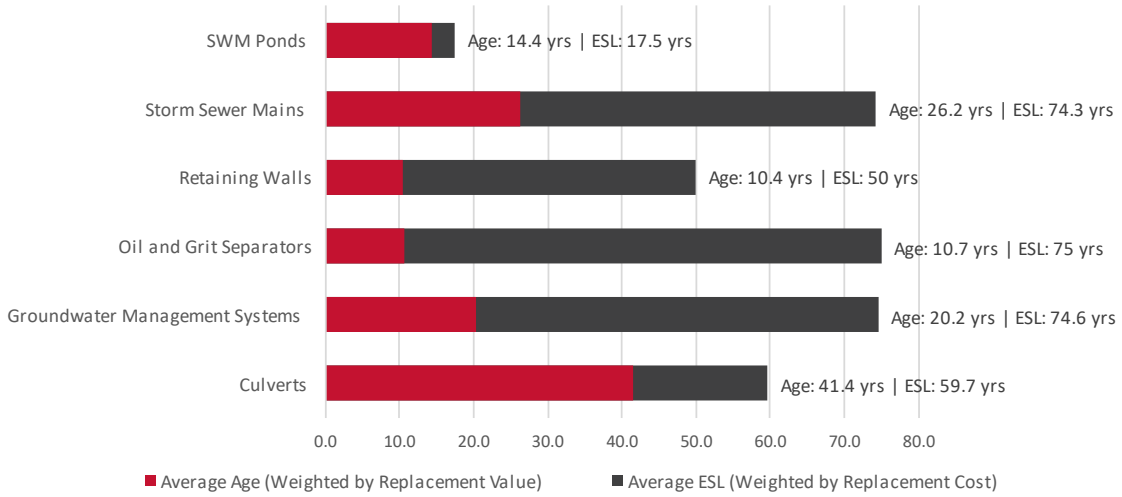


Figure 5-23: Age as a Proportion of Estimated Service Life (ESL) of Stormwater Management Assets

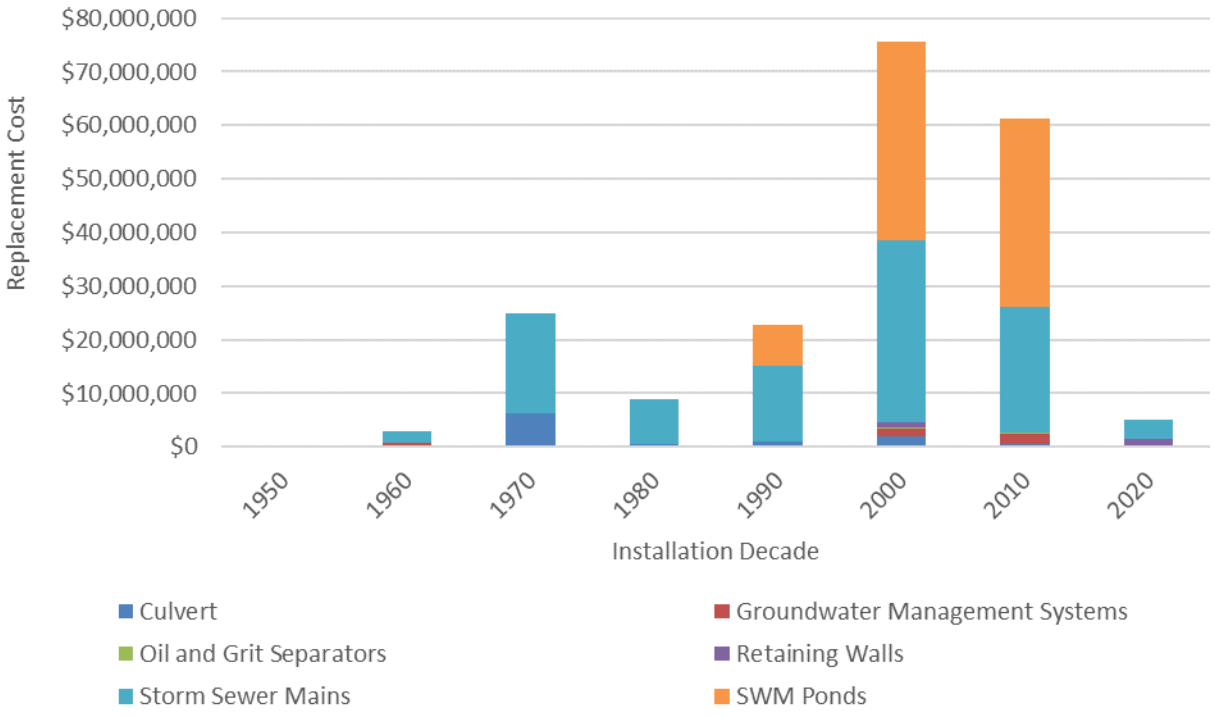


Figure 5-24: Age Distribution by Installation Decade of Stormwater Management Assets

5.3.1.3 Asset Condition

The Township has completed some closed-circuit television (CCTV) inspections for its storm sewer mains using NASSCO's Lateral, Maintenance Hole, and Pipeline Assessment Certification Program inspection (i.e. LACP, MACP, and PACP, respectively)); however, the resulting condition ratings were not in a format that could be applied to the data at the time of development of this report. Condition inspections for the majority of road crossing culverts have been completed with general guidance from the Ministry of Transportation's Culvert Inspection Guide. Currently there is no formal condition assessment program for the other stormwater management assets and the Township relies on historical data – primarily age and estimated service life (ESL), to report on condition and make asset-related decisions. This includes SWM facilities as condition is assumed based on age and estimated service life for the dredging of sediment accumulation; however, the Township is working towards completing improved condition assessments and bathymetric surveys to better assess sediment removal needs and pond function for all its SWM facilities. It is important to note that the Ministry of Environment, Conservation and Parks (MECP) is requiring municipalities to complete more comprehensive reporting on its SWM infrastructure. Figure 5-25 and Figure 5-26 show the condition distribution of all stormwater assets. Table 5-20 summarizes how condition ratings are determined.

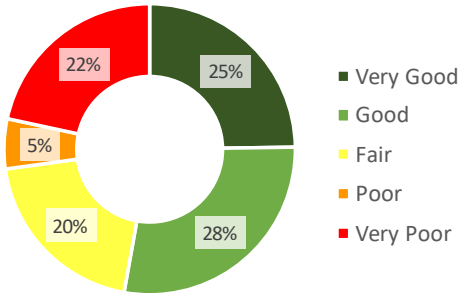


Figure 5-25: Condition Distribution of Stormwater Management Assets

Table 5-20: Condition Ratings for Stormwater Management Assets

Condition Category	Life Consumed	Culverts (Stormwater Culvert Condition Rating)	Condition Rating (All Other Assets)
Very Good	0% to 25%	1	Life Consumed is the metric used to evaluate condition for all asset classes.
Good	25% to 50%	2	
Fair	50% to 75%	3	
Poor	75% to 100%	4	
Very Poor	>100%	5	

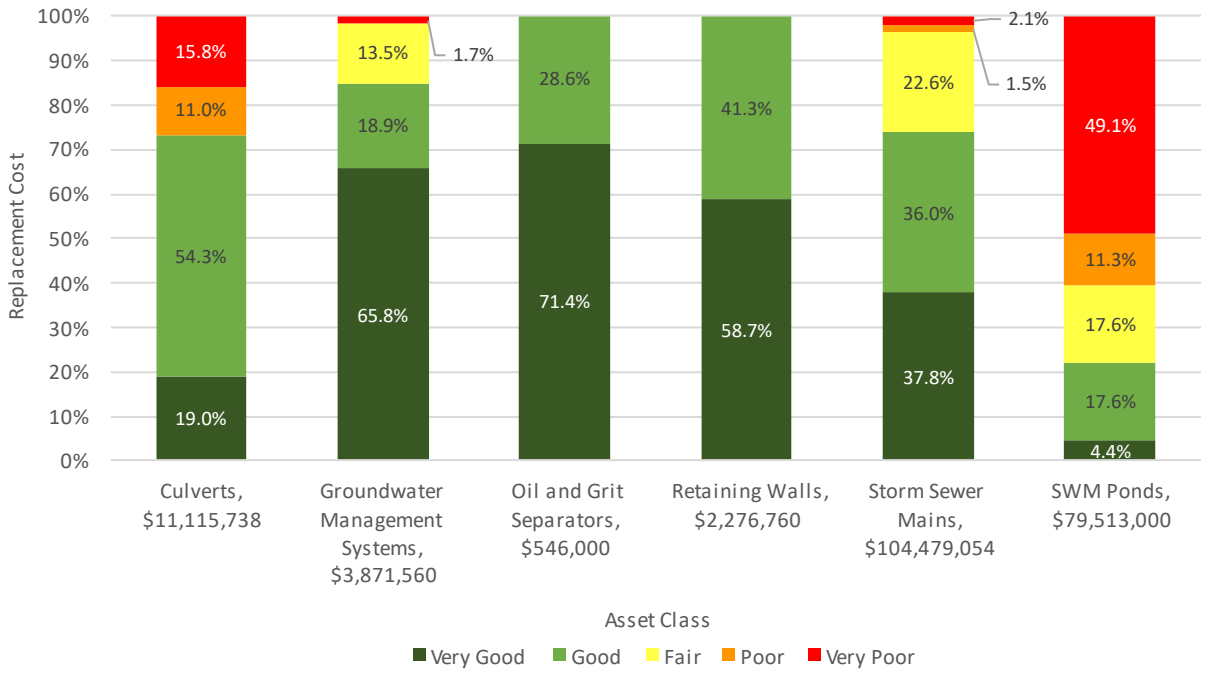


Figure 5-26: Condition Distribution of Stormwater Management Assets by Asset Class

5.3.1.4 Data Sources and Maturity

Table 5-21 and Table 5-22 summarize the data completeness and confidence of the Township's asset data.

Table 5-21: Data Completeness for Stormwater Management Asset Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost	Diameter	Material	Length
Stormwater Mains	100%	100%	0%	100%	96%	89%	100%
Groundwater Management Systems	100%	100%	0%	100%	99%	79%	100%
Culverts	100%	100%	67%	100%	69%	98%	100%
Oil Grit Separators	100%	100%	0%	100%	N/A	N/A	N/A
SWM Ponds	100%	100%	0%	100%	N/A	N/A	N/A
Retaining Walls	100%	100%	0%	100%	N/A	100%	100%

Table 5-22: Approach to Assessing Condition for Stormwater Management Assets

Asset Class	Approach to Assessing Condition
Stormwater Mains	Although the Township completes CCTV inspections of its storm sewer mains, the resulting condition ratings were not calculated in a format that could be applied to the data at this time. As a result, the Township relies on historical data (age and ESL). The Township is working towards incorporating CCTV condition scores for its stormwater network in the future. The estimated service life for storm sewer main assets is 75 years, if the material is corrugated steel pipe the ESL is 50 years. Further efforts are required to address data gaps.
Groundwater Management Systems	The Township does not undertake a formal condition assessment for these assets and uses asset age and ESL to understand condition. The estimated service life for groundwater management systems is 75 years. Further efforts are required to address data gaps.
Culverts	The Township is working on completing culvert condition inspections on all culverts; age and ESL is used to gap fill missing condition. The estimated service life for HDPE and PVC culverts is 75 years, if the material is corrugated steel pipe the ESL is 50 years and concrete is 100 years. Further efforts are required to address data gaps.
Oil Grit Separators	The Township does not undertake a formal condition assessment for these assets and uses asset age and ESL to understand condition. These assets require a maintenance cleaning cycle of approximately two to five years. The estimated service life for is 75 years.
SWM Ponds	The Township does not undertake a formal condition assessment for these assets and uses asset age and ESL to understand condition. The estimated service life for forebays is 60 years, with an assumed sediment dredging cycle every 15 years, and main cell ponds have an estimated service life of 50 years, with an assumed sediment dredging cycle every 25 years.
Retaining Walls	The Township does not undertake a formal condition assessment for these assets and uses asset age and ESL to estimate condition. The estimated service life is between 40 and 50 years depending on material.

5.3.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as completing additional condition assessments (e.g. LACP, MACP and PACP for stormwater mains, expanding the CCTV inspection program for groundwater management systems and small diameter culverts, and continuing to asses culverts using MTO's Culvert Inspection Guide), conducting a spatial analysis to verify inventory data and identify missing information, developing an inventory of CCTV condition data by reviewing historic condition reports, creating data links between data sources and filling data gaps where required (e.g. diameter and material). The Township is currently planning to conduct bathymetric surveys for all SWM ponds to assess the accumulation of sediment and develop sediment removal programs as well as condition assessments for facility structures which will help better inform the condition of stormwater assets. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset

management planning improvement recommendations can be found in the improvement plan (Section 11).

5.3.2 Levels of Service

The Township's goal is to provide stormwater management services that minimizes pollutants entering natural watercourses and minimizes flooding and the impact of flooding on properties, the transportation system, and environment. Table 5-23 and Table 5-24 provide a summary of the customer and technical LOS metrics that have been established by the Township and required by O. Reg. 588/17 for stormwater management services.

Table 5-23: Stormwater Management Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance (2023)
Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.*	Scope	Urban areas are protected from flooding through urban ditch system or underground storm collection, some with designed outlets. Most rural areas protected from flooding through provision of municipal drains or rural ditch systems, some with defined outlets.
Sewer backups and flooding are minimized.	Reliable	The technical metrics for reliability based on condition are in a good state suggesting that the system is generally reliable. Further robust condition information is required.
Transportation impacts from flooding are minimized	Reliable	
Property impacts from flooding are minimized	Reliable	

*Customer levels of service required by O. Reg. 588/17

Table 5-24: Stormwater Management Services Technical Levels of Service

Service Attributes	Technical Measures	Current Performance (2023)
Scope	Percentage of properties in municipality resilient to a 100-year storm.*	39.4%
Scope	Percentage of the municipal stormwater management system resilient to a 5-year storm.*	70.7%
Reliable	Percentage of storm sewer mains that are in poor or better condition	98%
Reliable	Percentage of culverts that are in poor or better condition	84%
Reliable	Percentage of groundwater management systems that are in poor or better condition	98%
Reliable	Percentage of retaining walls that are in poor or better condition	100%
Reliable	Percentage of SWM facilities that are in poor or better condition	52%

*Technical levels of service required by O. Reg. 588/17

5.3.3 Lifecycle Management Strategies

For the Township to provide stormwater management services and maintain LOS, various lifecycle activities are performed on the stormwater management assets. These include non-infrastructure solutions such as developing plans and performing condition assessments; preventative and reactive maintenance activities to repair assets; refurbishing assets; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. The following tables summarize the lifecycle activities performed on stormwater management assets.

Table 5-25: Lifecycle Management Activities for Linear Stormwater Management Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs, Master Drainage Plan, models) • Municipal drains • Consolidated Linear Infrastructure Environmental Compliance Approvals • Geographic Information System (GIS) data analysis and mapping • Policies, procedures/standards and by-laws	As required
	Sump Pump Policy Stormwater Utility Implementation	Future Initiative
	Flood Implementation Plan	As required

Lifecycle Activity	Description	Frequency
	Conduct community engagement to define priorities and standards to establish budgeting and service levels for the future.	Future Initiative
Operations and Maintenance	CCTV inspections	As required
	Culvert inspections	As required
	Flushing (mains, culverts, cellar) to remove debris	As required
	Pipe spot repairs (Appurtenances repairs)	As required
	Catch basin, lateral and maintenance hole repairs	As per inspections
	Groundwater management systems and catch basin cleaning to remove debris and sediment	As per inspections, Catch basing cleaning occurs biennially
Renewal/Rehabilitation	Erosion control	As per inspections
	Inlet/Outlet and outfall	As per inspections
	Sewer Lining	As Required
Replacement/Disposal	Pipe replacement Service lateral replacement (open cut replacement of mainline pipe and connected assets)	End of life
	Maintenance hole replacement	Coordinated with sewer replacement
	Storm sewer structure replacement • Replace inlet/outlet structure • Stormwater outlet/headwall replace	End of life
	OGS replacement	End of life
	SWM pond dredging/cleanouts and sediment disposal	As per inspections
	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
Expansion and Service Improvements	Conduct community engagement to define priorities and standards to establish sustainable budgets and service levels.	Future Initiative
	Growth needs are known based on the Development Charges and Master Servicing and Stormwater Management Report and other Secondary Plans.	Through growth and development
	Stormwater network expansion/upgrades to service new areas or expand capacity of existing network (pipe upsizing, new subdivisions, coordination with other services).	Through growth and development

Table 5-26: Lifecycle Management Activities for Stormwater Management Facilities Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs, Master Drainage Plan, models) • Consolidated Linear Infrastructure Environmental Compliance Approval • Policies, procedures/standards and by-laws	As required
	Stormwater Utility Implementation	Future Initiative
	Flood Implementation Plan	As required
	Conduct community engagement to define priorities and standards to establish budgeting and service levels for the future.	Future Initiative
Operations and Maintenance	SWM Facilities Inspections (bathymetric surveys, sediment sampling and depth measurement, visual inspections, thermal regime monitoring, inlet/outlet and outfall)	As required/Future Initiative
	SWM pond blockage and vegetation removal (E.g. Dredging) SWM facility outlet cleaning	As per inspections
	OGS (Oil Grit Separators) cleaning to remove debris and sediment	As per inspections
Renewal/ Rehabilitation	Erosion control	As per inspections
Replacement/ Disposal	SWM pond retaining wall and storm sewer structure replacements. • Replace inlet/outlet structure • Stormwater outlet/headwall replace	End of life
	OGS replacement	End of life
	SWM pond dredging/cleanouts and sediment disposal	As per inspections
	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
	Disposal of sediment and debris	As required
Expansion and Service Improvements	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative
	Growth needs are known based on the Development Charges and Master Servicing and Stormwater Management Report and other Secondary Plans.	Through growth and development
	Stormwater network expansion/upgrades to service new areas or expand capacity of existing network (pipe upsizing, new subdivisions, coordination with other services).	Through growth and development

5.3.4 Risk Management Strategy

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all stormwater management assets. The results from the risk analysis are provided in Table 5-27. The distribution table illustrates the amount of assets within each risk score (1-25).

There are approximately $43.0M of assets that have a high likelihood of failure (LOF score of 5) and of these assets, COF scores range from 2 to 4. Approximately $898.5k (<1% of the asset portfolio) are high-risk assets, $56.3M (28%) are medium risk, and the remainder are low risk assets. Assets identified as high risk should be validated, reviewed and prioritized in capital planning to reduce the overall risk of stormwater management services.

Table 5-27: Risk Score Distribution of Stormwater Management Assets

		Likelihood of Failure				
		1	2	3	4	5
Consequence of Failure	1	$4,879 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
	2	$39,586,614 (19.6%)	$35,766,436 (17.7%)	$22,457,802 (11.1%)	$1,097,886 (0.5%)	$3,828,672 (1.9%)
	3	$9,241,098 (4.6%)	$20,366,762 (10.1%)	$12,189,921 (6.0%)	$10,280,524 (5.1%)	$38,690,593 (19.2%)
	4	$507,121 (0.3%)	$3,385,275 (1.7%)	$3,500,000 (1.7%)	$433,131 (0.2%)	$465,398 (0.2%)
	5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium (10-15)
- High risk (16-25)

5.3.5 Lifecycle Forecasting

5.3.5.1 Scenario 1: Maintain Current LOS

Scenario 1 forecasts asset performance by maintaining current service levels. A total of $48.1M (annual average of $1.9M) is anticipated to be spent over the next 25 years to maintain the current distribution of assets that are in very poor condition. In 2023, approximately 21% of assets are in very poor condition which is maintained over the next 25 years and the remaining 79% of the portfolio are kept in poor to very good

condition. The performance and spending forecasts are provided in Figure 5-27 and Figure 5-28.

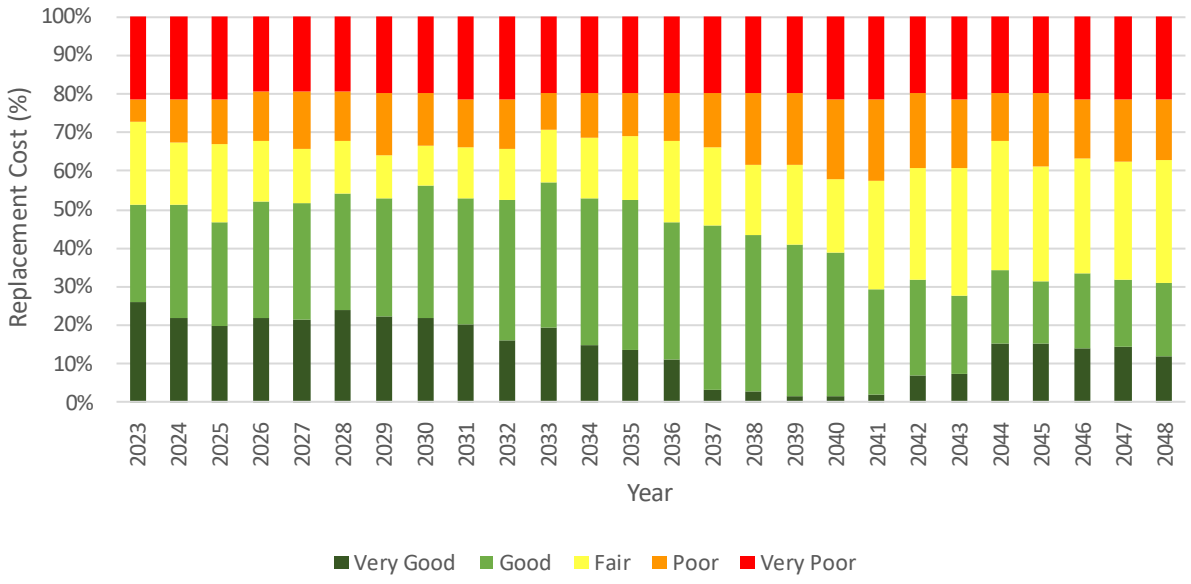


Figure 5-27: Scenario 1 – Maintaining Current LOS Performance Distribution for Stormwater Management Assets

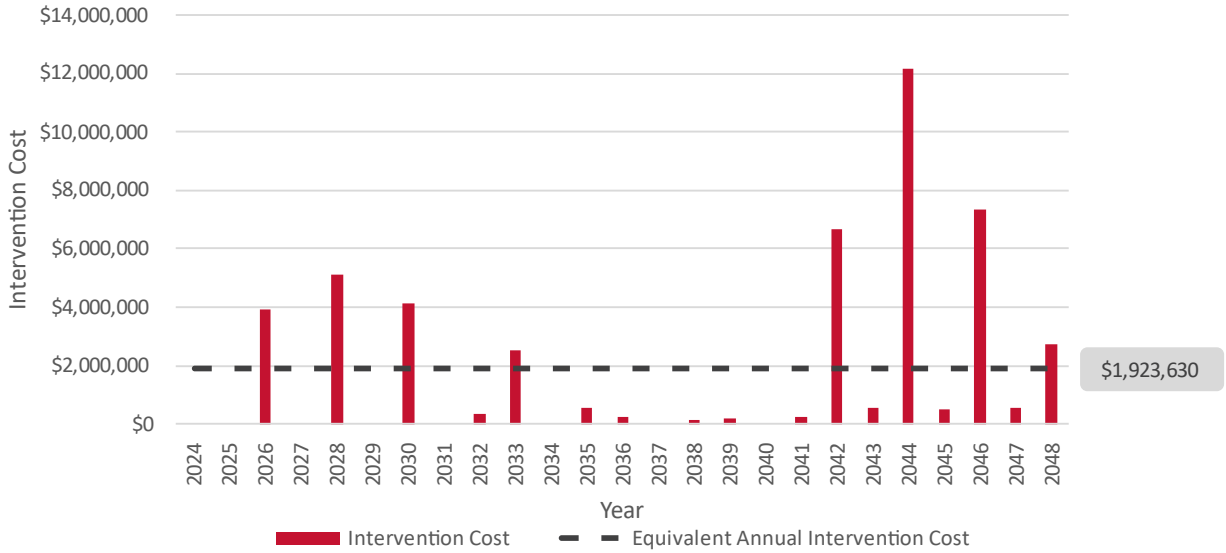


Figure 5-28: Scenario 1 – Maintain Current LOS Intervention Costs for Stormwater Management Assets

5.3.5.2 Scenario 2: Backlog Analysis

In scenario 2, a total of $90.7M (annual average of $3.6M) is spent. The annual average of $3.6M represents the average funding required to address the backlog and maintain the asset portfolio to ensure that no assets are in very poor condition over the next 25 years. Included in the annual average is the current backlog requirement of $23.5M of assets in very poor condition identified in 2024, with future large expenditures occurring in the 2040s. It is anticipated that significant funding will be required for SWM facility assets in 2040, and for both linear and SWM facility assets in 2044 and 2046. The performance and spending forecasts are provided in Figure 5-29 and Figure 5-30.

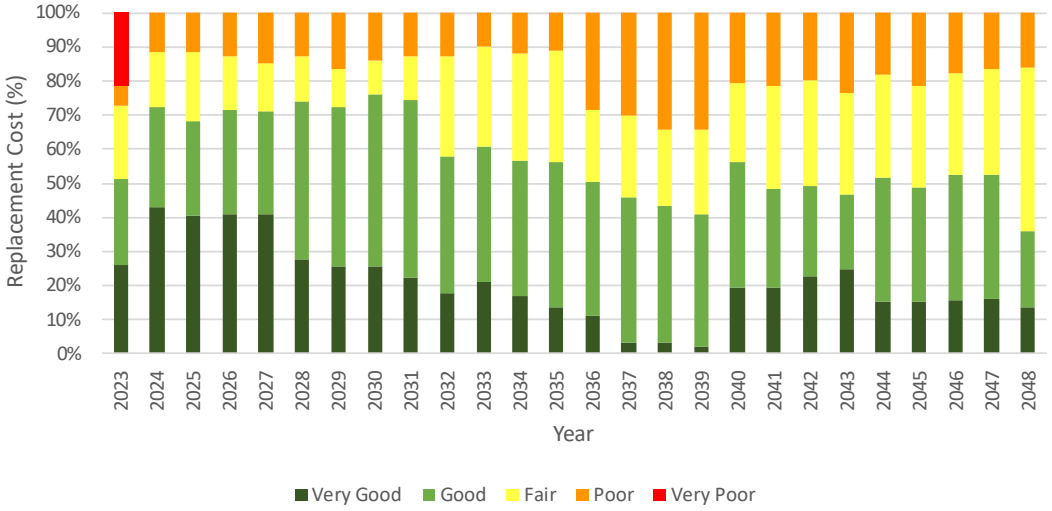


Figure 5-29: Scenario 2 – Backlog Analysis Performance Distribution for Stormwater Management Assets

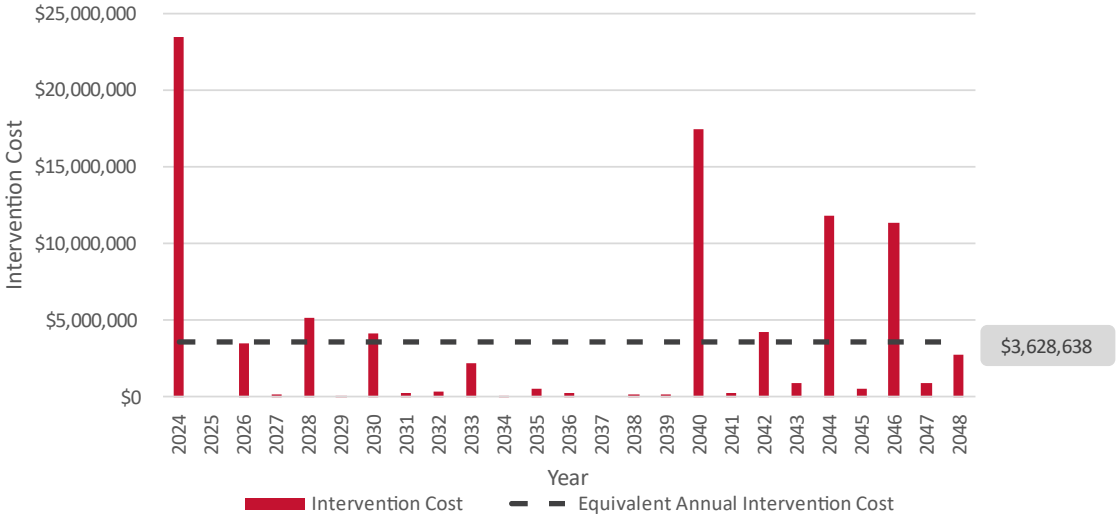


Figure 5-30: Scenario 2 – Backlog Analysis Intervention Costs for Stormwater Management Assets

5.3.5.3 Scenario Comparison

Table 5-28 provides a comparison of the scenarios.

Table 5-28: Lifecycle Scenario Comparison for Stormwater Management Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	$1.9M	=
Scenario 2: Backlog Analysis	$3.6M	↑

The majority of asset needs in this asset group are related to stormwater management facilities, such as SWM ponds. Needs over the 25-year forecast period are a combination of backlog and upcoming needs that will arise as the years progress. Traditionally, most of the Township's funding is allocated towards stormwater linear assets. The SWM ponds will require funding to ensure that the Township keeps up with backlog as well as anticipated lifecycle needs (e.g. sediment removal). The needs of SWM facilities will become clearer as the Township gathers more information on the condition of SWM facilities and works on developing a program to assess and address stormwater pond sediment accumulations to ensure SWM facilities operate as designed.

5.4. CELLAR DRAIN COLLECTION SYSTEM

The Township of Woolwich has a cellar drain collection system that is only found in the settlement of Elmira. The system was originally installed in the early 1900's to drain/lower the groundwater to facilitate the construction of homes. In other areas of Ontario, this is referred to as a third-pipe system where there is a wastewater sewer, a storm sewer, and a foundation drain. The concept being that the foundation drain is not directly connected to the storm sewer and would therefore not be affected by a surcharge of the storm sewer system. These contribute to collecting stormwater to protect homes, businesses, and other properties from flooding as well as convey the flow back to the natural environment. In Elmira, the cellar drain system was installed alongside the sanitary wastewater system and used common maintenance holes with weir walls in the structures to separate the clean groundwater from wastewater effluent. During surcharge events there would be a mixing of the two discharges, which meant that both sewage and groundwater would be mixed and discharged to both the Elmira Wastewater Treatment Facility and the natural environment. This is not an uncommon situation throughout Ontario as it was an acceptable method for treating wastewater using dilution; however, today with the advancements in technology, it is no longer an acceptable practice and adds cost to municipalities as clean water is also treated. The Township's current practice is to separate cellar drain systems from the sanitary wastewater collection system, which is done during large scale reconstruction projects. Creating a separate cellar drain network greatly reduces the potential for any mixing of groundwater and wastewater effluent.

SERVICE AT A GLANCE

WHAT'S INCLUDED IN CELLAR DRAIN COLLECTION SERVICES?

The Township of Woolwich's cellar drain collection system consists of sewer mains, maintenance holes and service laterals. The Township owns and maintains approximately $16.9M of cellar drain collection system assets within the community of Elmira. This represents 2% of the Township's total assets replacement value.

