Municipality of Lakeshore | Asset Management Plan for Core Assets

2022

Contents

List of Figures

List of Tables

Executive Summary

This asset management plan (AMP) for the Municipality of Lakeshore was developed in accordance with Ontario Regulation 588/17 ("O. Reg"). It includes key elements of an industry-standard and regulation compliant AMP, and provides a detailed overview and analysis of the Municipality's core infrastructure. Together, the five asset categories analyzed in this asset management plan have a total current replacement cost of **$1.3 billion**.

The Municipality's core asset portfolio comprises a road network of paved, unpaved, and surface treated roadways; bridges and structural culverts; stormwater collection and conveyance infrastructure; water treatment and distribution network; wastewater collection and treatment infrastructure. At 42% of the total replacement cost of all infrastructure, roads and related assets form the largest share of the Municipality's asset portfolio and have a current replacement cost of more than $534 million.

Based on both assessed condition and age-based analysis, 80% of the Municipality's infrastructure portfolio is in fair or better condition, with the remaining 20% in poor or worse condition. Typically, assets in poor or worse condition may require replacement or major rehabilitation in the immediate or short-term. Asset criticality and targeted condition assessments may help further refine the list of assets that may be candidates for immediate intervention.

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

We note that with the exception of the Municipality's road network, and bridges & culverts, which together comprise 50% of total asset value, no in-field condition assessment data was available for other assets. As such, age was used as an approximation of condition for these assets. While a useful substitute in the absence of inspection data, using asset age to approximate its condition can lead to inaccurate results as age can under- or over-state asset needs. A more programmatic approach to condition assessments is recommended to improve data confidence.

Aging assets require maintenance, rehabilitation, and replacement. On average, $24.3 million is required each year to remain current with capital replacement needs for the Municipality's existing core asset portfolio. This figure relies on age and available condition data. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. We note that this figure assumes a like-for-like asset replacement, and does not account for capacity upgrades that offer higher levels of service at higher potential costs.

Average annual funding available totals $15.5 million for core assets. As a result, the Municipality is funding 64% of its annual capital requirements. This creates a total annual funding deficit of $8.8 million. Addressing annual infrastructure funding shortfalls is a difficult and long-term endeavour for municipalities. Considering the Municipality's current funding position, it will require many years to reach full funding for current assets. Short phase-in periods to meet these funding targets may place too high a burden on taxpayers too quickly, whereas a phase-in period beyond 20 years may see a continued deterioration of infrastructure, leading to larger backlogs.

To close annual deficits for tax-funded assets, we recommend the Municipality review feasibility of implementing a 3.4% annual increase in revenues over a 5-year phase-in period. Similarly, water rate revenues would need to increase at 1.2% to achieve full-funding over a 5-year phase-in period. For wastewater, a 10-year phase-in is recommended, requiring a 2.3% increase in rate revenues annually to close annual funding gaps. Funding scenarios over longer time frames are also presented which may reduce these annual increases.

We also note that these increases do not reflect the additional costs that will need to be accounted for as the Municipality implements its gravel conversion program. Through 2032, a total of 76km of gravel roads are slated for conversion to surface treated roads, yielding higher service levels and improved user experience. Based on existing replacement costs and target reinvestment rates, this will result in an annual cost increase of $656,800. As roads are converted, their added lifecycle costs would need to be factored in to future financial planning, which may have implications on tax rates.

In addition to annual needs, there is also an infrastructure backlog of nearly $38 million, comprising assets that remain in service beyond their estimated useful life. It is highly unlikely that all such assets are in a state of disrepair, requiring immediate replacements or full reconstruction. This makes targeted and consistent condition assessments integral to refining long-term replacement and backlog estimates.

Risk frameworks and levels of service targets can then be used to prioritize projects and help select the right lifecycle intervention for the right asset at the right time—including replacement or full reconstruction. The Municipality has developed preliminary risk models which are integrated with its asset register. These models are capable of producing risk matrices that classify assets based on their risk profiles.

Most municipalities in Ontario, and across Canada, continue to struggle with meeting infrastructure demands. This challenge was created over many decades, and will take many years to overcome. To this end, a number of broad recommendations should be considered, including:

- continuous and dedicated improvement to the Municipality's infrastructure datasets, which form the foundation for all analysis, including financial projections and needs;
- continuous refinements to the Municipality's risk and lifecycle models as additional data becomes available. This will aid in prioritizing projects and creating more strategic long-term capital budgets that are better aligned with corporate goals.

- development of key performance indicators for all infrastructure programs to meet 2024 O. Reg requirements, and to establish benchmark data to calibrate levels of service targets for 2025 regulatory requirements;
- establishing a dedicated, full-time asset management function to manage the Municipality's asset management program;

The Municipality has taken important steps in building its asset management program, including developing a more complete and accurate asset register—a substantial initiative. Continuous improvement to this inventory will be essential in maintaining momentum, supporting long-term financial planning, and delivering the highest affordable service levels to the Lakeshore community.

Lakeshore is also developing its first corporate asset management strategy to support the development of a formal and more structured asset management program. This essential step will reinforce the Municipality's commitment to deliver a quality infrastructure program with affordable levels of service.

About this document

This asset management plan (AMP) for the Municipality of Lakeshore was developed in accordance with Ontario Regulation 588/17 (“O. Reg 588/17”). It contains a comprehensive analysis of Lakeshore’s infrastructure portfolio. The AMP is a living document that should be updated regularly as additional asset and financial data becomes available.

Ontario Regulation 588/17

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

Table 1 Ontario Regulation 588/17 Requirements and Reporting Deadlines

Requirement	2019	2022	2024	2025
Asset Management Policy	●		●	
Asset Management Plans		●	●	●
State of infrastructure for core assets		●		
State of infrastructure for all assets			●	●
Current levels of service for core assets		●		
Current levels of service for all assets			●	
Proposed levels of service for all assets				●
Lifecycle costs associated with current levels of service		●	●	
Lifecycle costs associated with proposed levels of service				●
Growth impacts		●	●	●
Financial strategy				●

Scope

The scope of this AMP includes all requirements for the 2022 reporting deadline, and additional analysis that includes non-core assets as well as a financial strategy to address any identified annual infrastructure funding shortfalls. Core assets addressed in this AMP include roads, bridges & culverts, and storm, water, and wastewater.

In addition to limiting the analysis only to core assets, the projections and forecasts contained in the AMP are limited to Lakeshore's existing infrastructure assets. System-generated analysis and projections, including asset replacement needs, do not account for planned capital expenditures on growth-related assets nor capacity upgrades. All replacement projections and financial requirements are limited to like-for-like asset replacements.

As new assets are built or acquired, and eventually put in to service, these assets should be added to Lakeshore's asset register for inclusion in future asset management related documentation, including AMPs.

Overview of Asset Management

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

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

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

Key Technical Concepts in Asset Management

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

Lifecycle Management Strategies

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. Asset deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk and even service disruption.

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

There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference in cost.

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations. Table 2 provides a description of each type of activity, the general difference in cost, and typical risks associated with each.

The Municipality's approach to lifecycle management is described within each asset category outlined in this AMP. Developing and implementing a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

Table 2 Lifecycle Management: Typical Lifecycle Interventions

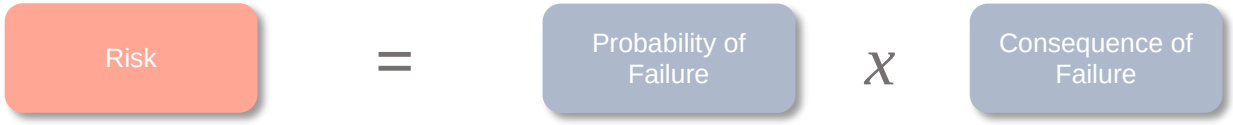
Lifecycle Activity	Description	Cost	Typical Associated Risks
Maintenance	Activities that prevent defects or deteriorations from occurring	$	• Balancing limited resources between planned maintenance and reactive, emergency repairs and interventions; • Diminishing returns associated with excessive maintenance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

Risk and Criticality

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

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

Figure 1 Risk Equation



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

Probability of Failure

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

Consequence of Failure

Estimating criticality also requires identifying the types of consequences that the organization and community may face from an asset's failure, and the magnitude of those consequences. Consequences of asset failure will vary across the infrastructure portfolio; the failure of some assets may result primarily in high direct financial cost but may pose limited risk to the community. Other assets may have a relatively minor financial value, but any downtime may pose significant health and safety hazards to residents.

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

Table 3 Risk Analysis: Types of Consequences of Failure

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

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

These models have been built in Citywide for continued review, updates, and refinements. Risk matrices are also generated using these models.

Levels of Service

A level of service (LOS) is a measure of the services that the Municipality is providing to the community and the nature and quality of those services. Within each asset category in this AMP, technical metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

Two levels of service key performance indicators are provided: Community Levels of Service, and Technical Levels of Service. At this stage, only those LOS that are required under O. Reg are included.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories, the Province, through O. Reg. 588/17, has mandated qualitative descriptions that are required to be included in this AMP.

Technical Levels of Service

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

For core asset categories, the province, through O. Reg. 588/17, has also prescribed technical metrics that are required to be included in this AMP.

Current and Proposed Levels of Service

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

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

Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost. By comparing the actual vs. target reinvestment rate (TRR) the Municipality can determine the extent of any existing funding gap.

Asset Condition

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

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

Table 4 Standard Condition Rating Scale

Condition	Pavement Condition Index (PCI)	Pipe Rating	Bridge Condition Index (BCI)	Age-based (Service Life Remaining%)	Broad Description
Very Good	91-100	0-1	>70	80-100	**Fit for the future** Well maintained, good condition, new or recently rehabilitated; no defects or minor defects
Good	76-90	2		60-80	**Adequate for now** Acceptable, signs of minor to defects and deterioration
Fair	66-75	3	50-70	40-60	**Requires attention** Signs of moderate deterioration and defects, some elements exhibit significant deficiencies
Poor	40-65	4	<50	20-40	**Increasing potential of affecting service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration; significant defects overall
Very Poor	0-39	5		0-20	**Unfit for sustained service** Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable

Age Profile

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

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

A comparison of the weighted average useful life of all segments and their weighted average age has been provided for all categories.

Foundational Documents in Asset Management

In the municipal sector, ‘asset management strategy’ and ‘asset management plan’ are often used interchangeably. Other concepts such as ‘asset management framework’, ‘asset management system’, and ‘strategic asset management plan’ further add to the confusion; lack of consistency in the industry on the purpose and definition of these elements offers little clarity. We make a clear distinction between the policy, strategy, and the plan.

Asset Management Policy

An asset management policy represents a statement of the principles guiding the Municipality’s approach to asset management activities. It aligns with the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program. All municipalities were required to develop and adopt an asset management policy in 2019 in compliance with O. Reg 588/17.

Asset Management Strategy

An asset management strategy is typically a higher-level document, focusing on business processes and organizational practices. It is a roadmap that includes key initiatives with recommended timelines that lead to higher state of asset management maturity. It is intended to convert the asset management policy from a set of formal, institutionalized, but philosophical commitments into specific actions.

While not a static document, the strategy should not evolve and change frequently—unlike the asset management plan. The strategy provides a long-term outlook on the overall asset management program development and strengthening key elements of its framework.

Asset Management Plan

The asset management plan is often identified as a key output within the strategy. The AMP has a sharp focus on the current state of the Municipality’s asset portfolio, and its approach to managing and funding individual service areas or asset groups. It is tactical in nature and provides a snapshot in time.

The strategic plan has a direct, and cascading impact on asset management planning and reporting, making it a foundational element. Many municipalities begin with an asset management plan. However, without the preceding documents, the AMP operates in a vacuum.

Limitations and Constraints

This AMP required substantial effort by staff. It was developed based on best-available data, and was subject to the following broad limitations, constrains, and assumptions:

1. The analysis in this AMP is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.
2. User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, and deployed in this AMP for some asset groups, can produce highly inaccurate estimates.
3. In the absence of condition assessment data, age was used to estimate asset condition ratings. This approach can result in an over- or understatement of asset needs. As a result, financial requirements generated through this approach can differ from those produced by staff.
4. Wastewater and water treatment facilities are not effectively componentized into their individual elements, major components, and minor components. These facilities contain thousands of individual assets, including the substructures, shell, interior assets, various electrical, plumbing, HVAC systems, and other complex equipment and furnishings. Each of these assets has its own useful life and replacement cost, and individual condition rating, as well as installation history. Without componentization, the value of condition ratings, age profiles, and long- and short-term forecasts remains limited.
5. The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

These limitations have a direct impact on most of the analysis presented in this AMP, including condition summaries, age profiles, long-term replacement and rehabilitation forecasts, and shorter term, 10-year forecasts that are generated from Citywide, the Municipality's primary asset management system.

These challenges are quite common among municipalities and require long-term commitment of resources and sustained effort by staff. As the Municipality's asset management program evolves and advances, the quality of future AMPs and other core documents that support asset management will continue to increase. Lakeshore's forthcoming asset management framework will identify ways to overcome many of these limitations.

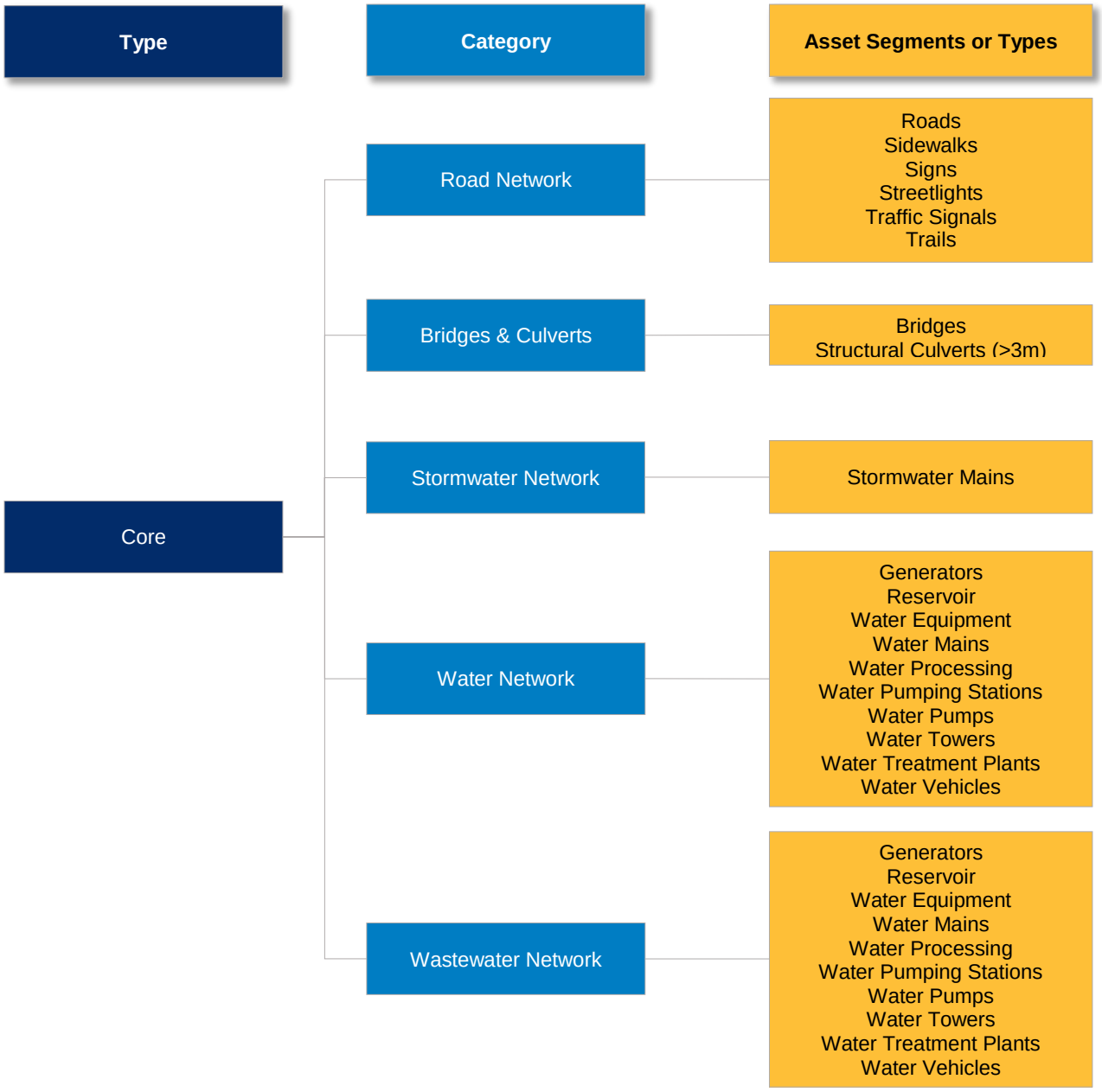
State of the Infrastructure

The state of the infrastructure (SOTI) summarizes the inventory, condition, age profiles, and other key performance indicators for the Municipality's infrastructure portfolio. Figure 2 illustrates how assets were classified within the infrastructure data hierarchy. Most reporting and analysis is presented at the segment level.

Asset Hierarchy and Data Classification

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

Figure 2 Asset Hierarchy and Data Classification

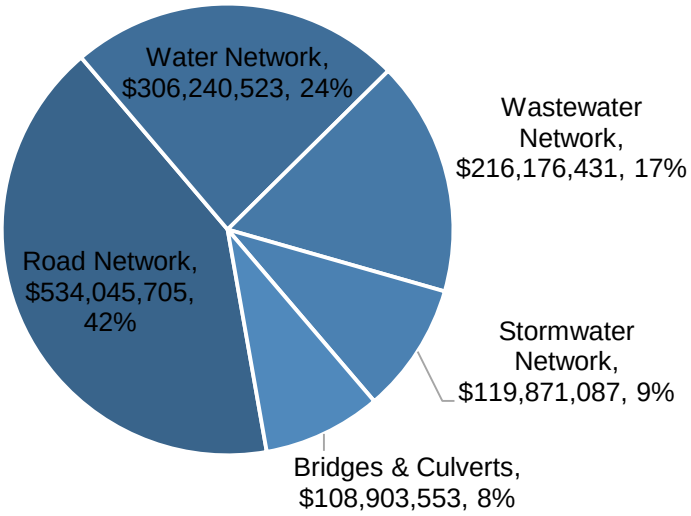


Portfolio Overview

The five core asset categories analyzed in this asset management plan have a total current replacement cost of $1.3 billion. This estimate was calculated using user-defined costing, as well as inflation of historical or original costs to current date.

Figure 3 illustrates the replacement cost of each asset category; at 42% of the total portfolio and with a current replacement cost of nearly $534 million, roads form the largest share of the Municipality's asset portfolio, followed by water at 24%.

