2023

ASSET MANAGEMENT PLAN

This Asset Management Program was prepared by:

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Executive Summary

Municipal infrastructure provides the foundation for the economic, social, and environmental health and growth of a community through the delivery of services. The goal of asset management is to balance delivering critical services in a cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

The overall replacement cost of the asset categories owned by Morris-Turnberry totals $164 million. 97% of all assets analysed are in fair or better condition and assessed condition data was available for all road and bridge assets and 28% of buildings. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation.

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

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Municipality's average annual capital requirement totals $2.78 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $1.23 million towards capital projects or reserves per year. As a result, the Municipality is funding 44% of its annual capital requirements. This creates a total annual funding deficit of $1.55 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 capital contributions from tax revenues for asset needs, it is recommended the Municipality review the feasibility of implementing a 1.8% annual increase in revenues over a 15-year phase-in period. Similarly, water rate revenues would need to increase at 2.5% annually for 15 years to close the funding gap. Funding scenarios over longer time frames are also presented which reduce the annual increases.

In addition to annual needs, there is also an infrastructure backlog of $1 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 can produce 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, several 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 risk and lifecycle models as additional data becomes available. This will aid in prioritizing projects and creating more strategic long-term capital budgets.
- Development of key performance indicators for all infrastructure programs to meet 2024 Ontario Regulation 588/17 requirements, and to establish benchmark data to calibrate levels of service targets for 2025 regulatory requirements.

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 affordable service levels to the Morris-Turnberry community.

About this Document

The Morris-Turnberry Asset Management Plan was developed in accordance with Ontario Regulation 588/17 ("O. Reg 588/17"). It contains a comprehensive analysis of Morris-Turnberry's infrastructure portfolio. This 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.

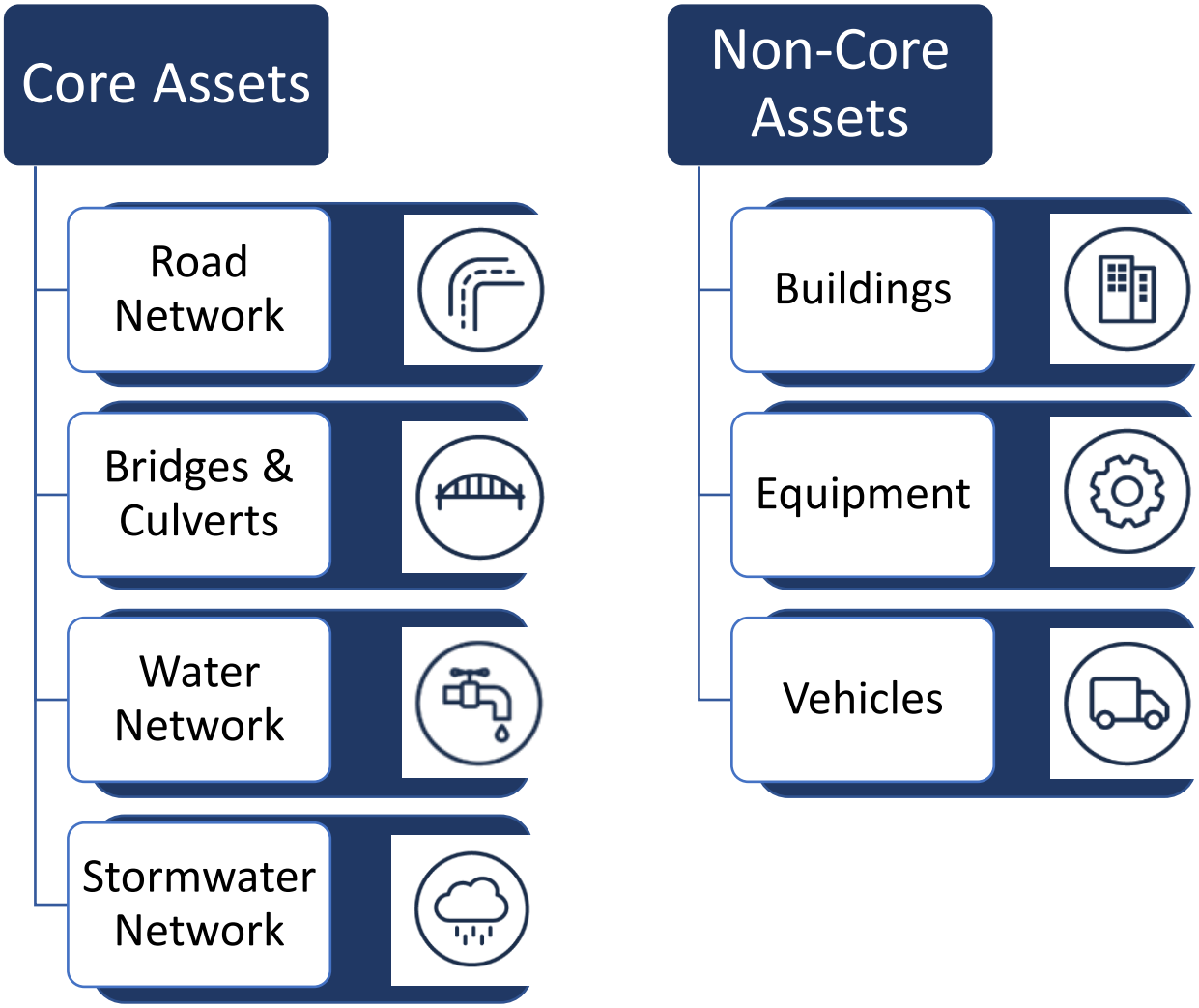
Table 1 Ontario Regulation 588/17 Requirements and Reporting Deadlines

Requirement	2019	2022	2024	2025
1. Asset Management Policy	●		●	
2. 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 document is to identify the current practices and strategies that are in place to manage the public infrastructure and to make recommendations where they can be further refined. Through the implementation of sound asset management strategies, the Municipality can ensure that public infrastructure is managed to support the sustainable delivery of services.

The following asset categories are addressed in further detail in the Appendix:



Limitations and Constraints

The asset management program development required substantial effort by staff, it was developed based on best-available data, and is subject to the following broad limitations, constrains, and assumptions:

- The analysis 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.
- 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, can produce inaccurate estimates.
- 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 in-field assessments.
- 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, 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 and require long-term commitment 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.

An 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 the community receives 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 the 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 (AMP).

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.

Foundational Documents

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. To make a clear distinction between the policy, strategy, and the plan see the following sections for detailed descriptions of the document types.

Strategic Plan

The strategic plan has a direct, and cascading impact on asset management planning and reporting, making it a foundational element. At the beginning of each term of Council, Council holds strategic planning exercises and discussions to identify major initiatives and administrative improvements it wishes to achieve during its tenure. Staff then identify the scope, resources, timing & other logistical matters associated with proposed initiatives.

Asset Management Policy

An asset management policy represents a statement of the principles guiding the Municipality's approach to asset management activities as well as the Municipalities commitment. It aligns with the organization and provides clear direction to municipal staff on their roles and responsibilities.

Morris-Turnberry adopted their asset management policy on May 21, 2019, in accordance with Ontario Regulation 588/17. The policy identifies the Municipality's mission of providing effective and efficient service delivery to its' residents.

Asset Management Strategy

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

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.

Key Technical Concepts

Effective asset management integrates several key components, including data management, lifecycle management, risk management, and levels of service.

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.

Table 2 Asset Classifications

CLASS	AM CATEGORY	AM SEGMENT
Infrastructure	Road Network	HCB Roads LCB Roads Gravel Roads Guiderails Streetlights
	Bridges & Culverts	Bridges Culverts
	Water Network	Service Stubs Water Treatment Watermains
	Stormwater Network	Catchbasins - Urban Storm Mains
General Capital	Buildings	Admin Landfill Recreation Roads
	Equipment	Admin Landfill Roads
	Vehicles	Admin Landfill Roads

Replacement Costs

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

- User-Defined Cost and Cost/Unit: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience
- Cost Inflation/CPI Tables: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index

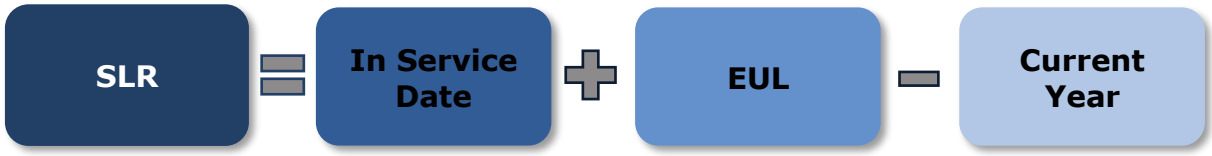
User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost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

Estimated Useful Life and Service Life Remaining

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

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

Figure 1: Service Life Remaining Calculation



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.