CELLAR DRAIN COLLECTION SYSTEM

LINEAR

- Cellar Mains
- Maintenance Holes
- Cellar Service Laterals

5.4.1 State of the Infrastructure

The cellar drain collection system includes sewer mains, service laterals, and maintenance holes. Note that for cellar mains, the lifecycle and valuation strategies for maintenance holes and service laterals are combined with the mains. As a result, the associated replacement values and condition ratings have been included in the cellar main asset reporting. Maintenance holes and service laterals are documented from an inventory perspective only. Figure 5-31 illustrates the distributions of replacement value and length of linear assets of cellar drain collection assets by asset type and community. All cellar drain collection assets are located in the settlement of Elmira.

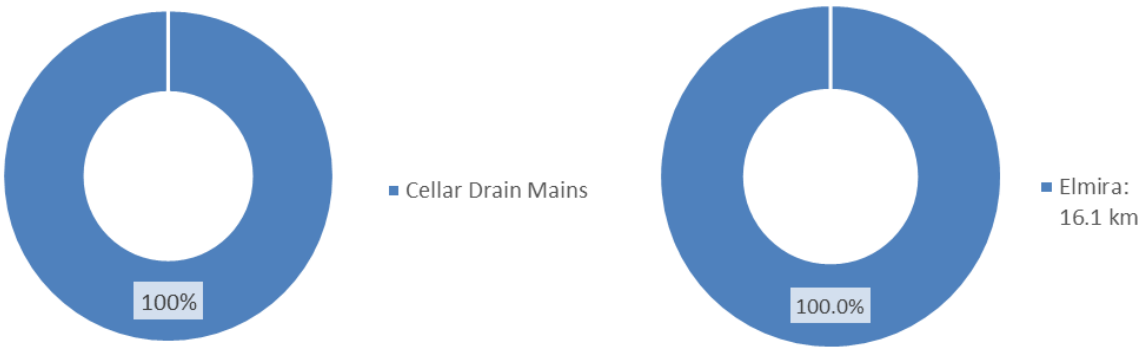


Figure 5-31: Replacement Value Distribution (left) and Linear Length Distribution of Cellar Drain Collection Assets by Asset Type and Settlement (right)

5.4.1.1 Asset Inventory and Valuation

Table 5-29 below summarizes the asset valuation, quantities, and condition for each asset category. Replacement costs for all cellar drain collection sewer mains were calculated using a per metre unit rate that also includes service laterals and maintenance holes.

Table 5-29: Inventory and Valuation of Cellar Drain Collection Services Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Linear	Cellar Drain Sewer Mains	$16,867,809*	16.1 km	Good
	Maintenance Holes	*Included**	81 assets	
	Service Laterals		948 laterals	

*Notes: Cellar main replacement values include the replacement values of service laterals and maintenance holes. Inventory length is rounded to nearest one metre (i.e., 0.1 kilometre).

5.4.1.2 Age Summary

Table 5-32 and Table 5-33 illustrate the age of cellar drain collection assets as a proportion of their estimated service life, as well as the value of cellar drain collection assets that were installed in each decade. The cellar drain collection system was originally installed in the 1920s in Elmira and as reconstruction projects occur, cellar drain systems are replaced with updated materials and are separated from the sanitary collection system. Therefore, there have been no expansion of cellar drain systems in the Township; however, the recent installation decades are attributed to replacements of the original cellar drain mains system.

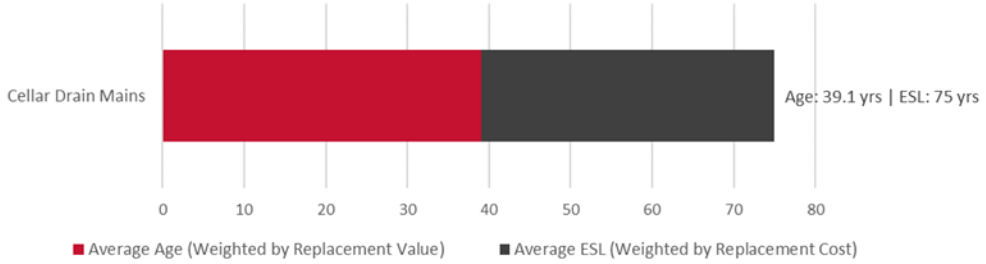


Figure 5-32: Age as a Proportion of Estimated Service Life (ESL) of Cellar Drain Collection Assets

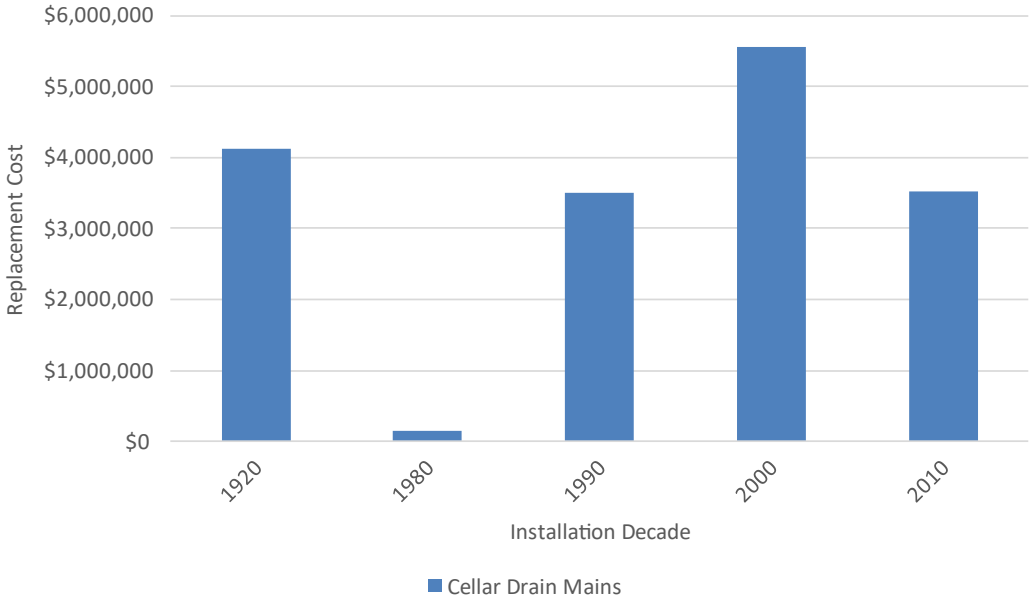


Figure 5-33: Age Distribution by Installation Decade of Cellar Drain Collection Assets

5.4.1.3 Asset Condition

The Township does not have a formal condition assessment program for cellar main assets. Historical data is instead used to approximate condition based on asset age and estimated service life (ESL). Table 5-30 illustrates the Township's methodology for assigning asset condition. The associated graphs illustrate the condition of the cellar drain collection network. Figure 5-34 and Figure 5-35 show the condition distribution of all cellar drain collection assets. Overall, 74% of the asset profile is in a good to very good condition, based on age.

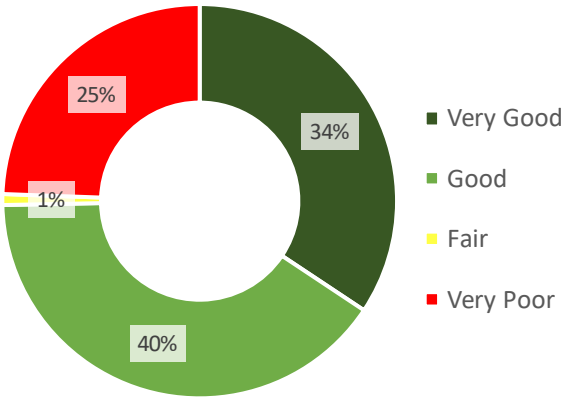


Figure 5-34: Condition Distribution of Cellar Drain Collection Services Assets

Table 5-30: Condition Ratings for Cellar Drain Collection Assets

Condition Category	Life Consumed	Condition Rating (Cellar Mains)
Very Good	0% to 25%	Life Consumed is the metric used to evaluate condition for all asset classes.
Good	25% to 50%	
Fair	50% to 75%	
Poor	75% to 100%	
Very Poor	>100%	

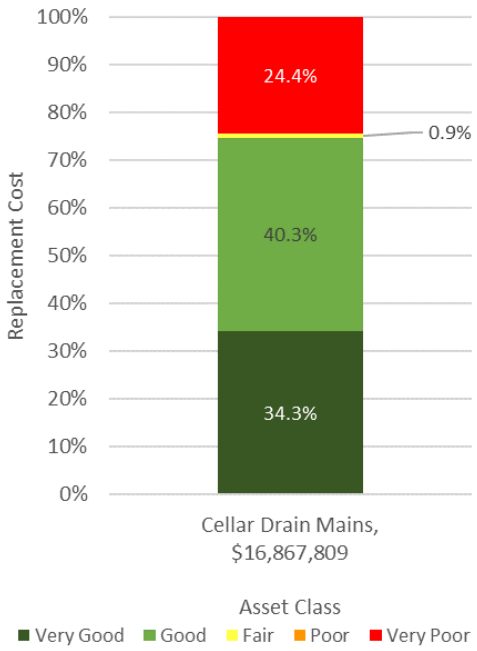


Figure 5-35: Condition Distribution of Cellar Drain Collection Assets by Asset Class

5.4.1.4 Data Sources and Maturity

Table 5-31 and Table 5-32 summarize the data completeness and confidence of the Township's asset data. There is currently no condition information available for cellar drain mains; however, it being a gravity system, a similar approach to sanitary sewer mains can be used in the future, such as deriving condition from CCTV inspections following NASSCO's Lateral, Maintenance Hole, and Pipeline Assessment Condition Program (i.e. LACP, MACP, and PACP, respectively).

Table 5-31: Data Completeness for Cellar Drain Collection Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost	Diameter	Material	Length
Cellar Drain Sewer Mains	100%	100%	0%	100%	100%	100%	100%

Table 5-32: Approach to Assessing Condition for Cellar Drain Collection Assets

Asset Class	Approach to Assessing Condition
Cellar Drain Sewer Mains	The Township does not undertake a formal condition assessment for these assets and relies on historical data. Age and ESL are used to understand an asset's condition. The estimated service life for all cellar drain assets is 75 years.

5.4.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as expanding sewer condition assessments for the cellar drain system (e.g. LACP, MACP, PACP), conducting spatial analysis to verify inventory data and identify missing information, creating data links between data sources and filling data gaps where required. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset management planning improvement recommendations can be found in the improvement plan (Section 11).

5.4.2 Levels of Service

The Township's goal is to provide cellar drain collection services that minimize impacts from flooding and are reliable. Table 5-33 and Table 5-34 provide a summary of the customer and technical LOS metrics that have been established for cellar drain collection assets.

Table 5-33: Cellar Drain Collection Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance
Sewer backups and flooding are minimized.	Reliable	The Township separates the existing cellar drain systems from the sanitary wastewater collection system and constructs cellar drains so the network can accommodate for excess flow and mitigate backups and flooding.
Property impacts from flooding are minimized	Reliable, Operational	Historical LOS measures indicate that the system has high reliability, is constructed with additional capacity, and overall, the system is kept in a state that minimizes impacts of flooding. Cellar drain systems are replaced in accordance with Township, Ontario Provincial Standards, and MECP standards. More information is required to report on supporting technical metrics for operational and environmental stewardship measures to truly inform service levels.
The cellar drain collection system consists of appropriate quantity control measures that meet standards and specifications.	Reliable, Operational, Environmental Stewardship	

Table 5-34: Cellar Drain Collection Services Technical Levels of Service

Service Attributes	Technical Measures	Current Performance
Reliable	Percentage of cellar mains that are in poor or better condition	76%

5.4.3 Lifecycle Management Strategies

For the Township to provide cellar drain collection services and maintain LOS, various lifecycle activities are performed on the assets. These include non-infrastructure solutions such as developing plans; preventative and reactive maintenance activities to repair assets; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. Table 5-35 summarizes the lifecycle activities performed on cellar drain collection system assets.

Table 5-35: Lifecycle Management Activities for Cellar Drain Collection Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs, Master Drainage Plan, models) • Municipal drains • Consolidated Linear Infrastructure Environmental Compliance Approval • Inflow & Infiltration (I&I) Program • Geographic Information System (GIS) data analysis and mapping • Policies, procedures/standards and by-laws	As required
	Sump Pump Policy Stormwater Utility Implementation	Future Initiative
	Flood Implementation Plan	As required
	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative
Operations and Maintenance	CCTV inspections Open cut repairs	As required
	Flushing to remove debris	As required
	Pipe spot repairs (appurtenances repairs)	As required
	Lateral and maintenance hole repairs	As per inspections
Renewal (Rehabilitation and Replacement)	Open cut replacement	As per inspections
	Sewer Lining	As required
Disposal	Pipe replacement Service lateral replacement (open cut replacement of mainline sewer pipe and connected assets)	End of life
	Maintenance hole replacement	Coordinated with sewer replacement
	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
Expansion and Service Improvements	Growth needs are known based on the Development Charges and Master Servicing and Stormwater Management Report and other Secondary Plans.	Through growth and development
	Cellar drain network expansion/upgrades to service new areas or expand capacity of existing network.	Only in unique situations

5.4.4 Risk Management Strategy

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all cellar drain collection assets. The results from the risk analysis are provided in Table 5-36. The distribution table illustrates the amount of assets within each risk score (1-25).

There are no high-risk assets in the Township's cellar drain portfolio. Approximately $4.1M (24%) of assets are medium risk and the remainder are low risk. Those categorized as a medium risk have a high likelihood of failure (LOF score of 5) and of these assets, COF scores range from 2 to 3.

Table 5-36: Risk Score Distribution of Cellar Drain Collection Assets

		Likelihood of Failure				
		1	2	3	4	5
Consequence of Failure	1	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
	2	$2,804,682 (16.6%)	$4,492,894 (26.6%)	$0 (0.0%)	$0 (0.0%)	$1,674,991 (9.9%)
	3	$2,987,462 (17.7%)	$2,312,908 (13.7%)	$150,681 (0.9%)	$0 (0.0%)	$2,444,192 (14.5%)
	4	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
	5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium (10-15)
- High risk (16-25)

5.4.5 Lifecycle Forecasting

5.4.5.1 Scenario 1: Maintain Current LOS

Scenario 1 forecasts asset performance by maintaining current service levels. In 2023, approximately 25% of assets are in very poor condition. This LOS is maintained over the next 25 years by keeping the amount of assets in very poor condition around 25%. In this scenario, no interventions or funding are required to maintain the current LOS. All asset needs are backlogged and there are no upcoming needs in the next 25 years. The performance forecast is provided in Figure 5-36 and Figure 5-37 below.

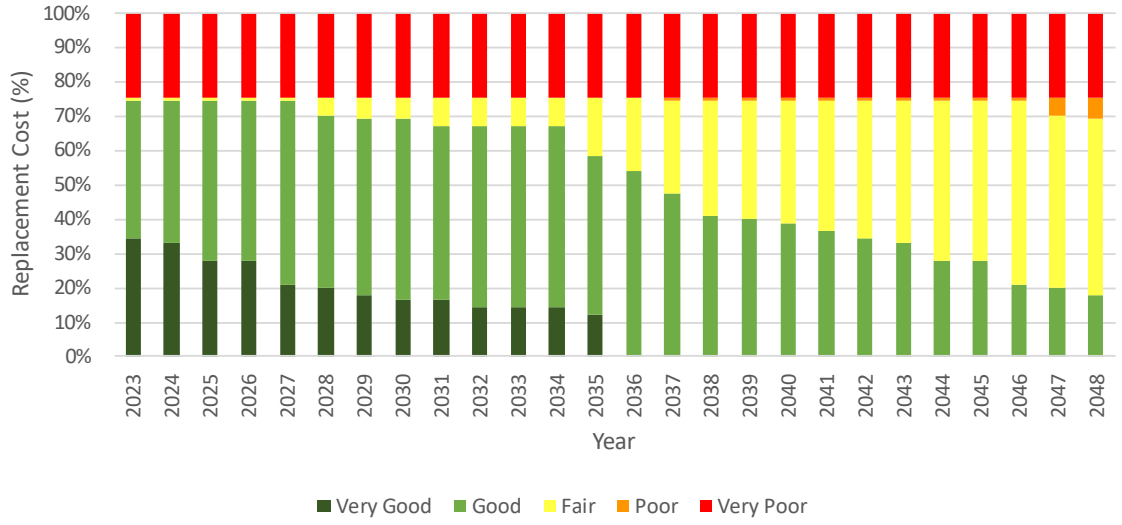


Figure 5-36: Scenario 1 – Maintain Current LOS Performance Distribution for Cellar Drain Collection Assets

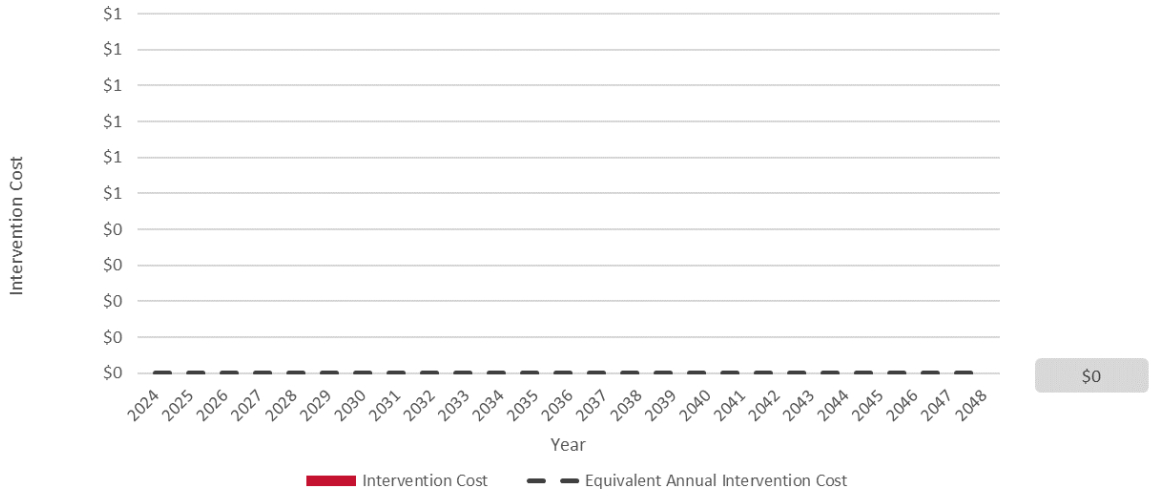


Figure 5-37: Scenario 1 – Maintain Current LOS Intervention Costs for Cellar Drain Collection Assets

5.4.5.2 Scenario 2: Backlog Analysis

In scenario 2, a total of $5.8M or an annual average of $233.0k, represents the average funding required to address the backlog and enhance the asset portfolio to ensure that no assets are in very poor condition over the next 25 years. Over the 25-year forecast, in 2024, approximately $1.7M of interventions will be required to address the current backlog, with an additional $4.2M of funding required in 2047. The performance and spending forecasts are provided below (Figure 5-38 and Figure 5-39).

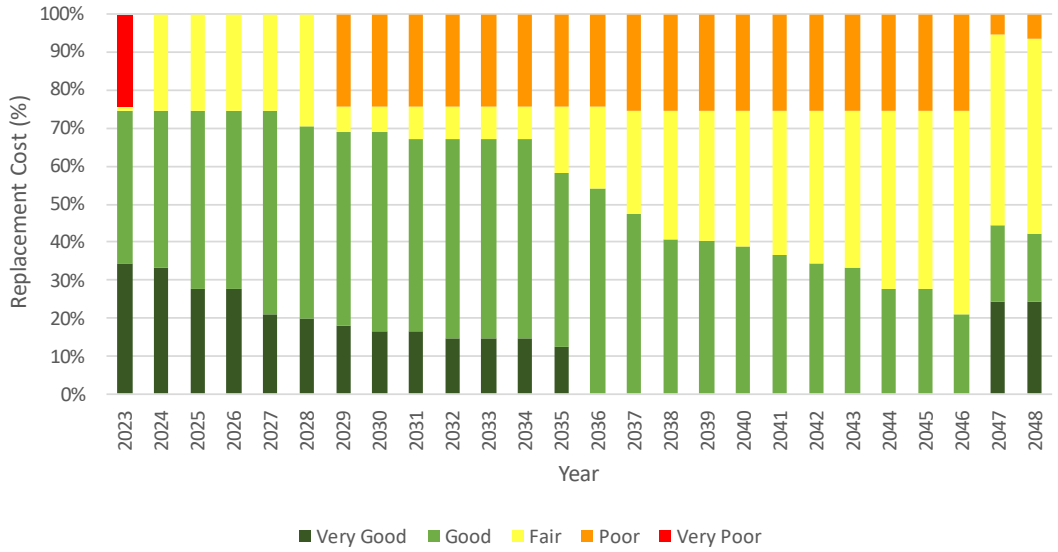


Figure 5-38: Scenario 2 – Backlog Analysis Performance Distribution for Cellar Drain Collection Assets

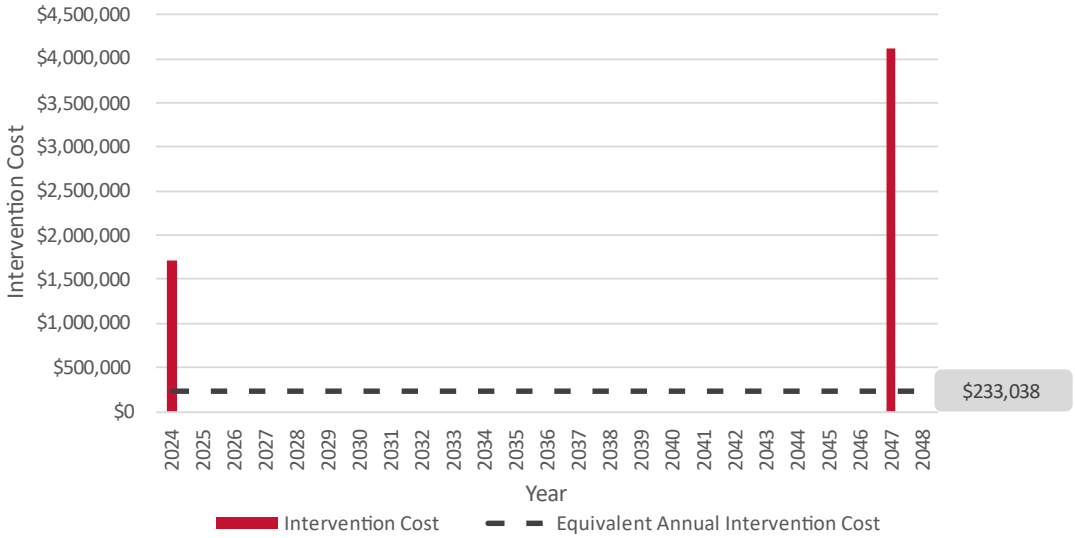


Figure 5-39: Scenario 2 – Backlog Analysis Intervention Costs for Cellar Drain Collection Assets

5.4.5.3 Scenario Comparison

Table 5-37 provides a comparison of the scenarios.

Table 5-37: Lifecycle Scenario Comparison for Cellar Drain Collection Services Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	-	=
Scenario 2: Backlog Analysis	$233.0k	↑

The scenario analysis revealed that all needs in the cellar drain collection system are related to addressing current backlog. No new needs are anticipated over the 25-year forecast period. This means that as the Township continues to invest in cellar drain replacements, it should see an increase in service levels, as investment will go towards eliminating backlog. The Township's preferred strategy for cellar mains is to reline these assets wherever possible. The asset management analysis revealed that many cellar drain assets are well beyond their service lives. As a result, the Township may wish to replace these assets as opposed to relining them, since it is possible that they may not be good candidates for relining, depending on their condition. This would be assessed by the Township on a case-by-case basis. Note that the analysis completed in this AMP was based on an age and service life analysis, therefore, actual condition of assets and replacement needs may vary.

6. DETAILED ASSET MANAGEMENT INFRASTRUCTURE REPORT – TRANSPORTATION SERVICES

The Township of Woolwich's transportation services consist of assets that provide various routes of movement for drivers, cyclists, and pedestrians. The transportation system plays a critical role in supporting connectivity, economic growth, and quality of life for residents and businesses in the Township and beyond.

SERVICE AT A GLANCE

Replacement Value

$478.2 Million

Overall Condition

Good

Quantity

353.1 centreline km of roads
130.9 km of sidew alks
8 footbridges
3,947 streetlights assets
4, 489 street signs
5 municipal parking lots
55 bridges and culverts
1,700.0 m of retaining w alls
39 equipment assets
28 fleet assets
7 machinery assets

WHAT'S INCLUDED IN TRANSPORTATION SERVICES?

The Township owns and maintains a total value of $478.2M (including street signs) of transportation services assets which all contribute to the movement of the community, tourism and surrounding municipalities which represents 43% of the Township's total asset replacement value.

ROAD NETWORK

ROADWAY

- Hard Top
- Loose Top

ACTIVE TRANSPORTATION

- Sidewalks
- Footbridges

FLEET

- Heavy Duty Vehicle (>11,000 kg GVW)
- Light Duty Vehicle (<11,000kg GVW)
- Machinery

TRAFFIC MANAGEMENT

- Decorative Streetlights
- Standard Streetlights
- Street Signs
- Municipal Parking Lots*

EQUIPMENT

- Light Equipment

MUNICIPAL STRUCTURES

- OSIM Bridges
- OSIM Culverts
- Retaining Walls

*The municipal parking lots within the scope of this service area are standalone parking lots only. Other parking lot assets have been assigned to their respective facility or park and are included in their related reports.

The following provides additional context to the scope of assets that are included in the Transportation Service area.

- Roads have been categorized into two primary road types: hard top, which includes asphalt and surface treatment roads; and, loose top, which includes gravel roads.
- The Township manages various structures that provide crossings over waterways or other openings. They are separated in the Township's asset hierarchy depending on their use. Footbridges support pedestrian traffic and are part of the Township's Active Transportation network. Ontario Structure Inspection Manual (OSIM) Bridges and OSIM Culverts support vehicular and pedestrian traffic. Note that these structures qualify for the Township's biennial OSIM inspections program because they have a span of 3 metres or greater.
- Street signs are an important part of the Township's road network but are funded differently from other assets. Their replacement is not funded through the Township's capital budget but is instead funded through the operating budget. As a result, they are not included in the lifecycle forecasting analysis that is completed for this service area – since that analysis is focused on capital renewal needs. The costs to maintain the Township's street signs are reflected in the operating budget forecasts – summarized in the financial strategy of the 2024 AMP. Some details of street signs, including replacement costs and

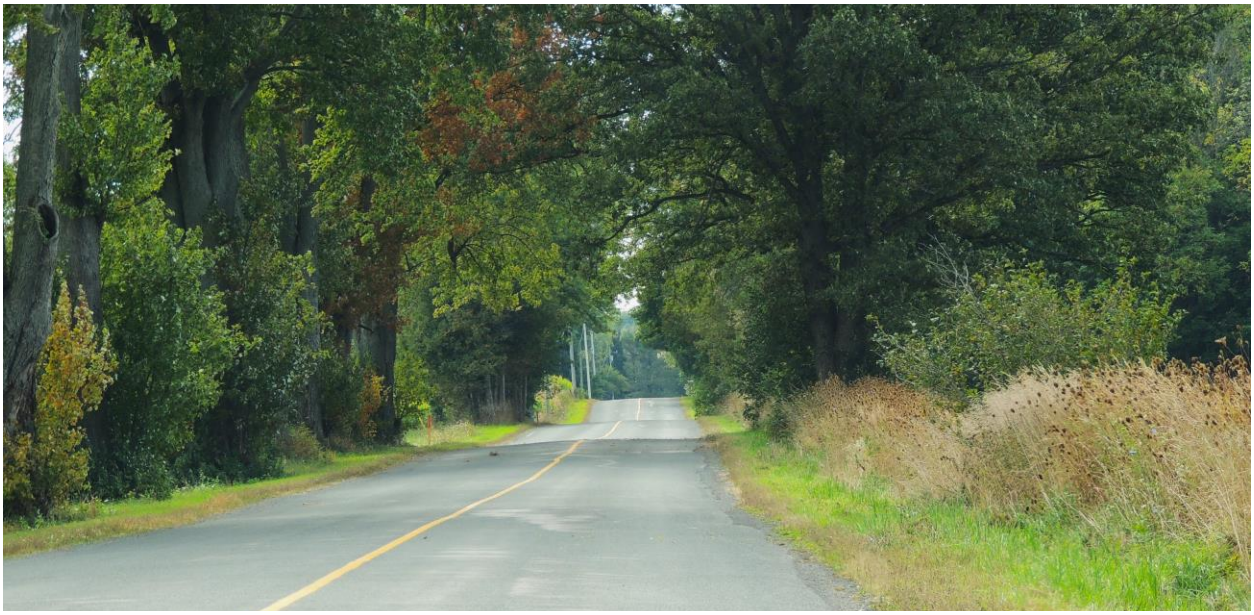
approaches to assessing condition are detailed here for inventory purposes only; however, they do not carry through to the forecasting section of this service area.

- The Township owns two types of streetlights: standard and decorative. Standard streetlights are more basic in design and can include ownership of the pole and luminaire or only the luminaire if it is attached to a hydro pole with the pole being under the ownership of the utility company, Enova Power. Decorative streetlights, such as a coach light design, can be found in newer subdivisions and in the downtown core, such as in Breslau, Elmira or St. Jacobs. The Township would own both the decorative pole and decorative luminaire.
- The Township manages several vehicles and other equipment to help maintain its road network. These vehicles are categorized by vehicle size (e.g. greater than or less than 11,000 kg gross vehicle weight (GVW)). Heavy-duty vehicles include loaders, tandems, graders, and other large vehicles that complete winter maintenance and general road maintenance. Light-duty vehicles include mostly passenger vehicles that are used by Township staff. Machinery includes tractors, trailers, and attachments.

Please note that the reporting of roadway assets detailed within this report is sourced from the Township of Woolwich's 2023 State of the Infrastructure (SOTI) and Asset Management Plan (AMP) for Roads Summary Report completed by 4 Roads Management Services (here in referenced as the 2023 Roads Summary Report). That report provides a detailed analysis of the Township's roadway assets that was completed in general accordance with the Ministry of Transportation's (MTO) Inventory Manual (IM) for Municipal Roads (1991), which is summarized at a high level herein. The 2023 Roads Summary Report can be made available by the Township upon request.

6.1. ROAD NETWORK

6.1.1 State of the Infrastructure



The Township of Woolwich's roadway network includes roads, municipal structures, traffic management, and fleet and equipment that service the entire transportation network. Figure 6-1 illustrates the distribution of replacement value of transportation services assets by asset class. Hard top and loose top roads account for 78% of the replacement value.

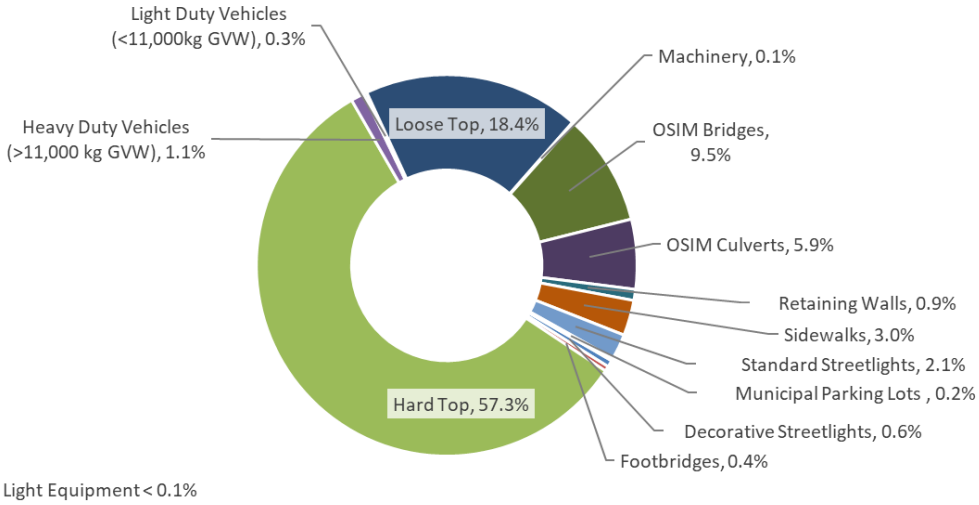


Figure 6-1: Replacement Value Distribution of Transportation Assets by Asset Type

6.1.1.1 Asset Inventory and Valuation

Table 6-1 below summarizes the asset valuation, quantities, and condition for each asset category.