Figure 3 Current Replacement Cost by Asset Category



Total Current Replacement Cost: $1,285,237,300

Condition Data

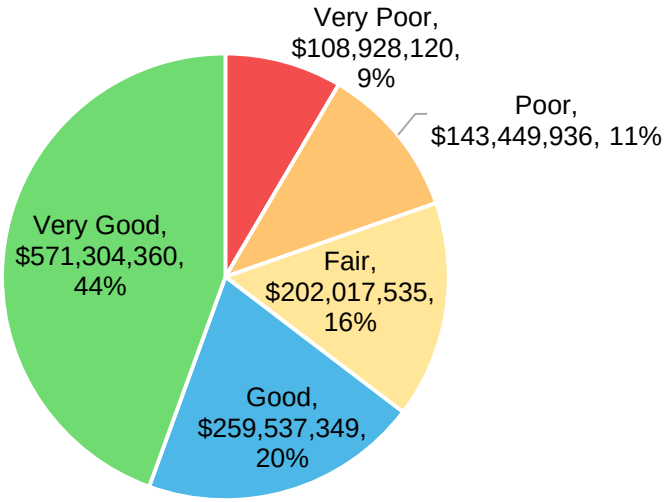
Figure 4 and Figure 5 summarize asset condition at the portfolio and category levels, respectively. Based on both assessed condition and age-based analysis, 80% of the Municipality's infrastructure portfolio is in fair or better condition, with the remaining 20% in poor or worse condition. Typically, assets in poor or worse condition may require replacement or major rehabilitation in the immediate or short-term. Targeted condition assessments may help further refine the list of assets that may be candidates for immediate intervention, including potential replacement or reconstruction.

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

With the exception of the Municipality's road network, and bridges & culverts, which together comprise 50% of total asset value, no in-field condition assessment data was available for other assets. As such, age was used as an approximation of condition for these assets. Age-based approach is limited in how accurately an asset's true condition can be approximated.

Further, when assessed condition data was available, it was projected to current year (2022). This 'projected condition' can generate lower condition ratings than those established at the time of the condition assessment. The rate of this deterioration will also depend on lifecycle curves used to project condition over time.

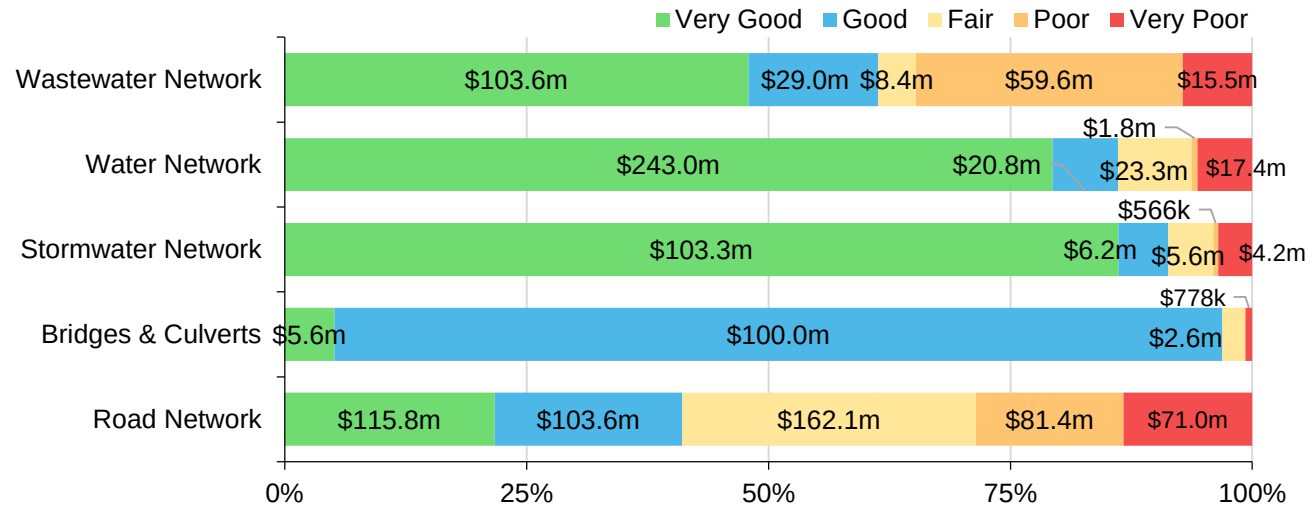
Figure 4 Asset Condition – Portfolio Overview



As further illustrated in Figure 5, the majority of major, core infrastructure including roads, bridges, and structural culverts are in fair or better condition, based on in-field condition assessment data. However, as no condition data was available for other essential assets such as storm, water, and wastewater, age was used to approximate asset condition. Age-based estimates revealed that a substantial portion of wastewater treatment plant assets, with a current replacement cost of more than $75 million, are in poor or worse condition. This was dominated by the Denis St. Pierre Pollution Control plant assets; the plant has been operating for 45 years.

See Table 5 Source of Condition Data for details on how condition data was derived for each asset segment. In addition, we also note that facilities assets in water, storm, and wastewater services are not componentized. As such, condition data could not be presented for individual major elements and components typically found in complex buildings and facilities.

Figure 5 Asset Condition – By Asset Category



Source of Condition Data

This asset management plan relies on assessed condition for 45% of assets, based on and weighted by replacement cost. For the remaining assets, aged is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Table 5 Source of Condition Data

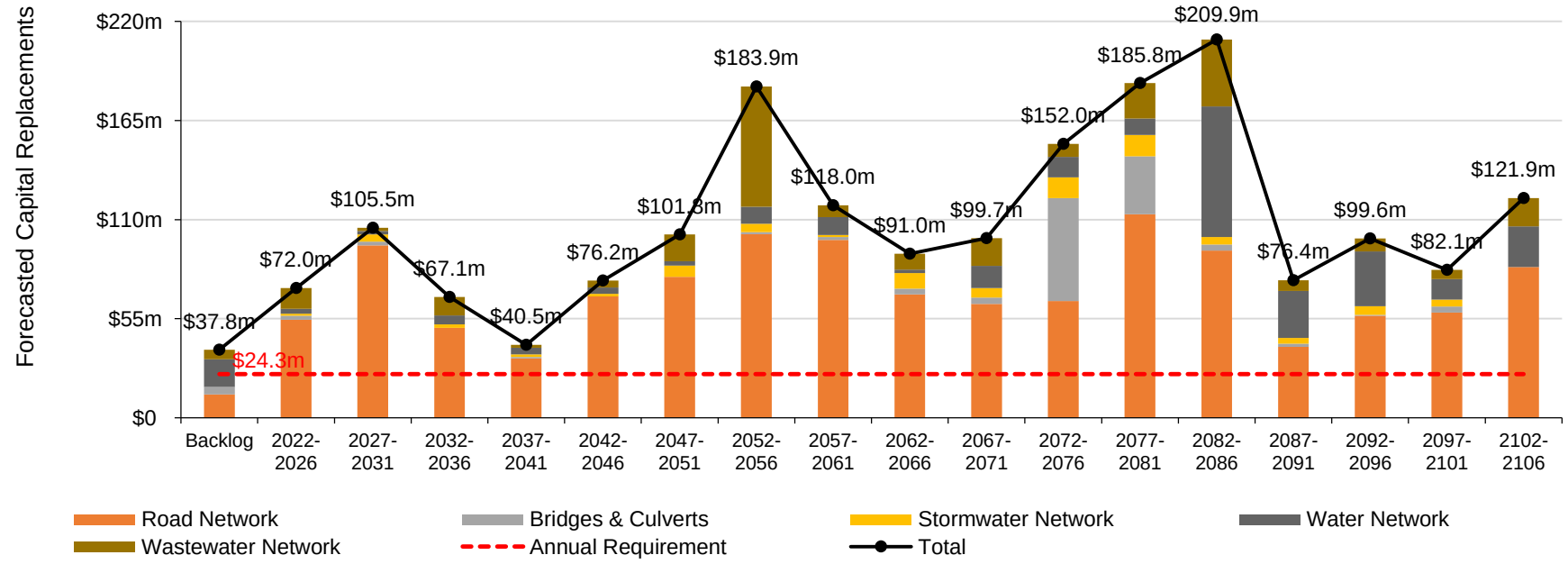
Asset Category	Segment	% of Assets with Assessed Condition	Source
Road Network	Roads	97%	2018 StreetScan Roads Needs Study
	Sidewalks	48%	2018 StreetLogix Sidewalk Inspection
	Signs	0%	Age-based estimates only
	Streetlights	0%	Age-based estimates only
	Traffic Signal	0%	Age-based estimates only
	Trails	0%	Age-based estimates only
Bridges & Culverts	Bridges	100%	2021 KBMC OSIM
	Culverts	100%	2021 KBMC OSIM
Storm	Mains	0%	Age-based estimates only
Water	Generators	0%	Age-based estimates only
	Reservoir	0%	Age-based estimates only
	Water Equipment	0%	Age-based estimates only
	Water Mains	0%	Age-based estimates only
	Water Processing	0%	Age-based estimates only
	Water Pumping Station	0%	Age-based estimates only
	Water Pumps	0%	Age-based estimates only
	Water Towers	0%	Age-based estimates only
	Water Treatment Plant	0%	Age-based estimates only
	Water Vehicles	0%	Age-based estimates only
Wastewater	Generators	0%	Age-based estimates only
	Pumphouse	0%	Age-based estimates only
	Sanitary Pumps	0%	Age-based estimates only
	Sanitary Pumps Electrical	0%	Age-based estimates only
	Sanitary Sewer Mains	0%	Age-based estimates only
	Sewage Lagoons	0%	Age-based estimates only
	Sewage Processing	0%	Age-based estimates only
	Sewage Treatment Plant	0%	Age-based estimates only
Total		**45%**	

Forecasted Long-term Replacement Needs

Aging assets require maintenance, rehabilitation, and replacement. Figure 6 below illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for all asset categories analyzed in this AMP. On average, $24.3 million is required each year to remain current with capital replacement needs for the Municipality's asset portfolio (red dotted line). Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. This figure relies on age and available condition data. Based on the current replacement cost of the portfolio, estimated at $1.3 billion, this represents an annual target reinvestment rate of 1.9%.

The chart also illustrates a backlog of nearly $38 million, comprising assets that remain in service beyond their estimated useful life. It is unlikely that all such assets are in a state of disrepair, requiring immediate replacements or major renewals. This makes targeted and consistent condition assessments integral. Risk frameworks, proactive lifecycle strategies, and levels of service targets can then be used to prioritize projects, continuously refine estimates for both backlogs and ongoing capital needs, and help select the right treatment for each asset.

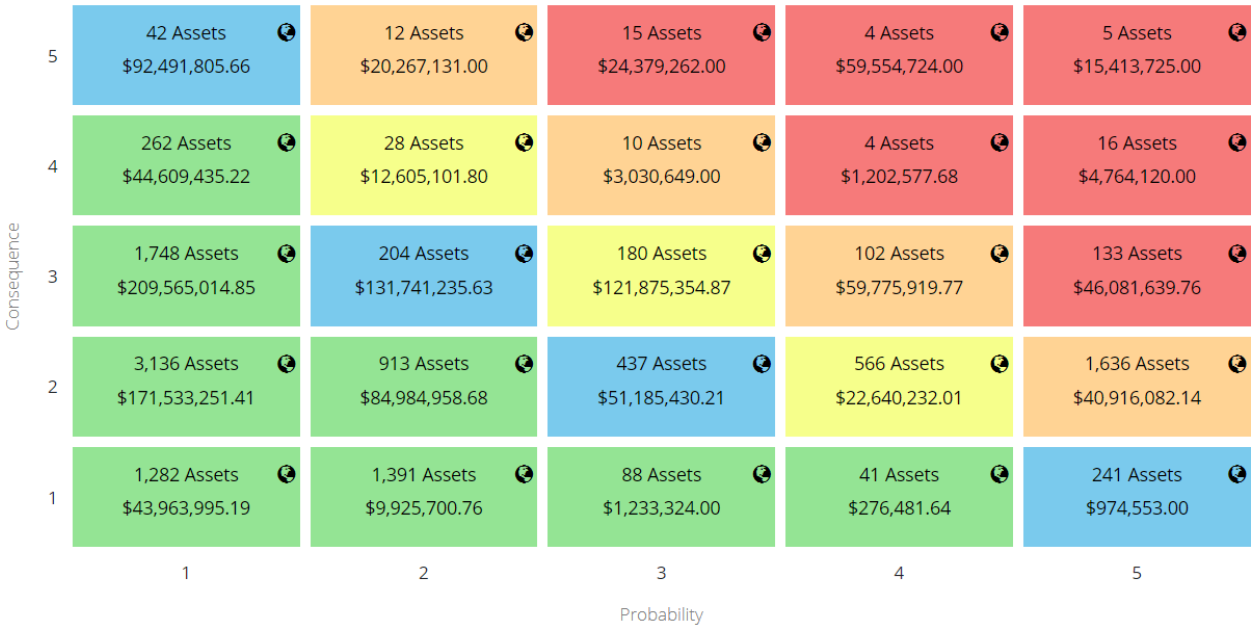
Figure 6 Capital Replacement Needs – Portfolio Overview 2022-2106



Risk Matrix

Using the risk equation and preliminary risk models, Figure 7 shows how assets across the different asset categories are stratified within a risk matrix.

Figure 7 Risk Matrix: All Assets



The analysis shows that based on current risk models, 12% of the Municipality's assets, with a current replacement cost of more than $151 million, carry a risk rating of 15 or higher (red) out of 25. Assets in this group may have a high probability of failure based on available condition data and age-based estimates and were considered to be most essential to the Municipality.

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

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

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

Road Network

The Municipality of Lakeshore's road network comprises the largest share of its infrastructure portfolio, with a current replacement cost of more than $534 million, distributed primarily between paved, surface treated, and gravel roads. The Municipality also owns and manages other supporting infrastructure and capital assets, including sidewalks, signs, streetlights, signals, and trails.

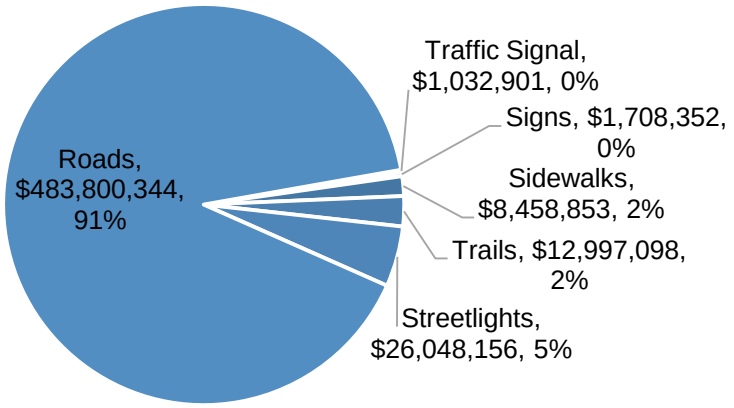
Inventory and Valuation

Table 6 summarizes the quantity and current replacement cost of the Municipality's various road network assets as managed in its primary asset management register, Citywide.

Table 6 Detailed Asset Inventory – Road Network

Segment	Quantity	Unit of Measure	Replacement Cost
Roads	538	km	$483,800,343
Paved - HCB	201	km	$276,268,691
Surface Treated – ICB/LCB	218	km	$160,860,357
Gravel	119	km	$46,671,295
Sidewalks	114	km	$8,458,853
Signs	3,781	Assets	$1,708,352
Streetlights	3,636	Assets	$26,048,156
Traffic Signal	15	Assets	$1,032,901
Trails	134	m.sq	$12,997,098
Total			**$534,045,704**

Figure 8 Portfolio Valuation – Road Network



Total Current Replacement Cost: $534,045,705

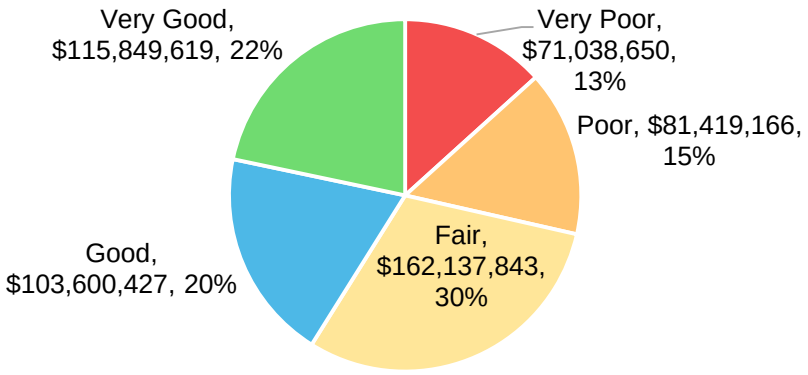
Asset Condition

Figure 9 summarizes the replacement cost-weighted condition of the Municipality's road network. Based on a combination of field inspection data and age, 71% of assets are in fair or better condition; the remaining 29% of assets are in poor to very poor condition. Condition assessments were available for 97% of roads and 48% of sidewalks, based on replacement cost.

This condition data was projected from inspection date to current year to estimate their condition today. No condition data was available for the remaining asset types, requiring age-based approximations.

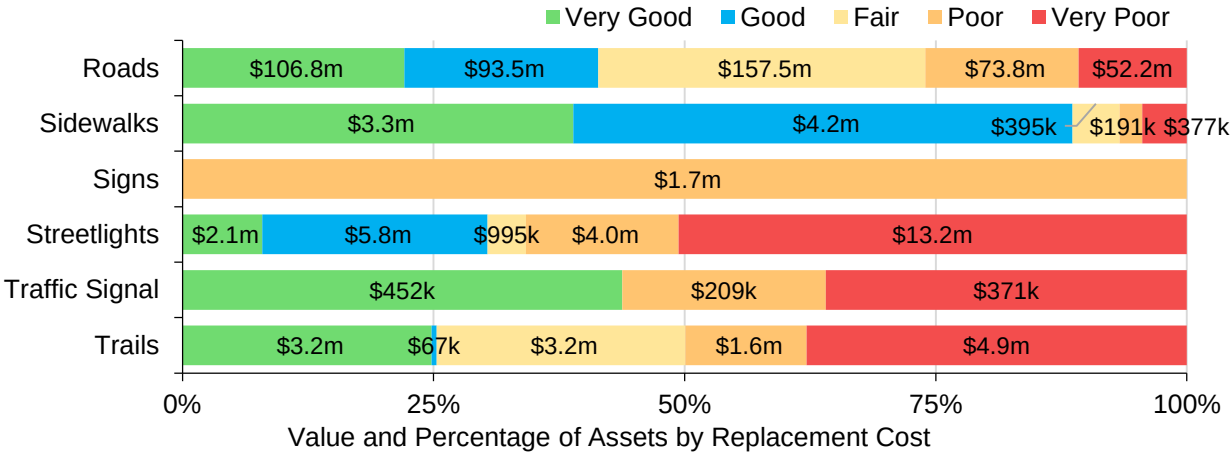
Assets in poor or worse condition may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition. As illustrated in Figure 9, the majority of the Municipality's road network assets are in fair or better condition.

Figure 9 Asset Condition – Road Network: Overall



As illustrated in Figure 10, based on condition assessments, the majority of the Municipality's paved and surface treated roads are in fair or better condition. However, 26% of the network is in poor or worse condition.