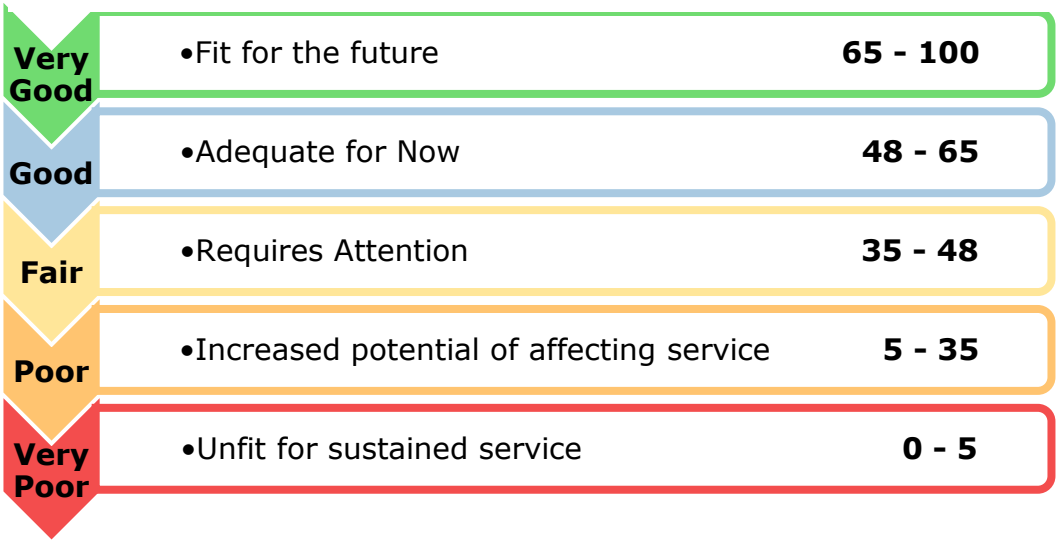
A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the Municipality's asset portfolio. The figure below outlines the condition rating system used to determine asset condition for all assets in Morris-Turnberry except for mains (water & stormwater).

Figure 2 Standard Condition Rating Scale

Very Good	**Fit for the future**	**90 - 100**
•Well maintained, good condition, new or recently rehabilitated		
Good	**Adequate for now**	**70 - 90**
•Acceptable, generally approaching mid-stage of expected service life		
Fair	**Requires attention**	**40 - 70**
•Signs of deterioration, some elements exhibit significant deficiencies		
Poor	**Increased potential of affecting service**	**10 - 40**
•Approaching end of service life, large portion of system exhibits deficiencies		
Very Poor	**Unfit for sustained service**	**0 - 10**
• Near or beyond expected service life, widespread signs of advanced deterioration		

The condition scale used for water and stormwater pipes takes into consideration that until a pipe reaches the last 10 years of it's 80-year service life it is in very good or good condition and there are no interventions or activities required. The scale used is shown below.

Figure 3 Water & Storm Mains Condition Scale



The analysis is based on assessed condition data (only as available). In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix H: Condition Assessment Guidelines includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

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.

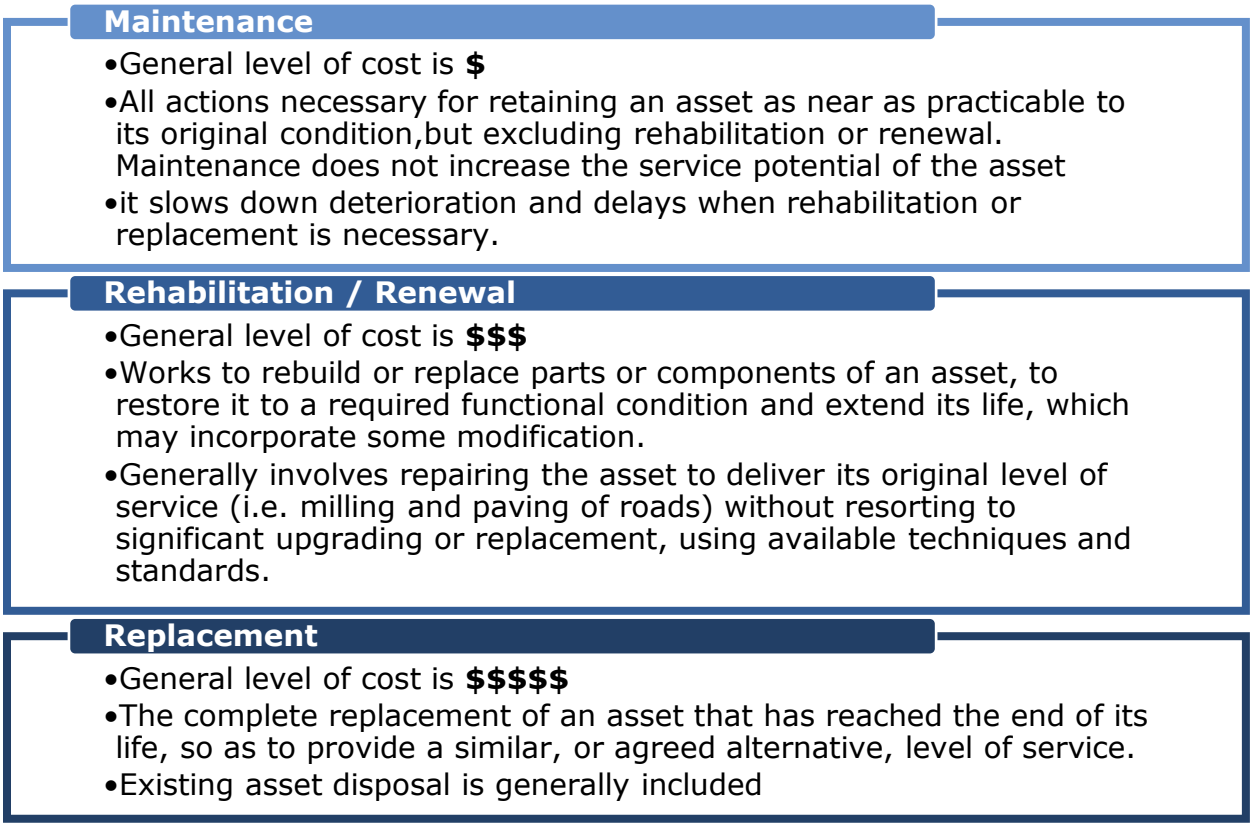
There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference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

Figure 4 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. 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.

Figure 4 Lifecyle Management Typical Interventions



Risk Management Strategies

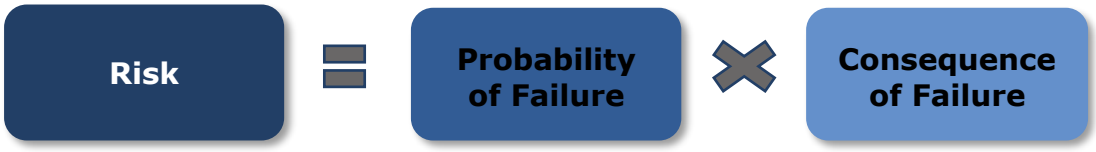
Municipalities generally take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important than others, and their failure or disrepair poses more risk to the community. For example, a road with a high volume of traffic that provides access to critical services poses a higher risk than a low volume rural road. These high-value assets should receive funding before others.

By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

A high-level evaluation of asset risk and criticality was performed. 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.

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 5 Risk Equation



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. See Appendix I: Risk Rating Criteria for definitions and the developed risk models.