Table 6-1: Inventory and Valuation of Transportation Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Roadway[3]	Hard Top [a]	$272,827,472	236.2 centreline km	Good
	Loose Top [a]	$87,551,504	116.9 centreline km	Fair
Municipal Structures	OSIM Bridges	$45,188,364	24 structures	Fair
	OSIM Culverts	$28,158,915	31 structures	Good
	Retaining Walls	$4,458,670	1,700 m	Good
Traffic Management	Decorative Streetlights (Poles and Luminaires)	$2,730,000	780 assets	Fair
	Standard Streetlights (Poles and Luminaires)	$10,227,500	3,167 assets	Very Good
	Street Signs [b]	$2,468,850	4,489 assets	Good
	Municipal Parking Lots	$1,103,200	5 assets	Poor
Active Transportation	Footbridges	$2,002,160	8 structures	Good
	Sidewalks	$14,271,605	130.9 km	Good
Equipment	Light Equipment	$148,088	39 assets	Fair
Fleet	Heavy Duty Vehicle (>11,000 kg GVW)	$5,420,000	15 assets	Fair
	Light Duty Vehicle (<11,000kg GVW)	$1,200,000	13 assets	Poor
	Machinery	$485,000	7 assets	Fair

Note: Inventory lengths are rounded to nearest one hundred metre (i.e., 0.1 kilometre).
[a] Replacement costs and inventory lengths for hard top and loose top roads have been adjusted for boundary roads.
[b] Street signs replacement values and condition are included in this table for inventory purposes. However, their replacement is funded through the Township's operating budget and therefore are not included in the lifecycle forecasting analysis for this service, which is focused on capital renewal needs. Street sign funding is reflected in the Township's 2024 AMP financial strategy operating budget forecasts.

[3] Township of Woolwich 2023 Sate of the Infrastructure and Asset Management Plan for Roads Summary Report, 4 Roads Management Services

6.1.1.2 Age Summary

Figure 6-2 and Figure 6-3 illustrate the age of transportation assets as a proportion of their estimated service life, as well as value of assets acquired by decade. O. Reg. 588/17 requires the average age of assets to be reported on; however, age is not applicable in relation to the Township's roadway network as extensive condition data exists. Due to the roadway assets being modelled following the Inventory Manual (1991), hard top and loose top roads are not included in Figure 6-2 and Figure 6-3 but are captured separately in the following paragraphs.

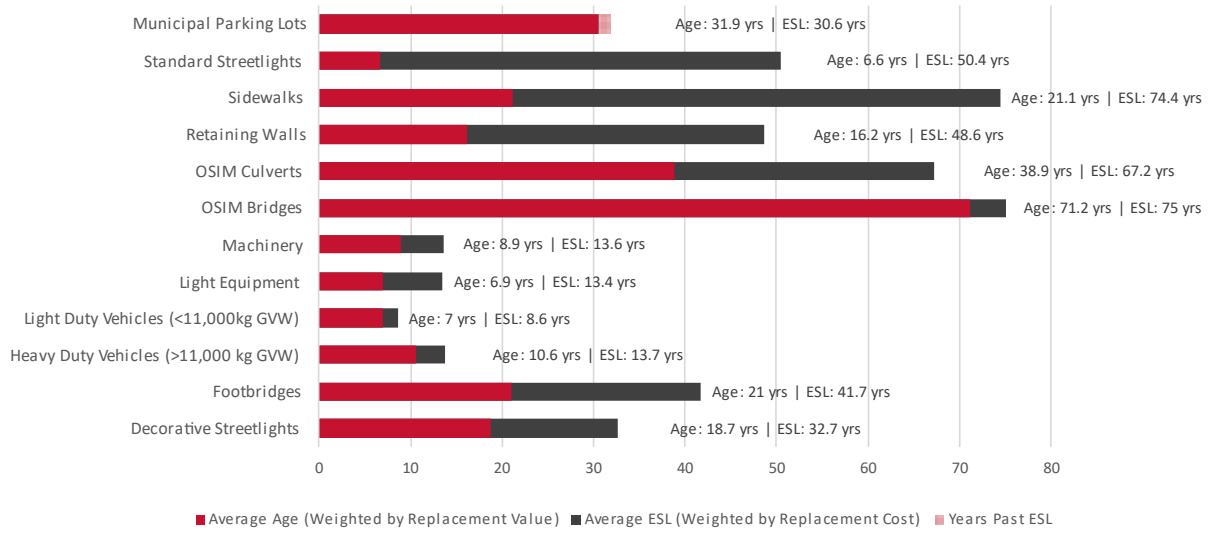


Figure 6-2: Age as a Proportion of Estimated Service Life (ESL) of Transportation Assets (excluding roadway assets)

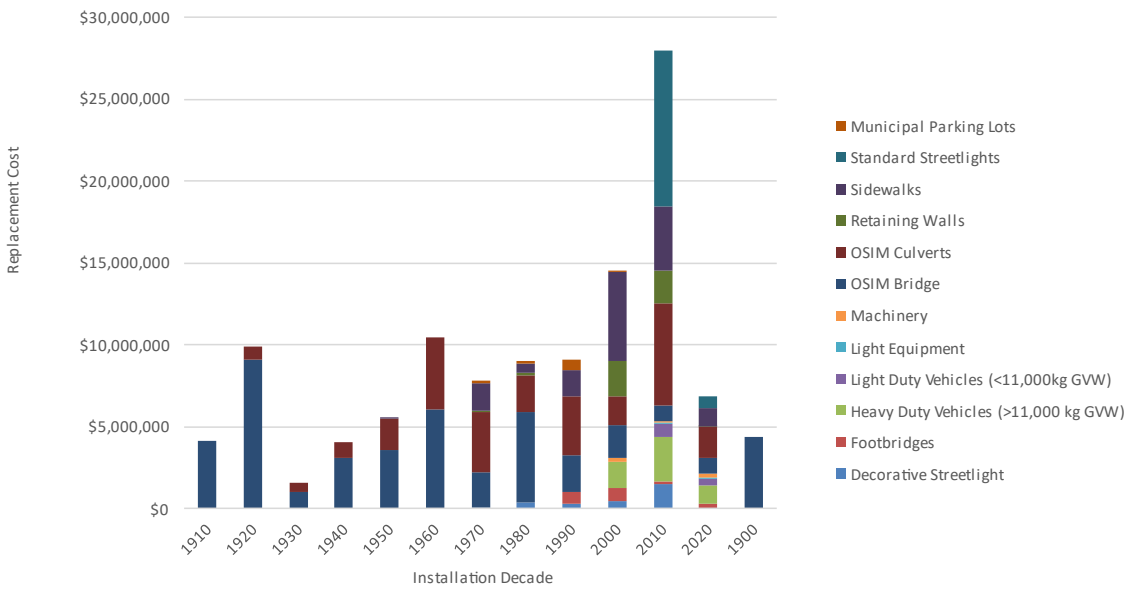


Figure 6-3: Age Distribution by Installation Decade of Transportation Assets (excluding roadway assets)

Please note that condition, not age, is the critical component to assessing road performance over time. As part of the Inventory Manual and the inspections and analyses reported in 2023 Road Summary Report, Time of Need (TON) scores are developed for road sections to predict the time until the road will require reconstruction or major rehabilitation. The following table (Table 6-2) summarizes the TON score for structural adequacy based on the type of roadside environment and is from the 2023 Road Summary Report. Structural adequacy measures the road segment's ability to support load and resist deformation and rupture and is used to assess the physical condition of the road system. In Figure 6-4, the TON is distributed according to the length of the road system and the associated physical condition score. The TON score can act as a proxy for age as it indicates remaining service life or the closer a road segment is to requiring full reconstruction (i.e. more deterioration is found on a 'NOW' need road segment). The Time of Need categories can be described as:

- Roads with 'NOW' needs require immediate major rehabilitation or reconstruction, have little service life remaining and are an indication of the backlog of the system (i.e. poor to very poor condition).
- Roads with '1 to 5' year and '6 to 10' year needs will require full major rehabilitation or reconstruction within the next one to ten years. They are considered fair and good condition, respectively, and are prime candidates for resurfacing activities to extend the life of the road and defer the need to reconstruct.

- Roads with an 'ADEQUATE' score are considered in very good condition and might only require minor maintenance, such as crack sealing and surface treatment.[3]

Table 6-2 Structural Adequacy by Time of Need [3]

Roadside Environment	Time of Need				TOTAL	% OF TOTAL
	1-5	6-10	ADEQUATE	NOW		
Rural	13.165	39.885	77.626	96.606	227.282	64.37%
Semi Urban	3.237	5.441	6.830	18.540	34.048	9.64%
Urban	20.046	12.474	50.605	8.649	91.774	25.99%
TOTAL	**36.448**	**57.800**	**135.061**	**123.795**	**353.103**	
% OF TOTAL	**10.32%**	**16.37%**	**38.25%**	**35.06%**		

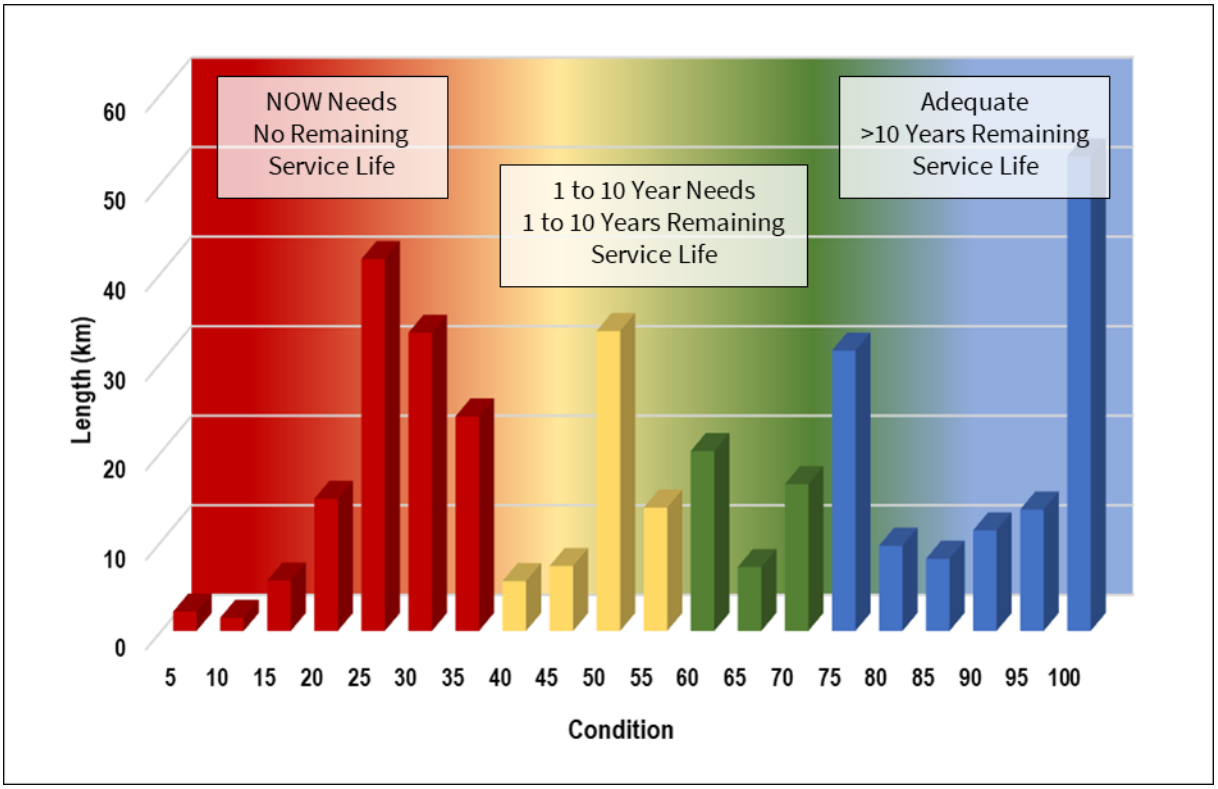


Figure 6-4 Remaining Service Life of the Roadway System (Based on Structural Adequacy) (Source: 2023 Roads Summary Report)

6.1.1.3 Asset Condition

Condition data for the Township's roadways is collected through inspections based on the Ministry of Transportation's 1991 Inventory Manual for Municipal Roads. This approach provides a comprehensive assessment of each road section by developing a rating in six critical areas: surface width, capacity, geometry, drainage, structural

adequacy, and surface type. A physical condition score is produced by multiplying the structural adequacy score by five to achieve a score out of a 100, which is comparable to a pavement condition index rating. Structural adequacy is a measurement of the percentage of the surface of the road that is exhibiting structural distress. Historically, road inspections have occurred every four years on average; however, the Township intends to complete more frequent inspections (i.e. loose top roads assessed annually and hard top roads assessed biennially). Bridges, significant culverts, and footbridges are inspected biennially as part of the Township's OSIM inspection program and are assigned a Bridge Condition Index (BCI) rating during inspections. The Township does not currently undertake a formal condition assessment program for retaining walls. The condition of vehicles is continually assessed as maintenance is performed, and equipment is replaced on an as needed basis. For these assets, age and estimated service life (ESL) are used to understand condition and lifecycle needs. Figure 6-5, Figure 6-7 and Figure 6-7 illustrate the condition distribution of all transportation assets. Table 6-3 summarizes how condition ratings are determined based on available data.

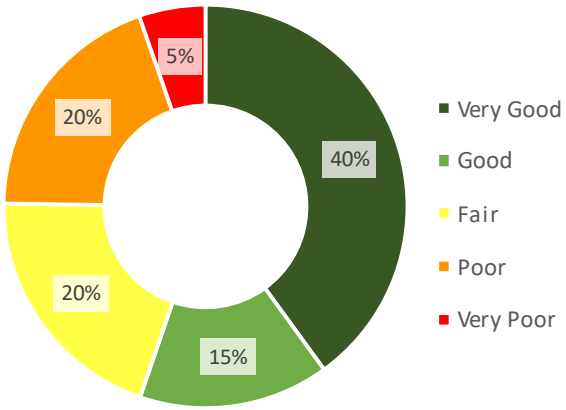


Figure 6-5: Condition Distribution of Transportation Assets

Table 6-3: Condition Ratings for Transportation Assets

Condition Category	Life Consumed	Roads (Physical Condition/ PCI)	OSIM Bridges, OSIM Culverts & Footbridges – Non-CSP* (BCI)	OSIM Bridges, OSIM Culverts & Footbridges –CSP* (BCI)	Streetlights, Retaining Walls, Municipal Parking Lots, Sidewalks, Fleet and Equipment	Street Signs
Very Good	0% to 25%	71 to 100	85 to 100	80 to 100	Life Consumed is the metric used to evaluate condition for theses asset classes.	The condition of signs is determined based on good or poor sign reflectivity.
Good	25% to 50%	56 to 70	70 to 85	70 to 80		
Fair	50% to 75%	36 to 55	60 to 70	55 to 70		
Poor	75% to 100%	20 to 35	50 to 60	40 to 55		
Very Poor	>100%	0 to 19	0 to 50	0 to 40		

*__Note:__ CSP = Corrugated Steel Pipe

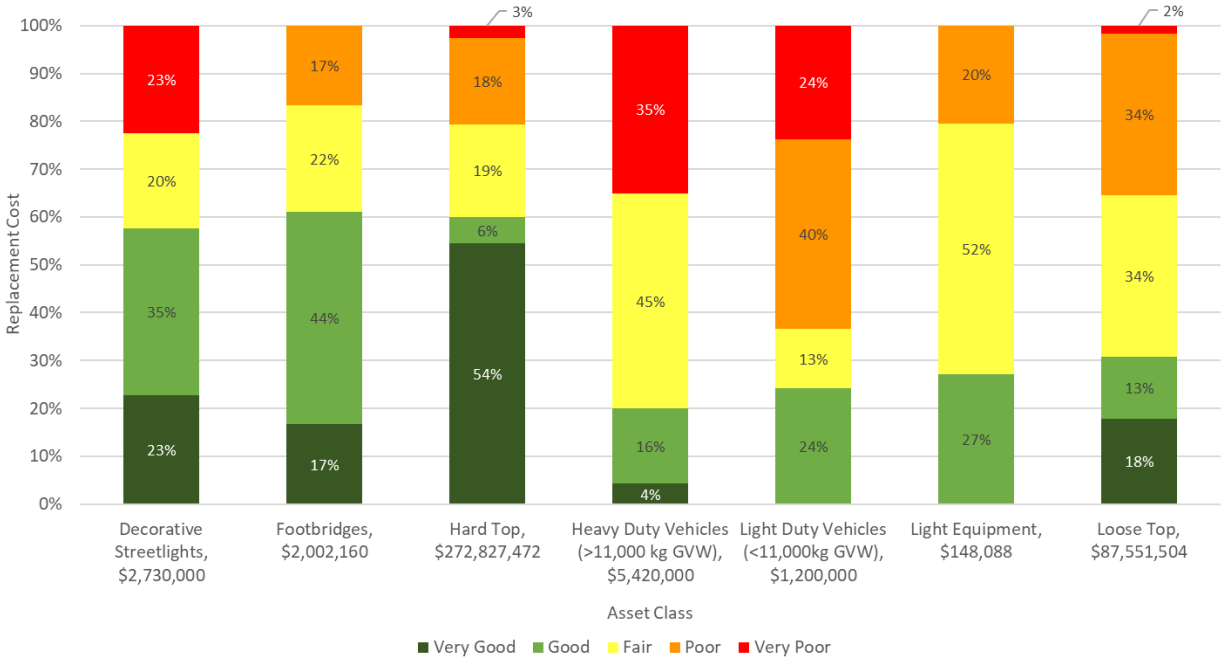


Figure 6-6: Condition Distribution of Transportation Assets by Asset Class (1).

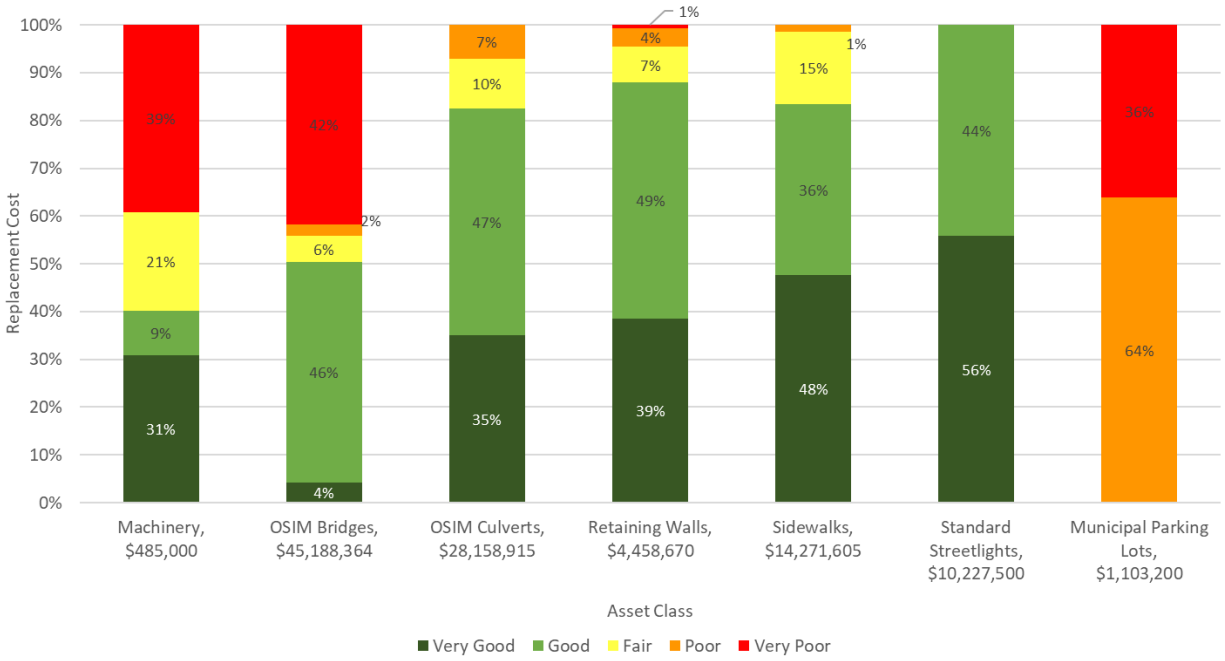


Figure 6-7: Condition Distribution of Transportation Assets by Asset Class (2).

6.1.1.4 Data Sources and Maturity

Table 6-4 and Table 6-5 summarize the data completeness and confidence of the Township's asset data.

Table 6-4: Data Completeness Transportation Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost	Length
Bridges and Significant Culverts	98%	100%	100%	100%	N/A
Decorative Streetlights	100%	100%	0%	100%	N/A
Equipment	100%	100%	N/A	100%	N/A
Fleet	100%	100%	N/A	100%	N/A
Footbridges	100%	100%	100%	100%	N/A
Retaining Walls	100%	100%	0%	100%	100%
Roadway	N/A	100%	100%	100%	100%
Sidewalks	100%	100%	N/A	100%	100%
Standard Streetlights	100%	100%	0%	100%	N/A
Street Signs	N/A	N/A	100%	100%	N/A

Table 6-5: Approach to Assessing Condition for Transportation Assets

Asset Class	Approach to Assessing Condition
Roadway	Condition assessments following the 1991 Inventory Manual will be performed every two years for hard top roads and every year for loose top roads. Installation dates are not used by the Township as all decision-making is based on condition. Age data was extrapolated from condition values based on remaining service life from the 2023 Road Summary Report. Roadway data is of high confidence due to the robust condition information available.
OSIM Bridges and OSIM Culverts, Footbridges	Condition assessments are assessed biennially based on OSIM methodology.
Retaining Walls	The Township does not undertake a formal condition assessment for these assets and relies on historical data. Age and ESL are used to understand asset condition.
Decorative Streetlights	The Township does not undertake a formal condition assessment for these assets and relies on historical data. The Township inspects streetlights based on the Minimum Maintenance Standards (O. Reg. 239/02). Age and ESL are used to understand asset condition.
Standard Streetlights	The Township does not undertake a formal condition assessment for these assets and relies on historical data. The Township inspects streetlights based on the Minimum Maintenance Standards (O. Reg. 239/02). Some standard streetlight poles are under the ownership of Enova Power. Age and ESL are used to understand asset condition.
Sidewalks	The Township inspects its sidewalk inventory annually in accordance with Minimum Maintenance Standards (O. Reg. 239/02) to determine condition assessment for these assets. However, inspection results have not been incorporated for the purposes of this report and age and ESL are used to approximate condition. Any issues identified during inspections are addressed through the operating and maintenance budget.
Street Signs	Sign reflectivity testing is assessed annually in accordance with O. Reg 239/02 and signs are replaced when required as an operating cost.
Equipment	Equipment is replaced on an as needed basis and does not require a formal condition assessment program. Age and ESL are used to approximate asset condition. The ESL of equipment ranges from 5 to 20 years.
Fleet	Fleet assets are assessed and identified for replacement through monitoring that occurs during regular maintenance activities. Excessive maintenance demands can also trigger a replacement need. The Township does not require a formal condition assessment program for fleet assets and relies on age and ESL to understand asset needs. The ESL for fleet assets ranges from 8 to 20 years.

6.1.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as completing additional condition assessments (e.g. retaining walls), conducting spatial analysis to verify inventory data and identify missing information, creating data links between data sources and filling data gaps where required (e.g. installation dates). Since developing and integrating robust condition information will

better inform the system performance and related asset management activities, it is important that current condition assessments (e.g., inspections on roads and structures with greater than 3m metre span) continue at the desired inspection frequency at least every two years. Many transportation assets defects are visually identified during road patrol or sidewalk inspections in accordance with the Minimum Maintenance Standards (O. Reg. 239/02) which directs operation and maintenance needs; however, greater links can be developed to identify and assess trends for assets with greater maintenance demands to better inform the condition of the assets and opportunities for renewal activities (e.g. if Operations staff are frequently filling potholes in a specific area, this information could better inform Engineering staff that a roadway may benefit from a resurfacing). Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset management planning improvement recommendations can be found in the improvement plan (Section 11).

6.1.2 Levels of Service

The Township's goal is to provide a transportation network that is safe and reliable, with adequate connectivity and capacity for pedestrians and road users. The following Table 6-6 and Table 6-7 provide a summary of the customer and technical Levels of Service (LOS) metrics that have been established by the Township and required by O. Reg. 588/17 for transportation assets.

Table 6-6: Transportation Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance
Description, which may include maps, of the road network in the municipality and its level of connectivity.*	Scope	The Township's roadways are comprised of hard-top and loose top roads, which make up 67% and 33% of its road network, respectively. The Township's roadways provide a high degree of connection within and throughout the settlements of the Township. The roads support various types of traffic, including motor vehicles, pedestrians, cyclists, and horse & buggy vehicles. The Township does not have any arterial roadways in its inventory as that class of roadways fall within the Region of Waterloo's jurisdiction.

Customer Measures	Service Attributes	Current Performance
Description or images that illustrate the different levels of road class pavement condition.*	Quality	Road class pavement condition scores are assessed by the following categories: Loose Top Roads: • Very Good = Physical Condition of 71 to 100, Structural Adequacy of 20, less than 5% of section length of road has 'soft spots', and 'no frost boils' exist • Good = Physical Condition of 56 to 70, Structural Adequacy of 15 to 19, between 5% and 15% of road has 'soft spots', and less than 5% of road has 'frost boils' • Fair = Physical Condition of 36 to 55, Structural Adequacy of 12 to 14, between 16% and 20% of road has 'soft spots', and 6% to 10% of road has 'frost boils' • Poor = Physical Condition of 20 to 35, Structural Adequacy of 8 to 11, between 21% and 25% of road has 'soft spots', and 11% to 15% has 'frost boils' • Very Poor = Physical Condition of 0 to 19, Structural Adequacy of 1 to 7, more than 25% of road has 'soft spots', and more than 15% has 'frost boils' Hard Top Roads • Very Good = Physical Condition of 71 to 100, Structural Adequacy of 20, signs of surface distress represent less than 5% of the length of the section • Good = Physical Condition of 56 to 70, Structural Adequacy of 15 to 19, distress between 5% and 10% of the length; maintenance may be above average • Fair = Physical Condition of 36 to 55, Structural Adequacy of 12 to 14, distress between 11% and 15% of the length; maintenance may be above average • Poor = Physical Condition of 20 to 35, Structural Adequacy of 8 to 11, distress between 16% and 20% of the length; maintenance effort is high • Very Poor = Physical Condition of 0 to 19, Structural Adequacy of 1 to 7, distress is more than 20% of the length; maintenance is excessive

Customer Measures	Service Attributes	Current Performance
Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).*	Scope	Municipal bridges and culverts support a range of traffic, including all types of vehicles such as passenger vehicles, transport trucks/vehicles, emergency vehicles and horses & buggies. Pedestrians and cyclists are also supported by the Township municipal bridges and culverts.
Description or images of the condition of bridges and how this would affect use of the bridges.*	Quality	The majority of the Township's bridges, including footbridges and OSIM bridges, are in fair or better condition (23 bridges). Three (3) bridges are in Poor condition and six (6) bridges are in Very Poor condition. Bridges that are in Poor/Very Poor condition or that have elements in Poor/Very Poor condition could be subject to load or dimensionality restrictions and even closures, if warranted. Bridges in fair or better condition can remain open and in service to support traffic.
Description or images of the condition of culverts and how this would affect use of the culverts.*	Quality	The majority of the Township's OSIM culverts are in fair or better condition (29 culverts). Two (2) culverts are in Poor condition and none are in Very Poor condition. Culverts that are in Poor condition or that have elements in Poor/Very Poor condition could be subject to load or dimensionality restrictions and even closures if warranted. Culverts in fair or better condition can remain open and in service to support traffic.
The road network is safe to travel on, is well maintained and is functional.	Safe, Reliable	The Township's road network generally has a high degree of reliability. The majority of road network assets (65%) are in fair or better condition. These assets are performing well and remain in service. Some municipal structures are in very poor condition; however, the Township ensures the safety of road users by ensuring that these structures are inspected regularly and if required, closed.

*Customer levels of service required by O. Reg. 588/17

Table 6-7: Transportation Services Technical Levels of Service

Service Attributes	Technical Measures	Current Performance
Scope	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality*	Arterial – N/A Collector – 128.5% Local – 98.2%[3]
Reliable	For paved roads in the municipality, the average pavement condition index value*	65.1[3]
	For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor)*	44.8[3]
	Overall weighted average physical condition	58.3[3]
	Percentage of bridges in the municipality with loading or dimensional restrictions*	38% Note: For road bridges
	For bridges in the municipality, the average bridge condition index value*	63 [a, b]
	For structural culverts in the municipality, the average bridge condition index value*	77
	For all municipal structures, the average bridge condition index value.	61[a, b]
	Percentage of roads in poor or better condition	98%
	Percentage of streetlights in poor or better condition	95%
	Percentage of OSIM bridges in poor or better condition	56%
	Percentage of OSIM culverts in poor or better condition	100%
	Percentage of footbridges in poor or better condition	100%
	Percentage of retaining walls in poor or better condition	99%
Reliable	Road network system adequacy score by centerline km	65.3%
Safe	Annual number of total roadway collisions (Current and 3-year average)	Current (2022): 101 2020-2022 Average: 91.3

*Technical levels of service required by O. Reg. 588/17.
[a] The average BCI includes footbridges.
[b] Four very poor bridges of note that influence the average BCI, include:

- Glasgow Street South bridge, which has been recently rehabilitated to remain in service but will be closed once inspections deem it to be at the end of its useful life, currently estimated to be between 2035-2040.
- Middlebrook Place bridge which is currently closed due to its condition and will be decommissioned.
- Peel Street bridge, which is currently closed due to its condition and is planned to be converted into a pedestrian bridge.
- Three Bridges Road (Low Level Bridge), which underwent emergency repairs in 2022; an environmental assessment is required to determine the long-term plan of this significant structure.

6.1.3 Lifecycle Management Strategies

For the Township to provide transportation services and maintain LOS, various lifecycle activities are performed on the transportation assets. These include non-infrastructure solutions such as developing plans and performing condition assessments; maintenance activities to repair assets; repaving roads to rehabilitate them; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. The following tables (Table 6-8, Table 6-9, Table 6-10, and Table 6-11) summarize the lifecycle activities performed on roadways and sidewalks, traffic management assets, municipal structures and footbridges, and fleet & equipment assets, respectively.