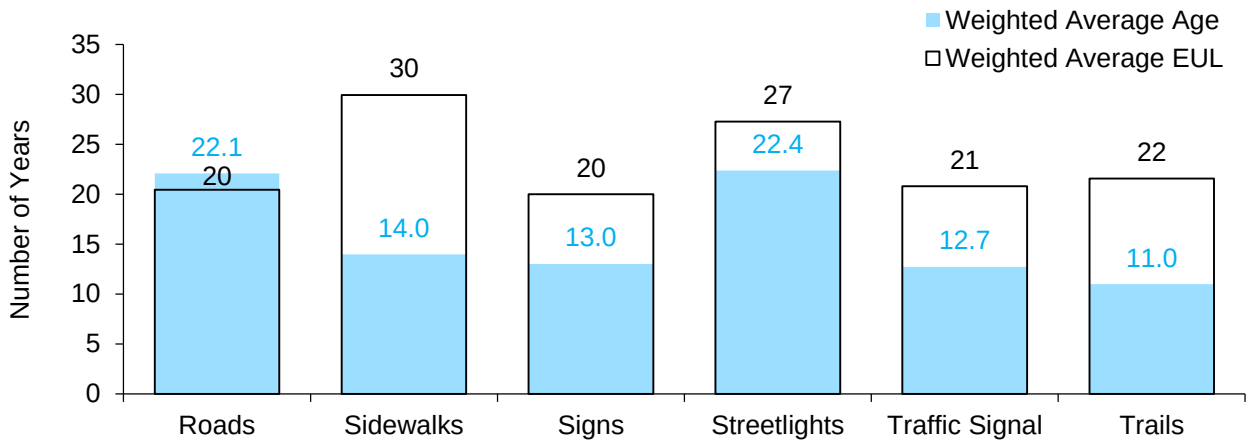
Figure 10 Asset Condition – Road Network: By Segment



Age Profile

Figure 11 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

Figure 11 Estimated Useful Life vs. Asset Age – Road Network



The analysis shows that, based on in-service dates, roads continue to remain in operation beyond their expected useful life, with an average age of 22.1 against an average expected serviceable life of 20 years. Age analysis also revealed that, on average, streetlights, traffic signals, and trails have entered the latter stages of their useful life. Condition assessments should be used to identify potential candidates for potential repair, renewal, or replacements.

Although age analysis is important, we do note that roads needs studies and pavement condition reports provide a much more accurate summary of road condition than average age, which is influenced by in-service dates, how road assets are treated within an accounting and financial reporting framework, and the useful life assigned. The Municipality's asset register contains 75 paved, surface treated, and gravel road segments, with a current replacement cost of $52.2 million, that have an in-service date of 1850. This was likely assigned as a 'dummy date' and should be updated.

Current Approach to Lifecycle Management

This section outlines Lakeshore's current approach to managing major infrastructure assets within the road network.

Roads

A roads needs study (RNS) is completed by an external consultant. The most recent RNS was completed in 2018 by StreetScan. As part of the study, a pavement condition index (PCI) was calculated based on distress quantity, type, and severity. Recommended treatment, ranging from preventative maintenance to rehabilitation and reconstruction, was developed for each road section a long with cost estimates.

PCI scores, staff judgment, traffic loads, and opportunity to bundle projects with utility work help inform the optimal lifecycle intervention, ranging from pothole repairs to potential replacements.

The Municipality's 5-year roads capital and lifecycle program for existing assets includes reconstruction, asphalt resurfacing, and treatment resurfacing projects totaling nearly $40 million.

Sidewalks

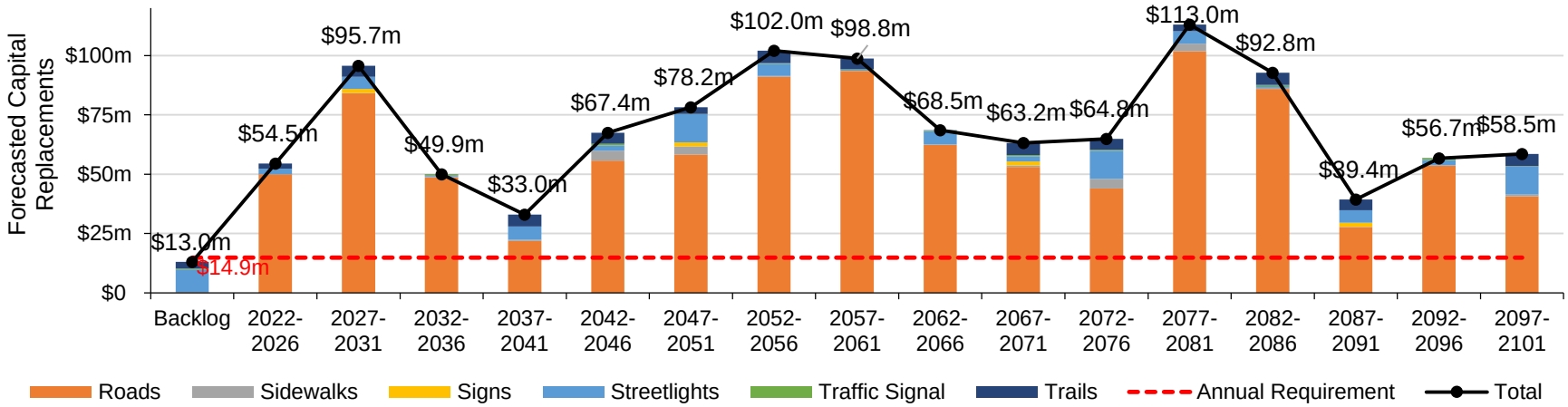
All sidewalk inventory is assessed annually by staff. The most recent external review was conducted in 2018 by StreetLogix, producing a sidewalk condition index (SCI), as well as the recommended lifecycle intervention ranging from grinding to partial replacement of panels. Internal inspections are done on an annual basis.

Forecasted Long-term Replacement Needs

Figure 12 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Municipality's road network. This analysis was run until 2101 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Lakeshore's average annual requirements (red dotted line) total $14.9 million for all assets in the road network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. The chart illustrates substantial capital needs through the forecast period, remaining above $50 million for most 5-year intervals.

It also shows a backlog $13 million, comprising assets that have reached the end of their useful life. The projections are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades. They are based on asset replacement costs, age analysis, and condition data when available, as well as lifecycle modeling (roads only). The lifecycle modeling included crack sealing and resurfacing (single and double lifts).

Figure 12 Forecasted Capital Replacement Requirements – Road Network 2022-2101



Often, the magnitude of capital needs is substantially higher than most municipalities can afford to fund. It is also unlikely that all assets will need to be rehabilitated or fully reconstructed as forecasted above. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. Regular pavement condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

System-generated 10-Year Replacement Forecast

The table below summarizes the projected cost of lifecycle activities (rehabilitation and replacements) that may be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register. They can be different from actual capital forecasts. Consistent data updates, particularly condition, replacement costs, and regular upkeep of lifecycle models, will improve the alignment between the system generated expenditure requirements, and the Municipality's capital expenditure forecasts.

Table 7 System-generated 10-Year Capital Replacement Forecast – Road Network

Segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Roads	$10.6m	$9.1m	$23.1m	$3.7m	$3.4m	$5.2m	$4.1m	$4.6m	$56.0m	$14.1m
Sidewalks	$1k	$0	$0	$0	$0	$1k	$51k	$0	$45k	$29k
Signs	$0	$0	$0	$0	$0	$0	$0	$1.7m	$0	$0
Streetlights	$386k	$577k	$125k	$639k	$650k	$1.3m	$1.3m	$555k	$955k	$1.1m
Traffic Signal	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Trails	$1.2m	$296k	$375k	$215k	$157k	$893k	$519k	$821k	$2.3m	$135k
Total	**$12.2m**	**$10.0m**	**$23.6m**	**$4.6m**	**$4.2m**	**$7.4m**	**$5.9m**	**$7.7m**	**$59.3m**	**$15.3m**

Planned Capital Expenditures

The table below summarizes the forecasted capital expenditures as outlined in Lakeshore's 2022 capital forecasts. Operating and other program service costs for 2022 are illustrated in Appendix 1: Operating Costs. Road lifecycle projections beyond 2026 are based on an average of the previous five years.

Table 8 Capital Plan – Road Network

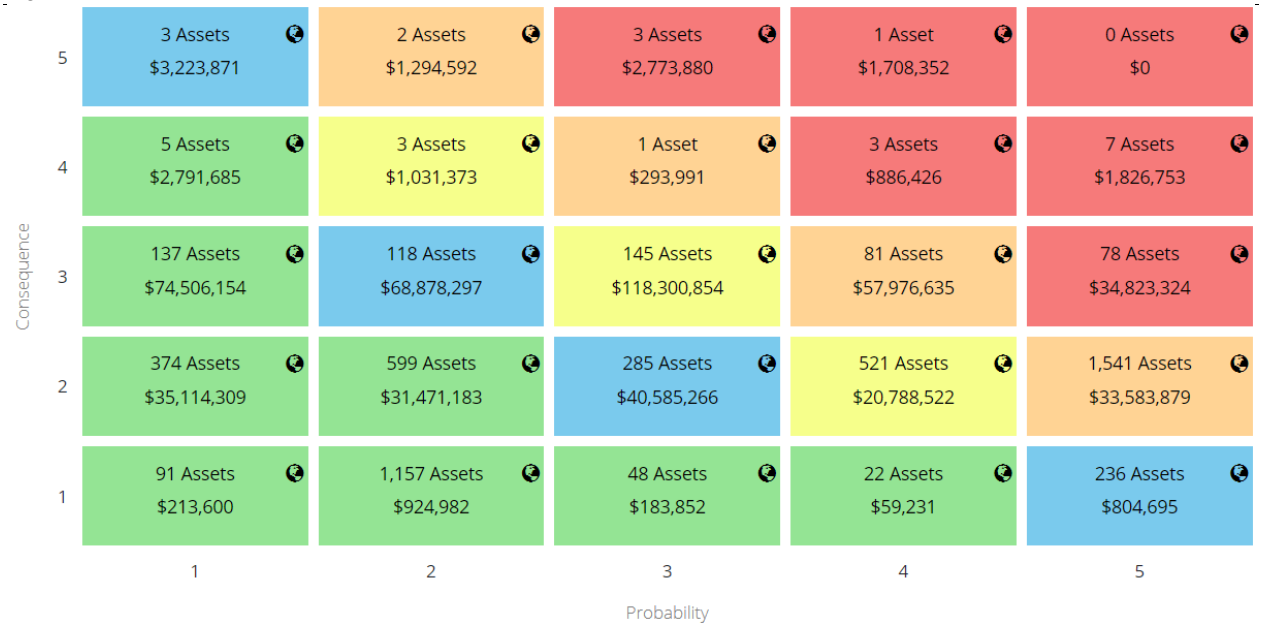
Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gravel Conversion	$1.1m	$990k	$1.0m	$889k	$1.2m	$930k	$1.0m	$995k	$1.1m	$986k
Roads Lifecycle	$6.0m	$7.1m	$9.3m	$10.5m	$8.5m	*$8.5m*	*$8.3m*	*$8.3m*	*$8.3m*	*$8.3m*
Total	**$7.1m**	**$8.1m**	**$10.3m**	**$11.4m**	**$9.7m**	**$9.4m**	**$9.4m**	**$9.3m**	**$9.4m**	**$9.3m**

Risk Analysis

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

See *Risk and Criticality* section for further details on approach used to determine asset risk ratings and classifications.

Figure 13 Risk Matrix – Road Network



In addition to asset level risk, the Municipality may also face risk associated with not executing key lifecycle activities, including repairs, rehabilitation, and replacement of critical assets. These include:

- missed opportunities for cost savings and increases in lifecycle costs;
- misallocation of funds leading to over- or under-investments;
- deferral of vital projects, or further lending and borrowing;
- accelerated asset deterioration and premature failure, which may lead to public health and safety hazards, and disruption of services to the Municipality's residential and commercial base;
- a decline in public satisfaction with the Municipality's service standards and the resulting reputational damage;

Levels of Service

The tables that follow summarize Lakeshore's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17.

Table 9 Ontario Regulation 588/17 Community Levels of Service – Road Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	Description, which may include maps, of the road network in the Municipality and its level of connectivity	See map in Figure 14
Quality	Description or images that illustrate the different levels of road class pavement condition.	See map in Figure 15

Table 10 Ontario Regulation 588/17 Technical Levels of Service – Road Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0.0478 km/km^2
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.8712 km/km^2
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	0.5758 km/km^2
Quality	Average pavement condition for paved roads in the Municipality	69
Performance	Average surface condition for unpaved roads in the Municipality (e.g. excellent, good, fair, poor)	65

Figure 14 Road Network

Description, which may include maps, of the road network in the municipality and its level of connectivity.

Exhibit 2-3: County Road Network

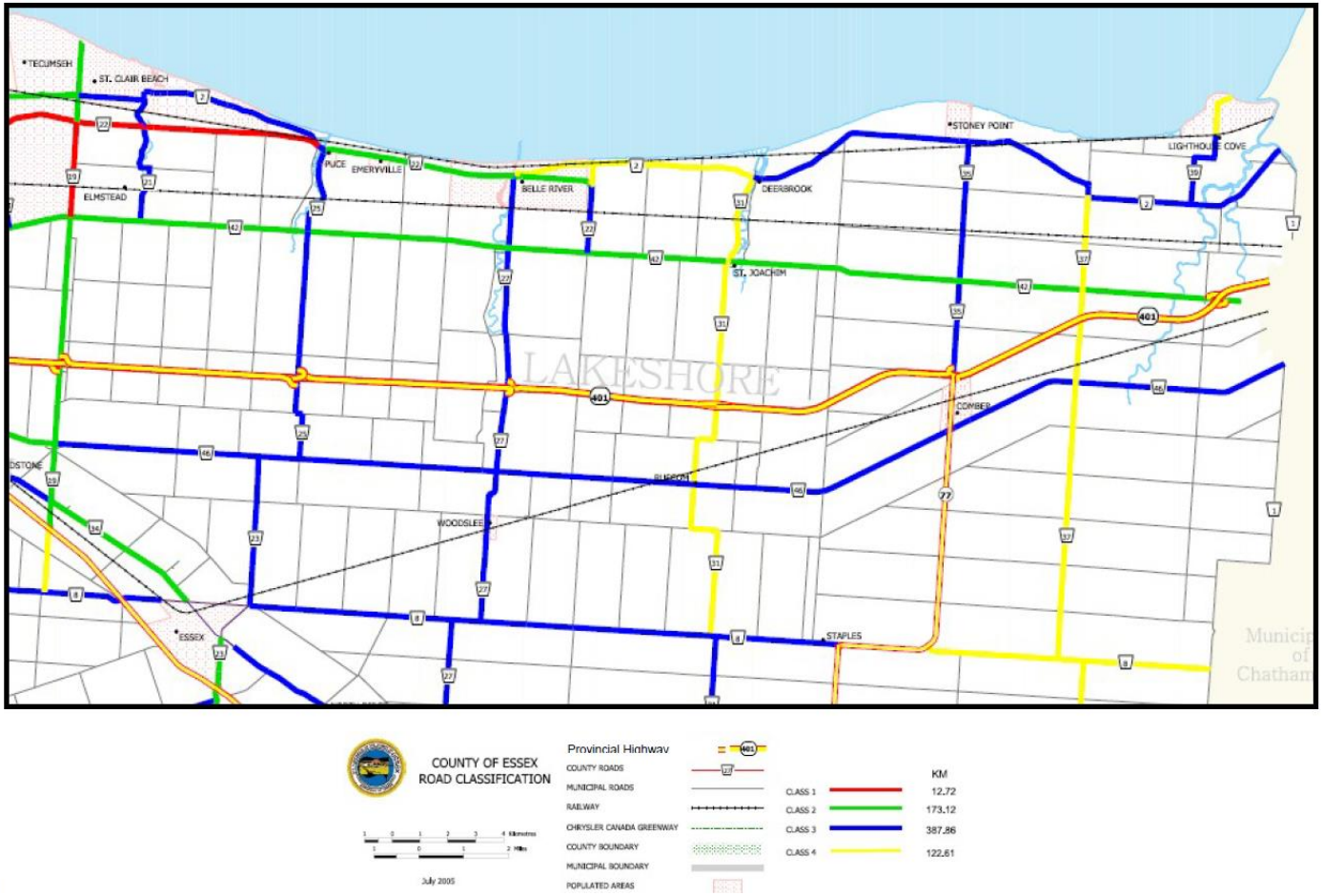
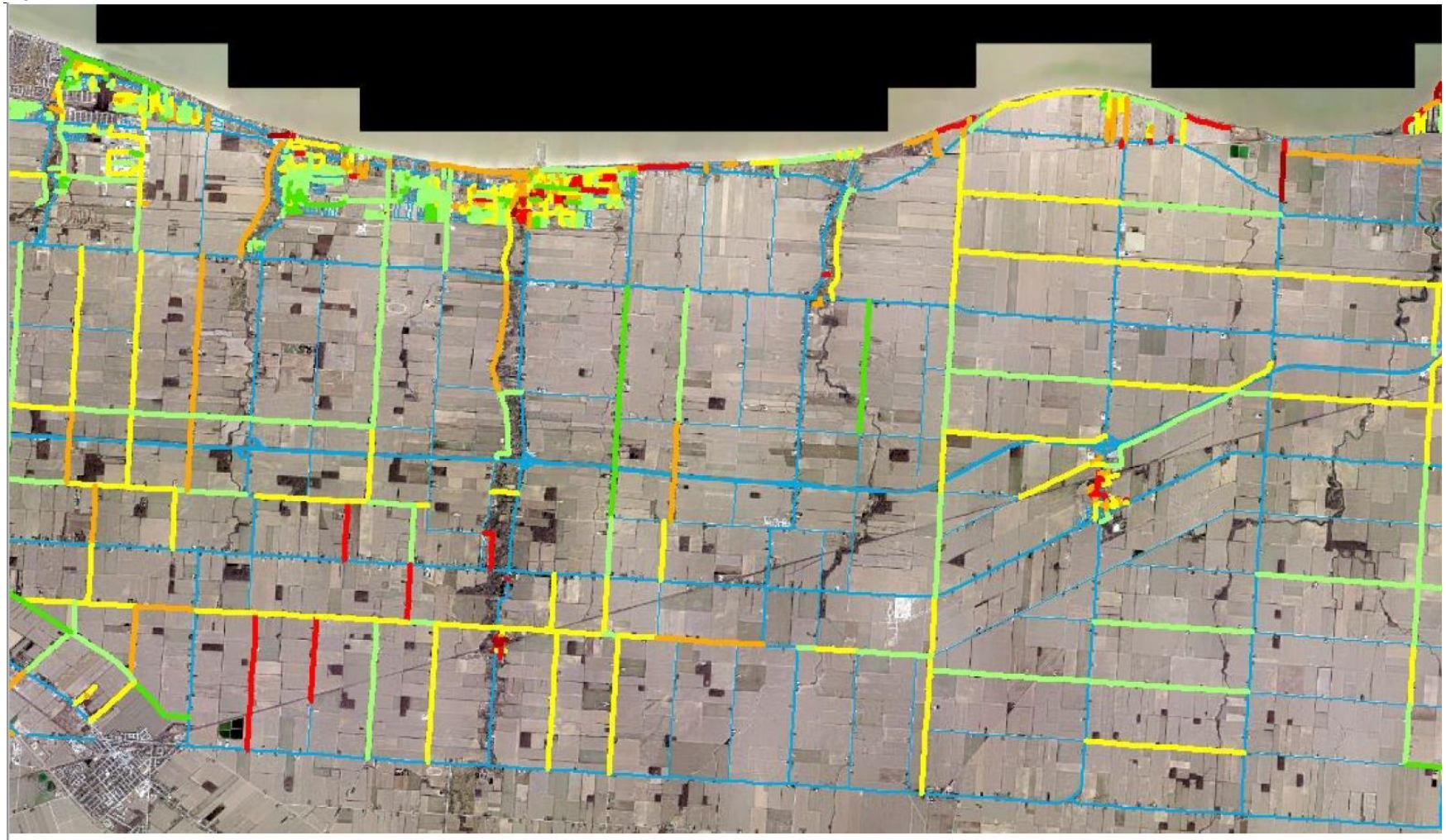


Figure 15 Road Network: PCI



Bridges & Culverts

The Municipality of Lakeshore's transportation network also includes bridges and structural culverts, with a current replacement cost of $109 million.