Levels of Service

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

At this stage, three strategic levels of service are measured for every asset category, and they are:

- Financial –targeted reinvestment rate compared to the actual current reinvestment rate.
- Performance – this is the condition breakdown for the asset category.
- Risk – this is the risk profile for the asset category.

Only those LOS that are required under O. Reg for core asset categories are included in addition to the strategic LOS.

Community Levels of Service

Community LOS 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 provided qualitative descriptions that are required. For non-core asset categories, the Municipality must determine the qualitative descriptions that will be used by July 1, 2024. The community LOS can be found in the Levels of Service subsection within each asset category section.

Technical Levels of Service

Technical LOS 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 provided technical metrics that are required. For non-core asset categories, the Municipality must determine the technical metrics that will be used by July 1, 2024. The metrics can be found in the LOS subsection within each asset category.

Current and Proposed Levels of Service

Morris-Turnberry is focused on measuring the current LOS provided to the community. Once current LOS have been measured and trended the Municipality plans to establish their proposed LOS 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 LOS have been established, and prior to July 2025, the Municipality must identify lifecycle management and financial strategies which allow these targets to be achieved.

Climate Change

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

The report revealed that between 1948 and 2016, the average temperature increase across Canada was 1.7°C; moreover, during this period, Northern Canada experienced a 2.3°C increase. The temperature increase in Canada has doubled that of the global average. If emissions are not significantly reduced, the temperature could increase by 6.3°C in Canada by the year 2100 compared to 2005 levels. Observed precipitation changes in Canada include an increase of approximately 20% between 1948 and 2012.

By the late 21st century, the projected increase could reach an additional 24%. During the summer months, some regions in Southern Canada are expected to experience periods of drought at a higher rate. Extreme weather events and climate conditions are more common across Canada. Recorded events include droughts, flooding, cold extremes, warm extremes, wildfires, and record minimum arctic sea ice extent.

The changing climate poses a significant risk to the Canadian economy, society, environment, and infrastructure. Physical infrastructure is vulnerable to damage and increased wear when exposed to these extreme events and climate variabilities. Canadian municipalities are faced with the responsibility to protect their local economy, citizens, environment, and physical assets.

Integration Climate Change and Asset Management

Asset management practices aim to deliver sustainable service delivery - the delivery of services to residents today without compromising the services and well-being of future residents. Climate change threatens sustainable service delivery by reducing the useful life of an asset and increasing the risk of asset failure. Desired levels of service can be more difficult to achieve because of climate change impacts such as flooding, high heat, drought, and more frequent and intense storms.

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

Impacts of Growth

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

Impact of Growth on Lifecycle Activities

By July 1, 2025, the Municipality's asset management plan must include a discussion of how the assumptions regarding future changes in population and economic activity informed the preparation of the lifecycle management and financial strategy.

As growth-related assets are constructed or acquired, they should be integrated into Morris-Turnberry's asset management program. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Municipality will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

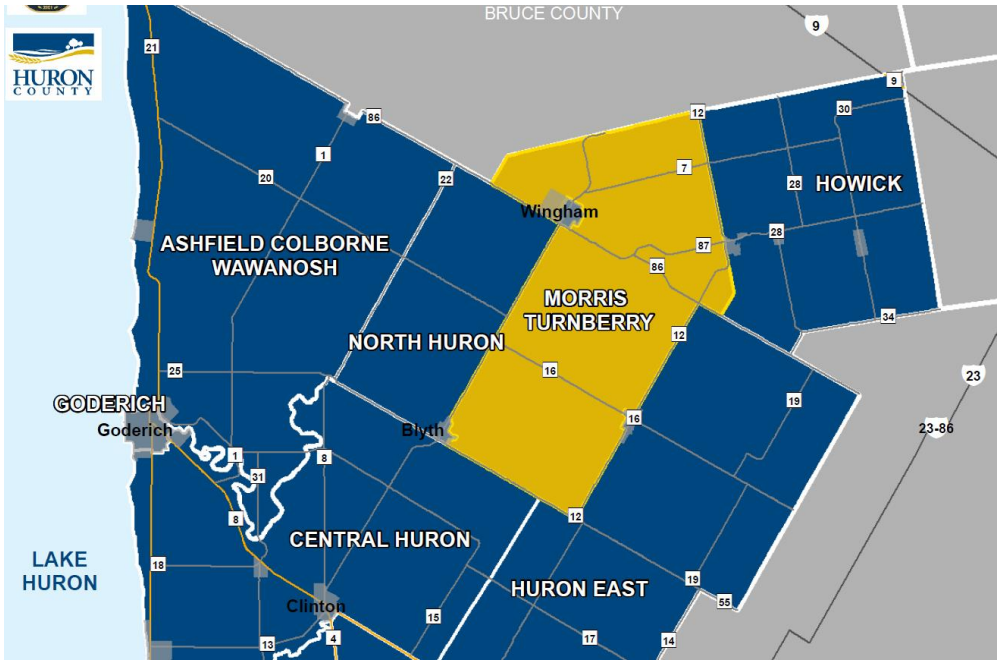
Reinvestment Rate

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

Portfolio Overview

Community Profile

The Municipality of Morris-Turnberry is located in the northern part of Huron County, Ontario. The Municipality was formed in 2001 as an amalgamation of the former Township of Morris and Township of Turnberry as part of the imposed restructuring of Ontario's local governments. Morris-Turnberry's settlement areas include Bluevale, Lowertown Wingham, Belgrave east of County Road 4 and small urban areas outside of Brussels, Belmore and Walton.



The Municipality covers 376.89 square kilometres and is a prime agricultural community, rich in productive agricultural land. The Municipality is diverse, offering a great setting for industrial, commercial, and residential growth. Only 30 minutes to the Lake Huron Shoreline with restaurants, golfing, walking and snowmobile trails, and friendly environment make Morris-Turnberry a wonderful place to live or visit.

Table 3 Morris-Turnberry & Ontario Census Information

Census Characteristic	Morris-Turnberry	Ontario
Population 2021	3,590	14,223,942
Population Change 2016-2021	2.7%	5.8%
Total Private Dwellings	1,283	5,929,250
Population Density	9.5/km^2	15.9/km^2
Land Area	376.89 km^2	892,411.76 km^2

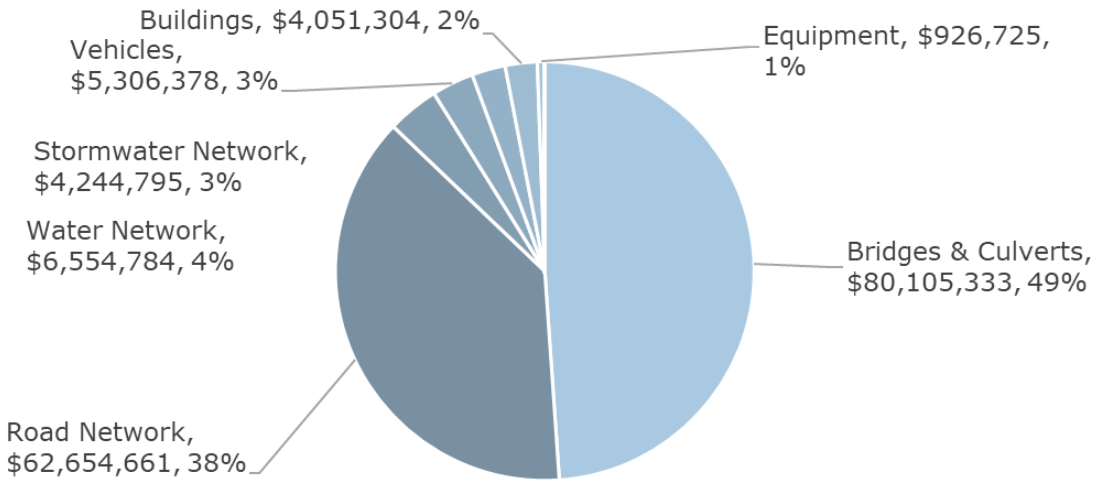
State of the Infrastructure

Asset Category	Replacement Cost	Asset Condition	Financial Capacity	
Road Network	$62,654,661	Good (77%)	Annual Requirement:	$699,812
			Funding Available:	$652,793
			Annual Deficit:	$47,019
Bridges & Culverts	$80,105,333	Good (71%)	Annual Requirement:	$1,312,985
			Funding Available:	$250,000
			Annual Deficit:	$1,062,985
Stormwater Network	$4,244,795	Very Good (83%)	Annual Requirement:	$53,060
			Funding Available:	$0
			Annual Deficit:	$53,060
Buildings	$4,051,304	Good (74%)	Annual Requirement:	$110,192
			Funding Available:	$65,898
			Annual Deficit:	$44,293
Vehicles	$5,306,378	Good (67%)	Annual Requirement:	$381,345
			Funding Available:	$150,000
			Annual Deficit:	$231,345
Equipment	$926,725	Poor (35%)	Annual Requirement:	$72,025
			Funding Available:	$50,000
			Annual Deficit:	$22,025
Water Network	$6,554,784	Very Good (90%)	Annual Requirement:	$147,064
			Funding Available:	$62,000
			Annual Deficit:	$85,064
Overall	$163,843,600	Good (74%)	Annual Requirement:	$2,776,482
			Funding Available:	$1,230,691
			Annual Deficit:	$1,545,791

Replacement Cost

All Morris-Turnberry's asset categories have a total replacement cost of $164 million based on available inventory data. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.