Table 6-8: Lifecycle Management Activities for Roadways and Sidewalks

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs, Regional Transportation Master Plan, traffic counting program, Active Master Transportation Plan) • Sidewalk warrant study (matrix for implementing new sidewalks based on priority) • Policies, procedures/standards, and by-laws (e.g. Driveway/Access Guidelines, Ditch Alteration Policy) • Boundary Road Agreements • Land evaluation and purchases • Geographic Information System (GIS) data analysis and mapping	As required/Ongoing
	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative
	Smart about salt program to reduce the impacts of de-icing salts	Ongoing
	Condition Assessment Program	Loose Top – annually Hard top – every 2 years
Operations and Maintenance	Maintenance such as street sweeping/cleaning, snow and ice removal, line painting, vegetation removal, ditching, etc. determined through inspections, patrol, and complaints	As required
	Minimum maintenance standards (sidewalk inspections and road patrol)	As per O. Reg.239/02
	Pothole repairs Crack sealing	As required

Lifecycle Activity	Description	Frequency
	Reactive maintenance or spot repairs Curb repairs Guiderail damage repairs Maintenance paving Ball bank program Dust suppressant Roadside ditch cleaning/debris removal	
Renewal (Rehabilitation and Replacement)	Performing renewals/rehabilitations (asphalt resurfacing, surface treatment reapplication, gravel resurfacing) based on condition inspections and lifecycle renewal procedures	As required
	Sidewalk repairs (spot replacements, asphalt padding, grinding, slab lifting)	As required
Disposal	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
	Material from roads, sidewalks recycled and repurposed for construction	Coordinated with replacement/end of life
Expansion and Service Improvements	Transportation network expansion/upgrades to service new areas or expand capacity of existing network (additional roads and sidewalks, road widening, upgrading loose top roads to hard top, etc.)	Through growth and development
	Sidewalk expansions	Through growth and development
	Road conversions/widenings	Through growth and development

Note: Sidewalk lifecycle activities have been included in this table along with roads assets, as the sidewalk lifecycle activities are closely coordinated with roadway works.

Table 6-9: Lifecycle Management Activities for Traffic Management Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs, Regional Transportation Master Plan, traffic counting program, Active Master Transportation Plan, Boundary Road Agreements)	As required/Ongoing
	Conduct community engagement to define priorities and standards to establish budgeting and service levels	Future Initiative
	Traffic calming procedures and solutions	Ongoing
Operations and Maintenance	Minimum maintenance standards (road patrol and sign retro-reflectivity)	As per O. Reg.239/02 and SOPs

Lifecycle Activity	Description	Frequency
	Replacement of missing, damaged, and/or deteriorated signs	As required
	Replacement of streetlight luminaires determined by road patrol	As required
Renewal (Rehabilitation and Replacement)	Asset replacement (sidewalks, streetlight poles, roads)	At optimal point in lifecycle analysis/end of life
Disposal	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
Expansion and Service Improvements	Traffic management expansion/upgrades to service new areas or expand capacity of existing network (e.g. street signs, streetlights, traffic islands, traffic calming, etc.)	Through growth, warrant studies, and development
	Streetlight improvements (new poles and luminaires, or replacement of old decorative and standard streetlights)	Through growth and development

Table 6-10: Lifecycle Management Activities for Municipal Structures and Footbridges

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (e.g. Master Plans, financial plans, capacity studies, AMPs, Active Transportation Master Plan, Environmental Assessments) Geographic Information System (GIS) data analysis and mapping	As required
	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative
	Smart about salt program to reduce the impacts of de-icing salts	Ongoing
	Bridge and culvert inspection and condition assessment (OSIM) program.	Every 2 years as prescribed through O. Reg. 104/97
Operations and Maintenance	Regular inspections and road patrol	Weekly to Monthly
	Minimum maintenance standards (road patrol)	As per O. Reg.239/02 and procedures
	Preventative and reactive maintenance (Structure washing and removing debris, minor repairs, pothole repairs, erosion repairs)	As required

Lifecycle Activity	Description	Frequency
	Perform Ontario Structure Inspection Manual (OSIM) inspections on bridges, significant culverts, and footbridges	Biennially
Renewal (Rehabilitation and Replacement)	Minor rehabilitation (wearing surface repairs, structure repairs as needed)	Determined through Condition Inspections
	Major renewals/rehabilitations (wearing surface repairs, substructure repairs, superstructure repairs, conversion of use)	Determined through Condition Inspections
	Full bridge replacement including foundations	At optimal point in lifecycle analysis/end of life, or as determined through Condition Inspections
Disposal	Asset disposal coordinated with asset replacement and material from structures recycled and repurposed for construction	Coordinated with replacement/end of life
Expansion and Service Improvements	Conduct community engagement to define priorities and standards to establish budgeting and service levels for the future.	Future Initiative
	Growth needs are determined based on the Development Charges Study, Township Transportation Master Plan, and Official Plan to service new areas or expand capacity.	Through growth and development

Note: footbridges have been combined with municipal structures as they share common lifecycle activities.

Table 6-11: Lifecycle Management Activities for Fleet and Equipment Assets

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs)	As required
Operations and Maintenance	Performing regular preventive maintenance	As per vehicle/equipment's manufacturer manual
	Reactive maintenance	As required
Renewal (Rehabilitation and Replacement)	Performing renewals/rehabilitations proactively that were predicted/scheduled via regular preventive maintenance and inspections	As required
	Refurbish fleet and equipment to maintain in inventory as spares	At optimal point in lifecycle analysis

Lifecycle Activity	Description	Frequency
	Determine optimal point in asset lifecycle for asset replacement that minimizes maintenance and renewal/rehabilitation costs	At optimal point in lifecycle analysis/end of life
	Purchase/procure electric vehicles when possible to support environmental stewardship and reduce fuel consumption/greenhouse gas emissions	As required
Disposal	Sold as part of vehicle/equipment decommissioning	At optimal point in lifecycle analysis/end of life
	Vehicle/equipment disposal if cannot be sold due to current state/condition	At end of life
Expansion and Service Improvements	Review shared assets amongst services to determine overall capacity/needs	Annually
	Purchase/procure additional fleet and equipment assets to support population growth or service expansion	Through growth and development
	Purchase/procure electric vehicles and equipment when possible (EV availability and charging infrastructure required) to support environmental stewardship and reduce fuel consumption/greenhouse gas emissions.	Through growth and development

6.1.4 Risk Management Strategy

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all transportation assets. The results from the risk analysis are provided in Table 6-12. The distribution table illustrates the amount of assets within each risk score (1-25).

Approximately $31.1M of assets have a high likelihood of failure (LOF score of 5) and of these assets, COF scores range from 1 to 4. Approximately $9.9M (2% of the asset portfolio) are high-risk assets, 10% of assets are medium risk and the remainder are low risk. Assets identified as high risk should be validated, reviewed, and prioritized in capital planning to reduce the overall risk of the transportation network.

Table 6-12: Risk Score Distribution of Transportation Assets

Consequence of Failure	Likelihood of Failure				
	1	2	3	4	5
1	$12,072,886 (2.5%)	$10,187,729 (2.1%)	$2,683,155 (0.6%)	$222,035 (0.0%)	$653,122 (0.1%)
2	$94,750,916 (19.9%)	$22,738,463 (4.8%)	$57,019,283 (12.0%)	$58,950,822 (12.4%)	$8,821,386 (1.9%)
3	$74,716,702 (15.7%)	$29,205,732 (6.1%)	$31,693,706 (6.7%)	$22,297,326 (4.7%)	$13,675,299 (2.9%)
4	$9,869,000 (2.1%)	$13,360,915 (2.8%)	$2,951,000 (0.6%)	$1,978,000 (0.4%)	$7,925,000 (1.7%)
5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium (10-15)
- High risk (16-25)

6.1.5 Lifecycle Forecasting

Lifecycle forecasting for the transportation services is divided into two forecasting components because roadway assets were assessed and modelled using the 1991 Inventory Manual and separate software. Therefore, Scenario 1 and Scenario 2 have been modelled to exclude roadway assets (Subsections 6.1.5.1 and 6.1.5.2) and specific modelling for roadway assets has been included in Subsection 6.1.5.3. It is important to note that all transportation services are supported by the general levy, although there are opportunities to receive funds from government funding and development charges funding.

6.1.5.1 Scenario 1: Maintain Current LOS (Excluding Roadway Assets)

Scenario 1 forecasts asset performance by maintaining current LOS. A total of $30.9M (annual average of approximately $1.2M) is anticipated to be spent over the next 25 years. In this scenario, the distribution of approximately 19% of assets that are in very poor condition in 2023 is maintained over the next 25 years. Therefore, approximately 81% of the asset portfolio will continue to be in poor or better condition. The annual very poor distribution fluctuates due to the model accumulating funds prior to replacement, based on risk and condition. The performance and spending forecasts are provided in Figure 6-8 and Figure 6-9.

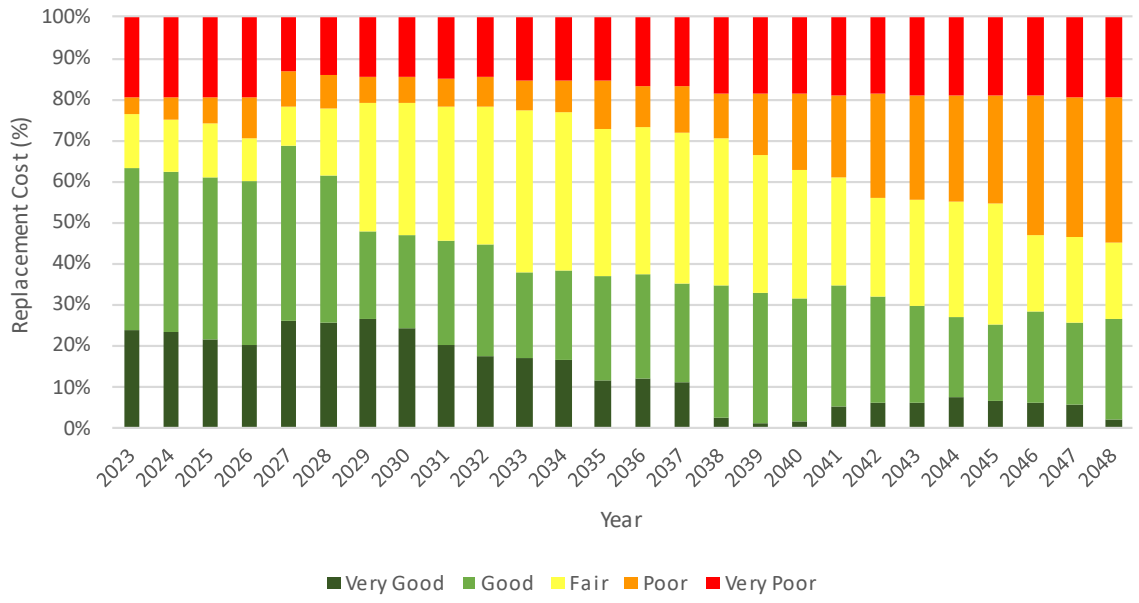


Figure 6-8: Scenario 1 – Maintain Current LOS Performance Distribution for Transportation Assets

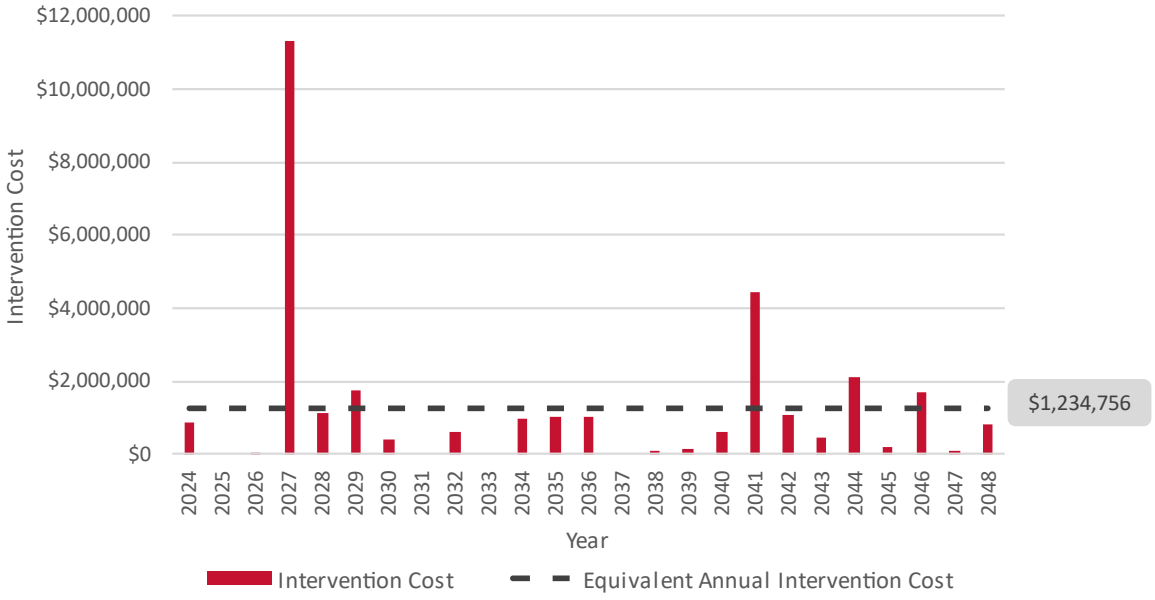


Figure 6-9: Scenario 1 – Maintain Current LOS Intervention Costs for Transportation Assets

6.1.5.2 Scenario 2: Backlog Analysis (Excluding Roadway Assets)

In Scenario 2, a total of $65.6M or an annual average of approximately $2.6M is forecasted to be spent to address the backlog and maintain the asset portfolio in poor or better condition over 25 years. In 2024, approximately $23.4M will be required to address the current backlog with significant intervention costs required in 2041 and 2048. It is anticipated that the significant amount to be spent in 2041 will be allocated towards streetlights, municipal structures, and fleet and equipment assets. The amount to be spent in 2048 is anticipated to be allocated towards municipal structures, footbridges, sidewalks, and fleet and equipment assets. The performance and spending forecasts are provided in Figure 6-10 and Figure 6-11.

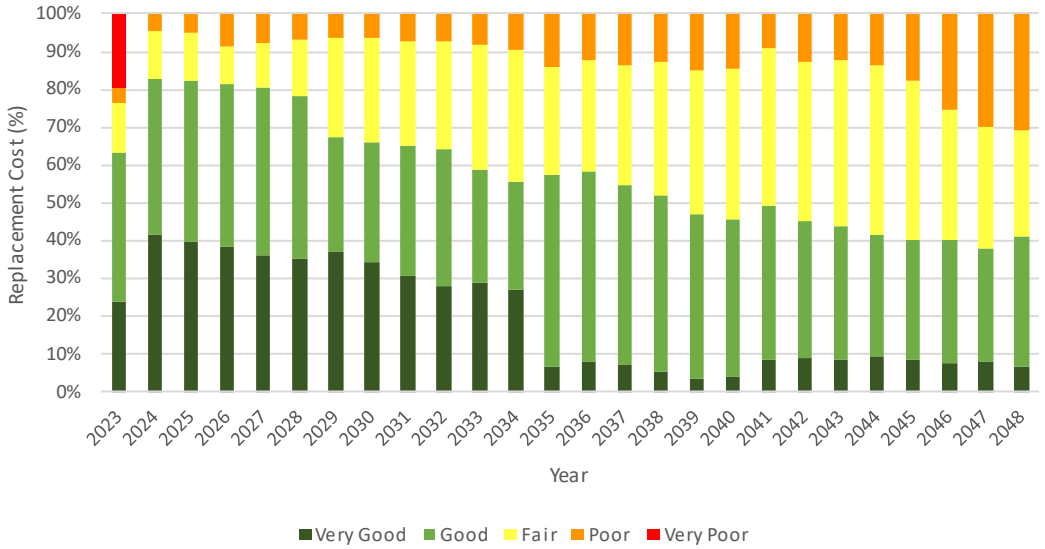


Figure 6-10: Scenario 2 – Backlog Analysis Performance Distribution for Transportation Assets

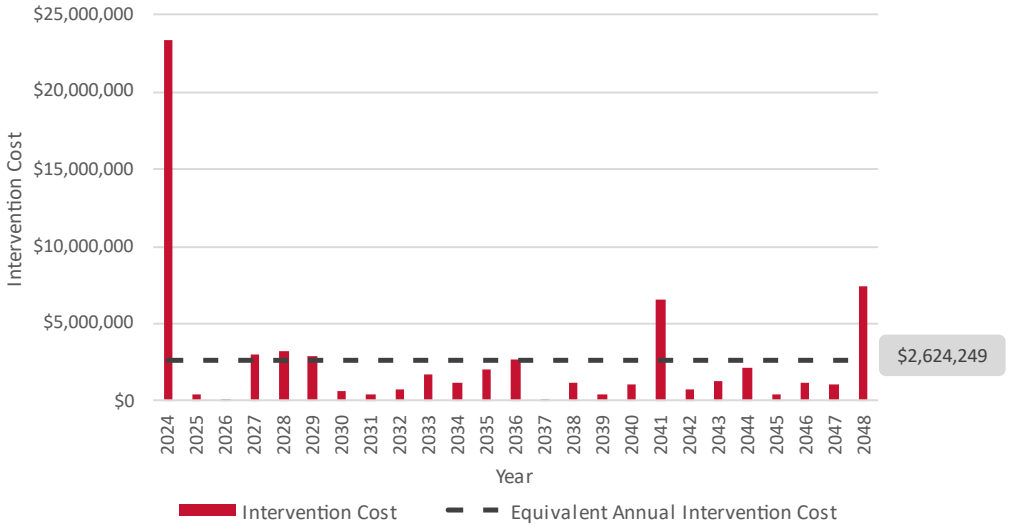


Figure 6-11: Scenario 2 – Backlog Analysis Intervention Costs for Transportation Assets

6.1.5.3 Roadway Assets Lifecycle Forecasting

The Township's 2023 State of the Infrastructure and Asset Management Plan for Roads Summary Report (Roads Summary Report) completed by 4 Roads Management Services provides a detailed analysis of the Township's network of roadway assets under various funding scenarios. The following Figure 6-12 has been adapted from the 2023 Road Summary Report and depicts the results of this analysis. Scenarios from the analysis completed in the 2023 Roads Summary Report were modelled over 50 years and efforts have been made to align these scenarios to the two standard scenarios (e.g. cost to maintain LOS and a backlog analysis) found within this AMP (Table 6-13).

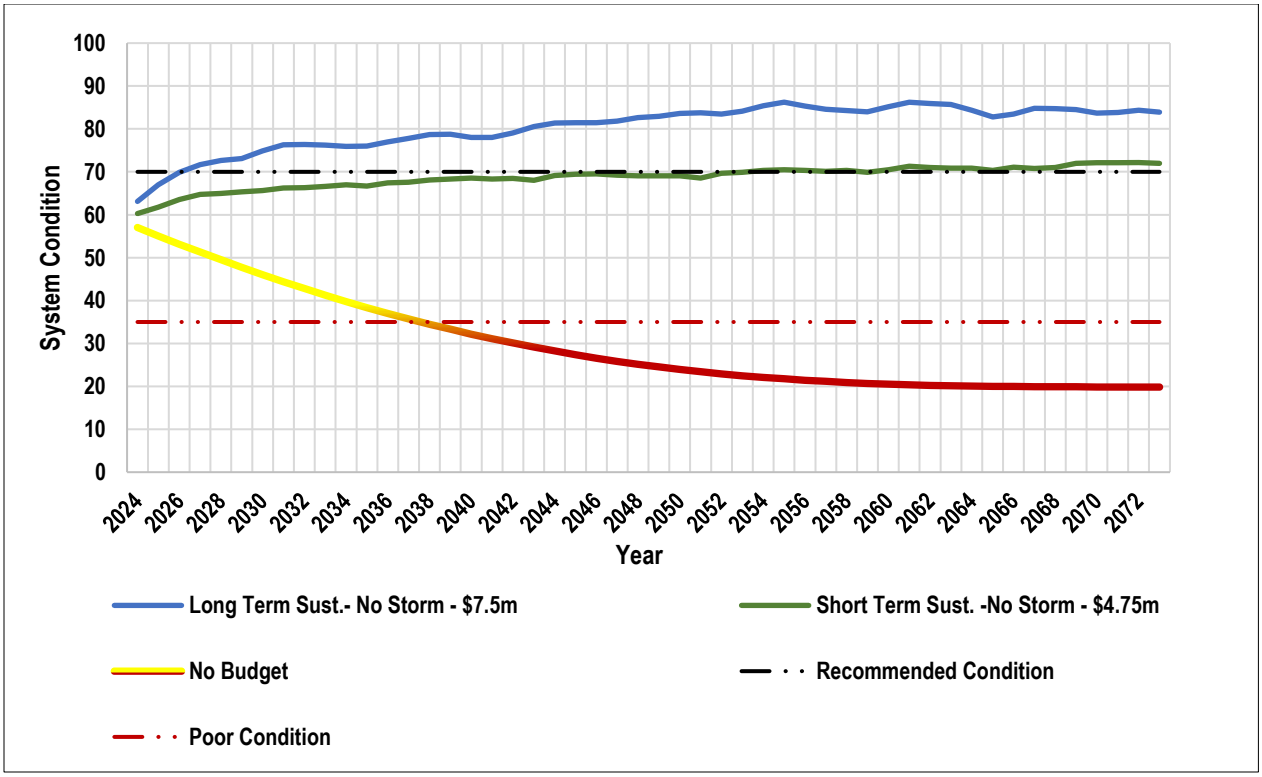


Figure 6-12. Anticipated Road System Performance at Proposed Funding Levels[3]

The roads reporting and methodology recommends the road network to have a system adequacy of 60% or greater which measures the proportion of the road system that is not a 'NOW' need (i.e. the percentage of roads that are fair to very good condition). The Township's current system adequacy is 65.3%, which has remained relatively static since 2009. This is a concerning trend as the Township has experienced growth over the past 14 years with the development of new subdivision roadways. The addition of the new roadways to the system did not influence the system adequacy in any meaningful way and instead the system adequacy is being held. This indicates that not enough is being done to improve the condition of existing system (i.e. the roadways that are outside of new subdivisions). Another important LOS metric is the physical condition of the system, which should be maintained at a recommended minimum score of 70 or higher by weighted average. The current system weighted average physical condition score is 58.3. To raise the system to 70 from its current condition would require $30,005,000 in improvements.[3] Again, this indicates that the system is deficient and requires a significant increase in investment to improve. As stated in the 2023 Roads Summary Report, an annual investment of $7,503,400 is required to achieve a long-term sustainability of the system over a 50-year lifecycle. Please note that the models and scenarios in the 2023 Roads Summary Report target these recommended system performance measures over a 50-year scenario and modelling results that have been included in this report are retained under the same 50-year forecast period as presented in the 2023 Road Summary Report by 4 Roads Management Services.

Table 6-13. Relationship Between Roads Summary Report and 2024 AMP

Scenario Name (Roads Summary Report)	Description	Alignment to 2024 AMP Scenario
Short-Term Sustainability	This scenario is modelled to establish the required funding level to preserve the condition of the road system for up to a 10-year period and forecasted over 50 years.[3]	Scenario 1: Maintain Current LOS
Long-Term Sustainability	This scenario is modelled to establish the required funding level to sustain the road system based on a 50-year lifecycle.[3]	Scenario 2: Backlog Analysis

Scenario 1 (Short-Term Sustainability) will result in a total investment requirement of $237.3M over 50-years (or an annual average of approximately $4.75M). For this scenario, the average system performance will reach the average physical condition of approximately 70 at around 30 years and maintain the recommended system adequacy average until the end of the 50-year forecast (refer to the green solid line in Figure 6-12). This scenario most closely aligns with the 2024 AMP's Scenario 1 (Maintain Current LOS). The short-term sustainability funding level was created to determine the minimum required to sustain the system over the short-term (10 years) in theory only and focuses on adequately funding pavement maintenance, preservation, and resurfacing programs. However, to sustain the system over the entire lifecycle, the long-term sustainability funding level is required as replacement of roadways are needed. Note that an improvement in system performance will occur with the short-term sustainability funding scenario instead of simply maintaining the same system performance. This scenario analysis for roadways uses an average condition target to estimate funding needs, which differs from other asset groups in this AMP, which uses a percentage-based targeting to estimate funding needs. Nevertheless, this scenario most closely aligns with the Scenario 1 developed for the 2024 AMP[3].

Scenario 2 (Long-Term Sustainability) will result in a total investment requirement of $375.2M over 50-years (or an annual average of approximately $7.5M). For this scenario, the average system performance will reach the recommended average physical condition of 70 within the first five years with a system adequacy of approximately 84 at the end of the 50-year forecast (as shown with the blue solid line in Figure 6-12). This model forecasts the road condition under the recommended annual funding required to sustain the road system over 50 years, and the overall performance under this scenario exceeds the minimum recommended system condition of 70[3].

6.1.5.4 Scenario Comparison

The following tables provide a comparison of the scenarios for transportation assets (excluding roadway assets) and for roadway assets.

Table 6-14. Scenario Comparison - Transportation Assets Excluding Roadways Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	$1.2M	=
Scenario 2: Backlog Analysis	$2.6M	↑

Table 6-15. Scenario Comparison - Roadway Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS (Short-Term Sustainability)	$4.75M	↑
Scenario 2: Backlog Analysis (Long-Term Sustainability)	$7.5M	↑

The most significant budgetary need pertains to roads, which requires significant funding to maintain current LOS, and a more substantial increase in annual funding to reach the recommended long-term sustainability funding amount. Since roadways account for such a large proportion of the Township's assets, it is important for the Township to continually inspect its road system and construction methods to ensure Township approved standards are being followed and adequate quality control measures are being adhered to. Without proper inspections, improper installation methods and deficient materials will lead to much earlier degradation of roadways and increase maintenance or resurfacing needs, which translates to a reduced service life and much higher costs.

For the remaining road network assets (i.e. not including roads), the most significant needs arise from municipal structures, as the Township has some high value bridges that require replacement. The Township is in the process of reviewing and deciding on strategies to address these assets, which include decommissioning Middlebrook Place bridge and converting Peel Street bridge to a pedestrian bridge. Refer to the technical measures level of service table in Section 6.1.2 for more details.

7. DETAILED ASSET MANAGEMENT INFRASTRUCTURE REPORT – EMERGENCY SERVICES

The Township of Woolwich's emergency services asset portfolio consists of various asset classes that support fire services. The Woolwich Fire Department currently operates six fire stations across the Township and is made up of approximately 175 volunteer fire fighters and officers. The Fire Department serves the community by providing protection services while responding to local needs and circumstances. Currently, the Woolwich Fire Department provides a high degree of service by meeting the Accredited Superior Tanker Shuttle Service for its rural coverage areas (within 8 km for residential areas and within 5 km for commercial areas). Woolwich Township Fire Department has four main areas of focus: fire protection services, Fire Code enforcement, fire safety and education programs, and emergency preparedness. Understanding and maintaining emergency services assets has an important role in allocating resources, responding to incidents, and reducing the impact and risk of fire in the community to protect citizens and property in Woolwich.

SERVICE AT A GLANCE

Replacement Value	Overall Condition	Quantity
$44.6 Million	Fair	6 fire stations 15 fire reservoir assets 607 equipment assets 25 fleet assets

WHAT'S INCLUDED IN EMERGENCY SERVICES?

Fleet and equipment are critical in delivering fire protection services that typically include emergency medical response, hazardous materials incident response, water and ice rescue, rope rescue, vehicle and farm extrication, and natural and accidental emergencies. The Township owns and maintains a total value of $44.6M of emergency services assets which all contribute to the protection of the community. This represents approximately 4% of the Township's total assets replacement value.

FIRE SERVICES

FACILITIES	EQUIPMENT	FLEET
• Fire Reservoirs • Fire Stations	• Emergency Equipment	• Emergency Response Vehicles • Fire Apparatus/Fire Trucks • Non-Emergency Vehicles

7.1. FIRE SERVICES

7.1.1 State of Infrastructure

The Township owns and maintains various fire stations, fire reservoirs, fire apparatus/fire trucks, emergency response vehicles, emergency equipment and non-emergency vehicles and equipment. The Woolwich Fire Department relies on specialized fleet and equipment to provide protection for firefighters and to respond to a variety of incidents. Figure 7-1 illustrates the replacement value distribution of emergency services assets. Fire apparatus/fire trucks account for the majority (58%) of the asset portfolio. There has been an upward trend in replacement cost for these goods since the COVID-19 pandemic, in part due to the challenges of inflation and

supply chain delays, which has resulted in an increase in replacement costs by 100% for some assets.

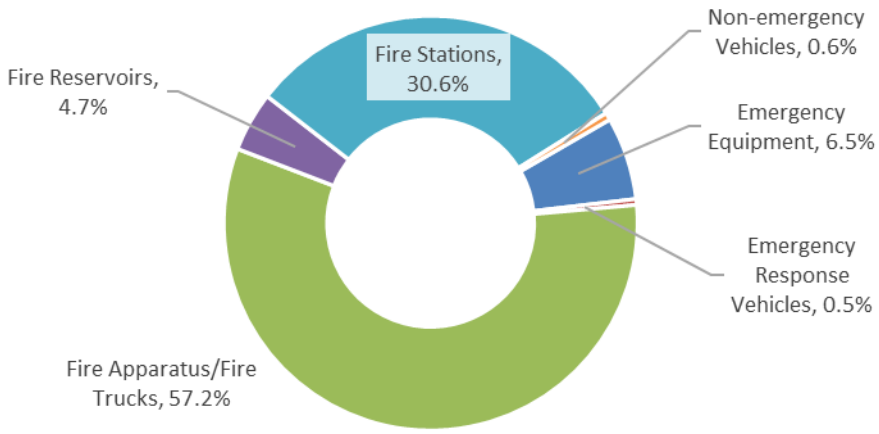


Figure 7-1: Replacement Value Distribution of Emergency Services Assets

7.1.1.1 Asset Inventory and Valuation

Table 7-1 below summarizes the asset valuation, quantities, and condition for each asset category.

Table 7-1: Inventory and Valuation of Emergency Services Assets

Asset Category	Asset Class	Replacement Value	Quantity	Average Condition
Equipment	Emergency Equipment	$2,884,085	607 Assets	Fair
Fleet	Emergency Response Vehicles	$205,000	4 Assets	Very Good
	Fire Apparatus/ Fire Trucks	$25,500,000	18 Assets	Fair
	Non-Emergency Vehicles	$250,000	3 Assets	Very Poor
Facilities	Fire Reservoirs	$2,074,000	15 Assets	Fair
	Fire Stations	$13,641,669	6 Facilities	Good

7.1.1.2 Age Summary

Figure 7-2 and Figure 7-3 illustrate the age of emergency services assets as a proportion of their estimated service life, as well as value of assets acquired by decade. As per Figure 7-2, non-emergency vehicles on average have exceeded the end of the average service life (note that this category represents three vehicles only), while for fire

stations, fire reservoirs and fire apparatus/fire trucks the average age is currently approximately 50% to 60% of the average service life of those asset classes. A large portion of fleet and equipment have been procured since the 2000s; however, given ESLs range from 5 to 30 years for these assets, replacement should be expected in the next few decades.