Inventory and Valuation

Table 11 summarizes the quantity and current replacement cost of bridges and culverts assets as managed in Lakeshore's asset register. We note that the 2021 OSIM inspection identified 107 bridges and 11 culverts, with a total replacement cost of $110,891,000.

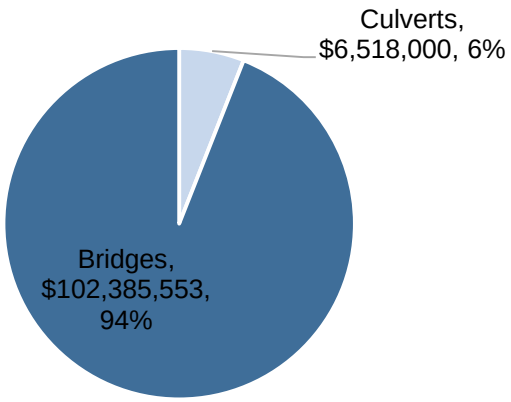
The difference in quantity and replacement costs of bridges between the OSIM report and the data in the table below is explained by two factors: the OSIM inspections does not include the Halliday Drain bridge (Asset ID 49408), with a listed replacement cost of $32,553. This asset was put in service after the inspection.

Similarly, some assets included in the OSIM report are not found in the municipality's asset register. These include OSIM Bridge IDs Ped 2, Ped 3, Ped 5, and Ped 6. These assets have a total replacement cost of $2,020,000. The net difference totals $1,987,447.

Table 11 Detailed Asset Inventory – Bridges & Culverts

Segment	Quantity	Unit of Measure	Replacement Cost
Bridges	104	Assets	$102,385,553
Culverts	11	Assets	$6,518,000
Total	**115**		**$108,903,553**

Figure 16 Portfolio Valuation – Bridges & Culverts

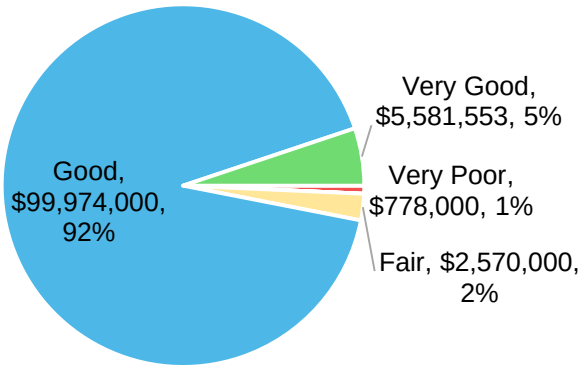


Total Current Replacement Cost: $108,903,553

Asset Condition

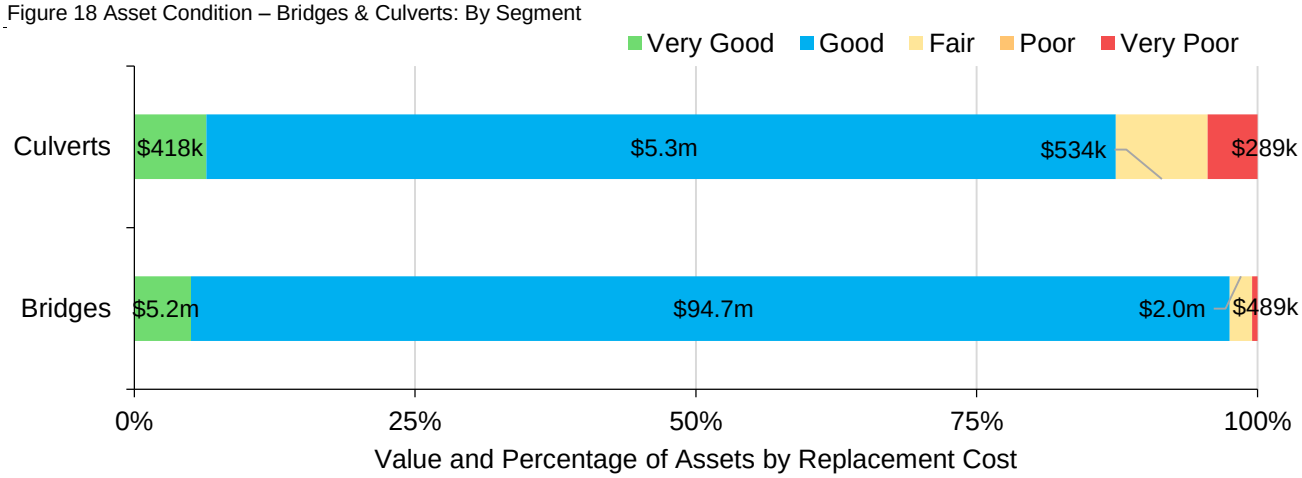
Figure 17 summarizes the replacement cost-weighted condition of the Municipality's bridges and culverts. Based on the Municipality's 2021 OSIM assessments, 99% of all bridges and culverts are in fair or better condition. Some elements or components of these structures may be candidates for replacement or rehabilitation in the medium term and should be monitored for further degradation in condition.

Figure 17 Asset Condition – Bridges & Culverts: Overall



As further detailed in Figure 18, based on in-field condition assessments, less than 1% of bridges were assessed as very poor. Bridges and structures with a poor or worse rating (i.e., a bridge condition index of less than 60) are not necessarily unsafe for regular use. The OSIM ratings are designed to identify repairs needed to elevate condition ratings to a fair or higher.

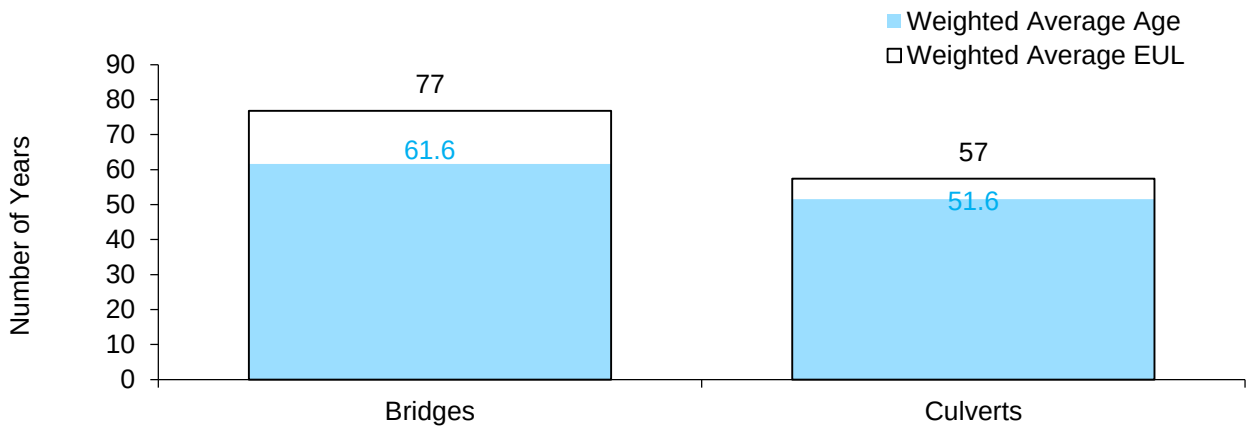
Figure 18 Asset Condition – Bridges & Culverts: By Segment



Age Profile

Figure 19 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

Figure 19 Estimated Useful Life vs. Asset Age – Bridges & Culverts



Age analysis reveals that on average, bridges and culverts are in the latter stage of their expected serviceable life. On average, bridges have a weighted average age of 61.6 years against an average estimated useful life of 77 years. Similarly, culverts have an average age of 51.6 years against an EUL of 57 years.

OSIM assessments should continue to be used in conjunction with age and asset criticality to prioritize capital and maintenance expenditures, and to identify potential candidates for further review and analysis.

Current Approach to Lifecycle Management

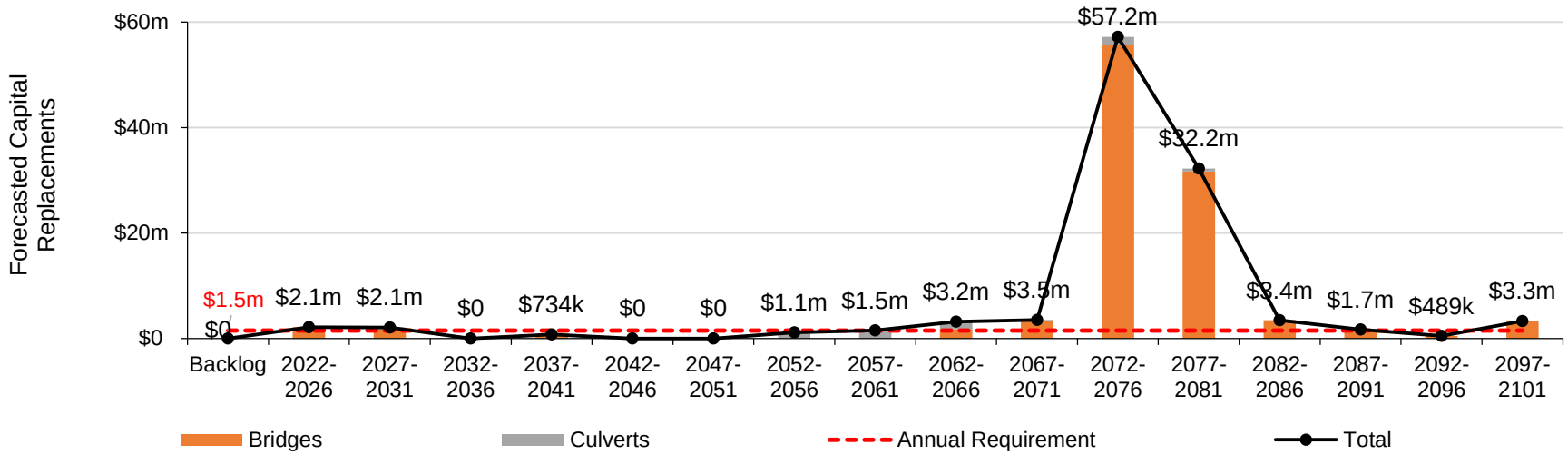
The condition of bridges and structural culverts is assessed biennially in compliance with Ontario Structure Inspection Manual (OSIM). The most recent inspection report was completed in 2021. The bridge condition index (BCI) is used to guide and prioritize capital investment, unless health and safety concerns warrant a different, more immediate intervention.

Forecasted Long-term Replacement Needs

Figure 20 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Municipality's bridges and culverts. These projections are based on asset replacement costs, age analysis, and condition data. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

The analysis was run until 2101 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Lakeshore's average annual requirements (red dotted line) for bridges and culverts total $1.5 million. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Figure 20 Forecasted Capital Replacement Requirements – Bridges & Culverts 2022-2101



While no major replacement spikes are anticipated for the next 30 years, capital needs will rapidly after 2052 and peak at $57.2 million between 2072 and 2076 as assets reach the end of their useful life. It is highly unlikely that all assets will require full reconstruction or replacement. With proactive lifecycle management, the life of most assets can be extended by many years in a cost-effective manner. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves. OSIM condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

System-generated 10-Year Replacement Forecast

The table below summarizes the projected cost of lifecycle activities (capital replacement only) that will need to be undertaken over the next 10 years to support current levels of service. We note that these are represented at the major asset level, i.e., full cost of bridge or culvert, rather than partial repair, rehabilitation, or replacement.

Table 12 System-generated 10-Year Capital Replacement Forecast – Bridges & Culverts

Segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Bridges	$0	$14k	$288k	$1.5m	$294k	$77k	$408k	$0	$1.2m	$0
Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$340k	$0
Total	**$0**	**$14k**	**$288k**	**$1.5m**	**$294k**	**$77k**	**$408k**	**$0**	**$1.6m**	**$0**

These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for bridges and structural culverts. These projections may be different from actual capital forecasts as outlined in OSIM inspections and recommended workplans. Consistent data updates, especially condition, will improve the alignment between the system generated expenditure requirements, and the Municipality's capital expenditure forecasts, including long-term capital plans.

Planned Capital Expenditures

The table below summarizes the forecasted capital expenditures as outlined in Lakeshore's 2022 capital forecasts. Operating and other program service costs for 2022 are illustrated in Appendix 1: Operating Costs.

Table 13 Capital Plan – Bridges & Culverts

Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Bridges & Culverts Lifecycle	$702k	$794k	$547k	$405k	$504k	$690k	$408k	$360k	$822k	$294k
Total	**$702k**	**$794k**	**$547k**	**$405k**	**$504k**	**$690k**	**$408k**	**$360k**	**$822k**	**$294k**

Risk Analysis

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

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

Figure 21 Risk Matrix – Bridges & Culverts

In addition to asset level risk, the Municipality may also face risk associated with not executing key lifecycle activities, including repairs, rehabilitation, and replacement of critical assets. These include:

- missed opportunities for cost savings and increases in lifecycle costs;
- deferral of vital projects, or further lending and borrowing;
- accelerated asset deterioration and premature failure, which may lead to public health and safety hazards, and disruption of services to the Municipality's residential and commercial base;
- a decline in public satisfaction with the Municipality's service standards and the resulting reputational damage;

- bridges are inherently vital to the Municipality's transportation infrastructure, and their failures can disconnect communities, lead to public health and safety incidents, and can impede the efficient flow of residential and commercial traffic.

An asset's criticality rating, determined by the nature and magnitude of the consequences of its potential failure should be used to prioritize projects, particularly lifecycle management strategies. Using risk in conjunction with levels of service, and the recommended workplans in OSIM inspections, can assist in optimizing limited funds.

Levels of Service

The tables that follow summarize Lakeshore's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17.

Table 14 Ontario Regulation 588/17 Community Levels of Service – Bridges & Culverts

Service Attribute	Qualitative Description	Current Level of Service
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The municipality's bridges and culverts support all traffic types.
Quality	1. Description or images of the condition of bridges and how this would affect use of the bridges.	The majority of the municipality's bridges and culverts are in fair or better condition, and continue to support the safe and efficient flow of traffic.
	2. Description or images of the condition of culverts and how this would affect use of the culverts.	

Table 15 Ontario Regulation 588/17 Technical Levels of Service – Bridges & Culverts

Service Attribute	Qualitative Description	Current Level of Service
Scope	Percentage of bridges in the Municipality with loading or dimensional restrictions.	1.9%. The 2021 OSIM recommended load posting for two of the 107 bridges.
Quality	1. For bridges in the Municipality, the average bridge condition index value.	73
	2. For structural culverts in the Municipality, the average bridge condition index value.	71

Stormwater Network

Lakeshore's Stormwater Network comprises concrete, PVC, and clay sewer mains with a total current replacement cost of approximately $120 million. The Municipality is responsible for 113 kilometres of storm mains.

Inventory and Valuation

Table 16 summarizes the quantity and current replacement cost of all stormwater management assets available in the Municipality's asset register.

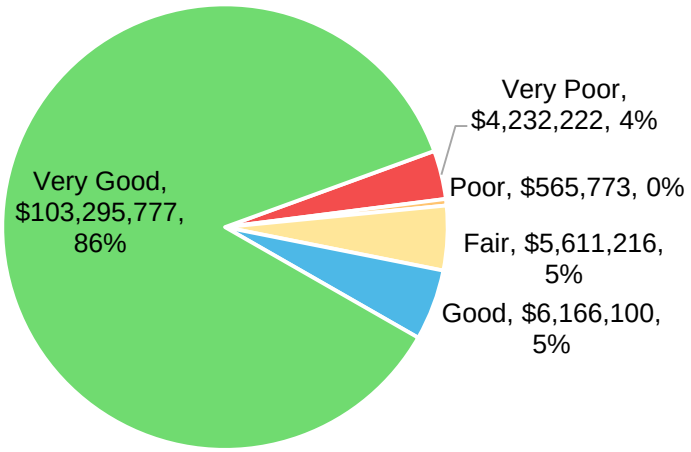
Table 16 Detailed Asset Inventory – Stormwater Network

Segment	Quantity	Unit of Measure	Replacement Cost
Stormwater Mains	113	Kilometers	$119,871,087
Total			**$119,871,087**

Asset Condition

Figure 22 summarizes the replacement cost-weighted condition of the Municipality's stormwater mains. Based on age data only, approximately 96% of mains are in good to very good condition, with the remaining in poor to very poor condition.

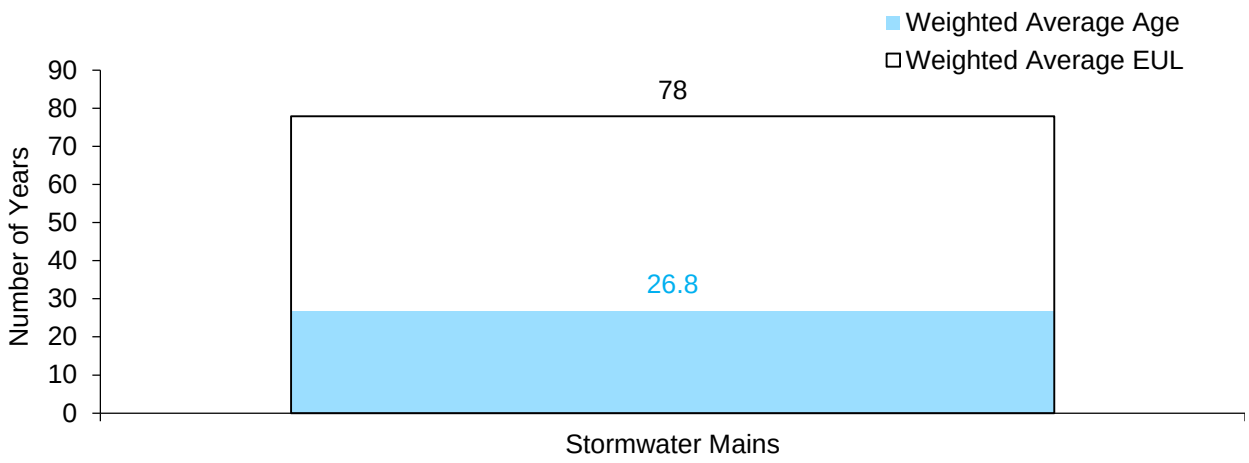
Figure 22 Asset Condition – Stormwater Network: Mains



Age Profile

Figure 23 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

Figure 23 Estimated Useful Life vs. Asset Age – Stormwater Network: Mains



Age analysis reveals that on average, storm mains are in the earlier stages of their estimated useful life. Nearly $90 million in storm mains was put into service after 1990. Age profiles and CCTV inspections will help to identify mains in need of replacements and/or upgrades. A review of EULs for mains may also be considered based on performance history to date and staff's professional judgement.