Figure 6 Portfolio Replacement Value

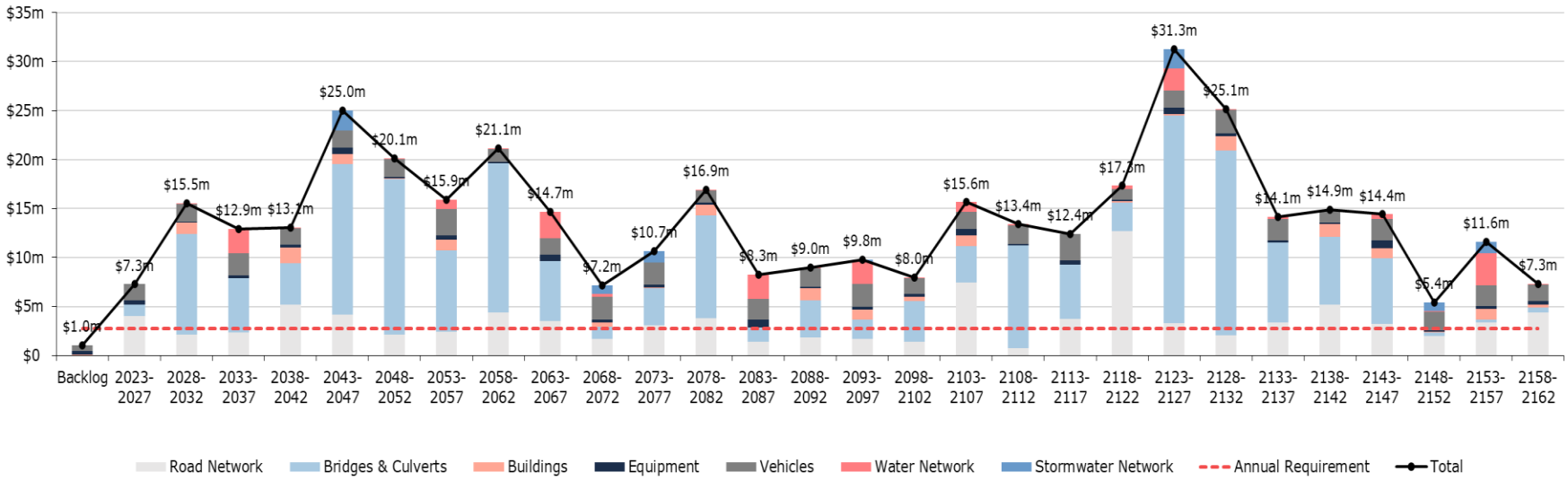


Forecasted Capital Requirements

Aging assets require maintenance, rehabilitation, and replacement. Figure 7 below illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for all asset categories analyzed. On average, $2.78 million is required each year to remain current with capital replacement needs for Morris-Turnberry'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 $164 million, this represents an annual target reinvestment rate of 1.69%.

Figure 7 Forecasted Capital Requirements



The chart also illustrates a backlog of $1 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.

Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 97% of assets in Morris-Turnberry are in fair or better condition. This estimate relies on both age-based and field condition data.

Assessed condition data is available for 88% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data.

Table 4 Assessed Condition Data Sources

Asset Category	Assets with Assessed Condition	Source of Condition Data
Road Network	100%	2022 Internal Assessment
Bridges & Culverts	100%	2022 OSIM Bridge Inspections

Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 15% of the Municipality's assets will require rehabilitation / replacement within the next 10 years. Details of the capital requirements are identified in each asset section.

Risk & Criticality

Morris-Turnberry has noted key trends, challenges, and risks to service delivery that they are currently facing:

Climate Change & Extreme Weather

Asset deterioration is accelerated due to extreme weather, which in some cases can cause unexpected failures. Freeze-thaw cycles, ice jams, and surface flooding from extreme rainfall have been experienced in recent years. These events make long-term planning difficult and can result in a lower level of service

Funding

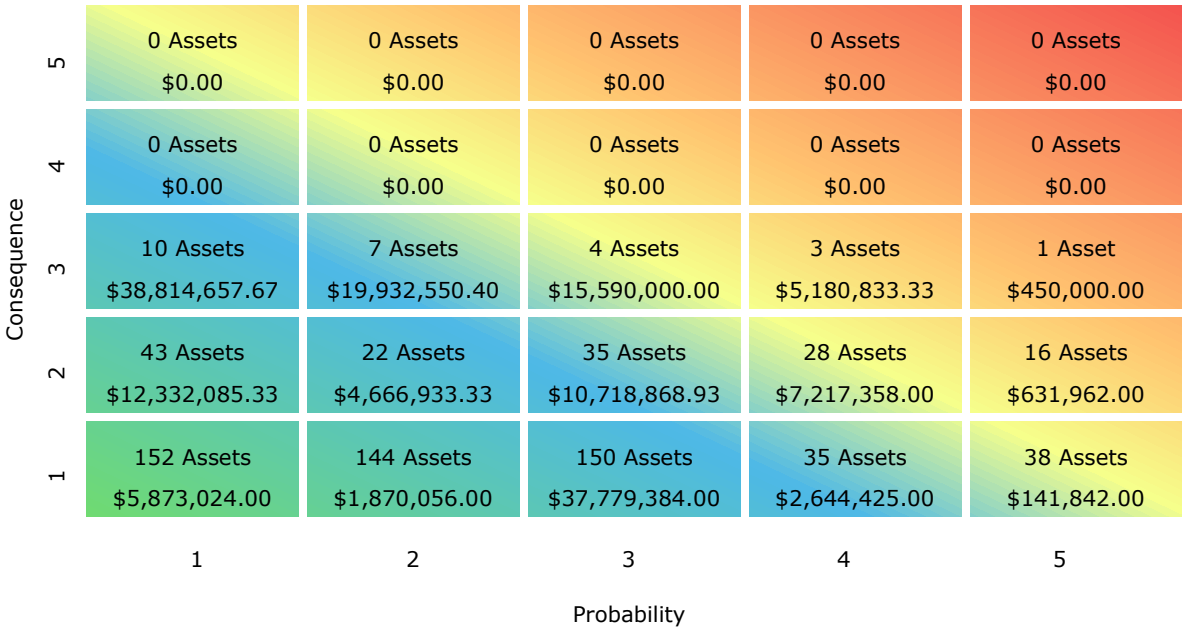
Failure to perform scheduled lifecycle activities or forecast future needs can expose the municipality to financial risk. If an asset fails due to lack of maintenance and repair, the cost to replace it can be significant. Cost overruns and volatile market prices can also pose a financial risk to the municipality

Reputational Risk

Municipal infrastructure is used by the public daily. If lifecycle activities and general maintenance are postponed the assets will deteriorate. The daily use of infrastructure in disrepair can result in the public developing a negative impression of the municipality. A tarnished reputation can be exceedingly difficult to correct and can impact the municipality's ability to recruit qualified staff or attract economic growth to the area.

The overall asset risk breakdown for Morris-Turnberry's asset inventory is portrayed in the figure below.