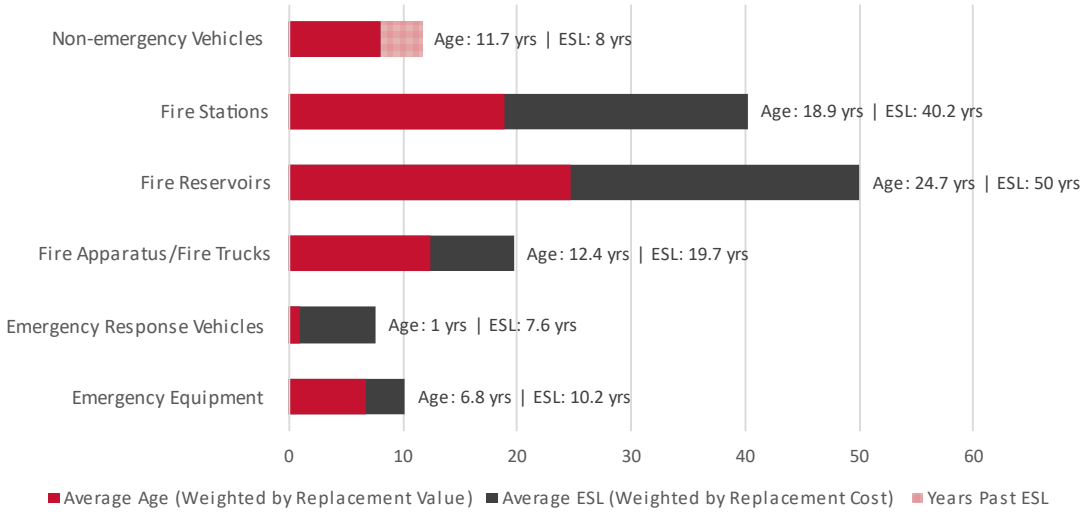


Figure 7-2: Age as a Proportion of Estimated Service Life (ESL) of Emergency Services Assets

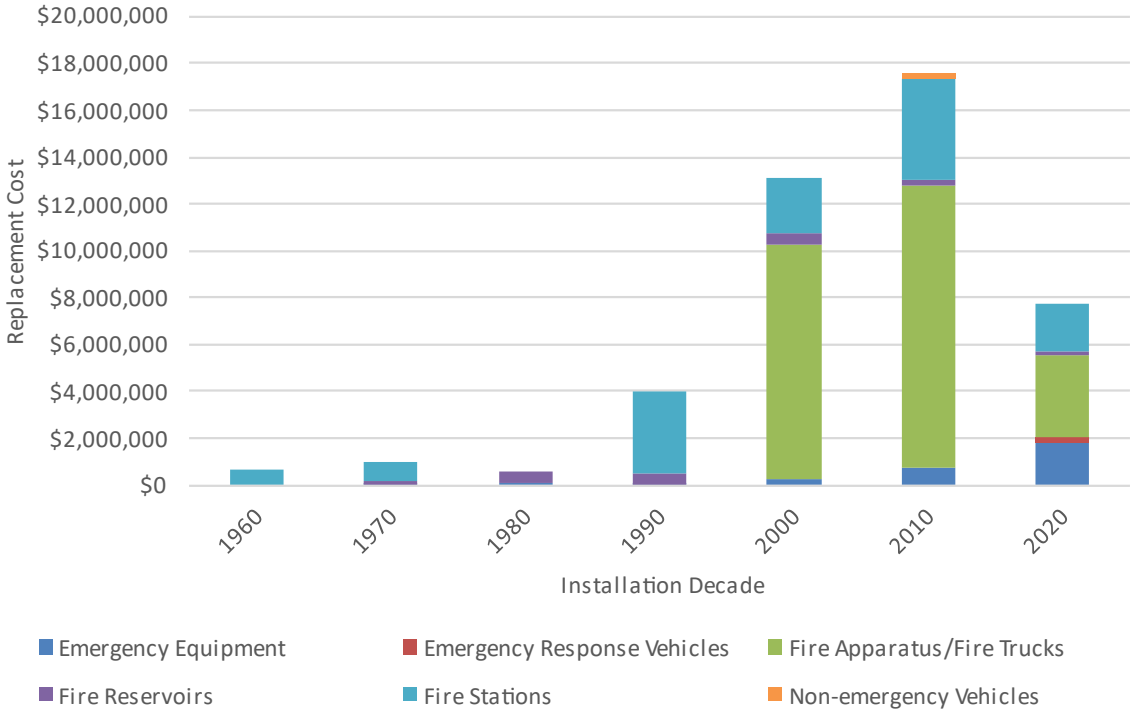


Figure 7-3: Age Distribution by Installation Decade of Emergency Services Assets

7.1.1.3 Asset Condition

The condition of vehicles is continually assessed as maintenance is performed. Vehicles are inspected annually. These assets are replaced when identified through regular maintenance and monitoring, and in keeping with the Township's Fleet Management Policy. Equipment is replaced on an as needed basis and at end of life. Facility assets are also informally assessed, although the Township has completed some building condition assessments (BCAs); however, condition data is not always recorded formally against asset inventories. For all of these assets, age and estimated service life (ESL) are used to approximate condition. Figure 7-4 and Figure 7-5 illustrate the condition distribution of all emergency services assets. In Figure 7-4, a combined 42% of assets are in good to very good condition, with a combined 36% of assets in poor to very poor condition. Table 7-2 summarizes how condition ratings are determined. Figure 7-5 below identifies non-emergency vehicles in very poor condition, generally due to the fact that the Township has kept trucks in service past their estimated useful life to eliminate the need for personal vehicles used at an emergency scene.

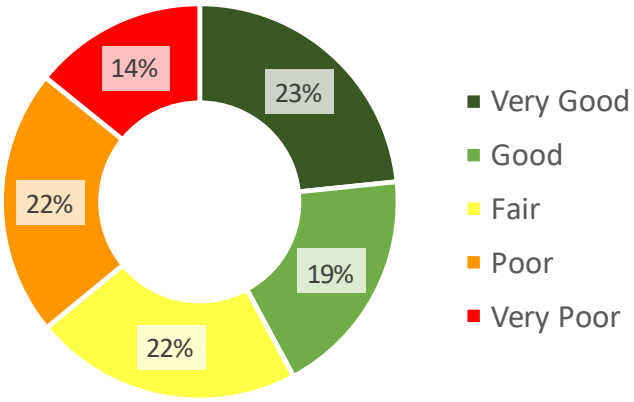


Figure 7-4: Condition Distribution of Fire Services Assets

Table 7-2: Condition Ratings for Emergency Services Assets

Condition Category	Life Consumed	Condition Rating (All Assets)
Very Good	0% to 25%	Life Consumed is the metric used to evaluate condition for all asset classes. Assets within facilities that are assessed receive a remaining life from the assessment.
Good	25% to 50%	
Fair	50% to 75%	
Poor	75% to 100%	
Very Poor	>100%	

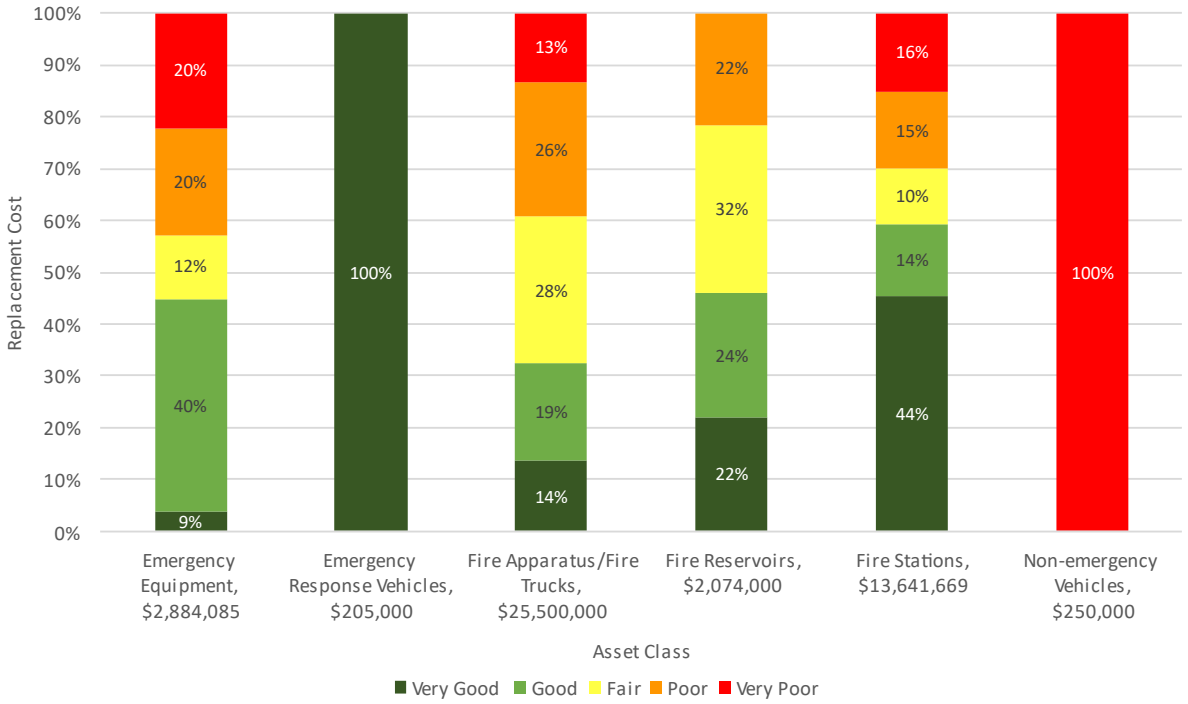


Figure 7-5: Condition Distribution of Emergency Services Assets by Asset Class

7.1.1.4 Data Sources and Maturity

Table 7-3 and Table 7-4 summarize the data completeness and confidence of the Township's asset data.

Table 7-3: Data Completeness for Emergency Services Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost
Fire Stations	100%	100%	37%	100%
Fire Reservoirs	100%	100%	N/A	100%
Fleet (Emergency Response Vehicles, Fire Apparatus/Fire Trucks, Non-Emergency Vehicles)	100%	100%	N/A	100%
Equipment (Emergency Equipment)	100%	100%	N/A	100%

Table 7-4: Approach to Assessing Condition for Emergency Services Assets

Asset Class	Approach to Assessing Condition
Fire Stations	Some fire stations have been assessed and condition data was recorded formally against the asset inventories. The Township is in the process of completing BCAs for each facility. Facilities are assessed through BCAs to determine asset condition and needs. Asset data is updated annually based on capital works. Assets within facilities that are assessed receive a remaining life from the assessment.
Fire Reservoirs	Fire reservoirs are replaced on an as needed basis and do not undertake a formal condition assessment program. Age and service life are used to approximate condition. The ESL of fire reservoirs is 50 years.
Equipment	Equipment is replaced on an as needed basis and does not require a formal condition assessment program. Age and service life are used to approximate condition. The ESL of equipment ranges from 5 to 30 years.
Fleet	Fleet assets are assessed and identified for replacement through monitoring that occurs during regular maintenance activities. Excessive maintenance demands can also trigger a replacement need. The Township does not require a formal condition assessment program for fleet assets and relies on age and ESL to understand asset condition. The ESL for fleet assets ranges from 5 to 20 years.

7.1.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions, such as completing additional condition assessments (e.g. building condition assessments), conducting spatial analysis to verify inventory data and identify missing information (e.g. fire reservoirs), creating data links between data sources (e.g. having maintenance activities inform asset condition and potential need for renewals) and filling data gaps where required. Since developing and integrating robust condition information will better inform the system performance and related asset management activities, it is important that condition assessments programs are implemented at regular intervals. Emergency services assets are a relatively new addition for asset management reporting which can benefit from continued actions to validate the inventory and establish asset management workflows and procedures. Fire reservoirs have historically been visually inspected by staff and the Township is working towards developing a more robust condition assessment process that will better inform the inventory and identify reservoirs needing retrofits to meet updated Township standards. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset management planning improvement recommendations can be found in the improvement plan (Section 11).

7.1.2 Levels of Service

The Township's goal is to provide fire services that prevent fires and keep the community safe by responding to incidents effectively. Table 7-5 and Table 7-6 provide a summary of the customer and technical LOS metrics that have been established for emergency services (i.e. fire services) assets. Customer and Technical LOS measures were decided by reviewing the Township's Strategic Plan, existing planning documents, and staff expertise.

Table 7-5: Emergency Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance
Fire services are actively working towards preventing fires	Availability, Reliable, Safe	Woolwich Fire Department completed 237 fire safety programs in 2023. Other technical reliable and safe metrics also support the Township meeting this customer measure.
Fire services are actively educating the public	Availability, Reliable, Safe	In 2023, Woolwich Fire Department completed 53 events focused on educating the public on fire safety and prevention.
Fire services respond to incidents in a timely manner	Reliable, Prevention, Safe	The technical metrics for reliability, prevention and safety suggest that Woolwich Fire Department responds to incidents in a timely manner.
Fire services surpass the minimum requirement for rural communities	Reliable, Prevention, Safe	The Township is meeting this measure by maintaining response time per the Fire Protection Act for suburban areas and is exceeding requirements based on currently achieving the Accredited Superior Tanker Shuttle Service.

Table 7-6: Fire Services Technical Levels of Service

Service Attributes	Technical Measures	Current Performance
Availability (Education, Prevention)	Annual number of fire safety programs completed.	237 total events; 53 education related
Prevention, Safe	Percentage of incidents 10 firefighters can arrive at within 10 minutes response time (based on the suburban rule with a volunteer fire department).	90%
Reliable	Annual average response time	9 minutes and 17 seconds
Availability (Prevention)	Annual number of fire incidents/1000 people.	0.022[1]

Service Attributes	Technical Measures	Current Performance
Reliable	Percentage of fire apparatus and emergency response vehicles that have exceeded their ESL.	13%
Reliable	Percentage of non-emergency vehicles that have exceeded their ESL.	100%
Reliable	Percentage of emergency equipment that have exceeded their ESL.	21%
Reliable, Safe	Inspections are performed as required and on time.	100%
Reliable	Fire services has the certified tanker shuttle certification (6 tankers - 1 per station)	100%
Reliable (Prevention)	% of facilities with Building Condition Assessments completed within 5 years	33%
Safe (Prevention)	Number of fire code violations per year, obtained from facility inspections	0
Environmental Stewardship	Annual facility natural gas consumption per square foot	1.37 m3
Environmental Stewardship	Annual facility hydro consumption per square foot	3.77 KWH
Reliable	Percentage of Fire Station assets that have not exceeded their ESL	84%

[1] Year-End 2022 Population and Household Estimates, Region of Waterloo

7.1.3 Lifecycle Management Strategies

For the Township to provide fire services and maintain LOS, various lifecycle activities are performed fire services assets. These include non-infrastructure solutions such as developing plans and performing condition assessments; preventative and reactive maintenance activities to repair assets; refurbishing assets; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. Table 7-7 and Table 7-8 summarize the lifecycle activities performed on fleet, equipment, and facilities.

Table 7-7: Lifecycle Management Activities for Emergency Services Equipment and Fleet

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs) Policies and procedures/standards	As required
Operations and Maintenance	Performing regular preventive maintenance	As per vehicle/equipment's manufacturer manual

Lifecycle Activity	Description	Frequency
	Reactive maintenance	As required
Renewal (Rehabilitation and Replacement)	Performing renewals/rehabilitations proactively that were predicted/scheduled via regular preventive maintenance and inspections	As required
	Refurbish fleet and equipment to maintain in inventory as spares	At optimal point in lifecycle analysis
	Determine optimal point in asset lifecycle for asset replacement that minimizes maintenance and renewal/rehabilitation costs	At optimal point in lifecycle analysis/end of life
	Purchase/procure electric vehicles when possible to support environmental stewardship and reduce fuel consumption/greenhouse gas emissions	As required
Disposal	Sold as part of vehicle/equipment decommissioning	At optimal point in lifecycle analysis/end of life
	Vehicle/equipment disposal if cannot be sold due to current state/condition	At end of life
Expansion and Service Improvements	Review shared assets amongst services to determine overall capacity/needs	Annually
	Purchase/procure additional fleet and equipment assets to support population growth or service expansion	Through growth and development
	Purchase/procure electric vehicles and equipment when possible (EV availability and charging infrastructure required) to support environmental stewardship and reduce fuel consumption/greenhouse gas emissions	Through growth and development

Table 7-8: Lifecycle Management Activities for Emergency Services Facilities

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs)	As required
	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative
	Building condition assessment program	Ongoing
Operations and Maintenance	Performing regular preventive maintenance to extend service lives	As per maintenance programs
	Reactive maintenance to address issues found through inspections, preventive maintenance, or complaints	As required

Lifecycle Activity	Description	Frequency
Renewal (Rehabilitation and Replacement)	Building rehabilitation needs	Based on inspections and condition assessments
	Equipment or building component replacement	As required
	Major equipment or structural building component replacement	At optimal point in lifecycle analysis/end of life
Disposal	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
Expansion and Service Improvements	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative
	Construction of new facilities in new subdivisions to accommodate for population growth or expansion of existing facilities to accommodate for population intensification	Through growth and development
	Purchase/procure additional equipment and fleet assets to support population growth or service expansion	As required
	New fire station construction	Through growth and development

7.1.4 Risk Management Strategy

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all fire assets. The results from the risk analysis are provided in Table 7-9. The distribution table illustrates the amount of assets by value within each combination of LOF and COF ratings.

There are no high-risk assets in the Township's Emergency Services portfolio. Approximately $14.1M (32%) of emergency service assets are medium risk and the remainder are low risk. Approximately $6.5M of assets have a high likelihood of failure (LOF score of 5) and of these assets, COF scores range from 1 to 3.

Table 7-9: Risk Score Distribution of Emergency Services Assets

Consequence of Failure	Likelihood of Failure 1	2	3	4	5
1	$273,466 (0.6%)	$78,455 (0.2%)	$34,497 (0.1%)	$60,741 (0.1%)	$50,759 (0.1%)
2	$4,153,522 (9.3%)	$1,240,170 (2.8%)	$894,574 (2.0%)	$1,872,438 (4.2%)	$1,380,223 (3.1%)
3	$5,967,218 (13.4%)	$7,070,324 (15.9%)	$8,698,739 (19.5%)	$7,748,760 (17.4%)	$5,030,867 (11.3%)
4	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium (10-15)
- High risk (16-25)

7.1.5 Lifecycle Forecasting

7.1.5.1 Scenario 1: Maintain Current LOS

Scenario 1 forecasts asset performance by maintaining current service levels. A total of $42.5M, or annual average of approximately $1.7M, is anticipated to be spent over the next 25 years to maintain the current distribution of assets that are in very poor condition. In 2023, approximately 14% of assets are in very poor condition which is maintained over the next 25 years in this scenario. Note that the annual performance fluctuates due to the nature of the inventory data, which contains a wide variance of replacement costs. The performance and spending forecasts are provided in Figure 7-6 and Figure 7-7.

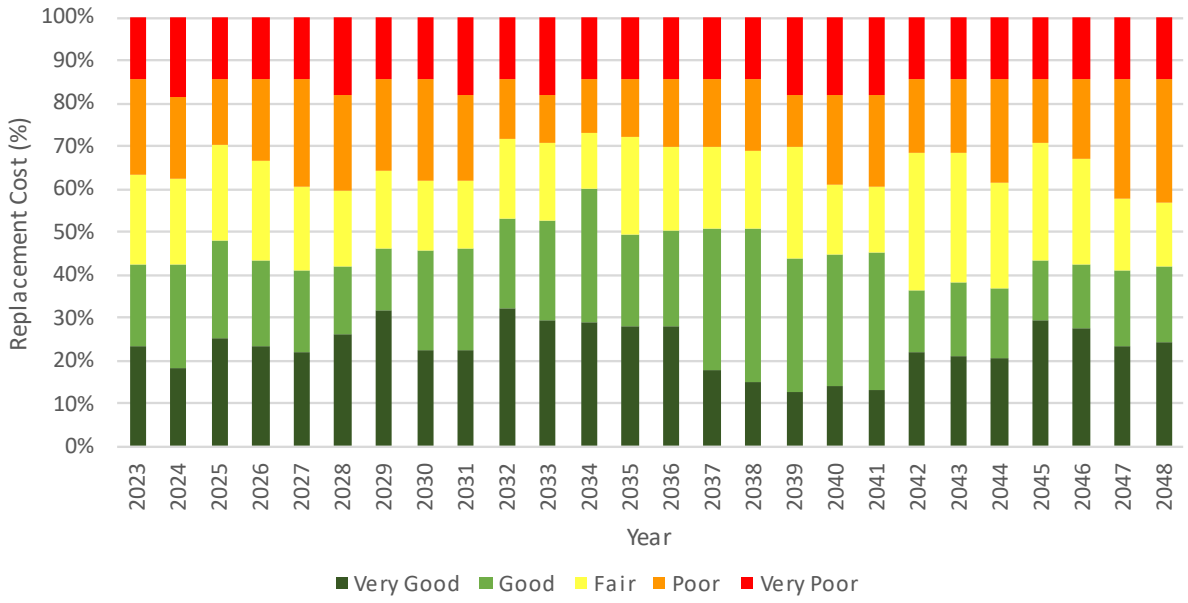


Figure 7-6: Scenario 1 – Maintain Current LOS Performance Distribution for Emergency Services Assets

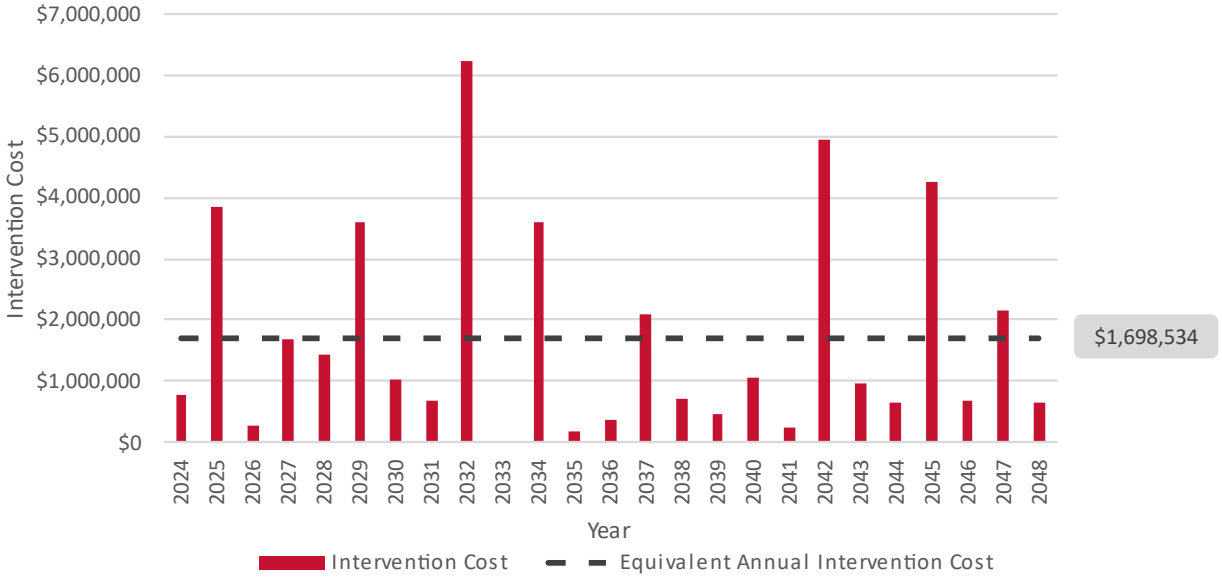


Figure 7-7: Scenario 1 – Maintain Current LOS Intervention Costs for Emergency Services Assets

7.1.5.2 Scenario 2: Backlog Analysis

In Scenario 2, a total of $59.1M, or an annual average of approximately $2.4M, represents the average funding required to address the backlog and maintain the asset portfolio to ensure there are no assets in very poor condition over the next 25 years. Included in the total amount is the approximately $8.8M that would be required to address the current backlog. Required funding changes from year to year in this scenario, where certain years may have significant investment needs due to the timing of asset replacements based on their lifecycle needs. For example, it is anticipated that a significant amount will be required for fleet in 2032, 2044, and 2048. The performance and spending forecasts are provided in Figure 7-8 and Figure 7-9.

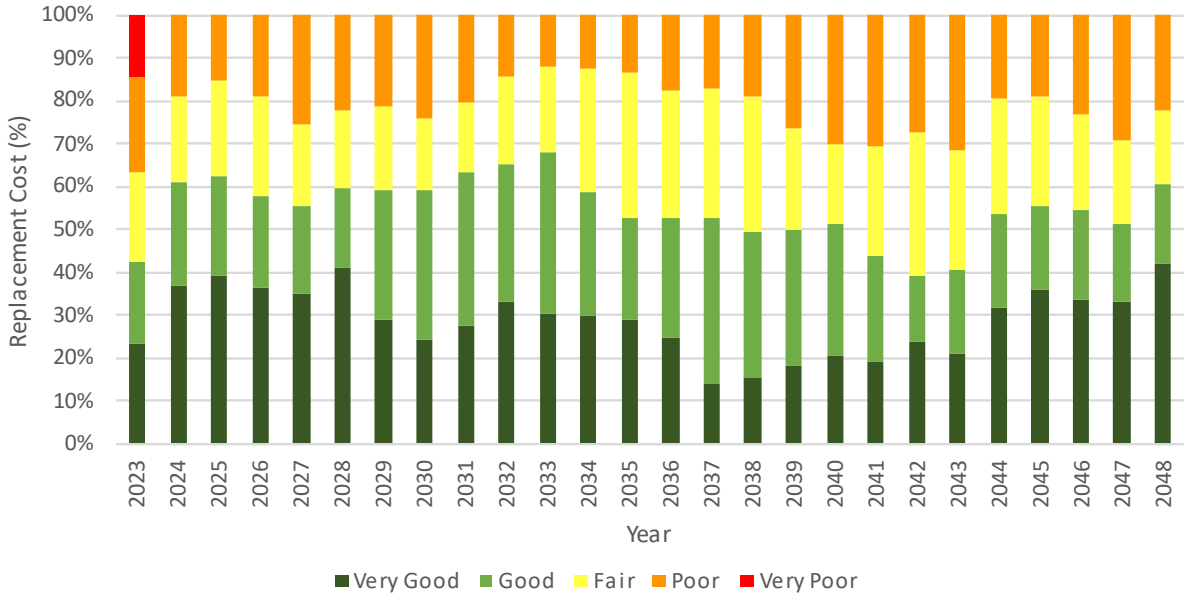


Figure 7-8: Scenario 2 – Backlog Analysis Performance Distribution for Fire Services Assets

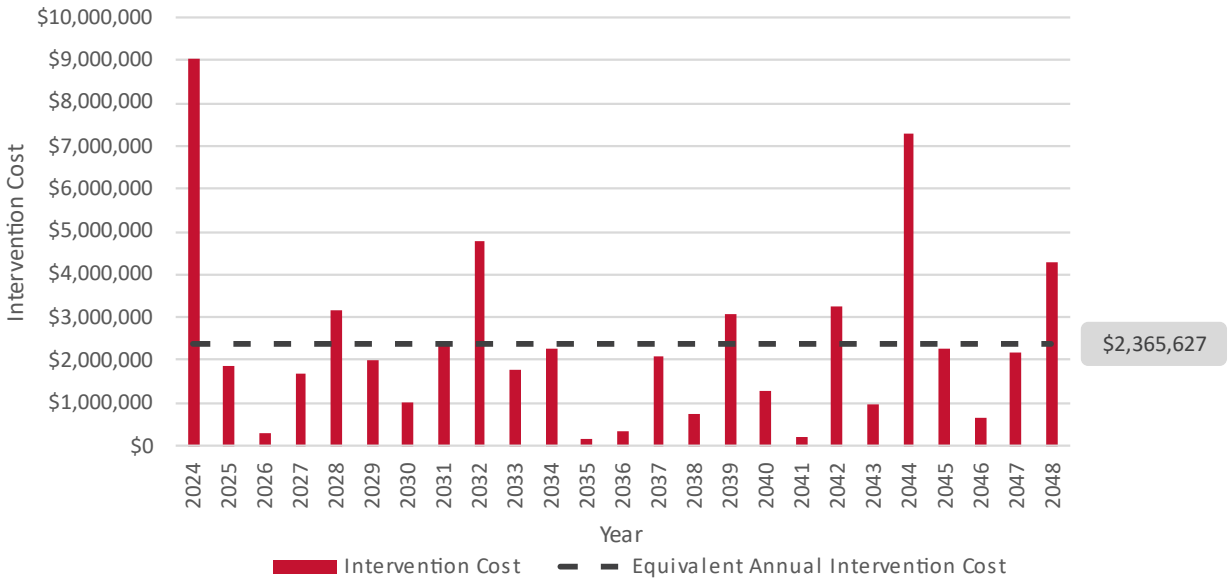


Figure 7-9: Scenario 2 – Backlog Analysis Intervention Costs for Fire Services Assets

7.1.5.3 Scenario Comparison

Table 7-10 provides a comparison of the scenarios.

Table 7-10: Lifecycle Scenario Comparison for Emergency Services Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	$1.7M	=
Scenario 2: Backlog Analysis	$2.4M	↑

Fire services has seen significant increases to the cost of its assets, particularly fire apparatus/fire trucks, over the last several years. As a result, a significant increase in backlog will occur as fleet reach their end of life and are due for replacements without increased funding being available. The analysis has identified an annual required funding amount of $2.4M for improvements in service levels and $1.7M annually to maintain emergency services assets at current service levels. Fire apparatus/fire trucks represent the largest impact to funding needs over the next 25-years of the entire emergency services asset portfolio.

8. DETAILED ASSET MANAGEMENT INFRASTRUCTURE REPORT – RECREATION AND FACILITIES

The Township of Woolwich aims to promote healthy living and active lifestyles by providing community programs that are affordable, accessible, safe, and reliable. The Township supports these initiatives with opportunities for recreation at indoor facilities, such as pools, arenas, courts, and community spaces. Additionally, the department oversees the provision of administrative facilities and libraries. Outdoor facilities include both passive and active opportunities for play and sports, such as playgrounds, splash pads, sports fields, trails, and multi-use courts.

SERVICE AT A GLANCE

Replacement Value

$90.9 Million

Overall Condition

Fair

Quantity

6 administration & operation facilities
12 equipment assets
34 fleet assets
256 IT equipment assets
2 libraries
2 multi use/event spaces
6 recreation centres/arenas
289 outdoor recreation assets
21.6 km of trails

WHAT'S INCLUDED IN RECREATION AND FACILITIES?

The Township of Woolwich's recreation amenities and facilities consist of administration & operations facilities, and parks & recreation facilities subservices, which includes the fleet and equipment required to perform maintenance and support the service. Fleet is composed of both machinery (e.g., tractors, ice resurfacing equipment, utility vehicles, and trailers) and light duty vehicles (e.g., work trucks and passenger vehicles). There is also a light equipment category that includes smaller facility maintenance and landscaping equipment.

The Township owns and maintains a total value of approximately $90.9M of recreation and facilities assets, the majority of which support the mental and physical well-being for children, youth, and adults. This represents 8% of the Township's total assets replacement value. Please note that fire station facilities have been categorized and analyzed under Emergency Services.

ADMINISTRATION AND OPERATIONS

FACILITIES

- Administration
- Operations/Other

EQUIPMENT

- Light Equipment

FLEET

- Light Duty Vehicles
- Machinery

INFORMATION TECHNOLOGY

- Equipment

PARKS AND RECREATION

INDOOR RECREATION FACILITIES

- Libraries
- Multi Use/Event Spaces
- Recreation Centres/Arenas

OUTDOOR RECREATION FACILITIES

- Amenities and Furnishings
- Field Houses
- Park Structures
- Park Washrooms
- Parking and Other Paving
- Parks Linear
- Parks Utilities
- Playgrounds and Splash Pads
- Sports Pads

8.1. ADMINISTRATION AND OPERATIONS

8.1.1 State of the Infrastructure

The Township owns and maintains approximately $12.3M in administration and operations assets. Administration and operations assets include administration facilities, operations facilities, and the fleet and equipment that support the service. Figure 8-1 illustrates the replacement value distribution of administration and operations assets. Together both the administration and operations facilities comprise 71% of the replacement value.