Current Approach to Lifecycle Management

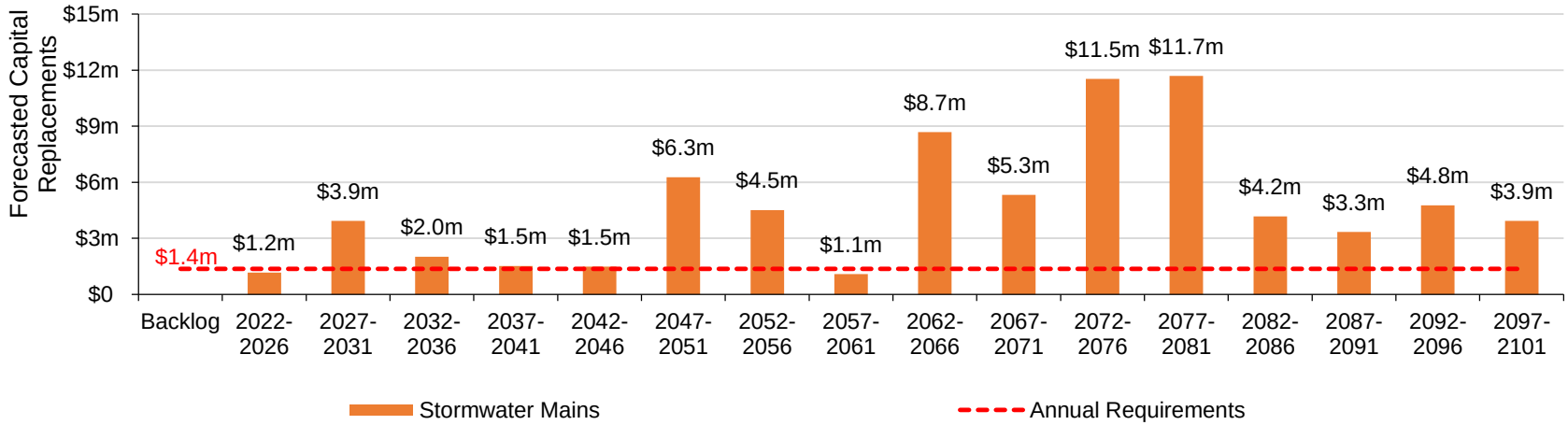
The Municipality's stormwater network management includes storm pond sedimental removal on a 10-year cycle, and remote monitoring for 10 storm pumping stations. No CCTV condition assessment program is in place; however, storm sewers may be replaced in coordination with roadwork and other utility works.

Forecasted Long-term Replacement Needs

Figure 24 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Municipality's storm mains. This analysis was run until 2101 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Lakeshore's average annual requirements (red dotted line) total $1.4 for all assets in the stormwater network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

The largest replacement spike is forecasted in the 2070s as mains reach the end of their useful life. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 24 Forecasted Capital Replacement Requirements – Stormwater Network 2022-2101



Often, the magnitude of replacement needs is substantially higher than most municipalities can afford to fund. In addition, most assets may not need to be replaced as forecasted, while others may be replaced as part of coordinated roadwork. However, quantifying and monitoring these spikes is essential for long-term financial planning, including establishing dedicated reserves, and identifying assets that may be candidates for further inspections. Although no backlog is identified based on data in the Municipality's asset register, CCTV inspections may reveal one. The inspections may also help reduce long-term projections by providing more accurate condition data for mains than age. In addition, a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including replacements.

System-generated 10-Year Replacement Forecast

The table below summarizes the projected cost of lifecycle activities (capital replacement only) that may be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide, assume a like-for-like replacement, and rely on the data available in the asset register. As no assessed condition data was available for the stormwater network, only age was used to determine forthcoming replacement needs. Further, no data was available on stormwater facilities. These projections can be different from actual capital forecasts. Consistent data updates, especially condition, will improve the alignment between the system generated expenditure requirements, and the Municipality's capital expenditure forecasts.

Table 17 System-generated 10-Year Replacement Forecast – Stormwater Network

Segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Stormwater Mains	$164k	$129k	$208k	$519k	$152k	$212k	$151k	$2.2m	$1.1m	$221k
Total	**$164k**	**$129k**	**$208k**	**$519k**	**$152k**	**$212k**	**$151k**	**$2.2m**	**$1.1m**	**$221k**

Planned Capital Expenditures

The table below summarizes the forecasted capital expenditures as outlined in Lakeshore's 2022 capital forecasts. Operating and other program service costs for 2022 are illustrated in Appendix 1: Operating Costs. The capital plan below includes potential capacity upgrades as storm mains are replaced.

Table 18 Capital Plan – Stormwater Network

Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Stormwater Lifecycle	$310k	$5.8m	$5.7m	$5.8m	$5.7m	$5.9m	$6.2m	$5.7m	$5.7m	$5.2m
Total	**$310k**	**$5.8m**	**$5.7m**	**$5.8m**	**$5.7m**	**$5.9m**	**$6.2m**	**$5.7m**	**$5.7m**	**$5.2m**

Risk Analysis

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

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

Figure 25 Risk Matrix - Stormwater Mains

In addition to asset level risk, the Municipality may also face risk associated with not executing key lifecycle activities, including repairs, rehabilitation, and replacement of critical assets. These include:

- missed opportunities for cost savings and increases in lifecycle costs associated with more frequent asset maintenance;
- deferral of vital projects, or further lending and borrowing;
- accelerated asset deterioration and premature failure, which may lead to public health and safety hazards, and disruption of services to the Municipality's residential and commercial base;
- a decline in public satisfaction with the Municipality's service standards and the resulting reputational damage;
- failure of stormwater assets can be particularly detrimental, causing excessive flooding, erosion, backups, road and bridge closures, environmental damage, and substantial property damage. Water quality may also be jeopardized, further exacerbating public health and safety challenges.
- increased frequency of extreme weather events has made some communities even more vulnerable to flooding. These events can also create legal liabilities for the Municipality in the event of asset failure.

An asset's criticality rating, determined by the nature and magnitude of the consequences of its potential failure should be used to prioritize projects, particularly lifecycle management strategies. Using risk in conjunction with levels of service, and findings from standard CCTV inspections will assist in optimizing limited funds.

Levels of Service

The tables that follow summarize Lakeshore's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17.

Table 19 Ontario Regulation 588/17 Community Levels of Service – Stormwater Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	Description, which may include maps, of the user groups or areas of the Municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	Lakeshore's flood management system includes a network of storm mains, stormwater management facilities, pumps, and seawalls to protect its residents, including the shoreline.

Table 20 Ontario Regulation 588/17 Technical Levels of Service – Stormwater Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	1. Percentage of properties in municipality resilient to a 100-year storm.	See note below. TBD
	2. Percentage of the municipal stormwater management system resilient to a 5-year storm.	See note below. TBD

Risk Management

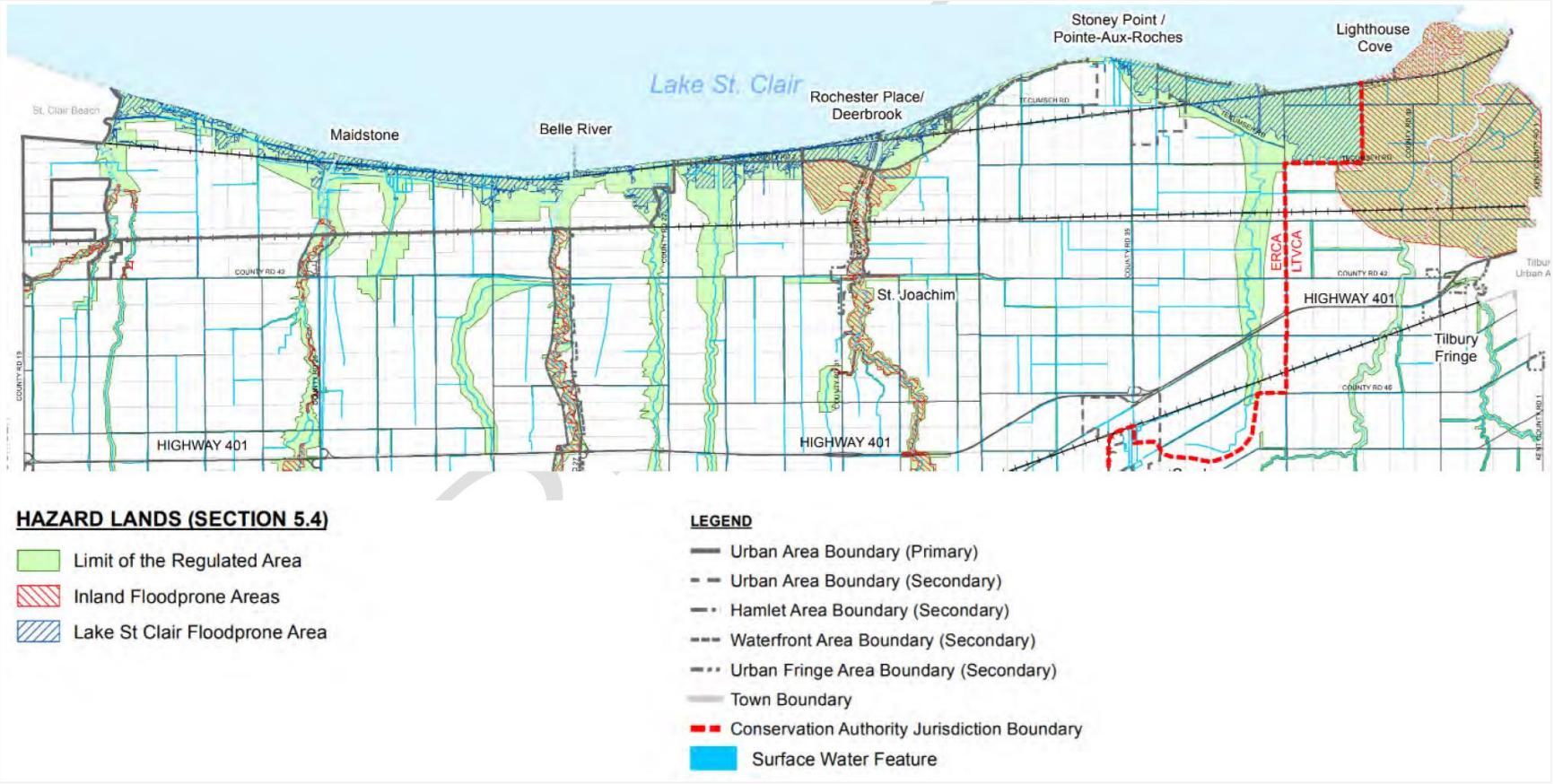
The Municipality of Lakeshore recently adopted a Shoreline Management Plan for the Lake St. Clair shoreline, map flooding, erosion, and dynamic beach hazards, and develop management and policy recommendations to increase resilience. The entire northern extent of the Municipality of Lakeshore consists of the Lake St. Clair shoreline and includes both serviced and unserviced development areas. Each reach of the shoreline is exposed to shoreline hazards, such as flooding and erosion. There are areas within the Municipality that are also subject to inland and riverine flood hazards. Shoreline hazards consist of the 100-year flood level, plus allowances for wave uprush, 100 years of shoreline erosion, and dynamic beach hazards.

Lakeshore also completed Phase 1 of a stormwater master plan (SMP) in 2020 to develop a stormwater servicing strategy to address drainage concerns in the urban portion of the Town. The SMP is being undertaken in two phases with Phase 1 addressing stormwater issues in the mostly urban areas of the northwest portion of the Town and Phase 2 addressing the remaining urbanized areas of the Town.

The Phase 1 study area limits are County Road 42 to the south, Lake St. Clair to the north, County Road 19 (Manning Road) to the west and County Road 22 (near Duck Creek) to the east. The study area consists of approximately 2,300 hectares (ha) of developed land and 2,400 ha of agricultural lands. Screening of catchments determined that buildings in 10 of the 25 catchments would be vulnerable to surface ponding.

Lakeshore's development manuals and agreements identify minimum elevations of new roads and buildings to protect against flooding whilst being able to provide access to properties in emergencies.

Figure 26 Natural Hazards and Floodprone Areas



Water Network

Lakeshore's Water distribution network includes mains, treatment facilities, towers, vehicles, and various machinery and equipment, with a total current replacement cost of more than $306 million.

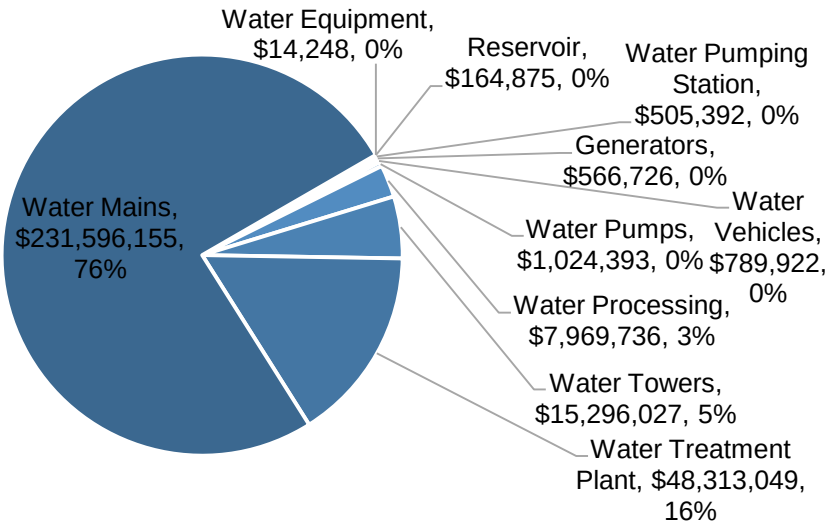
Inventory and Valuation

Table 21 summarizes the quantity and current replacement cost of all water distribution and treatment assets available in the Municipality's asset register. At 76% of the portfolio, mains comprise the largest share of water assets.

Table 21 Detailed Asset Inventory – Buildings & Facilities

Segment	Quantity	Unit of Measure	Replacement Cost
Generators	8	Assets	$566,726
Reservoir	1	Assets	$164,875
Water Equipment	5	Assets	$14,248
Water Mains	619	Kilometers	$231,596,155
Water Processing	13	Assets	$7,969,736
Water Pumping Station	4	Assets	$505,392
Water Pumps	18	Assets	$1,024,393
Water Towers	2	Assets	$15,296,027
Water Treatment Plant	2	Assets	$48,313,049
Water Vehicles	17	Assets	$789,922
Total			**$306,240,523**

Figure 27 Portfolio Valuation – Buildings & Facilities



Total Current Replacement Cost: $306,240,523

Asset Condition

Figure 28 summarizes the replacement cost-weighted condition of the Municipality's water distribution portfolio. Based only on age data, less than 7% of assets are in poor or worse condition. These assets may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

Figure 28 Asset Condition – Water Network: Overall

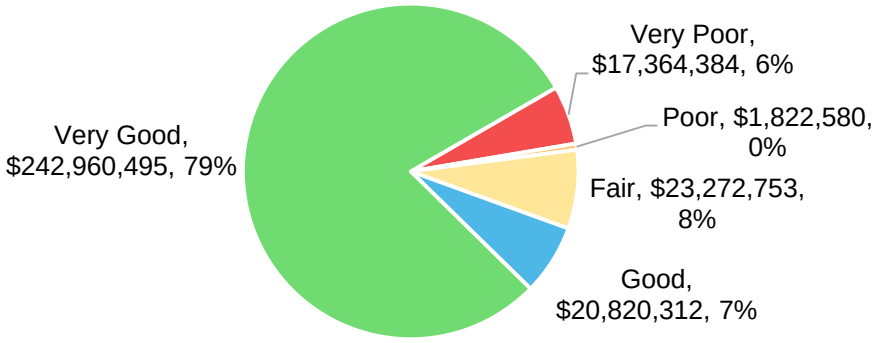
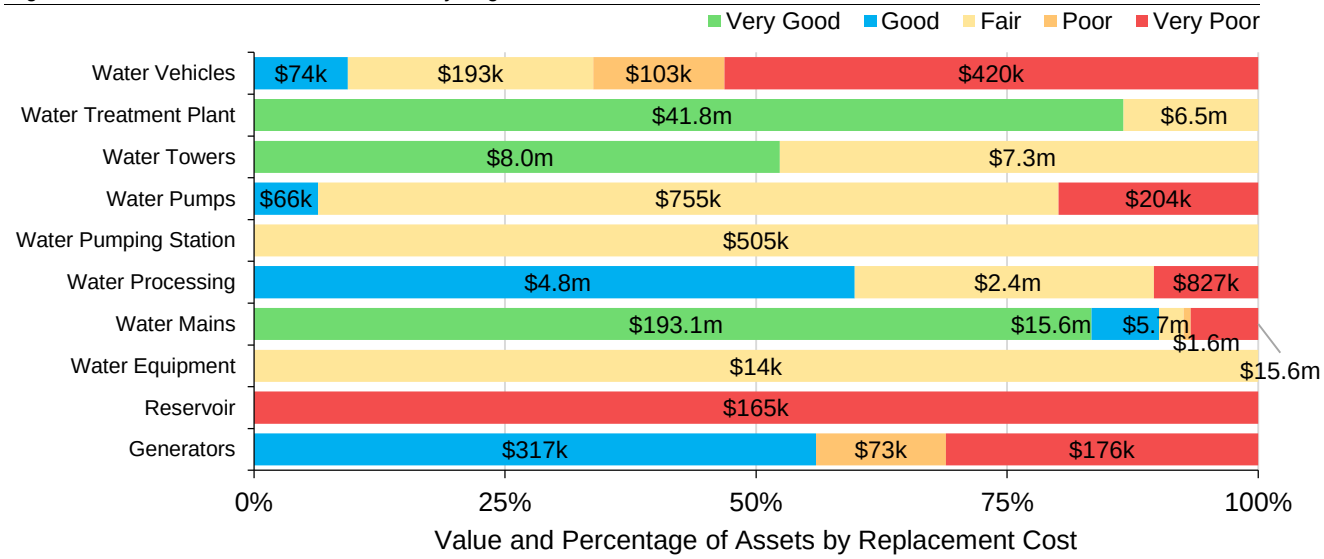


Figure 29 summarizes the age-based condition of water infrastructure by each segment. The analysis shows that the majority of each water infrastructure segment is in fair or better condition. We note that water treatment facilities and pumping stations are not componentized. Without sufficient componentization, condition data for major components and elements of various facilities may remain hidden.

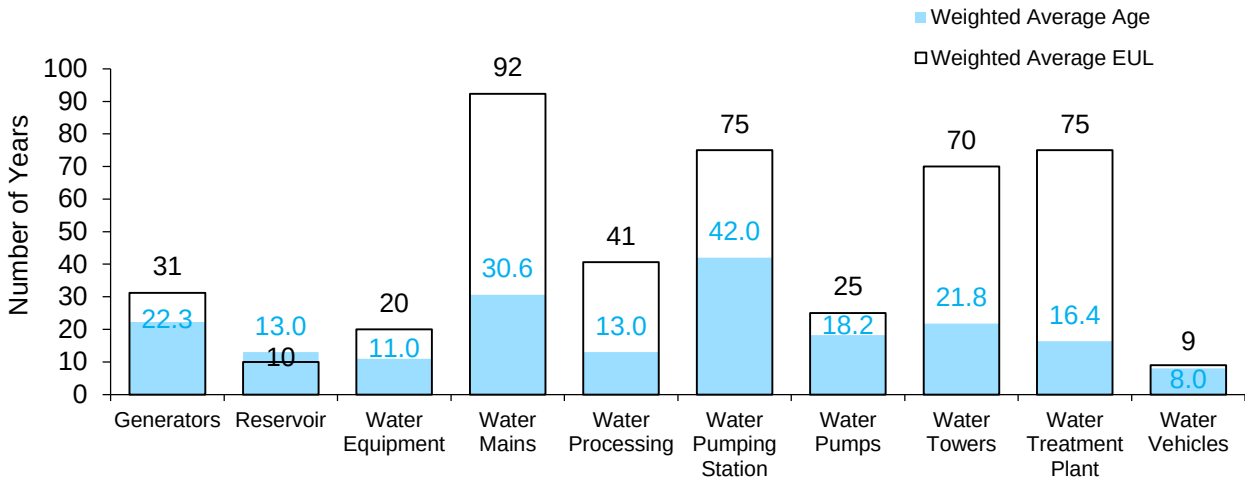
Figure 29 Asset Condition – Water Network: By Segment



Age Profile

Figure 30 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

Figure 30 Estimated Useful Life vs. Asset Age – Water Network



Age analysis reveals that, on average, water mains are in the earlier stages of their life. However, as with storm mains, these findings are impacted by the accuracy of in-service dates, and useful life estimates for various main types. On average, watermains are 30.6 years old, against an EUL of 92 years.