Figure 8 Overall Asset Risk Breakdown



Reviewing the list of very high-risk assets to evaluate how best to mitigate the level of risk the Municipality is experiencing will help advance Morris-Turnberry's asset management program.

Morris-Turnberry Climate Profile

The Municipality is expected to experience notable effects of climate change which include higher average annual temperatures, an increase in total annual precipitation, and an increase in the frequency and severity of extreme events. According to Climatedata.ca – a collaboration supported by Environment and Climate Change Canada (ECCC) – Morris-Turnberry may experience the following trends:

1. Higher Average Annual Temperature

- Between the years 1971 and 2000 the annual average temperature was 6.8ºC
- Under a high emissions scenario, the annual average temperatures are projected to increase to 9.3ºC by the year 2050 and to 13.2ºC by the end of the century.

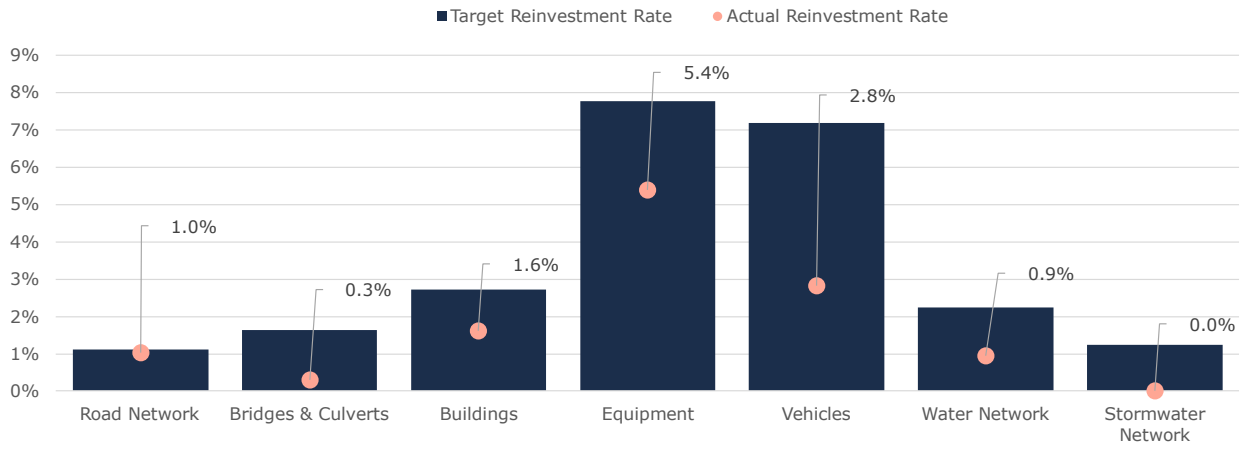
2. Increase in Total Annual Precipitation

- Under a high emissions scenario, Morris-Turnberry is projected to experience a 12% increase in precipitation by the year 2080 and a 16% increase by the end of the century.

Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Municipality is recommended to be allocating approximately $2.78 million annually, for a target reinvestment rate of 1.69%. Actual annual spending on infrastructure totals approximately $1.23 million, for an actual reinvestment rate of 0.75%.

Figure 9 Target vs Actual Reinvestment Rates



Impacts of Growth

Morris-Turnberry is a rural community with productive agricultural lands and a network of important natural systems and resources. Hamlets and urban settlements provide areas for community facilities, residential, commercial, and industrial development. The visions, goals and policies of the Morris-Turnberry Official Plan intend to balance land uses including development and conservation.

The population growth experienced in the last 5 years was 2.7% from Statistics Canada. Based on the growth allocations in the Huron County Official plan the growth projection for Morris-Turnberry out to 2041 is very minimal at 0.3%. Recent development is small in scale and will have a minimal impact on the infrastructure's lifecycle activities.

Current lifecycle activities are scheduled to meet the current population and economic activity levels. If a significant development is proposed these assumptions will be re-evaluated.

Financial Strategy

Financial Strategy Overview

Each year, the Municipality of Morris-Turnberry 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 the community.

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 Morris-Turnberry, the averaged spending of 2021 and 2022 values were used to project available funding.

Only reliable and predictable sources of funding are used to benchmark funds that may be available on any given year. The funding sources include:

- Revenue from taxation allocated to reserves for capital purposes
- Revenue from water rates allocated to capital reserves
- The Canada Community Benefits Fund (CCBF), formerly the Federal Gas Tax Fund
- The Ontario Community Infrastructure Fund (OCIF)

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

Annual Capital Requirements

The annual requirements represent the amount the Municipality should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs, and achieve long-term sustainability. For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

However, for the road network as well as for bridges & culverts, lifecycle management strategies have been developed to identify costs that are realized through strategic rehabilitation and renewal. The development of these strategies allows for a comparison of potential cost avoidance.

The following table compares two scenarios:

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

Lifecycle Strategy Scenario: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Table 5 Road Network Annual Capital Requirement Comparison

Asset Segment	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Gravel Roads	$9,375,345	$0	$9,375,345
HCB Roads	$391,233	$376,430	$14,803
LCB Roads	$621,500	$316,965	$304,535
Guiderails	$2,204	$2,204	$0
Streetlights	$4,213	$4,213	$0

The implementation of a proactive lifecycle strategy for paved roads (HCB and LCB), leads to a potential annual cost avoidance of approximately $320 thousand. This represents a reduction of the annual capital requirement for paved roads by 32%.

Gravel roads lifecycle costs are not considered capital and as such reduces the annual capital requirement from over $9 million a year to $0. The operating expense is approximately $800 thousand per year, which includes annual grading and dust suppression calcium application. Incorporating the operating costs still shows a $8.5 million reduction in overall spending for the municipality. As the lifecycle strategy scenario represents the lowest cost option available to the Municipality, we have used this annual capital requirement in the development of the financial strategy.

Bridges & culverts comparison between the two scenarios (replacement only and lifecycle strategy) can be seen in Table 6. The reduction in annual capital requirement for bridges & culverts is estimated at 18%. As the lifecycle strategy scenario represents the lowest cost option available to the Municipality, we have used this annual capital requirement in the development of the financial strategy.

Table 6 Bridges & Culverts Annual Capital Requirement Comparison

Asset Segment	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Bridges	$1,476,393	$1,171,409	$304,985
Culverts	$125,713	$141,576	$15,863

The overall reduction of the capital requirement because of the lifecycle strategies implemented at Morris-Turnberry is 78%, mainly due to the management of gravel roads.

Table 7 outlines the total average annual capital requirements for existing assets in each asset category. Based on a replacement cost of $164 million, annual capital requirements total just under $2.78 million for all the asset categories analysed.

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 categories is estimated at 2.2%.

Table 7 Average Annual Capital Requirements

Asset Category	Replacement Cost	Annual Capital Requirements	Target Reinvestment Rate
Road Network	$62,654,661	$699,812	2.8%
Bridges & Culverts	$80,105,333	$1,312,985	1.6%
Buildings	$4,051,304	$110,192	2.7%
Equipment	$926,725	$72,025	7.8%
Vehicles	$5,306,378	$381,345	7.2%
Water Network	$6,554,784	$147,064	2.2%
Stormwater Network	$4,244,795	$53,060	1.3%
Total	**$163,843,980**	**$2,776,482**	**1.69%**

Although there is no industry standard guide on optimal annual investment in infrastructure, the Target Reinvestment Rates 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.

Current Funding Levels

Table 8 summarizes how current capital funding levels compare with funding required for each asset category. At existing levels, the Municipality is funding 44% of its annual capital requirements for all infrastructure analyzed. This creates a total annual funding deficit of $1 million.

Table 8 Current Funding Position vs Required Funding

Asset Category	Annual Capital Requirements	Annual Funding Available	Annual Infrastructure Deficit	Funding Level
Road Network	$699,812	$652,793	$47,019	93%
Bridges & Culverts	$1,312,985	$250,000	$1,062,985	19%
Buildings	$110,192	$65,898	$44,293	60%
Equipment	$72,025	$50,000	$22,025	69%
Vehicles	$381,345	$150,000	$231,345	39%
Water Network	$147,064	$62,000	$85,064	42%
Stormwater Network	$53,060	$-	$53,060	0%
Total	**$2,776,482**	**$1,230,691**	**$1,545,791**	**44%**

Closing the Gap

Eliminating annual infrastructure funding shortfalls is a difficult and long-term endeavor 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 Morris-Turnberry can close the 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.