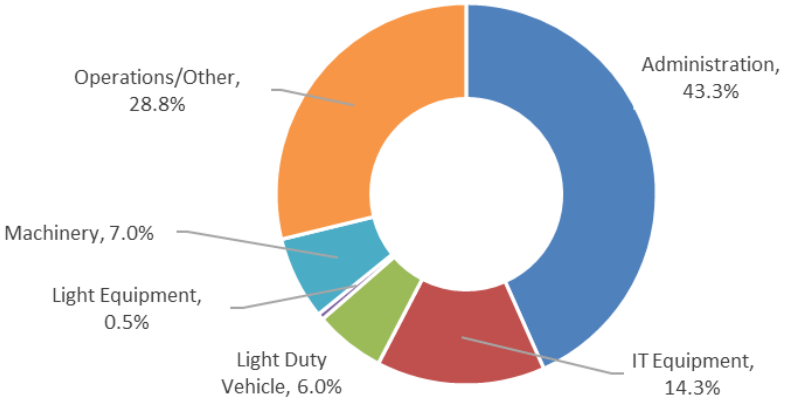


Figure 8-1: Replacement Value Distribution of Administration & Operations Assets

8.1.1.1 Asset Inventory and Valuation

Table 8-1 below summarizes the asset valuation, quantities, and condition for each asset category.

Table 8-1: Inventory and Valuation of Administration & Operations Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Equipment	Light Equipment	$67,044	12 assets	Poor
Facilities	Administration	$5,311,342	3 facilities	Fair
	Operations/Other	$3,529,993	3 facilities	Fair
Fleet	Light Duty Vehicles	$733,875	12 assets	Fair
	Machinery	$861,083	22 assets	Fair
Information Technology	IT Equipment	$1,755,996	256 assets	Very Poor

8.1.1.2 Age Summary

Figure 8-2 and Figure 8-3 illustrate the age of administration & operations assets as a proportion of their estimated service life, as well as value of administration & operations assets acquired by decade. As seen in Figure 8-2, based on average age, the majority of the operations/other facilities are extending past the average estimate service life. Both Light Equipment and IT equipment assets have also exceeded their average service life based on average age. Of note is that IT Services was directed in 2021 to extend the replacement cycles for Staff Workstations from 4 years to 6 years and Server Infrastructure from 5 years to 8 years as a cost-saving measure. Utilizing aging hardware creates challenges in keeping up with new software requirements in terms of Memory, Storage, and CPU demands, risking the inability to procure replacement parts, and ensuring all components are operating optimally. As systems age, in particular staff workstations, there is a degradation in performance, which impacts staff's ability to remain productive and efficient in their tasks. Some of this has been mitigated by obtaining third-party hardware support and adding resources as needed. Despite the aging hardware, security of the systems have been maintained but often requires additional staff time to do so.

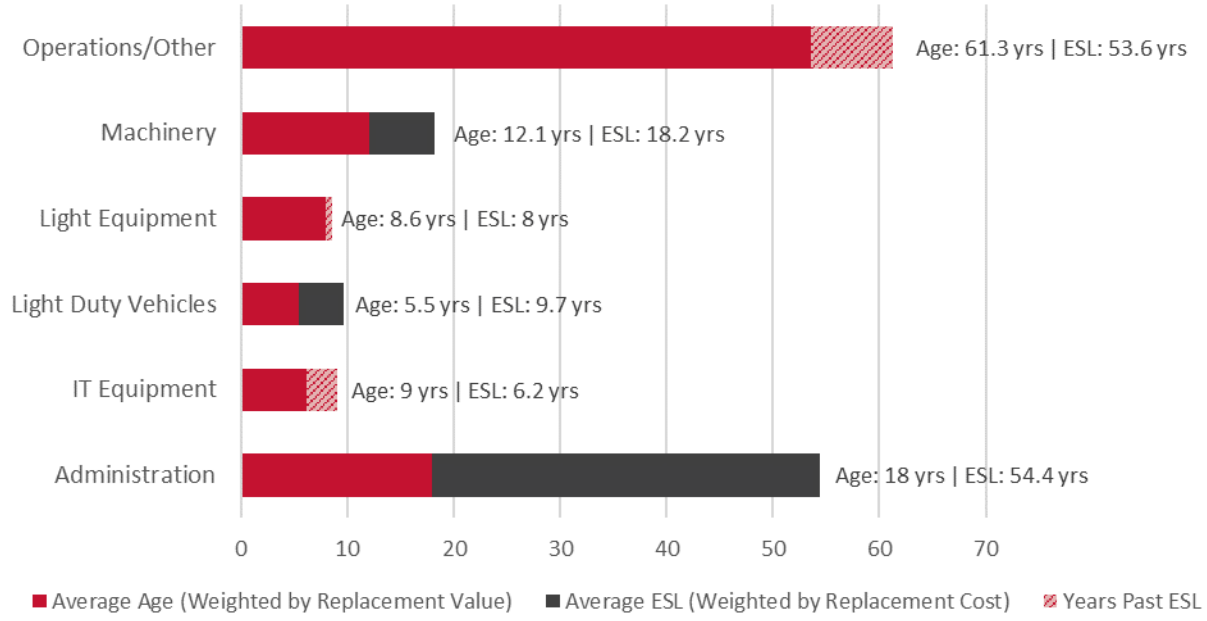


Figure 8-2: Age as a Proportion of Estimated Service Life (ESL) of Administration & Operations Assets

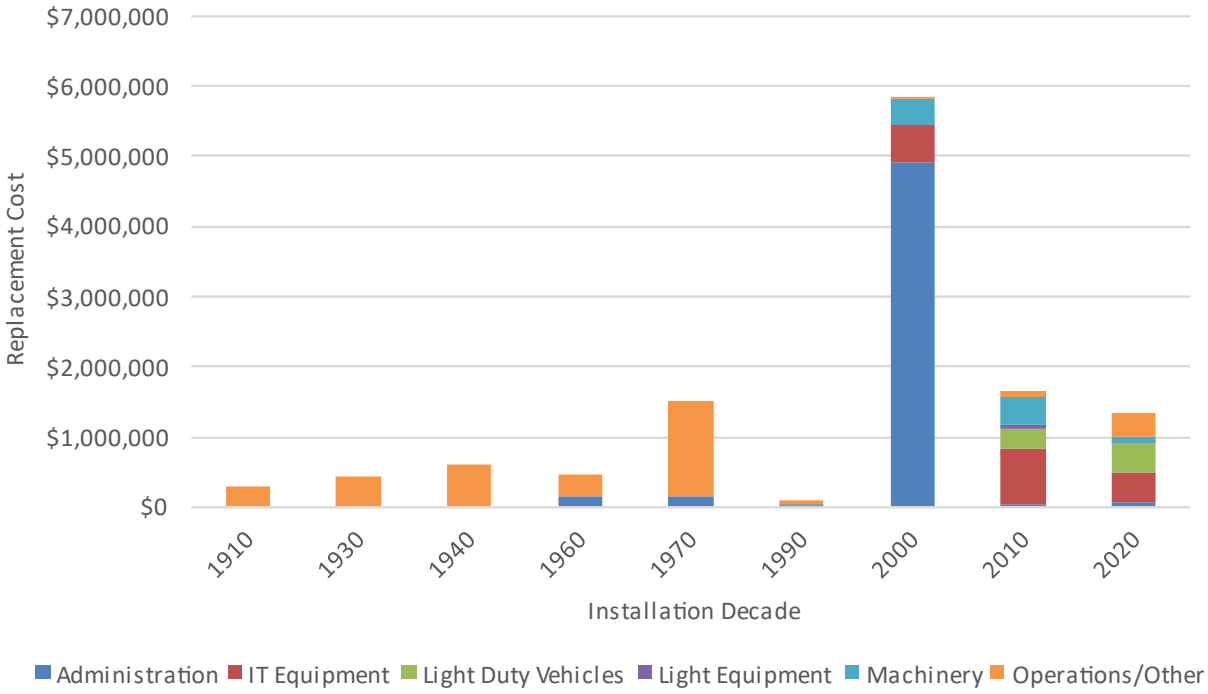


Figure 8-3: Age Distribution by Installation Decade of Administration & Operations Assets

8.1.1.3 Asset Condition

The condition of vehicles is continually assessed as maintenance is performed. These assets are typically replaced in accordance with the Township's Fleet Management Policy, and on an as needed basis and at the end of their useful life. Facility assets are also informally assessed regularly, and the Township has completed some building condition assessments (BCA); however, condition data is not always recorded formally against asset inventories. For all of these assets, age, and estimated service life (ESL) are used to approximate condition. Figure 8-4 and Figure 8-5 illustrate the condition distribution of all administration and operations assets. In Figure 8-4, a combined 31% of assets are in good to very good condition, with a combined 41% of assets in poor to very poor condition, with a large proportion being found in IT equipment (Figure 8-5). As mentioned above, IT equipment assets have faced additional pressures from previous Council to extend replacement cycles resulting in more degradation in condition, when assessed by age and ESL. IT equipment, and recreation and facilities, as a whole, are new additions to the asset management plan reporting and the Township can benefit from creating procedures and researching industry best practices to improve efficiencies and accuracy when recording and maintaining asset lifecycle and condition information. In general, although assets may be identified as very poor condition based on age, it is important to note that this measure is limited by the quality of the data and does not mean the equipment is not serviceable. Instead, this might be an indication that the equipment may require more maintenance to keep in service (i.e. staff time and resources) and may also benefit from more investment. Further investigation should be conducted to ensure IT equipment assets are adequately funded, meet current levels of service expected and meet the proposed levels of service determined for the 2025 AMP update. Table 8-2 summarizes how condition ratings are determined.

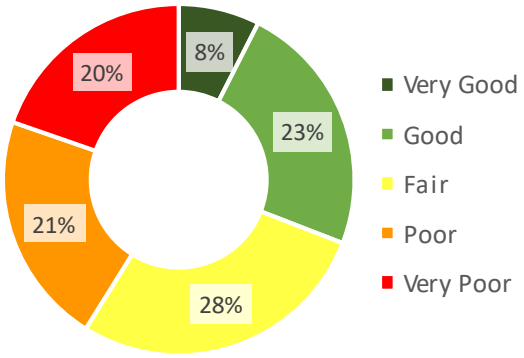


Figure 8-4: Condition Distribution of Administration & Operations Assets

Table 8-2: Condition Ratings for Administration & Operations Assets

Condition Category	Life Consumed	Condition Rating (All Assets)
Very Good	0% to 25%	Life Consumed is the metric used to evaluate condition for this asset class. Assets within facilities that are assessed receive a remaining life from the assessment.
Good	25% to 50%	
Fair	50% to 75%	
Poor	75% to 100%	
Very Poor	>100%	

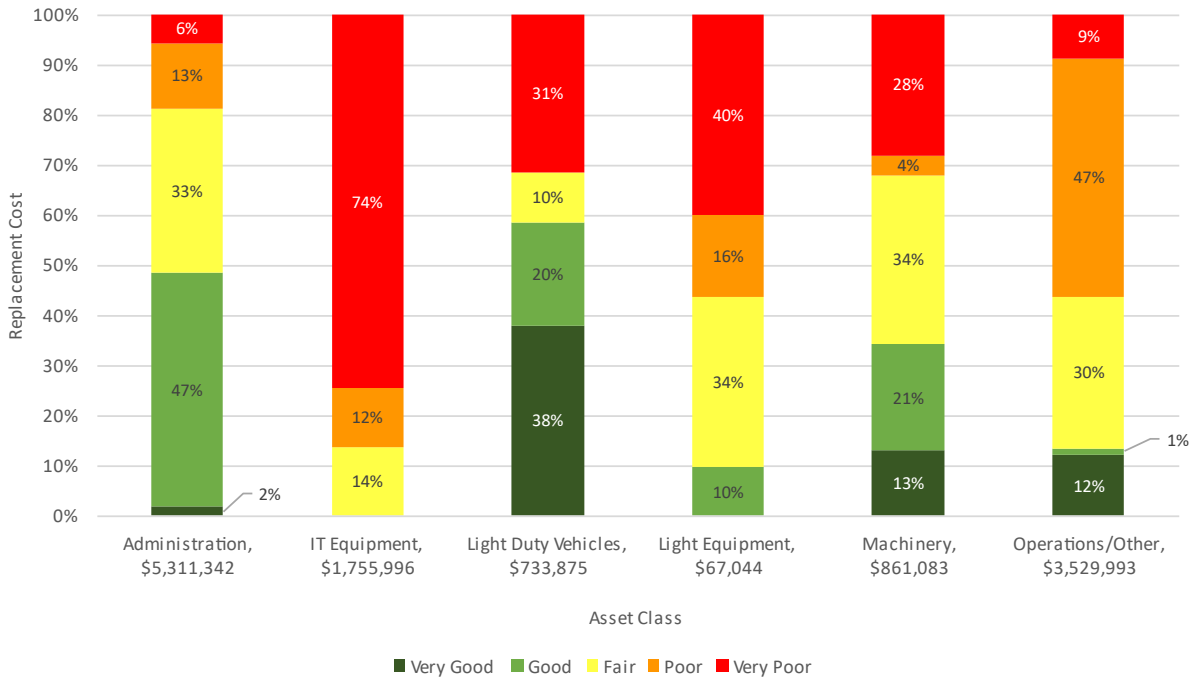


Figure 8-5: Condition Distribution of Administration & Operations Assets by Asset Class

8.1.1.4 Data Sources and Maturity

Table 8-3 and Table 8-4 summarize the data completeness and confidence of the Township's asset data.

Table 8-3: Data Completeness for Administration & Operations Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost
Facilities (Administration, Operations/Other)	100%	100%	79%	100%
Fleet (Light Duty Vehicles and Machinery)	100%	100%	N/A	100%
Equipment (Light Equipment and IT Equipment)	100%	100%	N/A	100%

Table 8-4: Approach to Assessing Condition for Administration & Operations Assets

Asset Class	Approach to Assessing Condition
Facilities	The Township is working towards completing BCAs for each facility. Facilities are assessed through BCAs to determine asset condition and needs. Asset data is updated annually based on capital works. Assets within facilities that are assessed receive a remaining life from the assessment.
Equipment	Equipment is replaced at end of life and does not require a formal condition assessment program. The condition of equipment is approximated through asset age. The ESL of equipment ranges from 5 to 25 years.
Fleet	Fleet assets are assessed and identified for replacement through monitoring that occurs during regular maintenance activities. Excessive maintenance demands can also trigger a replacement need. The Township does not require a formal condition assessment program for fleet assets and relies on age and ESL to understand asset condition. The ESL for fleet assets ranges between 8 and 25 years.

8.1.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as completing additional condition assessments (e.g. building condition assessments), verifying inventories, creating data links between data sources (e.g. having maintenance activities informing asset condition and potential need for renewals) and filling data gaps where required. Since developing and integrating robust condition information will better inform the system performance and related asset management activities, it is important that building condition assessment programs are implemented at regular intervals. Administration and operations assets are a relatively new addition for asset management reporting which can benefit from continued actions to validate the inventory and establish detailed workflows and procedures, such as for information technology equipment and facility renewal activities. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset management planning improvement recommendations can be found in the improvement plan (Section 11).

8.2. PARKS AND RECREATION

8.2.1 State of the Infrastructure

The Township owns and maintains $78.7M of parks and recreation assets, which include both indoor and outdoor recreation facilities. Indoor recreation facilities include facilities such as libraries, recreation centres/arenas, and event spaces. Outdoor recreation facilities include play areas, sports pads, trails, and associated amenities. Included in the parks' inventory are infrastructure assets associated with inactive and active cemeteries where maintenance and capital demands vary. Figure 8-6 illustrates the replacement value distribution of parks and recreation assets. Recreation centres and arenas account for the majority of the asset portfolio. The largest facility in the recreation centres/arenas category in terms of replacement value and scale is the Woolwich Memorial Centre, which contains two pools, two ice rinks, a fitness center, a walking track, and various event spaces. Membership and program-based activities include swimming lessons, hockey, fitness, and more. The Township also serves a wide variety of residents by offering a variety of public drop-in programming, such as public skating and public swimming. In the Multi Use/Event Space category, the Township supports additional opportunities for community events with leasing and ownership agreements with the Lion Clubs International for the Lions Halls in Elmira and St. Jacobs. Note that the financial forecasts contained within this report focus on the financial obligations of the Township only and do not include financial needs that are the responsibility of others, such as with these types of shared assets. The Township also has a partnership with the Region of Waterloo to operate libraries which can be found in Elmira and St. Jacobs in Township-owned buildings, within the existing community center in Breslau, and through a lease agreement for the Bloomingdale location.

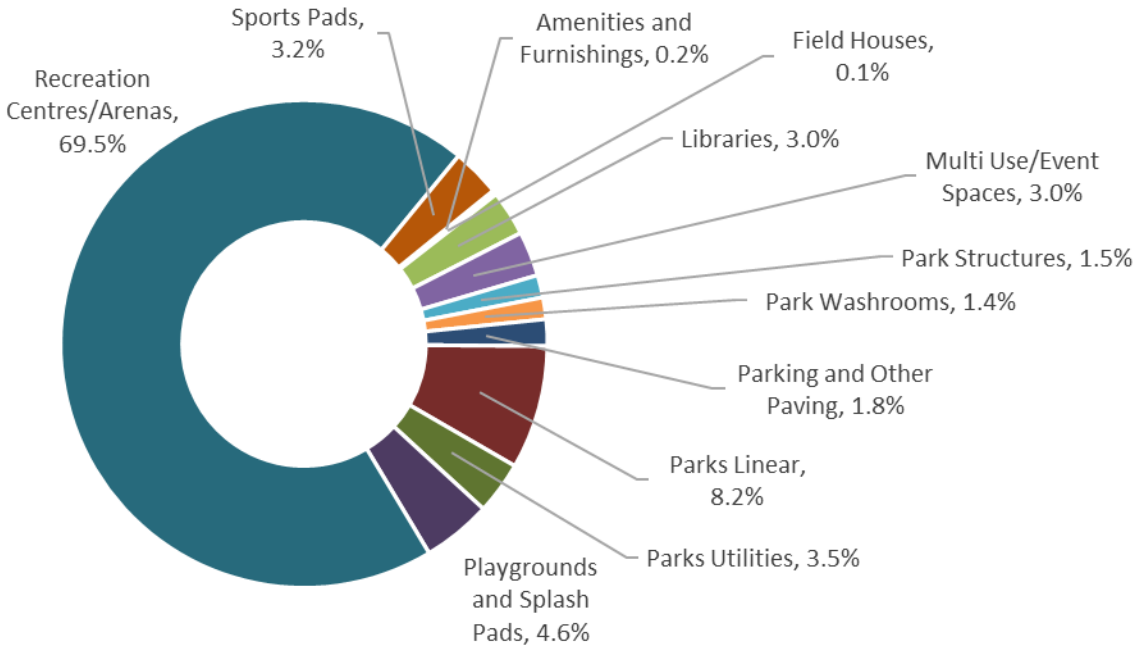


Figure 8-6: Replacement Value Distribution of Parks and Recreation Assets

8.2.1.1 Asset Inventory and Valuation

Table 8-5 below summarizes the asset valuation, quantities, and condition for each asset category.

Table 8-5: Inventory and Valuation of Parks and Recreation Assets

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
Indoor Recreation Facilities	Libraries	$2,354,624	2 facilities	Poor
	Multi Use/Event Spaces	$2,245,459	2 facilities	Poor
	Recreation Centres/Arenas	$54,801,186	7 facilities	Good
Outdoor Recreation Facilities	Amenities and Furnishings	$161,387	42 assets	Fair
	Field Houses	$86,179	4 assets	Very Good
	Park Structures	$1,170,102	27 assets	Poor
	Park Washrooms	$1,130,736	5 facilities	Good
	Parking and Other Paving	$1,398,769	25 assets	Very Poor
	Parks Linear	$6,442,748	21.6 km of trails; 1.4 km of fencing; 52 other assets (e.g. benches, signs, structures)	Poor

Asset Category	Asset Class	Replacement Value	Inventory	Overall Condition
	Parks Utilities	$2,738,635	18 assets	Fair
	Playgrounds and Splash Pads	$3,610,535	64 assets	Good
	Sports Pads	$2,521,481	64 assets	Fair

Note: Inventory length is rounded to nearest one hundred metre (i.e., 0.1 kilometre).

8.2.1.2 Age Summary

Figure 8-7 and Figure 8-8 illustrate the age of parks and recreation assets as a proportion of their estimated service life, as well as value of parks and recreation assets installed/constructed by decade. Figure 8-7 illustrates that some asset classes are approaching the end or extend beyond the end of their average estimated service life based on average age. These include parking and other paving, multi-use/event spaces, libraries, and amenities and furnishings. Moving forward it will be important to improve the Township's approach to acquiring condition information in order to gain a better understanding of age and condition. This will allow the Township to implement appropriate intervention strategies that maximize the facilities and park assets useful life at the most fiscally efficient time. Figure 8-8 shows a large increase in recreation assets installed since the 2000s which aligns with the growth and subsequent demand in recreation resources the Township has experienced.

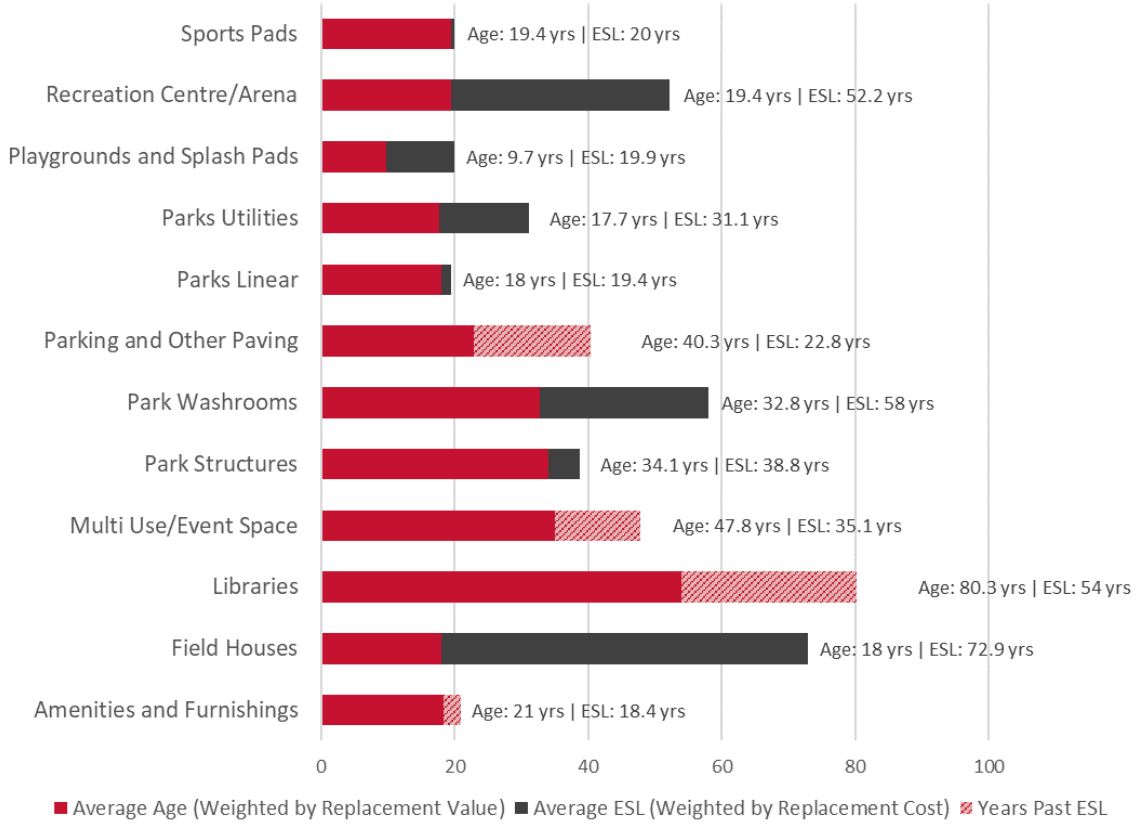


Figure 8-7: Age as a Proportion of Estimated Service Life (ESL) of Park & Recreation Assets

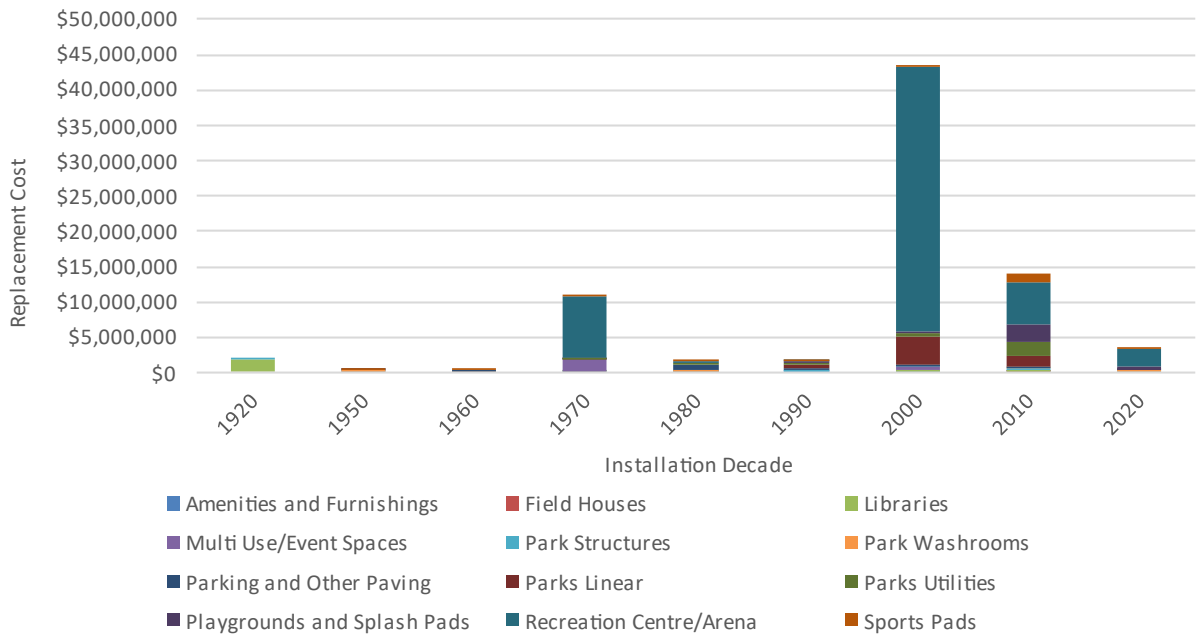


Figure 8-8: Age Distribution by Installation Decade of Parks & Recreation Assets

8.2.1.3 Asset Condition

The indoor and outdoor parks and recreation facilities are inspected regularly by staff, including park, trail, playground, and facility equipment inspections, as well as health and safety inspections. However, the results of these inspections are not currently tied to asset data, and therefore are not integrated into the condition information reported within this Plan; however, these inspections have historically allowed staff to identify and resolve maintenance and safety concerns and have fed into proactive planning for capital replacement. For all these assets, age, and estimated service life (ESL) are used to approximate condition. Figure 8-9 and Figure 8-10 show the condition distribution of all parks and recreation assets. Table 8-6 summarizes how the condition ratings are determined. As seen in Figure 8-9, 63% of indoor and outdoor recreation facilities are in good to very good condition, with 20% in poor to very poor condition.

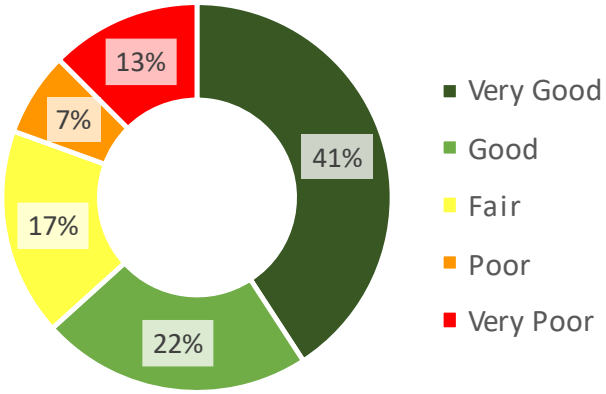


Figure 8-9: Condition Distribution of Parks & Recreation Assets

Table 8-6: Condition Ratings for Parks & Recreation Assets

Condition Category	Life Consumed	Condition Rating (All Assets)
Very Good	0% to 25%	Life Consumed is the metric used to evaluate condition for all asset classes. Assets within facilities that are assessed receive a remaining life from the assessment.
Good	25% to 50%	
Fair	50% to 75%	
Poor	75% to 100%	
Very Poor	>100%	

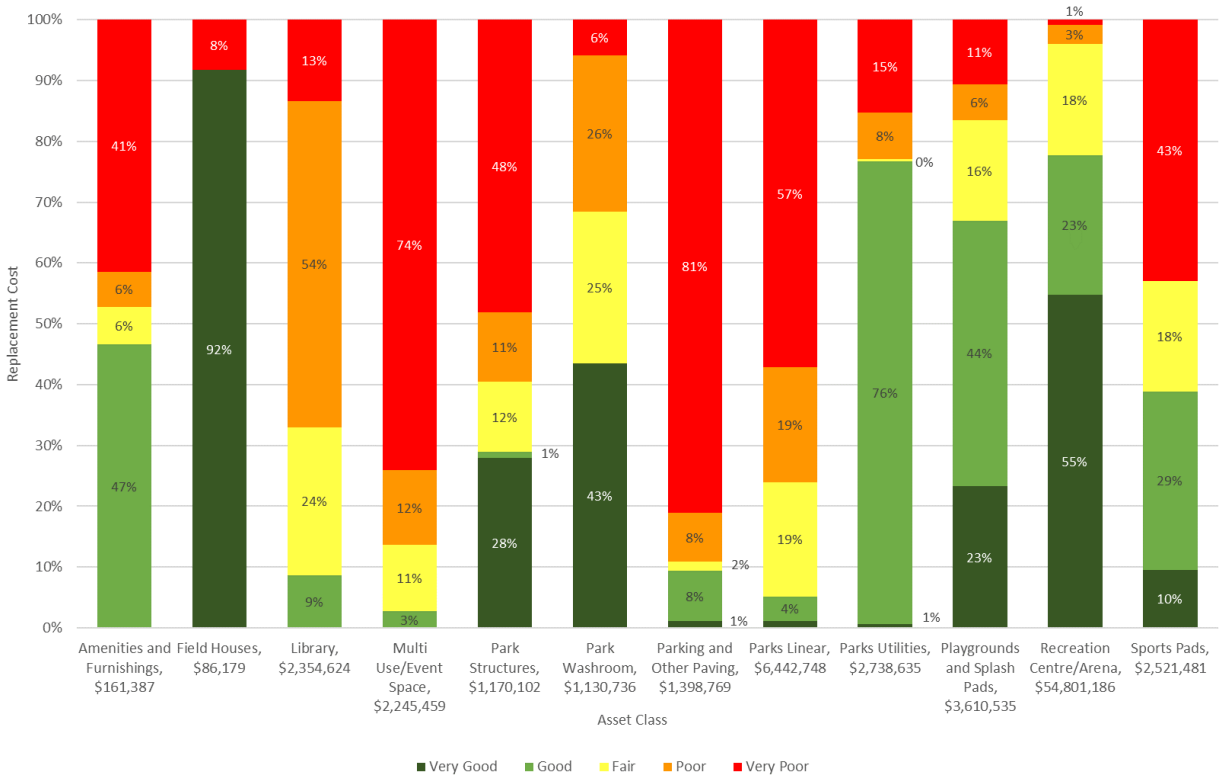


Figure 8-10: Condition Distribution of Parks & Recreation Assets by Asset Class

8.2.1.4 Data Sources and Maturity

Table 8-7 and Table 8-8 summarize the data completeness and confidence of the Township's asset data.