Facilities have hundreds to thousands of individual element and components. As noted previously, water facilities are not componentized. For example, there are only four asset records available for the Stoney Point and John George treatment plants. In the absence of componentization, age analysis was only possible at the site level, rather than at the major element or component level.

Current Approach to Lifecycle Management

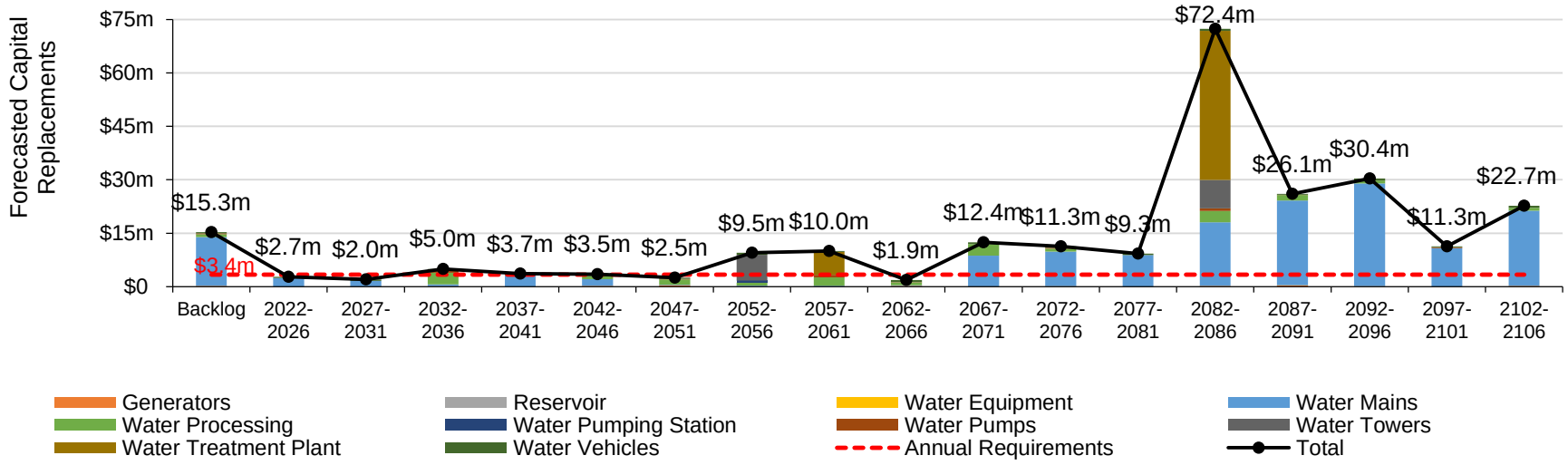
Although no formal condition assessment program is in place, break history, inadequate fire flow, and opportunity to bundle projects with road work or other major utility work informs renewal and/or replacement decisions. Capacity issues are also considered in project selection.

Forecasted Long-term Replacement Needs

Figure 31 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Municipality's water distribution portfolio. This analysis was run until 2106 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Lakeshore's average annual requirements (red dotted line) total $3.4 million for all water assets. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Given the lengthy useful life for watermains, replacement needs are forecasted to remain relatively flat, and below $15 million per 5-year interval until the late 2070s. At this point, replacement needs will rise rapidly, peaking at more than $72 million between 2082 and 2086. The chart also illustrates an age-based backlog of $15.3 million, dominated by mains. These projections and estimates are based on current asset records, their replacement costs, and age analysis only. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 31 Forecasted Capital Replacement Requirements – Water Network 2022-2106



It is highly unlikely that all assets will require replacements as forecasted, particularly given the potential for coordinating projects with road work. However, a review of useful life estimates, break histories, as well as componentization and condition assessment of water facilities may help uncover hidden needs and help refine backlog estimates.

System-generated 10-Year Replacement Forecast

The table below summarizes the projected cost of lifecycle activities (capital replacement only) that will need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide, assume like-for-like asset replacements, and rely on the data available in the asset register, which was limited to asset age, replacement cost, and useful life. In addition, as treatment facilities are not componentized, no element- or component-level replacement needs could be forecasted.

Table 22 System-generated 10-Year Replacement Forecast – Water Network

Segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Generators	$0	$0	$0	$0	$0	$73k	$0	$0	$0	$0
Reservoir	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$14k
Water Mains	$1.9m	$0	$220k	$191k	$96k	$211k	$224k	$907k	$161k	$0
Water Processing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Pumping Station	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Pumps	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Towers	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Treatment Plant	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Vehicles	$68k	$0	$60k	$103k	$40k	$0	$227k	$0	$231k	$0
Total	**$2.0m**	**$0**	**$279k**	**$294k**	**$136k**	**$284k**	**$451k**	**$907k**	**$391k**	**$14k**

Planned Capital Expenditures

The table below summarizes the forecasted capital expenditures as outlined in Lakeshore's 2022 capital forecasts. Operating and other program service costs for 2022 are illustrated in Appendix 1: Operating Costs. Estimates beyond 2027 represent an average of the previous six years.

Table 23 Capital Plan – Water Network

Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Watermain Replacements	$938k	$9.3m	$12.1m	$11.4m	$2.9m	$1.9m	*$6.4m*	*$6.4m*	*$6.4m*	*$6.4m*
Total	**$938k**	**$9.3m**	**$12.1m**	**$11.4m**	**$2.9m**	**$1.9m**	**$6.4m**	**$6.4m**	**$6.4m**	**$6.4m**

Risk Analysis

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

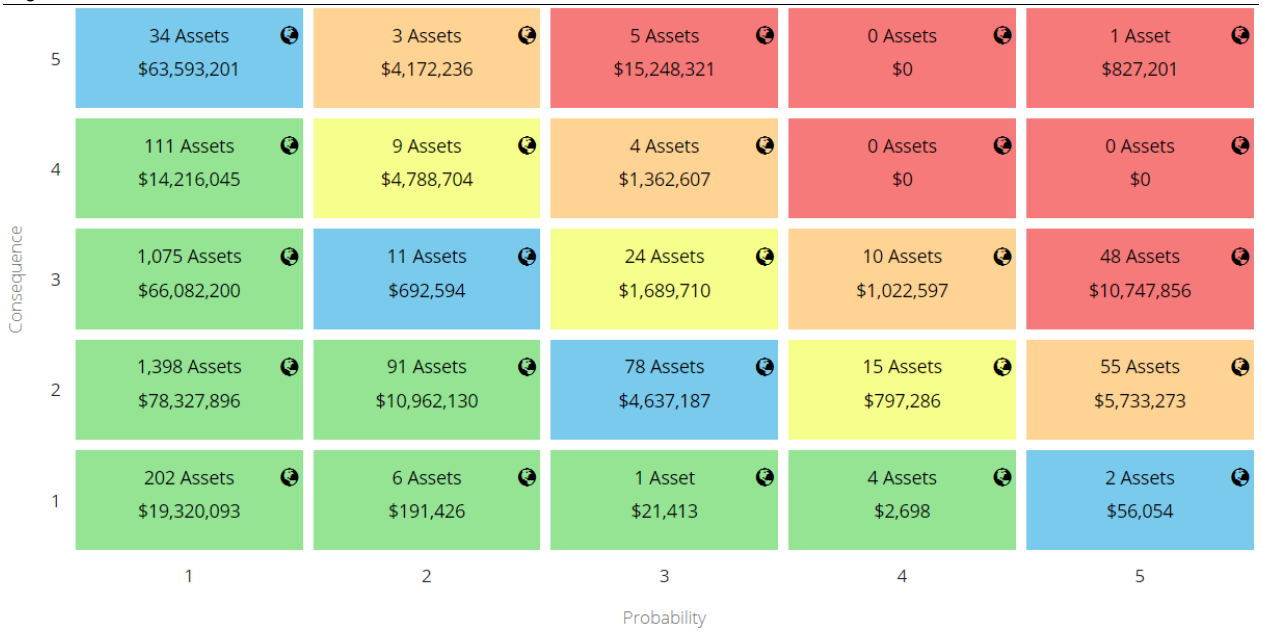
These risk models have been built into the Municipality's Asset Management Database (CityWide Asset Manager). See

Table 2 Lifecycle Management: Typical Lifecycle Interventions

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

Risk and Criticality section for further details on approach used to determine asset risk ratings and classifications.

Figure 32 Risk Matrix – Water Network



Levels of Service

The tables that follow summarize Lakeshore's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17.

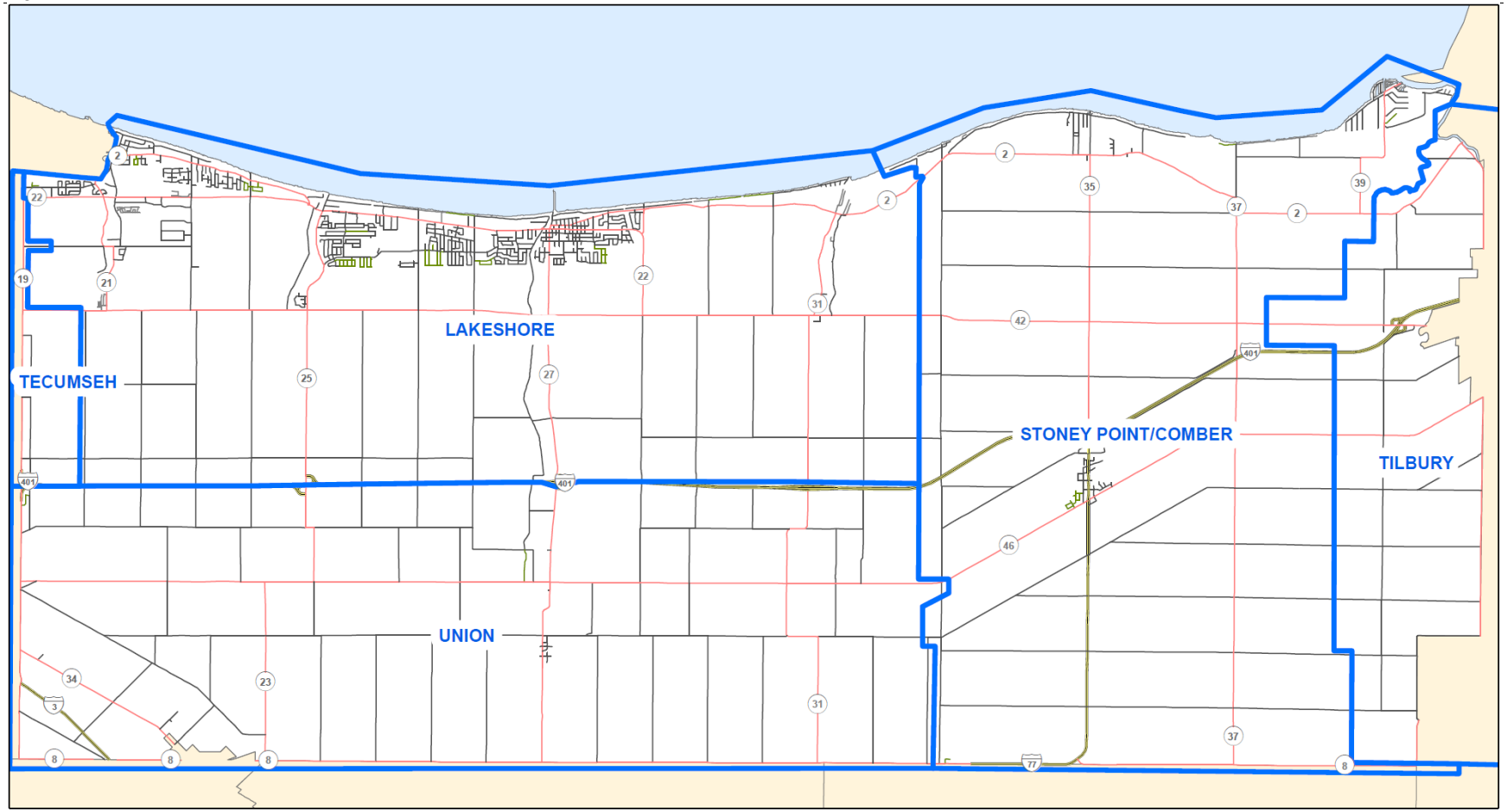
Table 24 Ontario Regulation 588/17 Community Levels of Service – Water Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system. 2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	See Figure 33
Reliability	Description of boil water advisories and service interruptions.	Lakeshore has not received/sent boil water advisory during the period of 2020 to date.

Table 25 Ontario Regulation 588/17 Technical Levels of Service – Water Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	1. Percentage of properties connected to the municipal water system. 2. Percentage of properties where fire flow is available.	1. 96.6% 2. 70%
Reliability	1. 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. 2. The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.	1. NA 2. Four watermain breaks, affecting two homes for four hours.

Figure 33 Water Service Area



Wastewater Network

Lakeshore's Wastewater Network infrastructure includes sewer mains, treatment facilities, and various appurtenances. The total current replacement of the Municipality's wastewater collection and treatment infrastructure is estimated at approximately $216 million.

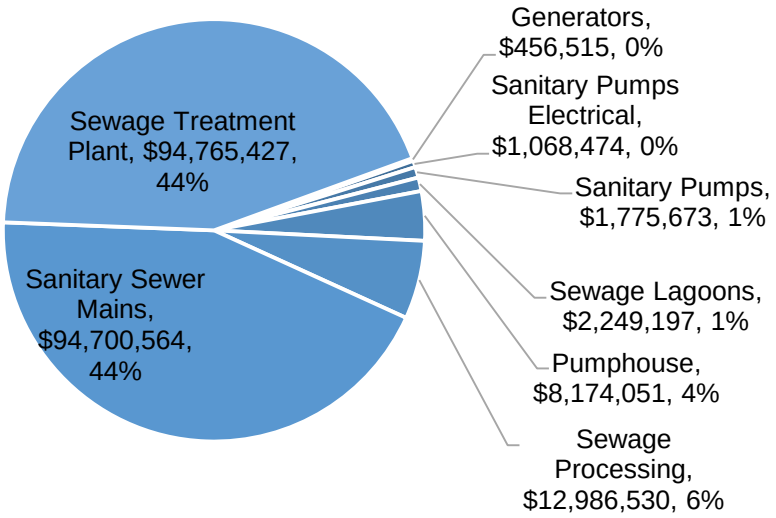
Inventory and Valuation

Table 26 summarizes the quantity and current replacement cost of all wastewater collection and treatment assets.

Table 26 Detailed Asset Inventory – Wastewater Network

Segment	Quantity	Unit of Measure	Replacement Cost
Generators	5	Assets	$456,515
Pumphouse	28	Assets	$8,174,051
Sanitary Pumps	72	Assets	$1,775,673
Sanitary Pumps Electrical	28	Assets	$1,068,474
Sanitary Sewer Mains	176	Kilometers	$94,700,564
Sewage Lagoons	3	Assets	$2,249,197
Sewage Processing	12	Assets	$12,986,530
Sewage Treatment Plant	5	Assets	$94,765,427
Total			**$216,176,431**

Figure 34 Portfolio Valuation – Wastewater Network



Total Current Replacement Cost: $216,176,431

Asset Condition

Figure 35 summarizes the replacement cost-weighted condition of the Municipality's wastewater infrastructure. Based on age data only, 35% of assets are in in poor or worse condition. These assets may be candidates for replacement in the short term; similarly, assets in fair condition may require rehabilitation or replacement in the medium term and should be monitored for further degradation in condition.

As with water infrastructure, we note that treatment facilities are not currently componentized, obscuring element- or component-level condition details.

Figure 35 Asset Condition – Wastewater Network: Overall

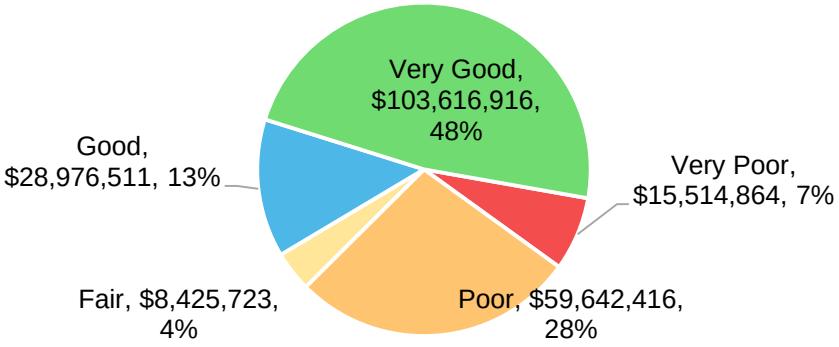
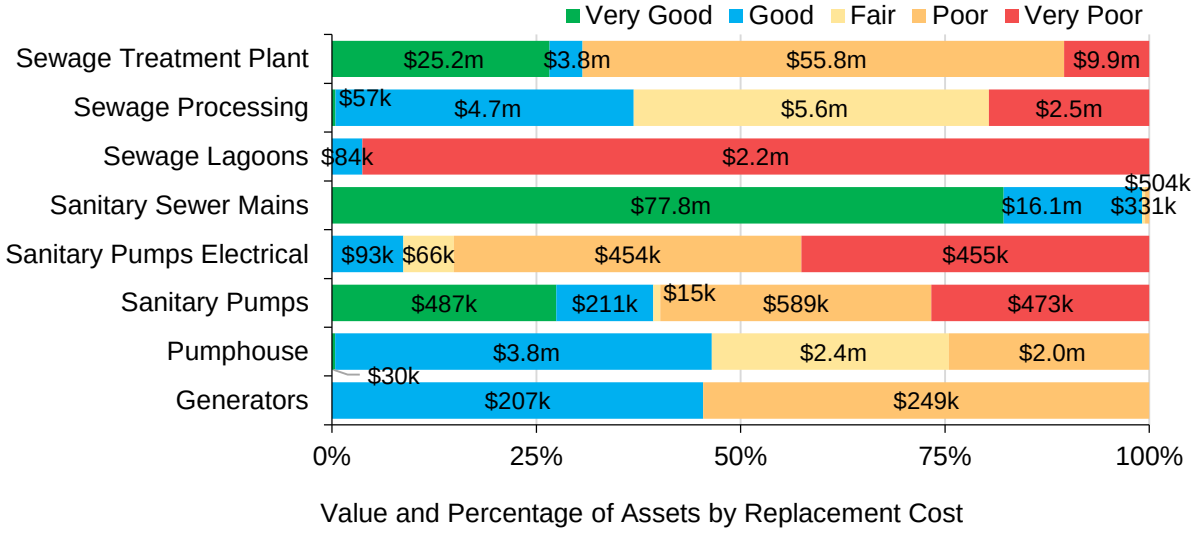


Figure 36 summarizes the age-based condition of wastewater assets by segment. The data suggests that 99% of sewer mains are in fair or better condition; however, substantial portions wastewater equipment and facilities are in poor or worse condition, including nearly 70% of treatment plant assets. As before, we note again that these estimates are based on age; further, for facilities, condition is represented primarily at the site-level. Without componentization, illustrating condition of individual element or component was not possible.