Full Funding Requirements Tax Revenues

In 2023, Morris-Turnberry will have an annual tax revenue of $4,850,424. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require a 29% tax change over time.

To achieve this increase, several scenarios have been developed using phase-in periods ranging from five to twenty 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 9 Phasing in Annual Tax Increases

Total % Increase Needed in Annual Property Taxation Revenues	Phase-in Period			
	5 Years	10 Years	15 Years	20 Years
29%	5.4%	2.7%	1.8%	1.3%

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.

Full Funding Requirements Utility Rate Revenues

For 2023, Morris-Turnberry's forecasted water rate revenues total $189,435. Annual capital requirements for the water network total $147,064, against available funding of $62,000. This creates a funding deficit of $85,064. To close this annual gap, the Municipality's water revenues would need to increase by 44.9%.

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

Table 10 Phasing in Rate Increases

Category	Phase-in Period			
	5 Years	10 Years	15 Years	20 Years
44.9%	7.7%	3.8%	2.5%	1.9%

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.

Use of Debt

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

Table 11 Premiums for Debt Financing Projects

Interest Rate	Number of Years Financed					
	5	10	15	20	25	30
7.0%	22%	42%	65%	89%	115%	142%
6.5%	20%	39%	60%	82%	105%	130%
6.0%	19%	36%	54%	74%	96%	118%
5.5%	17%	33%	49%	67%	86%	106%
5.0%	15%	30%	45%	60%	77%	95%
4.5%	14%	26%	40%	54%	69%	84%
4.0%	12%	23%	35%	47%	60%	73%
3.5%	11%	20%	30%	41%	52%	63%
3.0%	9%	17%	26%	34%	44%	53%

[1] Current municipal Infrastructure Ontario rates for 15-year lending is 3.2%.

Recommendations and Key Considerations

Financial Strategies

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

- implementing a 1.8% annual tax increase over a 15-year phase-in period and allocating the full increase in revenue towards capital funding
- implementing a 2.5% rate increase for water over a 15-year phase-in period
- continued allocation of OCIF and CCBF funding as previously outlined
- using risk frameworks and staff judgement to prioritize projects, particularly to aid in elimination of existing infrastructure backlogs

NOTE: Although difficult to capture inflation costs, supply chain issues, and fluctuations in commodity prices will also influence capital expenditures.

Asset Data

1. Continuously review, refine, and calibrate lifecycle and risk profiles to better reflect actual practices and improve capital projections. In particular:

- the timing of various lifecycle events, the triggers for treatment, anticipated impacts of each treatment, and costs
- the various attributes used to estimate the likelihood and consequence of asset failures, and their respective weightings

2. Asset management planning is highly sensitive to replacement costs. Periodically update replacement costs based on recent projects, invoices, or estimates, as well as condition assessments, or any other technical reports and studies. Material and labour costs can fluctuate due to local, regional, and broader market trends, and substantially so during major world events. Accurately estimating the replacement cost of like-for-like assets can be challenging. Ideally, several recent projects over multiple years should be used. Staff judgement and historical data can help attenuate extreme and temporary fluctuations in cost estimates and keep them realistic.
3. Like replacement costs, an asset's established serviceable life can have dramatic impacts on all projections and analyses, including 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 updated 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. As the data evolves and new attribute information is obtained, these models should also be refined and updated.
2. 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.

Appendix A: Road Network

State of the Infrastructure

Morris-Turnberry's road network comprises the second largest share of its infrastructure portfolio, with a current replacement cost of $62.7 million, distributed primarily between paved and unpaved roads.

The Municipality also owns and manages other supporting infrastructure and capital assets, including guiderails and streetlights.

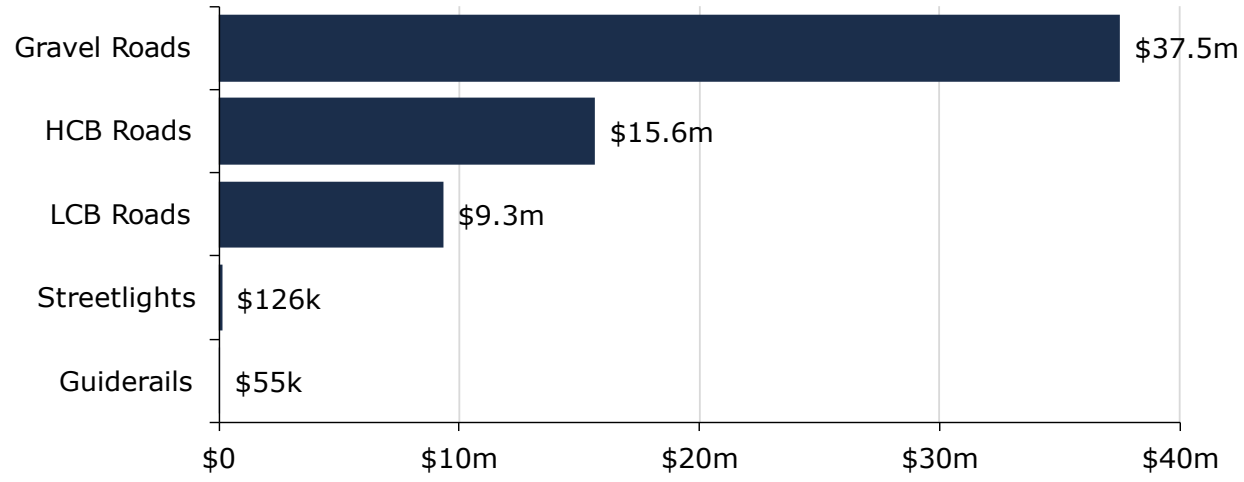
The state of the infrastructure for the road network is summarized below.

Replacement Cost	Condition	Financial Capacity	
		Annual Requirement:	$699,812
$62,654,661	Good (77%)	Funding Available:	$652,793
		Annual Deficit:	$47,019

Inventory & Valuation

The figure below displays the replacement cost of each asset segment in the Municipality's road inventory.

Figure 10 Road Network Replacement Value

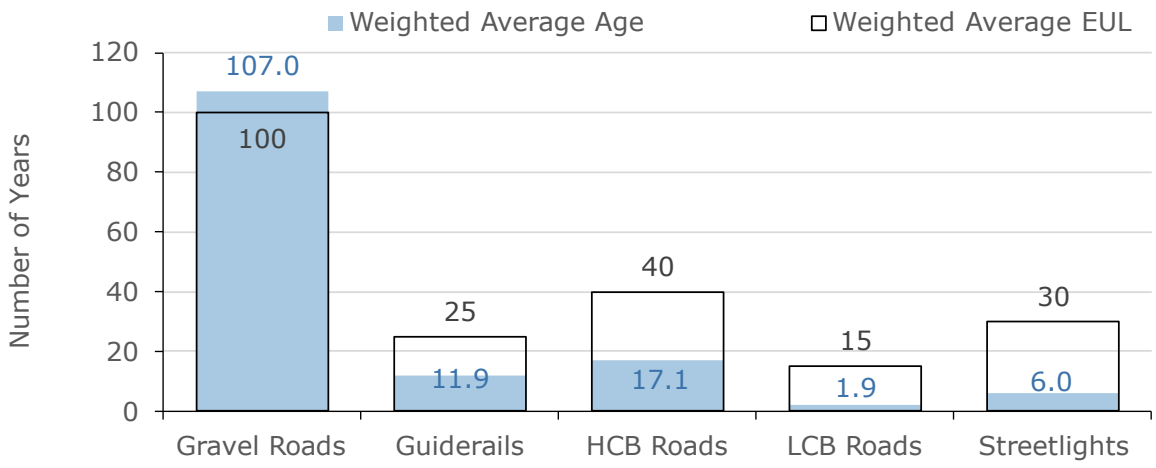


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

The graph below identifies the average age, and the estimated useful life for each asset segment. It is all weighted by replacement cost.