Table 8-7: Data Completeness for Parks & Recreation Datasets

Asset Class	Installation Date	ESL	Condition	Replacement Cost
Indoor Recreation Facilities (Recreation Centres/Arenas, Libraries, Multi Use/Event Spaces)	100%	100%	75%	100%
Outdoor Recreation Facilities (Amenities and Furnishings, Field Houses, Park Structures, Park Washrooms, Parking and Other Paving, Parks Linear, Parks Utilities, Playgrounds and Splash Pads, Sports Pads	100%	100%	0%	100%

Table 8-8: Approach to Assessing Condition for Parks & Recreation Assets

Asset Class	Approach to Assessing Condition
Indoor Recreation Facilities	The Township is working towards completing BCAs for each facility. Facilities are assessed through BCAs to determine asset condition and needs. Asset data is updated annually based on capital works. Assets within facilities that are assessed receive a remaining life from the assessment.
Outdoor Recreation Facilities	The Township does not undertake a formal condition assessment for these assets and relies on historical data. Age and ESL are used to approximate condition. Annual inspections occur for all park assets to review condition, age, and plan for replacement at the end of the service life. Staff plan to implement a more formal condition assessment process for park assets in the future.

8.2.1.5 Approach to Gap Filling and Data Improvements

The Township has identified opportunities to increase data maturity through a series of actions such as completing additional condition assessments (e.g. building condition assessments), verifying inventories, creating data links between data sources (e.g. having maintenance activities informing asset condition and potential need for renewals) and filling data gaps where required. Since developing and integrating robust condition information will better inform the system performance and related asset management activities, it is important that building condition assessment programs are implemented at regular intervals. Administration and operations assets are a relatively new addition for asset management reporting which can benefit from continued actions to validate the inventory and establish detailed workflows and procedures. Implementation of these important initiatives will require additional internal and external resources, such as funding for staff and/or contracted services. Additional asset management planning improvement recommendations can be found in the improvement plan (Section 11).

8.3. Levels of Service

The Township's goal is to provide recreation and facilities services and amenities that are clean, safe, and accessible to residents. Table 8-9 to Table 8-12 provide a summary of the customer and technical LOS metrics that have been established for recreation and facilities services assets.

Table 8-9: All Recreation and Facilities Services Customer Levels of Service

Customer Measures	Service Attributes	Current Performance
Facilities and parks are accessible.	Accessible	The Township's accessibility related technical measures indicate that there might be improvements to be made. The Township is currently completing a Parks and Recreation Master Plan and a Facility Accessibility Audit that will better inform this measure in the future.
There are sufficient and appropriate amenities available for all residents based on the Recreation Master Plan.	Accessible	
Facilities have minimal impact on the environment.	Environmental Stewardship	Currently, the Township's technical measures do not have enough details to fully understand this metric. Current efforts include reporting on facility energy and resource consumptions. Future efforts can include comparing energy consumption against proposed LOS (O. Reg 588/17) to meet established guidelines and goals, such as those in the Transform Waterloo Region strategy.
Vehicles, equipment, and system service disruption is minimized.	Reliable	The Township's current technical metrics indicate that there is a fairly good reliability since the overall assets are kept in fair condition. Further investigation is required to improve accuracy and reportability for this measure.
Facilities are safe.	Reliable, Safe	

Table 8-10: Recreation and Facilities Services Technical Levels of Service for Facilities

Service Attributes	Technical Measures	Current Performance
Accessible	% of playgrounds with accessible features (e.g., rubber surfacing, wheelchair height components)	33%
Accessible	Number of recreation centres per 1000 residents	0.00025[1]
Accessible	Registration rate for programs:	
	Aquatic Programs (includes drop-in and registration programs)	10,024
	Ice rental hour totals	6,945
	Community Center rental totals	489
	Fitness Center memberships	721
Quality	% of facilities with BCA's completed within 10 years	43%
Reliable	Percentage of assets that have not exceeded their ESL	88%
Reliable	Percentage of administration and operations assets in poor or better condition	93%
Reliable	Percentage of libraries, recreation centres/arenas and multi use/event spaces in poor or better condition	96%
Environmental Stewardship	Annual facility water consumption per square foot	0.09 m^3
Environmental Stewardship	Annual facility natural gas consumption per square foot	3.01 m^3
Environmental Stewardship	Annual facility hydro consumption per square foot	10.33 KWH
Environmental Stewardship	Annual facility propane consumption per square foot	0.01 BTU
Environmental Stewardship	Percentage of facilities that are net zero	0%

[1] Year-End 2022 Population and Household Estimates, Region of Waterloo

Table 8-11: Recreation and Facilities Services Technical Levels of Service for Parks

Service Attributes	Technical Measures	Current Performance
Accessible	% of playgrounds with accessible features (e.g. rubber surfacing and wheelchair height components)	33%
Reliable	Percentage of outdoor recreation assets in poor or better condition	87%

Table 8-12: Recreation and Facilities Services Technical Levels of Service for Fleet and Equipment

Service Attributes	Technical Measures	Current Performance
Reliable	Percentage of fleet and equipment assets that have not exceeded their ESL	67%
Reliable	Annual number of vehicles being replaced early due to rust/corrosion, excessive mileage, mechanical condition.	0
Safe	Percentage of fleet assets that meet legislated safety standards	100%
Environmental Stewardship	Percentage of light duty vehicles that are green vehicles (hybrid, plug in hybrid or EV)	8%
Available	Number of Recreation and Community Services light duty vehicles per population	11:28,310[1]
Available	Number of Recreation and Community Services mowers and tractors per population	9:28,310[1]
Available	Number of by-law service vehicles per population	1:28,310[1]

[1] Year-End 2022 Population and Household Estimates, Region of Waterloo

8.4. LIFECYCLE MANAGEMENT STRATEGIES

For the Township to provide recreation and facilities services and maintain LOS, various lifecycle activities are performed on the assets. These include non-infrastructure solutions such as developing plans and performing condition assessments; preventative and reactive maintenance activities to repair assets; refurbishing assets; replacing assets; asset and material disposal; and expanding and upgrading assets to support growth. The following Table 8-13, Table 8-14, and Table 8-15 summarize the lifecycle activities performed on fleet, equipment, amenities, and facilities.

Table 8-13: Lifecycle Management Activities for Administration & Operations and Indoor Recreation Facilities

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs)	As required
	Conduct community engagement to define priorities and standards to establish budgeting and service levels	Future Initiative and ongoing
	Building condition assessment program	Ongoing
Operations and Maintenance	Performing regular preventive maintenance to extend service lives	As per maintenance programs
	Reactive maintenance to address issues found through inspections, preventive maintenance, or complaints	As required
Renewal (Rehabilitation and Replacement)	Building rehabilitation needs	Based on inspections and condition assessments
	Equipment or building component replacement	As required
	Asset replacement/reconstruction	At optimal point in lifecycle analysis/end of life
Disposal	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
Expansion and Service Improvements	Conduct community engagement to define priorities and standards to establish budgeting and service levels.	Future Initiative and ongoing
	Construction of new facilities in new subdivisions to accommodate for population growth or expansion of existing facilities to accommodate for population intensification	Through growth and development and based on Master Plan
	Purchase/procure additional indoor recreation assets to support population growth or service expansion.	As required and based on Master Plan

Table 8-14: Lifecycle Management Activities for Outdoor Recreation Facilities

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs, Parks and Recreation Master Plan, Arts and Culture Master Plan)	As required
	Conduct community engagement to define priorities and standards to establish budgeting and service levels	Future Initiative and ongoing

Lifecycle Activity	Description	Frequency
Operations and Maintenance	Routine (weekly, monthly, and annual) parks inspections for all outdoor recreation assets	Annually as per inspection programs
	Performing regular preventive maintenance to extend service lives	As per maintenance programs
	Reactive maintenance to address issues found through inspections, preventive maintenance, or complaints	As required
Renewal (Rehabilitation and Replacement)	Performing renewals/rehabilitations proactively that were predicted/scheduled via regular preventive maintenance and annual inspections	As required
	Component replacement before asset requires full replacement (e.g., playgrounds)	As required
	Asset replacement/reconstruction	At optimal point in lifecycle analysis/end of life
Disposal	Asset disposal coordinated with asset replacement	Coordinated with replacement/end of life
Expansion and Service Improvements	Conduct community engagement to define priorities and standards to establish budgeting and service levels	Future Initiative and ongoing
	Growth needs are determined based on the Parks and Recreation Master Plan service standards and target provision levels. There is opportunity for collaboration amongst services (parks and recreation, transportation, environmental services/utilities) for service expansion.	Through growth and development
	Purchase/procure additional outdoor recreation assets to support population growth or service expansion.	As required and based on Master Plan

Table 8-15: Lifecycle Management Activities for Administration & Operations Fleet and Equipment

Lifecycle Activity	Description	Frequency
Non-Infrastructure	Planning and studies (Master Plans, financial plans, capacity studies, AMPs) Policies and procedures/standards	As required
Operations and Maintenance	Performing regular preventive maintenance	As per vehicle / equipment's manufacturer manual
	Reactive maintenance	As required
Renewal	Performing renewals/rehabilitations proactively that were predicted/scheduled via regular preventive maintenance and inspections	As required

Lifecycle Activity	Description	Frequency
(Rehabilitation and Replacement)	Refurbish fleet and equipment to maintain in inventory as spares	At optimal point in lifecycle analysis
	Determine optimal point in asset lifecycle for asset replacement that minimizes maintenance and renewal/rehabilitation costs	At optimal point in lifecycle analysis/end of life
	Purchase/procure electric vehicles when possible to support environmental stewardship and reduce fuel consumption/greenhouse gas emissions	As required
Disposal	Sold as part of vehicle/equipment decommissioning	At optimal point in lifecycle analysis/end of life
	Vehicle/equipment disposal if cannot be sold due to current state/condition	At end of life
Expansion and Service Improvements	Review shared assets amongst services to determine overall capacity/needs	Annually
	Purchase/procure additional fleet and equipment assets to support population growth or service expansion	Through growth and development
	Purchase/procure electric vehicles and equipment when possible (EV availability and charging infrastructure required) to support environmental stewardship and reduce fuel consumption/greenhouse gas emissions	Through growth and development

8.5. RISK MANAGEMENT STRATEGY

A risk management strategy was developed in order to assess the likelihood of failure (LOF), consequence of failure (COF) and risk for all recreation and facilities assets. The results from the risk analysis are provided in Table 8-16. The distribution table illustrates the amount of assets within each risk score (1-25).

There are no high-risk assets in the Township's recreation and facilities portfolio. Approximately $13.3M (15%) of assets are medium risk. The remainder are low risk. Approximately $12.2M of assets have a high likelihood of failure (LOF score of 5) and of these assets, COF scores range from 1 to 3.

Table 8-16: Risk Score Distribution of Recreation and Facilities Assets

		Likelihood of Failure				
		1	2	3	4	5
Consequence of Failure	1	$238,730 (0.3%)	$283,324 (0.3%)	$444,515 (0.5%)	$646,587 (0.7%)	$969,780 (1.1%)
	2	$9,083,085 (10.0%)	$12,508,403 (13.8%)	$7,841,521 (8.6%)	$5,464,984 (6.0%)	$10,617,485 (11.7%)
	3	$23,705,170 (26.1%)	$7,751,901 (8.5%)	$8,706,767 (9.6%)	$2,005,857 (2.2%)	$653,064 (0.7%)
	4	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)
	5	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)	$0 (0.0%)

Legend
- Low risk (1-9)
- Medium risk (10-15)
- High risk (16-25)

8.6. LIFECYCLE FORECASTING

8.6.1.1 Scenario 1: Maintain Current LOS

Scenario 1 forecasts asset performance by maintaining current LOS. A total of $41.7M, or annual average of approximately $1.7M, is anticipated to be spent over the next 25 years by maintaining the same distribution of approximately 13% of assets that are in very poor condition over the forecast period. The performance and spending forecasts are provided in Figure 8-11 and Figure 8-12.

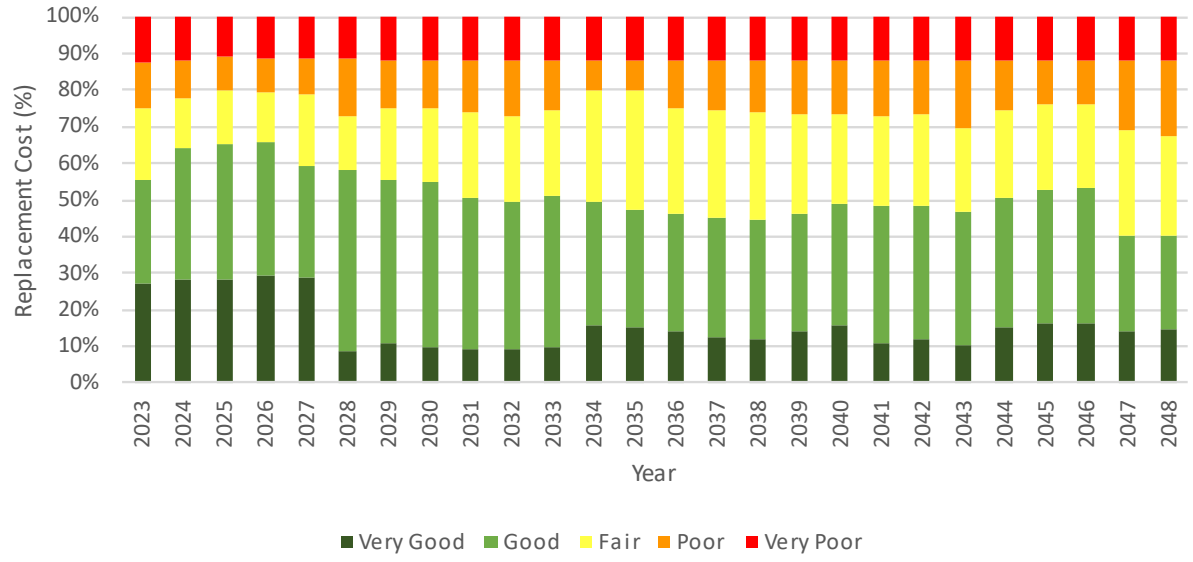


Figure 8-11: Scenario 1 – Maintain Current LOS Performance Distribution for Recreation and Facilities Assets

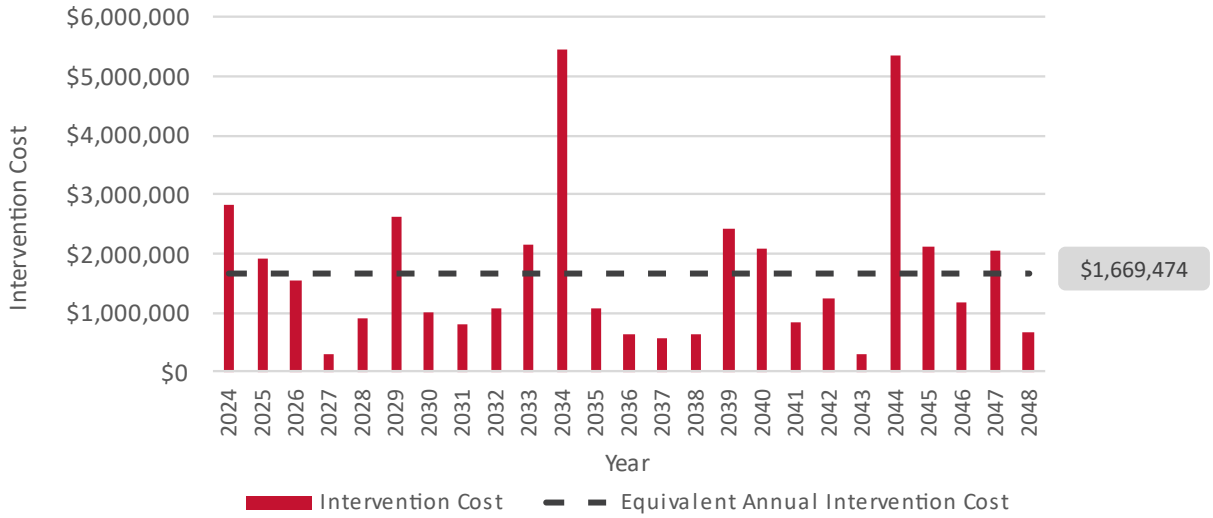


Figure 8-12: Scenario 1 – Maintain Current LOS Intervention Costs for Recreation and Facilities Assets

8.6.1.2 Scenario 2: Backlog Analysis

In Scenario 2, a total of $64.6M (annual average of $2.6M) is spent to address the backlog and maintain the asset portfolio to ensure that no assets are in very poor condition over the next 25 years. Included in this amount is approximately $12.0M that will be required to address the current backlog in 2024. It is anticipated that a significant amount will be spent on indoor recreation facilities and IT equipment in 2034, and on outdoor recreation facilities and IT equipment in 2044. The performance and spending forecasts are provided in Figure 8-13 and Figure 8-14.

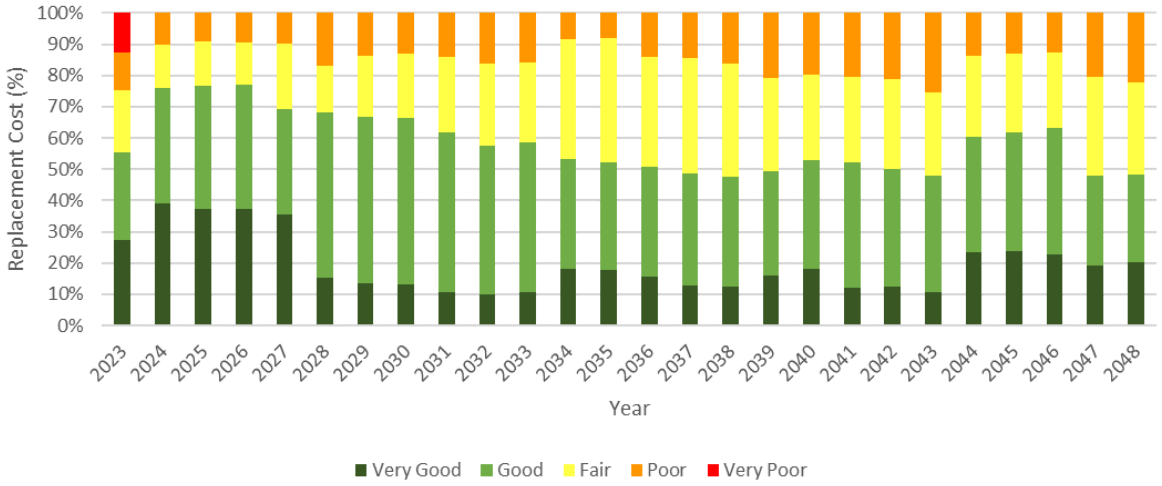


Figure 8-13: Scenario 2 – Backlog Analysis Performance Distribution for Recreation and Facilities Assets

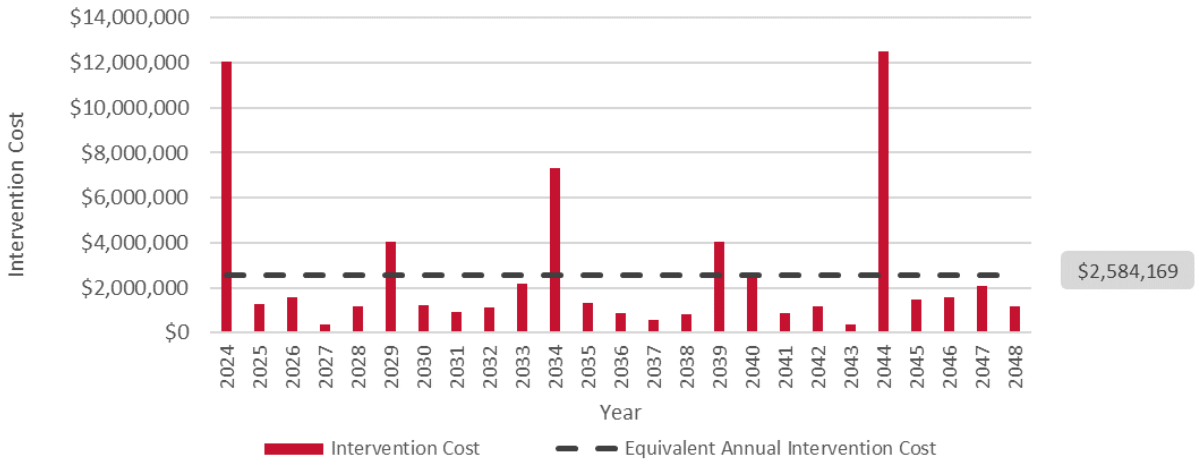


Figure 8-14: Scenario 2 – Backlog Analysis Intervention Costs for Recreation and Facilities Assets

8.6.1.3 Scenario Comparison

Table 8-17 provides a comparison of the scenarios.

Table 8-17: Lifecycle Scenario Comparison for Recreation and Facilities Assets

Scenario	Annual Funding	Performance Trend
Scenario 1: Maintain Current LOS	$1.7M	=
Scenario 2: Backlog Analysis	$2.6M	↑

Although the Township requires $1.7M per year to continue to maintain current service levels, an additional $0.9M per year would be required to address backlog. Note that only some of the Township's facilities have completed building condition assessments. As the Township continues to improve the maturity of its asset data by completing more condition assessments and better understanding asset condition in facilities, needs will be subject to change. Note that the required funding detailed in this scenario comparison addresses the state of existing assets. The Township also expects to experience growth in its recreation and facilities assets which will require further funding. Refer to the financial strategy (Section 10) for more information on the Township's full lifecycle costs, including growth.

9. GROWTH CONSIDERATIONS

The Township's Official Plan includes policies and a land-use planning framework and outlines the Council's long-term policy to guide the future growth within the Township to 2031. Note that the Township is in the process of updating its Official Plan to reflect the Region of Waterloo's Official Plan (ROP) Amendment No. 6. The Official Plan also provides a link between the policies established in the Regional Municipality of Waterloo's Official Plan, the Growth Plan, the Provincial Policy Statement, and the Township's municipal objectives:

- Regional Official Plan establishes the overall policy framework for planning within the Region.
- The Growth Plan for the Greater Golden Horseshoe provides a long-term framework for where and how municipalities will grow.
- The Provincial Policy Statement provides overall direction on land use planning and development in Ontario. It includes policies that support development while protecting the natural resources, public health and safety, and the natural environment.

From 2011 to 2016, the Township experienced a population growth of 8%[4]. In 2013, the approximate populations of the largest settlements within the Township were:

1. Elmira: 10,541
2. St. Jacobs: 1,988
3. Breslau: 3,770

In 2016 and 2021, the Township's populations were 25,006[5] and 28,700[6], respectively which represents a population growth of approximately 15% over five (5) years, which is greater than the population growth from 2011 to 2016.

[4] Demographics, Township of Woolwich (Demographics - Woolwich Township)
[5] Township of Woolwich Census Profile, 2021 Census of Population, Statistics Canada (Profile table, Census Profile, 2021 Census of Population - Woolwich, Township (TP) [Census subdivision], Ontario (statcan.gc.ca))

The Amendment No. 6 to the Region's Official Plan outlines the population and employment forecasts to 2051 in the following table.

Table 9-1: Township of Woolwich Population and Employment Forecasts[6]

Type	2021	2051
Population	28,700	51,200
Employment	17,300	33,000

These figures represent a population growth of 78% over 30 years and an employment growth of 91% over that same time period. The significant population and employment growth will result in additional expenditures required for operations and maintenance as well as capital expenditures to support growth.

The effects of growth on capital and operating expenditures are detailed in the financial strategy section of this report. The capital expenditures related to growth have been categorized as growth projects. The operations and maintenance expenditures related to growth have been considered by establishing an annual percent increase.

[6] Amendment No. 6 to the Regional Official Plan, Region of Waterloo

10. FINANCIAL STRATEGY

10.1. INTRODUCTION

The financial strategy identifies the funding levels required to continue to maintain service levels currently being provided to the community. It takes into consideration the gross revenues, operating and capital expenditures, debt, and any future commitment for all the asset classes in the plan by analyzing the 2022 5-year Capital Forecast and Operating Budgets. This financial strategy also provides suggestions and strategies for funding the Township's assets to address asset lifecycle needs and maintain service levels. It is not intended to be a capital plan, which prescribes projects to be completed, but rather it is intended to provide a system-level forecast of infrastructure expenditures for each lifecycle activity defined in the Township's lifecycle management strategy. The focus of the financial strategy in this 2024 AMP is to outline the funding required to maintain current levels of service over the 25-year forecast period.

As part of the Township's AMP development, the Township also developed a risk management strategy, to assess risk against its assets. This helped the Township understand asset needs from a combined lifecycle and risk-based approach, for which to complete its financial forecasts. Risks were built into the forecasting analysis completed by the Township's decision support system (DSS) tool and are also articulated in the DAMI reports included within this AMP.

The Township's budgets are developed to allocate the necessary funding to maintain and construct infrastructure assets to ensure that services are provided to the community through those assets. The budgets are based on required costs (i.e. expenditures) and available funding (i.e. revenues). The Township allocates a portion of their revenues from property taxes and development charges, as well as water and wastewater rates, to support current year projects, contribute to reserves, and make debenture repayments for past capital projects.

Property taxes fund most of the Township's asset programs and services apart from the drinking water distribution system and sanitary wastewater collection system, which are funded through user rates.

In this section, the asset classes are summarized into the following two categories:

- **Rate Funded:** Includes all drinking water distribution and sanitary wastewater collection assets.
- **Tax Funded:** Includes all stormwater collection system, cellar drain collection system, transportation services, emergency services, and recreation and facilities assets.

In terms of expenditures, the Township categorizes their budgets into one of the following:

- **Operating budget:** Supports the day-to-day activities and functions conducted to provide Township services. Samples of the expenditures funded from the operating budget include equipment maintenance, materials supply, and facilities services. These are expensed within the fiscal year. The total operating activities are the costs of the activities that can be tied directly with the repair and maintenance of the Township's assets.
- **Capital budget:** A comprehensive financial plan that addresses the financial requirements of growth, major rehabilitations, and replacements of existing infrastructure.

As part of the annual budget development process, the Township ensures continued financial sustainability through effective financial planning and risk management. The Township will continue to use one or more of these financial strategies to fund its projects:

- **Pay as you go:** Saving funds in advance to acquire an asset. This strategy often requires sacrificing short-term needs to retain funds long-term for a larger capital project.
- **Financing:** A loan issued to acquire an asset which requires annual repayments with interest (limited to an annual payment limit or 25% of the Township's own source revenue, as per O. Reg. 403/02). The Township's established Council policy is an annual payment limit of 10% of own source revenue which the Township considers to be an important avenue for financing capital projects while practicing good budget management.
- **Reserve Accounts:** Contributing to a reserve account to maintain a threshold for unexpected costs and to save for larger planned projects.
- **Government Grants:** Funding provided by Provincial and Federal Governments.
- **Development Charges:** Subsidies from development for growth related projects.
- **User Fees:** Fees from the user of a service.
- **Community Funding:** The Township sometimes receives funding through community donors or fundraising initiatives.

The following are additional funding options that can be explored:

- Conducting a Water and Wastewater User Rate Review on a regular basis;
- Consideration of the development of a stormwater utility; and,
- Consider additional fees and charges per the User Rate By-law.

The Township uses short- and long-term strategies to ensure fiscal responsibility and provide the necessary services to the residents and businesses of Woolwich. This includes the continued preparation and distribution of the 5-year capital plan.

Procurement strategies also form part of the Township's financial plan to meet service levels and address backlogs. The Township actively engages in project bundling wherever possible and feasible. This primarily applies to linear "corridor" assets, which include assets within the road right of way, such as roads, watermains, sanitary sewers, and storm sewers. By bundling these asset replacements together, the Township can take advantage of cost efficiencies. It is important to note that while the Township has not yet integrated bundled assets into its asset management planning analyses, it is something that is conducted on a regular basis when developing capital projects and budgeting.

10.2. TOTAL PORTFOLIO SUMMARY

The Township has identified the current capital renewal needs for all its assets (i.e. backlog). Backlogs were developed through a decision support system analysis, which combines asset data (including replacement cost and condition data), lifecycle models, risk ratings and LOS targets in order to determine asset needs. Current backlog is represented as the amount of immediate work that is required (not including additional work that may occur over the forecast periods) to meet the Township's LOS targets.

Table 10-1and Table 10-2 summarize the replacement values, current backlogs, and backlogs as a percentage of replacement values for each asset grouping. The analysis indicates a total of $45.6M of investment is needed to address the current backlog existing in the drinking water distribution and sanitary wastewater collection systems (i.e. rate funded service areas). The remaining assets (i.e. tax funded service areas) have a total of $150.0M of current backlog capital investment needs. Therefore, the resulting analysis indicates a total of $195.6M in backlog or 17% of the Township's total asset portfolio of $1.1 billion (current replacement value) is identified as needing capital investment currently.

The backlog is reported for information purposes only and this AMP does not stipulate on whether the current backlog for each asset category is appropriate for the service levels being provided, whether the risks are acceptable, and/or if the funding strategy is achievable. Instead, such topics will be further discussed and examined as part of the 2025 requirement from O. Reg. 588/17 when the Township will identify proposed levels of service and further consider the risks and long-term financial sustainability.

Table 10-1: Rate Funded Replacement Value and Backlog Summary

Category	Current Replacement Value (2023 $)	Current Backlog (2023 $)	Backlog as % of Replacement Value
Drinking Water Distribution	$141,875,130	$9,435,097	7%
Sanitary Wastewater Collection	$148,308,292	$36,184,807	24%
Total Rate Funded	**$290,183,422**	**$45,619,905**	**16%**

Note: Values have been rounded to the nearest dollar.

Table 10-2: Tax Funded Replacement Value and Backlog Summary

Category	Current Replacement Value (2023 $)	Current Backlog (2023 $)	Backlog as % of Replacement Value
Stormwater Management	$201,802,112	$23,500,425	12%
Cellar Drain Collection System	$16,867,809	$1,706,761	10%
Road Network – Roadway[1]	$360,378,976	$80,297,695	22%
Road Network - Remaining Assets[2]	$115,393,502	$23,394,084	20%
Fire Services	$44,554,754	$9,048,951	20%
Administration and Operations	$12,259, 332	$2,999,924	24%
Parks and Recreation	$78,661,842	$9,029,254	11%
Total Tax Funded	**$829,918,327**	**$149,977,093**	**18%**

[1] Roadway assets are separated from other Road Network assets since they are supported by a separate analysis that was completed by the Township, which differs from the analysis completed for other asset groups as part of the 2024 AMP. Current replacement value and current backlog amounts in this report have been adjusted for boundary roads.
[2] The replacement value of Road Network – Remaining Assets does not include street signs in this table since as they are captured in the operating and maintenance budget. Refer to the Transportation Services DAMI report for details.
Note: Values have been rounded to the nearest dollar.