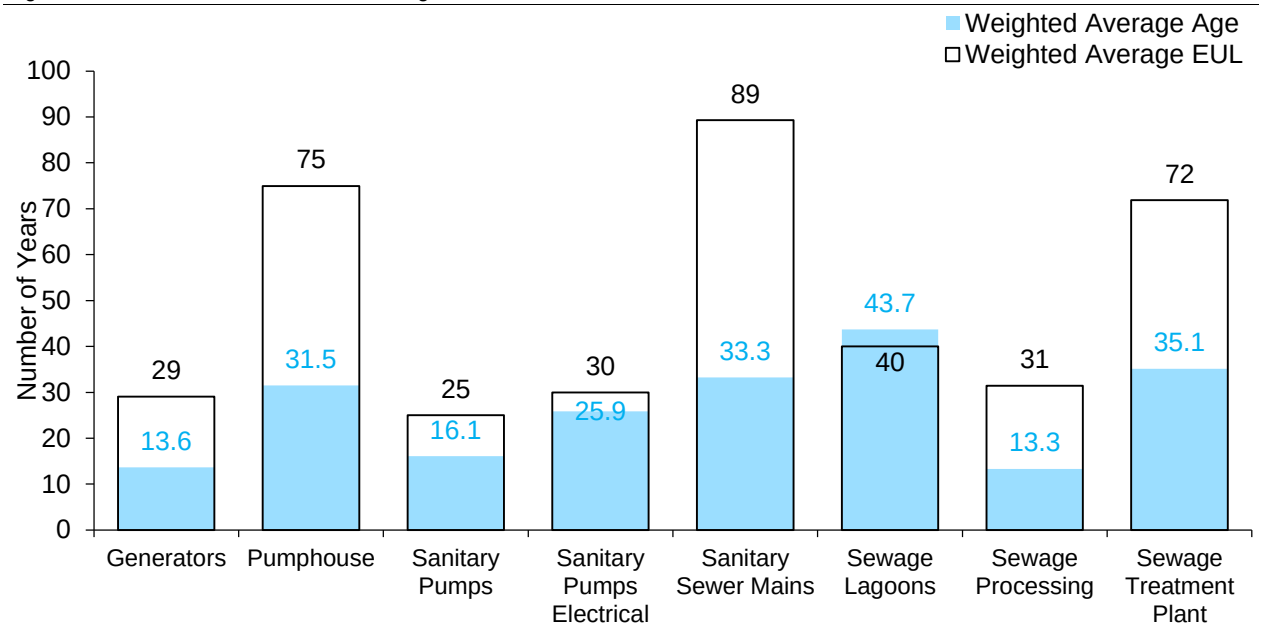
Figure 36 Asset Condition – Wastewater Network: By Segment



Age Profile

Figure 37 illustrates the average current age of each asset type and its estimated useful life. Both values are weighted by the replacement cost of individual assets.

Figure 37 Estimated Useful Life vs. Asset Age – Wastewater Network



Age analysis reveals that, on average, although mains are in the earlier stages of their life, sewage treatment plant assets have consumed, on average, nearly 50% of their established design life, with an average age of 35.1 years against an EUL of 72 years. However, the reliability of this analysis is limited given the lack of sufficient componentization within various sanitary facilities. With an in-service date of 1977, the Denis St. Pierre plant is more than 45 years old.

Although age indicates sewer mains have more than 50 years remaining before replacement needs arise, these estimates are directly impacted by the accuracy of in-service dates and the useful life benchmarks established for sewer mains. Periodically, these should be reviewed to better reflect in-field asset performance.

Current Approach to Lifecycle Management

Ontario Clean Water Agency (OCWA) has managed the Town of Lakeshores wastewater treatment and collections systems since 1971. They are responsible for the Denis St. Pierre Treatment Plant, the Comber and Stoney Point Lagoons and all pumping stations that are part of the wastewater system. Every year the Town discusses capital budget needs for capital repairs to items such as pump replacements, facility repairs, pump station repairs, collection mains.

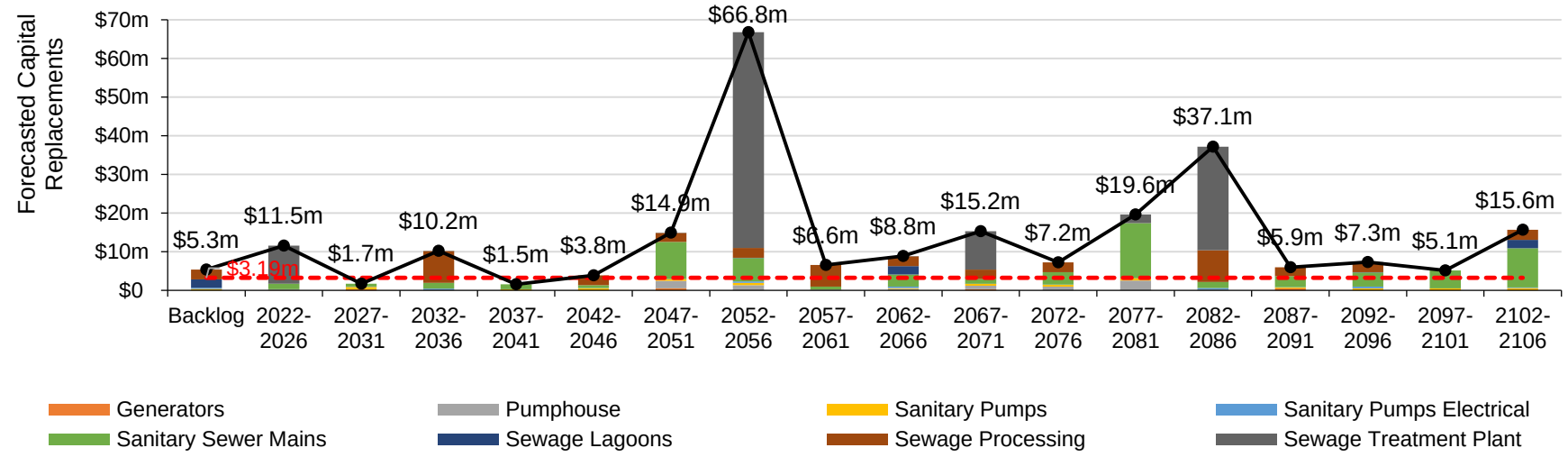
This AMP does not address or account for the need for increased capacity at existing treatment plants and lines, reflecting on like-for-like replacements of the infrastructure already installed. Master plans may identify capacity upgrade needs offering higher levels of service, which may be coordinated with condition analysis produced in the AMP.

Forecasted Long-term Replacement Needs

Figure 38 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Municipality's wastewater infrastructure. This analysis was run until 2106 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Lakeshore's average annual requirements (red dotted line) total $3.2 million for all wastewater assets. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Replacement needs are forecasted to fluctuate over the 80+ year time horizon, totaling more than $13 million in the current decade, and peaking at nearly $67 million between 2077 and 2081 as a substantial portion of mains and water treatment plant assets reach the end of their useful life. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades. The chart also shows an age-based backlog of $5.3 million, comprising assets that have reached the end of their useful life.

Figure 38 Forecasted Capital Replacement Requirements – Wastewater Network 2022-2106



As noted previously, treatment facilities and other assets are not componentized, limiting the accuracy of these projections. In addition, similar to storm and water assets, particularly mains, it is unlikely that all mains will need to be replaced as forecasted. Coordinated projects, along with CCTV inspection data, may drive replacements and rehabilitations.

System-generated 10-Year Replacement Forecast

The table below summarizes the projected cost of lifecycle activities (capital replacement only) that will need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register. For wastewater assets, no condition information was available. As a result, this system-generated 10-year forecast relies only on asset age and replacement cost. In addition, projections reflect only like-for-like replacements of existing assets, and do no account for new, growth-related infrastructure nor capacity upgrades. These projections can be different from actual capital forecasts. Consistent data updates, especially condition, will improve the alignment between the system generated expenditure requirements, and the Municipality's capital expenditure forecasts.

Table 27 System-generated 10-Year Replacement Forecast – Wastewater Assets

Segment	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Generators	$0	$0	$0	$0	$0	$249k	$0	$0	$0	$0
Pumphouse	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Pumps	$0	$19k	$0	$0	$118k	$23k	$23k	$490k	$57k	$0
Sanitary Pumps Electrical	$91k	$0	$0	$29k	$0	$0	$29k	$0	$0	$79k
Sanitary Sewer Mains	$216k	$252k	$514k	$225k	$183k	$204k	$193k	$127k	$141k	$78k
Sewage Lagoons	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sewage Processing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sewage Treatment Plant	$9.9m	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$10.2m**	**$271k**	**$514k**	**$254k**	**$301k**	**$476k**	**$246k**	**$617k**	**$198k**	**$157k**

Planned Capital Expenditures

The table below summarizes the forecasted capital expenditures as outlined in Lakeshore's 2022 capital forecasts. Operating and other program service costs for 2022 are illustrated in Appendix 1: Operating Costs. Projections beyond 2026 are an average of the previous five years.

Table 28 Capital Plan – Wastewater Assets

Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Wastewater Lifecycle	$2.8m	$1.1m	$1.6m	$3.2m	$1.2m	*$2.0m*	*$2.0m*	*$2.0m*	*$2.0m*	*$2.0m*
Total	**$2.8m**	**$1.1m**	**$1.6m**	**$3.2m**	**$1.2m**	**$2.0m**	**$2.0m**	**$2.0m**	**$2.0m**	**$2.0m**

Risk Analysis

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

These risk models have been built into the Municipality's Asset Management Database (CityWide Asset Manager). See

Table 2 Lifecycle Management: Typical Lifecycle Interventions

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

Risk and Criticality section for further details on approach used to determine asset risk ratings and classifications.

Figure 39 Risk Matrix – Wastewater Network

Levels of Service

The tables that follow summarize Lakeshore's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17.

Table 29 Ontario Regulation 588/17 Community Levels of Service – Wastewater Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	The Municipality of Lakeshore is made up of five wastewater service areas: Belle River and Maidstone, Stoney Point, Comber, South Woodslee, and North Woodslee. On behalf of the Municipality of Lakeshore, the Ontario Clean Water Agency (OCWA) operates the wastewater treatment facilities.
Reliability	1. 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. 2. Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches. 3. Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. 4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3. 5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.	1. There are no combined sewers in Lakeshore. 2. NA 3. Broken or damaged sewer pipes/connections on public or private side, cross connections, infiltration through cracks in pump station chambers 4. Continued efforts by Lakeshore to correct I&I including smoke testing, mini-camera inspections, flood resilient communication to residents, creating a spare supply of pumps to avoid interruptions due to replacement needs, refurbishing existing pumps, etc. 5. The effluent meets or exceeds the MECP standards for discharge. The Denis St. Pierre Pollution Control Plant outlets into Lake St. Clair. North and South Woodslee treatment plant outlet into the Belle River which flows to Lake St. Clair.

Table 30 Ontario Regulation 588/17 Technical Levels of Service – Wastewater Network

Service Attribute	Qualitative Description	Current Level of Service
Scope	Percentage of properties connected to the municipal wastewater system.	66.7%
Reliability	1. 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. 2. The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. 3. The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.	1. There are no combined sewers in Lakeshore. 2. NA 3. 1 occurrence of higher limit suspended solids at South Woodslee Package Plant

.

Financial Strategy

Each year, the Municipality of Lakeshore makes important investments in its infrastructure's maintenance, renewal, rehabilitation, and replacement to ensure assets remain in a state of good repair. However, spending needs typically exceed fiscal capacity. In fact, most municipalities continue to struggle with annual infrastructure deficits. Achieving full-funding for infrastructure programs will take many years, and should be phased-in gradually to reduce burden on taxpayers.

This financial strategy is designed for the Municipality's existing asset portfolio, and is premised on two key inputs: the average annual capital requirements and the average annual funding typically available for capital purposes. The annual requirements are based on the replacement cost of assets and their serviceable life, and where available, lifecycle modeling. This figure is calculated for each individual asset, and aggregated to develop category-level values.

The annual funding typically available is determined by averaging historical capital expenditures on infrastructure, inclusive of any allocations to reserves for capital purposes. For Lakeshore, this average was based on 2020 and 2022 values; due to the extreme impact of COVID-19 on municipal operations and finance, 2021 amounts were excluded.

Only reliable and predictable sources of funding are used to benchmark funds that may be available on any given year. For the purpose of this AMP, these funding sources include:

- revenue from taxation spent on capital works;
- revenue from taxation allocated to reserves for capital purposes;
- revenue from water and wastewater rates allocated to capital reserves;
- the Canada Community Benefits Fund (CCBF), formerly the federal Gas Tax Fund; and,
- the Ontario Community Infrastructure Fund (OCIF).

Although provincial and federal infrastructure programs can change with evolving policy, CCBF, OCIF, and OMPF are considered as permanent and predictable.

Annual Capital Requirements

Table 31 outlines the total average annual capital requirements for existing assets in each asset category. Based on a replacement cost of $1.3 billion, annual capital requirements total more than $24.3 million for the five core asset categories analyzed in this document. The table also illustrates the system-generated, equivalent target reinvestment rate (TRR), calculated by dividing the annual capital requirements by the total replacement cost of each category. The cumulative target reinvestment for these five categories is estimated at 1.9%.

Table 31 Average Annual Capital Requirements

Asset Category	Replacement Cost	Annual Capital Requirements	Equivalent Target Reinvestment Rate
Road Network	$534,045,705	$14,861,377	2.8%
Bridges & Culverts	$108,903,553	$1,497,524	1.4%
Stormwater Network	$119,871,087	$1,365,319	1.1%
Water Network	$306,240,523	$3,386,853	1.1%
Wastewater Network	$216,176,431	$3,188,736	1.5%
Total	**$1,285,237,300**	**$24,299,810**	**1.9%**

Although there is no industry standard guide on optimal annual investment in infrastructure, the TRRs above provide a useful benchmark for organizations. In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card also contained recommended reinvestment rates that can also serve as benchmarks for municipalities. The CIRC suggest that, if increased, these reinvestment rates can “stop the deterioration of municipal infrastructure.” The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as current municipal averages. Table 32 provides the CIRC lower and upper reinvestment rate targets for relevant asset groups. The table shows that, on average, municipalities are well below the recommended target reinvestment rates.

Table 32 Canadian Infrastructure Report Card (CIRC) Reinvestment Rate Targets

Asset Category	Lower Target	Upper Target	Municipal Average in 2016
Road Network (inc. sidewalks)	2.0%	3.0%	1.1%
Bridges & Culverts	1.0%	1.5%	0.8%
Stormwater Network (linear)	1.0%	1.3%	0.3%
Water Network (linear)	1.0%	1.5%	0.9%
Water Network (non-linear)	1.7%	2.5%	1.1%
Wastewater Network (linear)	1.0%	1.3%	0.7%
Wastewater Network (non-linear)	1.7%	2.5%	1.4%

Current Infrastructure Funding Framework

Figure 40 shows the Municipality's own-source funding that has historically been available for infrastructure purposes for 2020, 2021, and 2022 (budget). Based only on 2020 and 2022 data, average funding available to the five categories analyzed in this AMP totals $11 million. This figure excludes development charges that may be used for growth-related infrastructure.

Figure 40 Historical Funding Available for Infrastructure Purposes: Own-source Revenues Only

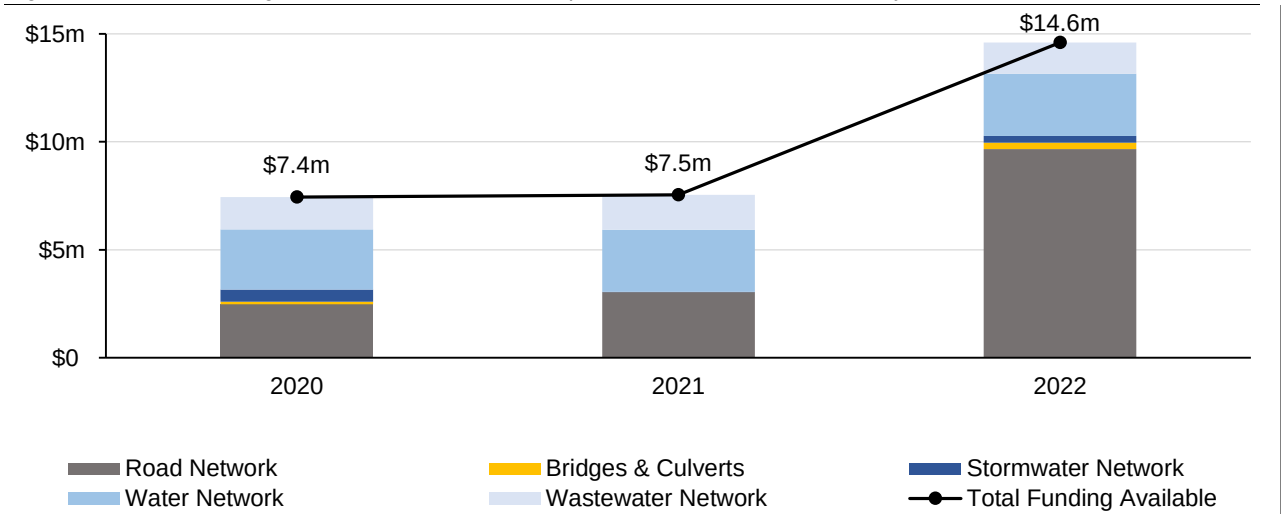


Table 33 further details how average funding is distributed across the five asset categories, and the various sources used to support spending. In addition to own-source revenue streams, namely property taxation and utility rates, the table also includes CCBF and OCIF as these sources are considered stable (2020, 2021, 2022 average). The inclusion of these funding sources increases available funding for roads by more than $4.4 million, and results in a total average annual funding of $15.5 million. We use this total funding, inclusive of OCIF and CCBF, as a baseline and to determine funding deficits.

Table 33 Allocation of Average Annual Infrastructure Funding by Asset Category

Asset Category	Primary Own-source Funding Stream	Allocated to Infrastructure	CCBF	OCIF	Average Annual Funding Available
Road Network	Property Tax	$6,067,393	$2,426,190	$2,033,906	$10,527,489
Bridges & Culverts	Property Tax	$208,425	$0	$0	$208,425
Stormwater Network	Property Tax	$438,018	$0	$0	$438,018
Water Network	Water Rates	$2,831,682	$0	$0	$2,831,682
Wastewater Network	Wastewater Rates	$1,477,102	$0	$0	$1,477,102
Total		**$11,022,619**	**$2,426,190**	**$2,033,906**	**$15,482,715**

Current Funding Levels and Infrastructure Deficits

Table 34 summarizes how current funding levels compare with funding required for each asset category. At existing levels, the Municipality is funding 64% of its annual capital requirements for all infrastructure analyzed in this asset management plan. This creates a total annual funding deficit of $8.8 million.