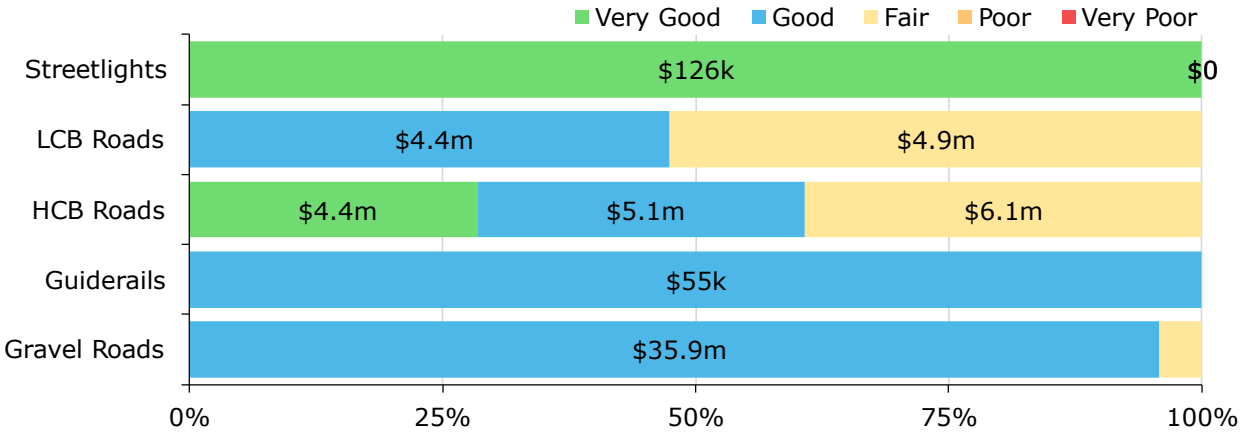
Figure 11 Road Network Average Age vs Average EUL



The analysis shows that, based on in-service dates, gravel roads continue to remain in operation beyond their expected useful life. This is due to the life cycle management strategies currently being utilized which will be outlined in a later section.

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

Figure 12 Road Network Condition Breakdown



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

Each asset's estimated useful life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The Municipality's current approach is described below.

All roads inspected/patrolled in accordance with O. Reg. 239/02 Minimum Maintenance Standards

Internal Staff Assessment completed in 2022

The condition scale for roads utilized is from 0 to 100 from Very Poor to Very Good.

Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies shown in Figure 13 have been developed as a proactive approach to managing the lifecycle of municipally owned roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Figure 13 Road Network Current Lifecycle Strategy

Maintenance

- gravel roads are graded, dust control applied annually and gravel application is done biennially
- deficiency repairs as required from patrols for minimum maintenance standards such as patching, shoulder grading, etc.
- winter control

Rehabilitation / Renewal / Replacement

- prioritization is based on road usage - no defined programs for rehabilitation are scheduled
- activities are more reactive

- PCI scores, staff judgment, traffic loads, and opportunity to bundle projects help inform the optimal lifecycle intervention, ranging from pothole repairs to potential replacements. Lifecycle models used to estimate the savings to annual capital requirement are shown below in Figure 14 for surface treated (LCB) roads ,Figure 15 for asphalt (HCB) roads and Figure 16 for gravel roads.

Figure 14 Surface Treated (LCB) Road Lifecycle Model

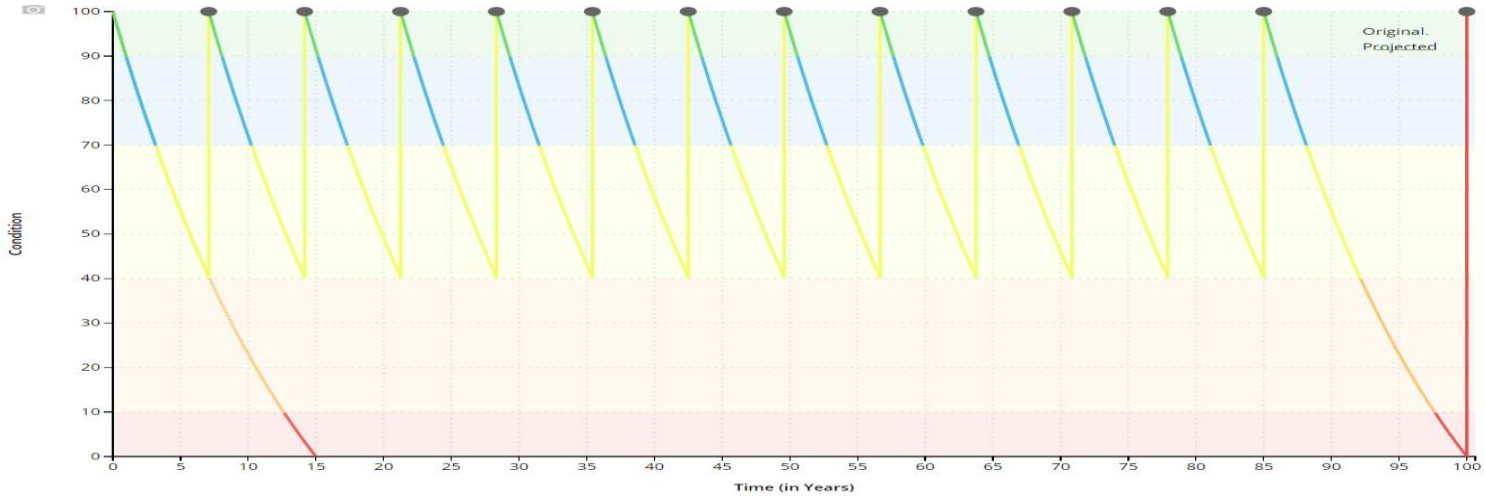


Figure 15 Asphalt (HCB) Road Lifecycle Model

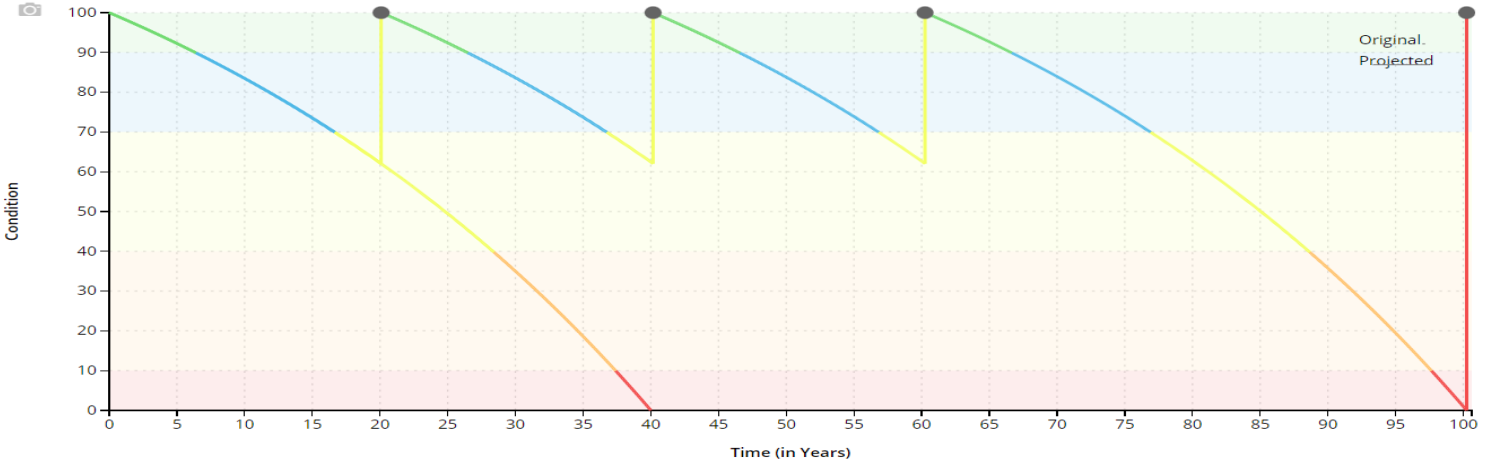
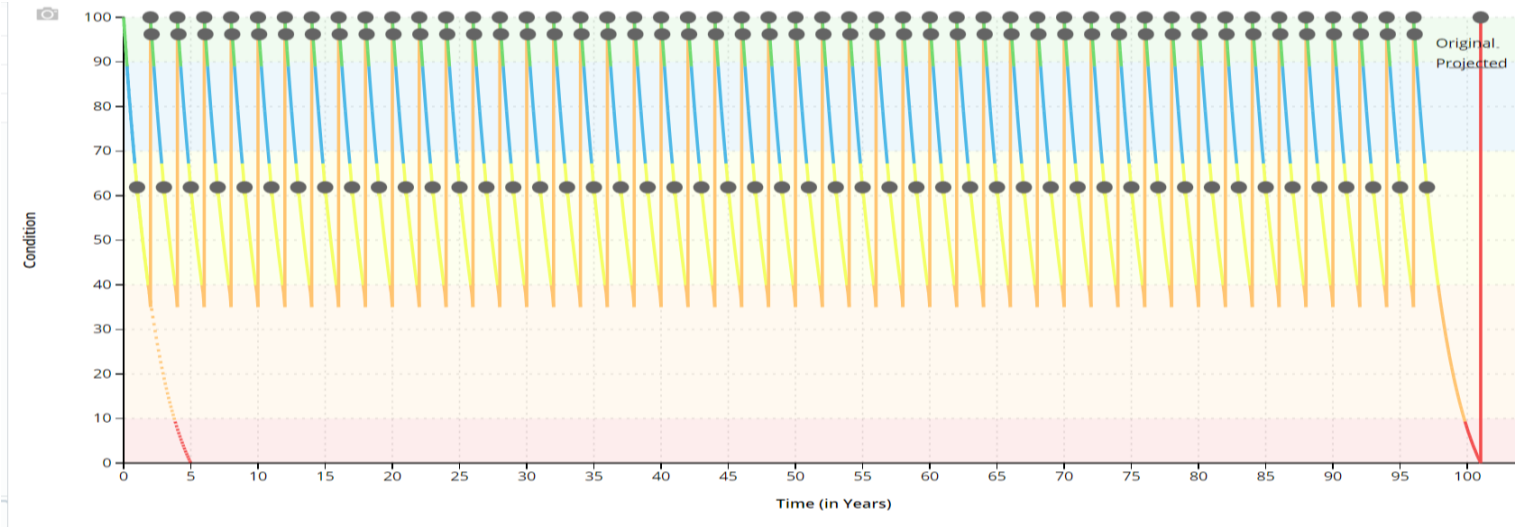