10.3. CAPITAL AND OPERATING BUDGET SUMMARIES

The following tables illustrate the Township's capital and maintenance budget forecasts for the rate and tax funded asset groupings. These tables provide 5-years of forecast information to align with the Township's capital budget forecasts from 2022 to 2026. The information from these tables is summarized here, and then used to create forward projections to comprise the 25-year time horizon contained within this financial strategy. Each forecast contains breakdowns of budget costs of the lifecycle activities described in Section 4.1.2.

It is important to note that the 5-year forecast budget amounts are based on the gross predicted project costs that include a combination of unsecured funding sources (e.g. upper government funding) and predictable funding sources (e.g. levy, user rates, the Ontario Community Infrastructure Fund, and the Canada Community Building Fund). The capital multi-year forecast is used as a reference to identify all proposed projects requiring major rehabilitation or replacement within the forecast period to present to Council what the upcoming needs and projects are; however, this forecast is limited by the following assumptions:

- The Township will be successful in securing all grant funding applications and at the full amount requested.
- Upper government funding contributions will not decrease from previous years.
- Upper government funding opportunities will be readily available.
- Debentures will annually be brought before Council and only issued within Council prescribed limits.

In practice, select projects from the 5-year forecast are included in the proposed budget that is presented to Council annually, which Council reviews, deliberates, and adopts the final budget for staff to implement for that budget year. In the end, the capital projects implemented according to the annual Council-approved budget and amounts received from funding sources can vary. Therefore, for the purpose of this analysis, the costs of the lifecycle activities have the inherent assumption that all funding identified is sustainable over the 25-year forecast. Additionally, there are uncertainties with the ability to predict project costs more than two to three years in the future which can contribute to less projects being earmarked for renewals in later years of the capital forecast, seen in Table 10-3 and Table 10-4. Further commentary is provided in the following subsections.

10.3.1 Rate Funded

In Table 10-3 rate funded capital budget forecasts fluctuate from 2022 to 2026, ranging from a high of $9.5M in 2023 to a low of $1.4M in 2026.

Operating budget forecasts are projected to increase moderately over time, to account for the additional expenses associated with the acquisition of new assets (expansion), as well as the aging of existing assets. They increase steadily each year from approximately $970k in 2022 to $1.1M in 2026.

Table 10-3: Rate Funded Capital and Operating Budget Planned Investments

Lifecycle Activity	2022	2023	2024	2025	2026
Non-Infrastructure	$200,000	$200,000	$0	$0	$0
Renewal	$5,819,860	$2,598,300	$3,584,850	$3,696,500	$1,123,000
Disposal	$0	$0	$0	$0	$0
Service Improvement	$51,467	$390,000	$106,667	$156,000	$8,000
Growth	$1,794,857	$6,320,700	$2,357,167	$963,000	$233,000
Total Capital Activities	**$7,866,183**	**$9,509,000**	**$6,048,683**	**$4,815,500**	**$1,364,000**
Total Operating Activities	**$969,522**	**$998,608**	**$1,028,566**	**$1,059,423**	**$1,091,206**

Note: Values have been rounded to the nearest dollar.

10.3.2 Tax Funded

In Table 10-4 total capital activities for tax funded assets fluctuate in the 5-year summary. They range from a high of $18.2M in 2023 to a low of $9.0M in 2026.

Operating budget forecasts are projected to increase moderately over time, to account for the additional expenses associated with the acquisition of new assets (expansion), as well as the aging of existing assets. They increase steadily from $2.4M in 2022 to $2.7M in 2026.

Table 10-4: Tax Funded Capital and Operating Budget Planned Investments

Lifecycle Activity	2022	2023	2024	2025	2026
Non-Infrastructure	$175,000	$100,000	$1,550,000	$60,000	$0
Renewal	$10,683,986	$14,382,320	$11,292,280	$10,764,160	$8,345,000
Disposal	$0	$0	$0	$0	$0
Service Improvement	$2,167,369	$271,000	$2,012,533	$220,000	$310,000
Growth	$2,299,577	$3,423,680	$2,645,803	$1,846,460	$316,500
Total Capital Activities	**$15,325,932**	**$18,177,000**	**$17,500,617**	**$12,890,620**	**$8,971,500**
Total Operating Activities	**$2,391,241**	**$2,462,978**	**$2,536,868**	**$2,612,974**	**$2,691,363**

Note: Values have been rounded to the nearest dollar.

10.4. 25-YEAR INVESTMENT FORECAST

To meet the requirements of O. Reg. 588/17, the Township has developed an investment forecast to project asset needs over a 25-year time horizon. Note that planning for a 25-year time horizon goes beyond the requirements of O. Reg. 588/17 (which request planning over a 10-year time horizon only).

The Township's investment forecasts were aligned with each of the lifecycle activities from the Township's lifecycle management strategy, as detailed in Subsection 4.1.2 and Table 4-2. The lifecycle activities are: Non-Infrastructure, Operations and Maintenance, Renewal (Rehabilitation and Replacement), Disposal, Service Improvements and Growth.

Forecasts from renewal needs were derived from the scenario analyses completed for each of the service areas, and as described in Subsection 4.1.5, and reported in the respective DAMI reports for each subservice. Forecasts for the remaining lifecycle activities were derived from the Township's Capital Budget Forecast and Operating Budget.

There are some assumptions that were made as part of this analysis when using the Capital Budget Forecast and Operating Budget to inform the 25-year forecast.

These include:

- The assumption that operating expenditures will remain the same for all scenarios and are fully accommodated under the Township's existing Operating Budget. A 3% increase in operating budget was modeled over the 25-year forecast period to account for anticipated increases in operating expenditures.
- The forecasted expenditures for non-infrastructure, disposal, service

improvements and growth were derived from the Township's Capital Budget Forecast. The first three years of the forecast (2024, 2025 and 2026) were provided by the Capital Budget Forecast. The 3-year average was utilized to estimate the remaining 22 years of the 25-year analysis period. As mentioned previously, the Township's capital forecast has included some projects that have funding sources that have not been confirmed (e.g. upper government funding) to develop its forecasts and future plan which may not be sustainable. It is assumed that the funding the Township is relying on will be received. Therefore, the forecasts are reflective of actual approved budgets and projects, as well as anticipated projects from the unconfirmed funding sources.

- The 3-year average from the capital forecast used to extrapolate the expenditures for non-infrastructure, disposal, service improvement, and growth for the remaining forecast period has inherent assumptions that the projects selected within that 3-year period are fully reflective of the needs of the system for the remaining 22 years of the 25-year forecast period.
- The capital activities related to growth are funded through Development Charges that are used to recover costs from the increase in the needs for service arising from growth and are governed by the Development Charges Act and the Township's Development Charges By-Law. An updated Development Charges By-Law will be completed in 2024, therefore the growth expenditures may not be reflective of the most up-to-date by-law and assumes growth captured in the 5-year capital forecast is sufficient to cover the predicted growth of the Township.
- The renewal needs in future years are in current replacement costs (2023 dollars) and have not been adjusted for inflation.

The results of the scenario analyses and financial plan are illustrated in Table 10-5 (and the corresponding Figure 10-1) for rate funded assets; and, Table 10-6 (and the corresponding Figure 10-2) for tax funded assets. The tables list the 25-year total forecasted expenditures and the equivalent annual average expenditure by lifecycle activity for both Scenario 1 and Scenario 2. The corresponding figures detail the forecasted expenditures for each of the 25-years in a bar graph format. The bars on each graph illustrate the costs associated with the abovementioned lifecycle activities. The equivalent annual cost of these bars is illustrated as a dashed line. Bars are provided for Scenario 1 only (i.e. cost to maintain LOS), however the equivalent annual costs are provided on the graph as a dashed line, for each of the two scenarios. This allows for easy comparison of the overall scenario results.

10.4.1 Rate Funded

The following Table 10-5 illustrates the 25-year investment forecast for rate-funded assets. For rate funded assets, a total investment of $104.5M over 25-years is required to maintain current service levels (equivalent annual average of $4.2M per year). In order to eliminate all backlog, the total 25-year investment would be $179.1M (equivalent annual average of $7.2M per year).

The following Figure 10-1 illustrates the results of the forecast.

Table 10-5: Rate Funded 25-Year Investment Forecast Summary Table

Lifecycle Activity		Scenario 1: Maintain Current LOS		Scenario 2: Backlog Analysis	
		25-Year Total	Equivalent Annual Average Cost	25-Year Total	Equivalent Annual Average Cost
Capital Activities	Non-Infrastructure	$1.8M	$0.1M	$1.8M	$0.1M
	Renewal	$6.9M	$0.3M	$81.5M	$3.3M
	Disposal	$0.0M	$0.0M	$0.0M	$0.0M
	Service Improvement	$3.4M	$0.1M	$3.4M	$0.1M
	Growth	$54.9M	$2.2M	$54.9M	$2.2M
	Total Capital Activities	**$67.0M**	**$2.7M**	**$141.6M**	**$5.7M**
Operating Activities	Operations and Maintenance	$37.5M	$1.5M	$37.5M	$1.5M
	Total Operating Activities	**$37.5M**	**$1.5M**	**$37.5M**	**$1.5M**
Total Capital and Operating Activities		**$104.5M**	**$4.2M**	**$179.1M**	**$7.2M**

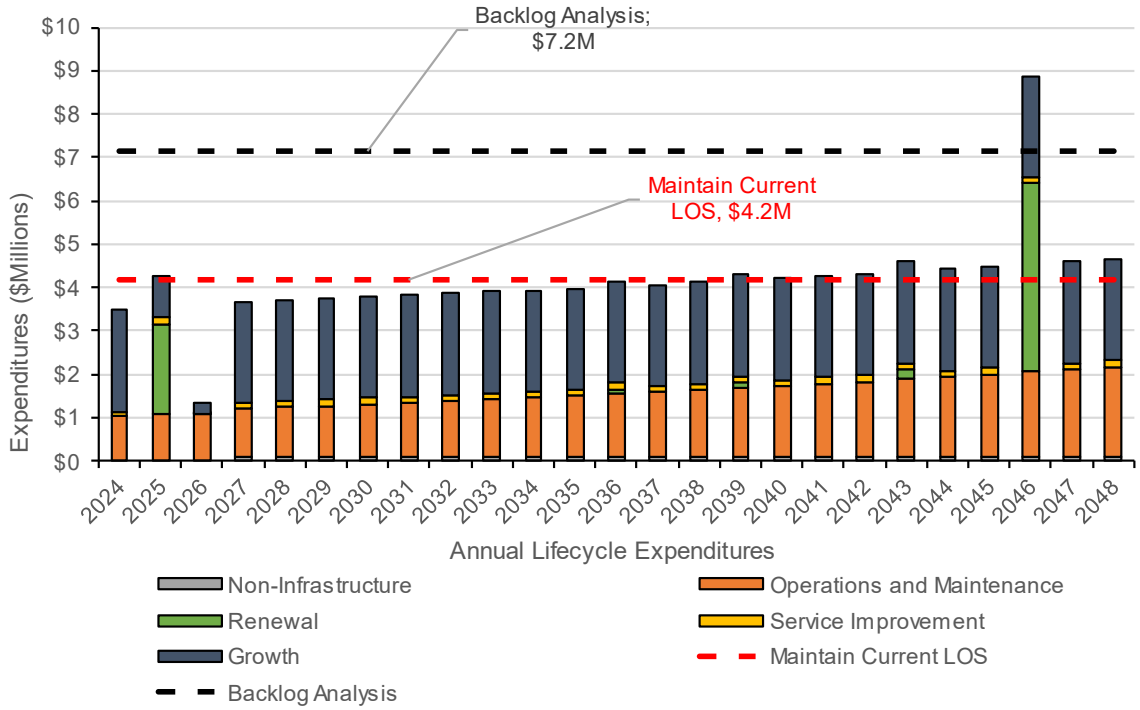


Figure 10-1: Rate Funded 25-Year Investment Forecast Summary

10.4.2 Tax Funded

The following Table 10-6 illustrates the 25-year investment forecast for tax-funded assets. For tax funded assets, a total investment of $459.8M over 25-years is required to maintain current service levels (equivalent annual average of $18.4M per year). In order to eliminate all backlog, the total 25-year investment would be $651.5M (equivalent annual average of $26.1M per year).Figure 10-2 illustrates the results of the forecast.

Table 10-6: Tax Funded 25-Year Investment Forecast Summary Table

	Lifecycle Activity	Scenario 1: Maintain Current LOS		Scenario 2: Backlog Analysis	
		25-Year Total	Equivalent Annual Average Cost	25-Year Total	Equivalent Annual Average Cost
Capital Activities	Non-Infrastructure	$9.9M	$0.4M	$9.9M	$0.4M
	Renewal	$281.8M	$11.3M	$473.5M	$18.9M
	Disposal	$0.0M	$0.0M	$0.0M	$0.0M
	Service Improvement	$24.5M	$1.0M	$24.5M	$1.0M
	Growth	$51.1M	$2.0M	$51.1M	$2.0M
	Total Capital Activities	**$367.3M**	**$14.7M**	**$559.0M**	**$22.4M**
Operating Activities	Operations and Maintenance	$92.5M	$3.7M	$92.5M	$3.7M
	Total Operating Activities	**$92.5M**	**$3.7M**	**$92.5M**	**$3.7M**
Total Capital and Operating Activities		**$459.8M**	**$18.4M**	**$651.5M**	**$26.1M**

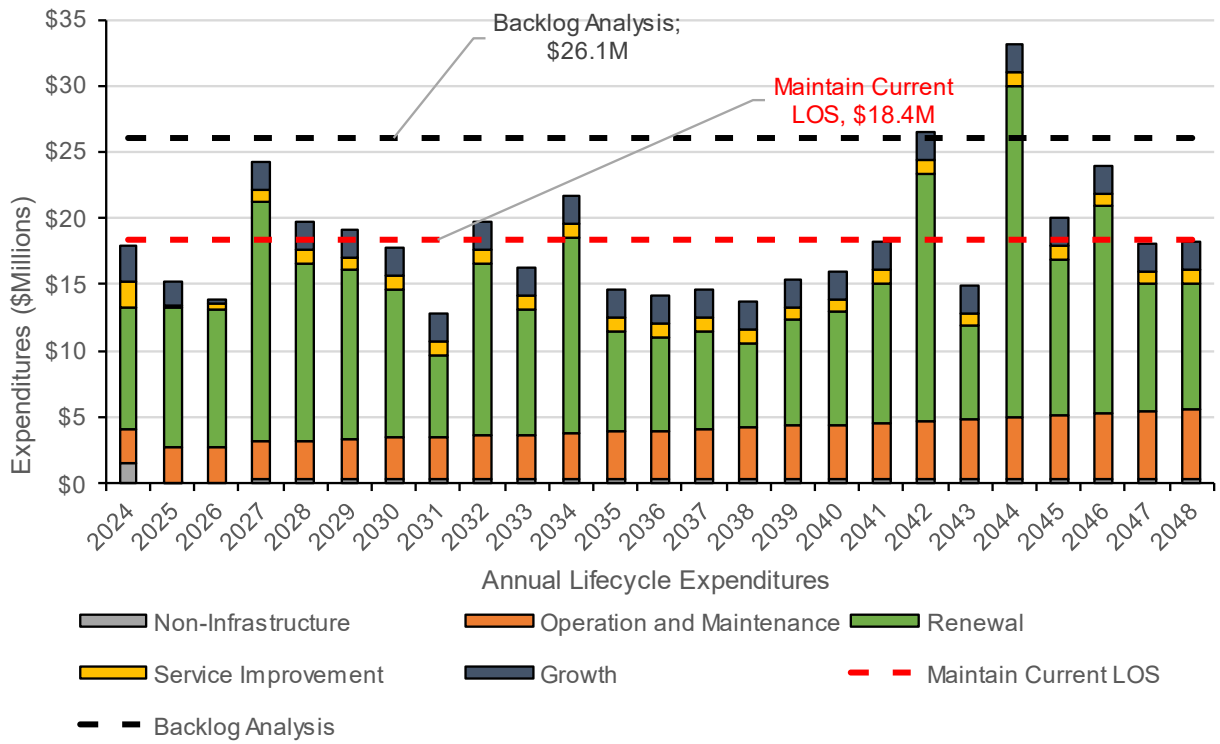


Figure 10-2: Tax Funded 25-Year Investment Forecast Summary

10.5. FUNDING SHORTFALL

The Township's funding shortfall can be assessed by comparing the actual approved budgets for 2024 to the Township's lifecycle forecasting scenarios completed in the AM analyses. By understanding the difference between existing and target levels, the Township can understand if there is a funding shortfall to maintain and meet LOS objectives over the long-term.

Table 10-7 provides an overview of the total funding available for all capital activities based on the 2024 approved budget. From the tables above, the total capital activities from Scenario 1 and Scenario 2 have been summarized in Table 10-8 below. The actual funding available can be compared to the average annual capital investment that is forecasted to be required to maintain current LOS based on the results of the analysis. From this comparison, a total renewal investment of $17.4M annually over 25-years is required to maintain current LOS for all assets. The current annual amount of sustainable funding available to the Township is $9.6M for all assets. Therefore, there is an annual capital investment increase of $7.8M required to maintain the Township's current LOS over 25-years.

The results of the backlog analysis for capital activities indicates that an average annual amount of $28.1M is required to address all capital backlog needs. The backlog

analysis considers the current backlog of the system and any upcoming needs over the 25-year forecast. Therefore, the Township's sustainable capital funding would have to increase by $18.5M annually to address all current and future capital needs within the 25-year forecast based on the current annual sustainable funding available ($9.6M).

Table 10-7: Total Capital Funding for Replacement Based on 2024 Council Approved Budgets

Description	Amount
Tax Levy	$1,198,413
Reserve Fund Transfers:	
- Equipment Replacement	$1,271,581
- Infrastructure Investment	$1,968,725
- Water	$1,560,000
- Wastewater	$1,151,000
- Property Building	$441,447
Sustainable Government Funding Sources:	
Ontario Community Infrastructure Fund (OCIF)	$1,185,858
Canada Community-Building Fund (CCBF)	$848,852
Total Township Funding Annually	**$9,625,876**

Table 10-8: Total Capital Activities summary from the 25-year Forecast (Scenario 1 and Scenario 2)

Category	Annual Average Cost for all Capital Activities (Scenario 1: Maintain Current LOS)	Annual Average Cost for all Backlog Capital Activities (Scenario 2: Backlog Analysis)
Rate Funded	$2.7M	$5.7M
Tax Funded	$14.7M	$22.4M
Total Required	**$17.4M**	**$28.1M**
Total Actual	**$9.6M**	**$9.6M**
Funding Gap	**$7.8M**	**$18.5M**

This analysis helps to demonstrate the total additional capital investment needed to maintain the Township's assets over the 25-year forecast. The cost to maintain the Township's current level of service assumes that the Township's current service levels continue in the future, regardless of if that service level is acceptable to the community or not. The Township's forthcoming 2025 asset management plan, required by O. Reg. 588/17 will further discuss the Township's proposed levels of service for each asset service and the feasibility of meeting the proposed service levels in terms of risk and financial sustainability.

10.6. FUNDING THE SHORTFALL

The Township has several options for addressing funding shortfalls in asset groups where they have been identified. Financial strategies can be used to maintain or improve service levels.

The first strategy is to increase overall net spending to improve asset performance. For this strategy, there are several options to consider:

1. Modest increases to property taxation and rates above-baseline revenue increases to fund the infrastructure funding shortfall.
2. Conducting a Water and Wastewater Rate Study every five years to ensure user rates are sufficient to sustain the water and wastewater infrastructure over its lifecycle. This is currently being completed in 2024. The Township may also explore additional user rates such as a stormwater utility rate.
3. Seek funding from the Provincial or Federal governments to fund infrastructure. The Township is hopeful that the development of this AMP may have a positive impact in the Township's ability to secure additional funding. Although grant funding will be helpful, it should not be relied upon by the Township since it is not guaranteed.
4. Draw from available reserves as reserves can assist in balancing shortfalls and excesses.
5. Consider debt financing. The Township has included anticipated future debt in its long-term financial forecast. The Township practices prudent borrowing. Appropriate long-term financing is to be used for only capital projects that involve significant capital dollars (>$2.5M) and have a lifecycle greater than 20 years. Reserve funding based on lifecycle replacement should be considered for funding assets that do not meet this criterion.

The second strategy is to adjust asset performance expectations. Although backlogs have been identified for all service areas, it does not necessarily mean that eliminating backlog fully is the optimal asset strategy. Operating with a certain amount of backlog (or assets in very poor condition) may be a possible strategy for low-risk assets. Operating with backlogs may result in increased maintenance expenditures to ensure assets remain in service; however, a balance of renewal and maintenance needs may be a more optimal approach financially as opposed to eliminating backlog (and reducing maintenance costs as a result). The Township should complete further analysis to understand the trade-offs between renewals and maintenance and strive to develop a strategy that optimizes funding while providing the best possible service levels and minimum risks.

A third strategy is to examine the trade-offs of allocating current funds between and within asset groups. It is good practice to minimize this occurrence for non-obligatory

reserve funds (e.g. infrastructure-related reserve funds); however, this can occur at Council's discretion based on asset priorities.

10.7. RISKS

This section summarizes the risks associated with the lifecycle strategies and funding analyses/recommendations, detailed in the sections above. It also articulates external influences that may affect the Township's financial strategy. The following subsections discuss risks/influences and potential mitigations.

10.7.1 Lifecycle and Financial Strategies

Lifecycle Strategies and Forecasts

The Township has identified backlogs in all asset classes. Furthermore, the Township has identified an overall funding shortfall over the forecasted 25-year analysis period. While operating in a state of backlog, or while shortfalls are being addressed, lower service levels (for some assets) could result in premature failures and an overall reduced LOS to the community, which increases the Township's overall risk. Furthermore, the Township cannot allocate all resources to address backlog immediately, which will result in some work being deferred. Deferrals can also have financial impacts, as they create a situation whereby the Township does not have the resources needed to intervene in asset renewals at the most optimal time. This could result in an increase in overall cost, by deferring less costly rehabilitations, which require more costly replacements sooner.

Deferred work may also require emergency intervention to replace assets that have failed. Emergency intervention is often costly, as it requires less planning and additional unforeseen costs to address issues immediately. When assets, such as buried (linear) infrastructure assets are replaced in this way, they are also not able to be coordinated and bundled with other adjacent corridor assets, which means the Township cannot take advantage of the cost savings associated with bundled projects.

Furthermore, if infrastructure backlogs are not addressed, an increase in maintenance costs will likely be experienced, as the Township will require additional resources and funds to maintain assets that are aged and at a higher risk of failure.

Ageing Infrastructure

As infrastructure ages, maintenance and rehabilitation activities may be performed more often and become more costly. It is important that this is recognized, and appropriate interventions are performed to not only continue providing undisrupted service to customers, but at the targeted level of service.

Although this AMP has looked forward for a 25-year time horizon, a longer-term plan may identify additional asset needs due to ageing infrastructure that occur beyond the 25-year forecasts. It is important to keep in mind the periods of growth the Township

experienced, particularly in the 1970s and 2000s, and the corresponding future demand in replacement as the infrastructure reaches its end of life.

Available Funding and Resources

The financial strategy detailed in this AMP is based on a budget forecast that will require funding through the various mechanisms that the Township has available to fund capital and operating needs. As noted above, several of the forecasted expenditures were derived from the Township's Capital Budget Forecast, which includes projects that have as of yet unconfirmed funding sources. Should this anticipated funding not be secured, or should less funding than anticipated be secured, it may result in prolonged backlogs and deferred work, which ultimately will result in lower service levels. For example, fire apparatus and storm ponds have large backlogs as well as anticipated needs in the years to come. If existing funding cannot be secured, or if more funding is not allocated to these asset classes, service levels are anticipated to worsen over time.

10.7.2 Asset Management Analysis and Strategies

Data Confidence

The asset management analyses completed as part of this AMP are reliant on the Township's asset and financial data. The confidence of that data affects the confidence of the results of each analysis. Data confidence, with respect to key asset management data, is detailed for each major asset class in the DAMI reports herein. In areas where data has a low confidence or completeness, the forecast analysis completed for this AMP may not fully represent real world conditions.

The Township endeavours to continue to update, maintain and improve asset data, which should increase the maturity of its data systems and the confidence in the analyses that support this AMP.

Asset Management Analysis and Strategies

For many assets, condition data was not available or was unable to be paired to inventories, and lifecycle forecasting was developed based on an age and service life approach. Without a complete understanding of asset condition, the full impacts of asset forecasts may not be fully understood. Assets may be in worse condition than identified, and backlog needs may be larger than originally thought.

Furthermore, the forecasting analysis used the Township's budget forecast data and paired it to asset inventories. In many instances, assumptions were required to determine the allocation of planned projects to specific assets for use in a comparative analysis. A better breakdown of project budgeting information would assist in improving the confidence of the forecasts detailed in this AMP.

10.7.3 External Trends and Influences

Economic Landscape

The current environment also contains a degree of uncertainty in the wake of the COVID-19 pandemic. The economic environment that has seen phenomena such as supply chain constraints, construction delays, and a rise in inflation to levels that are much higher than in the recent past, at the time of writing of this AMP. These uncertainties may result in economic pressures that could increase the financial impact of maintaining and replacing infrastructure.

Climate Change

The effects of climate change are predicted to include higher temperatures, more frequent and intense rainfall events as well as more variable rainfall and risk of low water or drought conditions, as well as an increased risk of extreme weather. This could pose a significant risk to the Township, particularly with vulnerable assets such as sanitary wastewater and stormwater collection systems, which are susceptible to inflow and infiltration from increased precipitation events. The Township may be required to complete additional studies and adjust its asset management and lifecycle strategies to complete upgrades and build more resilient asset networks to respond to the effects of climate change, which in turn, would result in impacts to funding.

Unplanned Growth

Canada, and by extension, Ontario has seen high levels of immigration in recent years, resulting in a need to respond to population increases through growth planning. Intensification and growth in areas that were not previously serviced or where growth exceeds planning projections may experience a reduction in service levels. Intensification and growth will result in increased demand for Township services, such as increased wastewater flows and drinking water consumption, and an increased strain on assets. This may contribute to accelerating asset needs (e.g. operations and maintenance, rehabilitation, and replacement). Growth in areas that were not previously serviced will require new construction to expand asset networks to provide services to these new areas.

Regulation and Policy Changes

Infrastructure renewal needs are sometimes driven by regulation changes. These include regulations and policies related to growth, climate change, development of asset management strategies, and more. They could also include changes to provincial government policies that result in strains on municipalities, such as the recent Bill 23. Regulatory changes could impact the way that the Township renews and replaces its infrastructure. These risks are generally considered to be low, since the Township endeavors to keep current with regulation changes, and incorporate them into its planning, which ensures that assets are up to date with the current regulatory environment.

Public Engagement

The Township has expressed the desire to facilitate public engagement events and platforms to evaluate customer expectations. This public engagement should be performed on a regular basis as service levels, customer expectations and priorities, and customer satisfaction may change. Changing customer expectations and priorities could result in changing business drivers that affects the way that the Township plans for and manages its assets. The Township plans to use public engagement platforms to both educate the public on its asset management program, as well as to solicit feedback on service levels that provide inputs to future AM analyses.

11. IMPROVEMENT PLAN

An important part of a leading asset management plan is to adopt a culture of continual improvement. This means that the Township commits to continually trying to gather better data, analyze the outcomes of its asset management planning processes and build on the analyses that support this AMP. This AMP represents the Township's current state, which is dependent on the maturity of the Township's data and asset management processes at the time of writing. In keeping with the philosophy of continual improvement, the following sections provide initiatives that the Township can enact to increase the maturity of its asset management system and the outcomes of future asset management planning processes and future iterations of this AMP.

11.1. ASSET MANAGEMENT AT THE TOWNSHIP

The Township has an objective to develop an asset management program that aligns with its capital planning process and long-term planning initiatives (including this and future versions of its AMP). The following initiatives have been identified to strengthen the asset management program at the Township and ensure that asset management becomes better integrated into business processes and day-to-day activities.

Table 11-1: Improvement Initiatives for Asset Management at the Township

Initiative	Description
1.	Complete a formal maturity assessment of the Township's Asset Management Program, which identifies processes and initiatives to increase asset management maturity at the Township. A maturity assessment goes beyond the initiatives detailed in this AMP by assessing the Township against common industry standards for asset management.
2.	Develop a Corporate Asset Management Strategy and Governance Framework, which defines the Township's Asset Management System and the processes that are part of it as well as the roles and responsibilities for conducting asset management practices.

11.2. DATA AND INFORMATION

The analyses supported in this AMP are founded on the Township's existing asset data inventories and supporting information which represents the Township's current understanding of the state of its infrastructure. The following table provides recommendations to improve data and information used to support asset management planning and future iterations of this AMP.

Table 11-2: Improvement Initiatives for Data and Information

Initiative	Description
1.	Develop and implement a data and information strategy (and standards) that details what asset data is necessary to support asset management and capital planning and details the necessary requirements and standards to keep all asset data up to date and maintained for use in various Township planning processes. This strategy should include (at a minimum): • Definitions on necessary data fields and how it is derived/calculated; • A framework to identify data maturity; • Assumptions to gap-fill existing data; • Processes for managing and updating data (such as annual reviews), and; • Governance pertaining to data collection, maintenance and management.
2.	Develop a formal condition assessment and data collection program, and enact it, to ensure that the Township collects condition information (and other pertinent asset data) for its asset portfolio. Although the Township has completed condition assessments in the past and is planning on completing more for certain asset groups, a formalized program will detail what information is required and how frequently it should be collected to support asset management planning. The Township should ensure that condition information is collected in an appropriate form so that it can be paired to asset inventories and used in future asset management analyses. Further details can be found in each individual DAMI report.
3.	Centralize and formalize existing data inventories to eliminate redundancies, identify sources of truth, and consolidate data so that it is readily available to support asset management analyses and other Township processes that rely on asset data.

11.3. ASSET MANAGEMENT STRATEGIES AND PLANNING

Although Asset Management planning is an existing practice at the Township, the development of this AMP has identified several opportunities for continual improvement of the Township's asset management strategies to better support the planning processes and asset management analyses within the Township. The following table summarizes initiatives for improvement in this area.

Table 11-3: Improvement Initiatives for Asset Management Strategies and Planning

Initiative	Description
1.	Establish proposed service levels in alignment with the 2025 requirements of O. Reg. 588/17.
2.	Implement the Township's asset management strategies, including the levels of service, lifecycle management and risk management strategies. Implementation of these strategies should include the following initiatives: • Regular and consistent reviews of the strategies and logic, to ensure they are updated to reflect the latest information available at the Township (such as annual or biennial reviews/updates). • Working towards implementing future initiatives identified in the strategies (such as implementing future LOS measures).
3.	Integrate climate change studies and planning into asset management analyses and future iterations of this AMP.
4.	Better integrate growth planning with operating and capital needs forecasting to enhance the confidence in the forecasting analyses related to growth.
5.	Adopt a process to engage the public and solicit their feedback to support the development of proposed levels of service and other asset management planning processes.
6.	Better integrate the Townships budget forecasts data with asset data and inventories, to ensure that a comparison of forecasted budgets (and projects) can be compared with asset lifecycle models to better support the lifecycle forecasting analysis process.
7.	Implement the Township's Decision Support System (DSS) tool that was developed to complete the data processing and forecasting analyses that supported the content of this AMP.