Table 34 Current Funding Position vs. Required Funding

Asset Category	Annual Capital Requirements	Average Annual Funding Available	Annual Infrastructure Deficit	Funding Level
Road Network	$14,861,377	$10,527,489	$4,333,888	71%
Bridges & Culverts	$1,497,524	$208,425	$1,289,099	14%
Stormwater Network	$1,365,319	$438,018	$927,302	32%
Water Network	$3,386,853	$2,831,682	$555,172	84%
Wastewater Network	$3,188,736	$1,477,102	$1,137,574	46%
Total	**$24,299,810**	**$15,482,715**	**$8,817,095**	**64%**

Table 35 compares Lakeshore's target vs. actual reinvestment rates. It shows that, while the Municipality's reinvestment rates are below target, they are higher or in line with other municipalities based on CIRC's 2016 average. The exception is bridges and culverts.

Table 35 Target vs. Actual Reinvestment Rates

Asset Category	Target Reinvestment Rate	Lakeshore Actual Reinvestment Rate	CIRC 2016 Municipal Average
Road Network	2.8%	2.0%	1.1%
Bridges & Culverts	1.4%	0.2%	0.8%
Stormwater Network	1.1%	0.4%	0.3%
Water Network	1.1%	0.9%	0.9%-1.1%
Wastewater Network	1.5%	0.7%	0.7%-1.4%
Total	**1.9%**	**1.2%**	**NA**

Closing Funding Gaps

Eliminating annual infrastructure funding shortfalls is a difficult and long-term endeavour for municipalities. Considering the Municipality's current funding position, it will require many years to reach full funding for current assets.

This section outlines how the Municipality of Lakeshore can close annual funding deficits using own-source revenue streams, i.e., property taxation and utility rates, and without the use of additional debt for existing assets. Separate analysis is provided for tax- and rate-funded assets.

Tax-Funded Assets

For 2022, the Municipality of Lakeshore's forecasted property tax revenue totals $36,448,510. Annual capital requirements for tax-funded categories total $17,724,221 against available funding of $11,173,932. This creates a funding deficit of $6,550,289. To close this annual gap, the Municipality's property tax revenue would need to increase by 18%. This will allow Lakeshore to meet its average annual requirements of $17.7 million for tax-funded categories.

Table 36 Increase Needed in Property Taxation Revenue to Meet Annual Infrastructure Needs

2022 Property Taxation Revenue	Additional Revenue Needed for Infrastructure	% Increase Needed
$36,448,510	$6,550,289	18%

To achieve this increase, several scenarios have been developed using phase-in periods ranging from five to 20 years. Shorter phase-in periods may place too high a burden on taxpayers, whereas a phase-in period beyond 20 years may see a continued deterioration of infrastructure, leading to larger backlogs.

Table 37 Phasing in Tax Increases

Total % Increase Needed in Annual Property Taxation Revenues	Phase-in Period			
	5 Years	10 Years	15 Years	20 Years
18%	3.4%	1.7%	1.1%	0.8%

Funding 100% of annual capital requirements ensures that major capital events, including replacements, are completed as required. Under this scenario, projects are unlikely to be deferred to future years. This delivers the highest asset performance and customer levels of service.

Rate-Funded Assets

For 2022, the Municipality of Lakeshore's forecasted water rate revenues total $9,269,371. Annual capital requirements for the water network total $3,386,853, against available funding of $2,831,682. This creates a funding deficit of $555,172. To close this annual gap, the Municipality's water revenues would need to increase by 6%. This will allow Lakeshore to meet its average annual requirements of $3.4 million.

Similarly, wastewater rate revenues are forecasted to be $6,751,651 in 2022. Average annual requirements for Lakeshore's wastewater assets total $3,188,736, against available funding of $1,477,102, creating an annual deficit of $1,711,635. Rate revenues would need to increase by 25.4% to close this funding gap.

Table 38 Increase Needed in Water and Wastewater Rate Revenues to Meet Annual Infrastructure Needs

Category	2022 Rate Revenues	Additional Revenue Needed for Infrastructure	% Increase Needed
Water Network	$9,269,371	$555,172	6%
Wastewater Network	$6,751,651	$1,711,635	25.4%

To achieve these increases, several scenarios have been developed using phase-in periods ranging from five to 20 years. As with tax-funded assets, short phase-in periods may require excessive rate increases, whereas more protracted timeframes may lead to larger backlogs and more unpredictable spending on emergency repairs and replacements.

Table 39 Phasing in Rate Increases

Category	Total % Increase Required in Rate Revenues	Phase-in Period			
		5 Years	10 Years	15 Years	20 Years
Water Network	6%	1.2%	0.6%	0.4%	0.3%
Wastewater Network	25.4%	4.6%	2.3%	1.5%	1.1%

Lowering Target Funding Levels

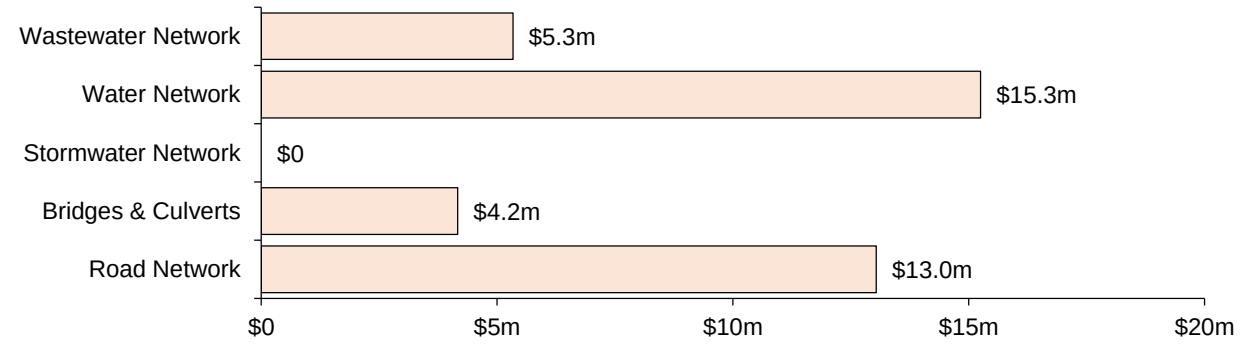
The above scenarios assume that the Municipality should target full funding for all asset classes. That is, it should strive to meet 100% of its average annual requirements of $23.7 million. If this target funding level is reduced, the total tax revenue and rate increases required would also decrease. However, this approach is not desirable as it reduces the Municipality's financial capacity to maintain its infrastructure in a state of good repair, yielding the following potential consequences:

- reduced asset performance and increased rate of asset failures; with a longer replacement cycle, assets may remain in service beyond their useful life;
- continuation of the 'worst-first' or reactive approach to infrastructure management and project selection;
- reduced customer service levels and increases in citizen complaints;
- potential reputational damage;
- increased risk to public health and safety;
- project deferrals or cancellations, leading to further accumulation of existing infrastructure backlogs.

Infrastructure Backlogs

The annual tax and rate increases proposed are designed to eliminate annual infrastructure deficits. However, they do not address existing backlogs. Figure 41 shows that the current infrastructure backlog totals approximately $37.8 million across all asset categories analyzed in this AMP. However, as many assets did not have condition assessment data available, age was used to estimate backlog figures. As a result, the figure below may be an under- or overstatement of actual asset needs. Condition assessment data will be essential in developing more accurate and credible estimates.

Figure 41 Current Infrastructure Backlog by Asset Category



Eliminating backlogs will require prioritizing projects, ideally through continuous improvements and application of the Municipality's risk models to augment staff judgement. This risk-based approach will ensure that project selection is objective, supports delivery of the Municipality's service level targets, and is in line with long-term strategic objectives.

Reserve Levels and Use of Debt

Table 40 summarizes the size of current infrastructure reserves for the five core asset categories. Across all asset categories in this AMP, infrastructure reserves total $17.5 million, or 1.4% of the total current replacement value of assets. These reserves are available for use for various infrastructure-related expenditures as needed and for potential tax stabilization.

Table 40 Infrastructure Reserve Levels

Reserve	Category	Closing Balance at December 31, 2021
Swim Drink Fish	Water Network	$19,029
Gravel Road Conversion	Road Network	$1,356,227
Street Lights - New	Road Network	$1,263,735
Roads	Road Network	$13,320,879
Railway Crossings	Road Network	$49,433
Road Share Drainage Works	Road Network	$1,310,809
Bridges and Culverts	Bridges & Culverts	-$224,091
Stormwater	Stormwater	$379,083
Total		**$17,475,104**

To put this in perspective, using $600,000 as an average home price for Windsor-Essex, the typical homeowner in Lakeshore would have approximately $8,400 on hand for major housing expenditures.

There is considerable debate in the municipal sector on the appropriate level of reserves that an organization should have on hand. No clear guideline has gained widespread acceptance. Factors that Lakeshore should consider when determining its capital reserve requirements include breadth of services provided; age and condition of infrastructure; use and level of debt; economic condition and outlook; and internal reserve and debt policies.

Impact of Gravel Road Conversion

Approximately 76km of Lakeshore's gravel roads, representing 64% of the total unpaved network, are slated for conversion to surface treated roads through 2032. This will offer higher levels of service. However, it will also increase the associated annual costs. To estimate potential changes in annual costs, we use a target reinvestment rate of 2.5%. This is the midpoint of CIRC's lower and upper target reinvestment rates for roads, as outlined in Table 32.

To estimate the current replacement cost of 76km of gravel roads, a per kilometer replacement cost of $392,200 is used. To estimate the replacement cost of the converted roads (surface treated), a per unit cost of $738,892 is used.

Table 41 Impact of Converting Gravel Roads to Surface Treated Roads

Length Converted	Current Replacement Cost	New Replacement Cost	Previous Annual Reinvestment Required (at 2.5%)	New Annual Reinvestment Required (at 2.5%)	Annual Increase $	Annual Increase %	Annual Increase per km
76km	$29,807,069	$56,079,757	$745,176	$1,401,994	$656,817	88%	$8,642

The analysis shows that converting 76km of gravel roads to surface treated roads will increase annual capital costs by approximately $657,000, representing an 88% increase in annual capital needs. As with all other areas of this document, this analysis is highly sensitive to asset replacement costs and reinvestment rates. For example, increasing annual reinvestment rate to 3% would produce an annual increase of $788,200, or a per km cost increase of $10,370.

The additional annual funding required would need to be integrated with future financial analysis and will have a direct impact on annual revenue required, and potential tax increases needed to maintain higher-order asset in a state of good repair. These cost increases should be balanced with the benefits expected from the conversions. We also note that based on staff feedback, existing surface treated roads are deteriorating faster than anticipated due to heavy industrial and commercial traffic load and volumes. For a growing community, these challenges can add additional wear and tear on roadways, requiring more frequent interventions.

Growth

Lakeshore is a rapidly growing community. Based on Census 2021, the community's current population is 40,410 residents, an increase of 10.4% from 2016. This followed a 9% increase over the previous census period, from 2011 to 2016. Based on the Municipality's 2015 Growth Analysis Study, employment base is forecasted to reach 15,180 by 2031—although, given recent population trends, the increase may be larger. To support anticipated growth and ensure service levels are adequately maintained, the Municipality will continue to invest in critical infrastructure. Table 42 summarizes 10-year growth-related capital expenditures for the core asset categories analyzed in this AMP.

Table 42 Growth-related Capital Expenditures

Category	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Road Network	$0	$1.3m	$1.9m	$7.0m	$89k	$89k	$9.9m		$20.5m	$0
Bridges & Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stormwater Network	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Network	$326k	$1.5m	$2.1m	$6.5m	$511k	$7.7m		$358k	$1.6m	$0
Wastewater Network	$58.1m	$235k	$5.4m	$0	$0	$5.6m	$0	$0	$0	$0
Total	**$58.4m**	**$2.9m**	**$9.4m**	**$13.5m**	**$600k**	**$13.4m**	**$9.9m**	**$358k**	**$22.1m**	**$0**

With the addition of this infrastructure, the Municipality will incur additional ongoing, lifecycle costs of ownership. Table 43 illustrates potential annual reinvestment needs to maintain new infrastructure in a state of good repair. The target reinvestment rates are based on existing infrastructure as listed in Table 31.

Table 43 Growth-related Reinvestments Required

Category	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Road Network	$0	$39k	$58k	$218k	$3k	$3k	$306k	$0	$635k	$0
Bridges & Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stormwater Network	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Network	$4k	$16k	$23k	$71k	$6k	$85k	$0	$4k	$18k	$0
Wastewater Network	$871k	$4k	$81k	$0	$0	$84k	$0	$0	$0	$0
Total	**$875k**	**$58k**	**$162k**	**$289k**	**$8k**	**$171k**	**$306k**	**$4k**	**$654k**	**$0**

Recommendations and Key Considerations

Financial Strategies

1. Review feasibility of adopting a full-funding scenario that achieve 100% of average annual requirements for the asset categories analyzed in this AMP. This involves:

- implementing a 3.4% annual tax increase over a 5-year phase-in period and allocating the full increase in revenue toward tax-funded asset categories;
- implementing a 1.2% rate increase for water over a 5-year phase-in period, and a 2.3% increase for wastewater, over a 10-year phase-in period;
- continued allocation of OCIF and CCBF funding as previously outlined in Table 33;
- using risk frameworks and staff judgement to prioritize projects, particularly to aid in elimination of existing infrastructure backlogs;

Although difficult to capture inflation costs, supply chain issues, and fluctuations in commodity prices will also influence capital expenditures. We also note that these recommendations reflect the needs associated with Lakeshore's existing assets, assume a like-for-like replacement, and do not account for any upgrades to existing infrastructure to meet higher capacity needs.

Better Asset Management Through Better Asset Data

1. Ensure stormwater inventory is complete, and includes appurtenances.
2. Componentize water and wastewater facilities data using Uniformat II Code standard for building classifications. This can be accomplished during building condition assessments. This will improve long-term replacement projections and better align system-generated forecasts with capital budgets.
3. Continuously review, refine, and calibrate lifecycle and risk profiles to better reflect actual practices and improve capital projections. In particular:
4. the timing of various lifecycle events, the triggers for treatment, anticipated impacts of each treatment, and costs;
5. the various attributes used to estimate the likelihood and consequence of asset failures, and their respective weightings.
6. Asset management planning is highly sensitive to replacement costs. Periodically update replacement costs based on recent projects, invoices, or estimates, as well as condition assessments, or any other technical reports and studies. Material and labour costs can fluctuate due to local, regional, and broader market trends, and substantially so during major world events. As a result, accurately estimating the replacement cost of like-for-like assets can be challenging. Ideally, several recent projects over multiple years should

be used. Staff judgement and historical data can help attenuate extreme and temporary fluctuations in cost estimates and keep them realistic.

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

Risk and Levels of Service

1. Risk models and matrices can play an important role in identifying high-value assets, and developing an action plan which may include repair, rehabilitation, replacement, or further evaluation through condition assessments. As a result, project selection and the development of multi-year capital plans can become more strategic and objective. Initial models have been built into Citywide for all asset groups. These models reflect current data, which was limited. As the data evolves and new attribute information is obtained, these models should also be refined and updated.
2. Although Ontario Regulation 588/17 requires reporting on specific, prescribed KPIs for the Municipality's core assets, municipalities have discretion on the KPIs they select to track the performance of their non-core assets, such as buildings and vehicles. This information will be required for the 2024 iteration of the AMP. KPIs should be established for all non-core asset groups to support regulatory compliance. Further, as available, data on current performance should be centralized and tracked to support any calibration of service levels ahead of O. Reg's 2025 requirements on proposed levels of service.
3. Staff should monitor evolving local, regional, and environmental trends to identify factors that may shape the demand and delivery of infrastructure programs. These can include population growth, and the nature of population growth; climate change and extreme weather events; and economic conditions and the local tax base. This data can also be used to revise service level targets.

Dedicated Asset Management Resources

1. The Municipality should increase its asset management resources and capacity, beginning with a dedicated asset management coordinator (AMC). The AMC has become a much needed technical function in the municipal sector, with strong rationale. The AMC typically manages critical asset management processes, coordinates between departments, manages asset-related datasets, and ensures completion of major asset management initiatives. The scale and complexity of Lakeshore's infrastructure portfolio, which will only continue to grow, may warrant a full-time staff member who would serve as a steward of the Municipality's asset management program.

Appendix 1: Operating Costs

Operating and other program service costs are illustrated by division for 2022. Beyond 2022, they are increased at a rate of 2% per year through the forecast period. This increase may be used to support potential increases in costs as new infrastructure is built to support growth, and to account for typical inflationary increases in program services.

Table 44 Divisions and Associated Asset Categories

Division	Relevant Asset Categories
GIS	Road Network, Bridges & Culverts, Stormwater Network, Water Network, Wastewater Network
Operational Services Admin	Road Network, Bridges & Culverts, Stormwater Network, Water Network, Wastewater Network
Roads and Fleet	Road Network, Bridges & Culverts
Water	Water Network
Wastewater	Wastewater Network
Engineering and Infrastructure	Road Network, Bridges & Culverts, Stormwater Network, Water Network, Wastewater Network
Capital Projects	Road Network, Bridges & Culverts, Stormwater Network, Water Network, Wastewater Network

Table 45 Operating and Program Service Costs by Division: 2022 Budget

Division	Wages	Office Expenses	Admin Expenses	Professional Services	Program Supplies	Operating Costs	Total
GIS	$188k	$22k	$0	$0	$0	$0	$210k
Operational Services Admin	$204k	$4k	$0	$0	$0	$0	$208k
Roads and Fleet	$1.8m	$98k	$0	$586k	$620k	$2.5m	$5.6m
Water	$3.0m	$212k	$1.8m	$109k	$473k	$1.6m	$7.2m
Wastewater	$75k	$17k	$1.3m	$2.2m	$0	$1.8m	$5.4m
Engineering and Infrastructure	$650k	$79k	$0	$180k	$1k	$24k	$934k
Capital Projects	$345k	$6k	$0	$0	$0	$0	$351k
Total	**$6.3m**	**$439k**	**$3.1m**	**$3.1m**	**$1.1m**	**$6.0m**	**$19.9m**

Table 46 Operating and Program Service Costs by Division: 2022 – 2031

Division	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
GIS	$214k	$219k	$223k	$227k	$232k	$237k	$241k	$246k	$251k	$214k
Operational Services Admin	$212k	$216k	$220k	$225k	$229k	$234k	$238k	$243k	$248k	$212k
Roads and Fleet	$5.8m	$5.9m	$6.0m	$6.1m	$6.2m	$6.4m	$6.5m	$6.6m	$6.7m	$5.8m
Water	$7.4m	$7.5m	$7.7m	$7.8m	$8.0m	$8.1m	$8.3m	$8.5m	$8.6m	$7.4m
Wastewater	$5.5m	$5.6m	$5.7m	$5.8m	$5.9m	$6.1m	$6.2m	$6.3m	$6.4m	$5.5m
Engineering and Infrastructure	$952k	$971k	$991k	$1.0m	$1.0m	$1.1m	$1.1m	$1.1m	$1.1m	$952k
Capital Projects	$358k	$365k	$373k	$380k	$388k	$395k	$403k	$411k	$420k	$358k
Total	**$20.3m**	**$20.8m**	**$21.2m**	**$21.6m**	**$22.0m**	**$22.5m**	**$22.9m**	**$23.4m**	**$23.8m**	**$20.3m**