Figure 16 Gravel Road Lifecycle Model



Forecasted Capital Requirements

Figure 17 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Municipality's road network. This analysis was run until 2067 to capture at least one iteration of replacement for the longest-lived asset in the asset register.

Morris-Turnberry's average annual requirements (red dotted line) total $700 thousand 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 capital needs through the forecast period in 5-year intervals.

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 identified above).

Figure 17 Road Network Forecasted Capital Replacement Requirements

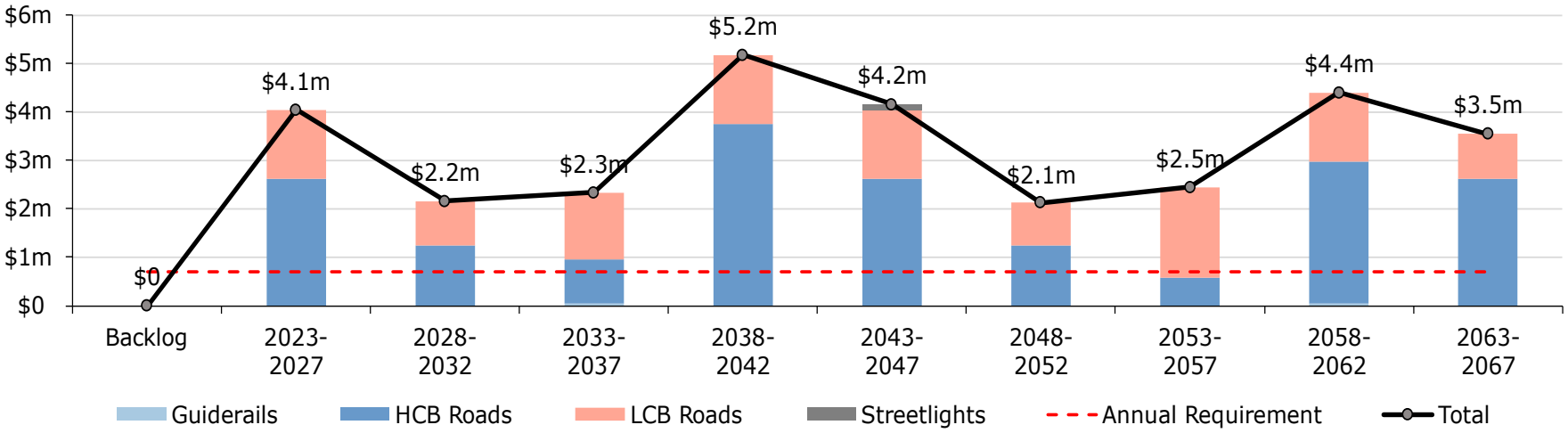


Table 12 below summarizes the projected cost of lifecycle activities (rehabilitation and replacement) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

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.

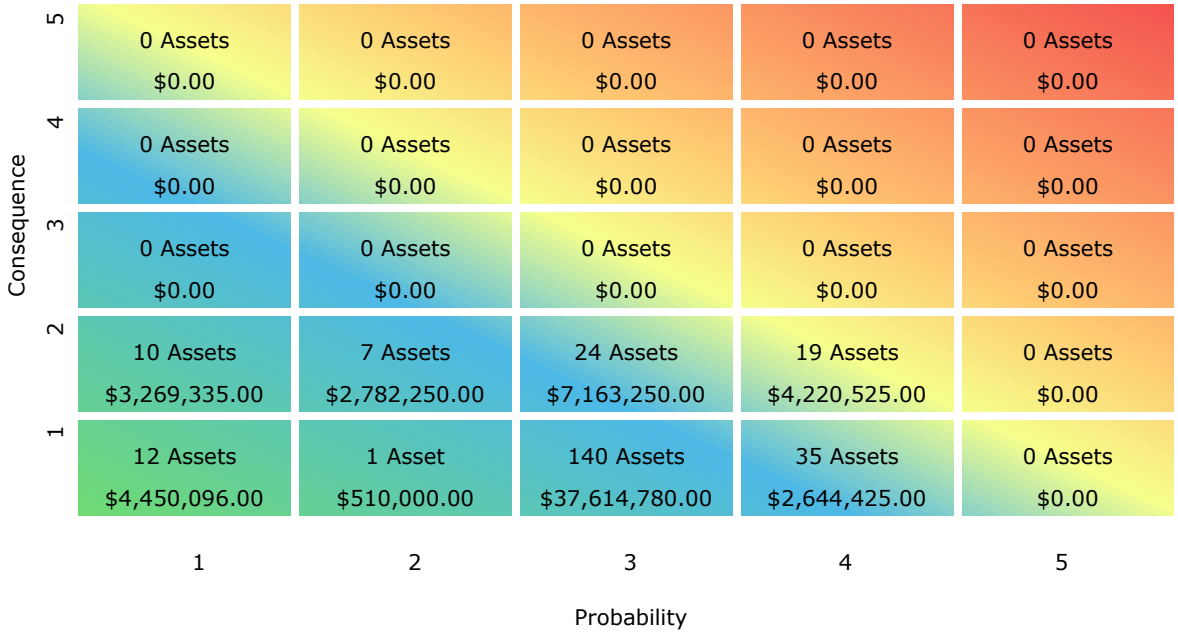
Table 12 Road Network System-generated 10-Year Capital Costs

Segment	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Guiderails	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HCB Roads	$3.9m	$122k	$0	$1.7m	$0	$780k	$0	$0	$330k	$0	$909k
LCB Roads	$2.4m	$0	$217k	$275k	$488k	$450k	$0	$435k	$0	$217k	$275k
Streetlights	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$6.2m**	**$122k**	**$217k**	**$2.0m**	**$488k**	**$1.2m**	**$0**	**$435k**	**$330k**	**$217k**	**$1.2m**

Risk & Criticality

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria**Error! Reference source not found.** for the criteria used to determine the risk rating of each asset.

Figure 18 Road Network Risk Matrix



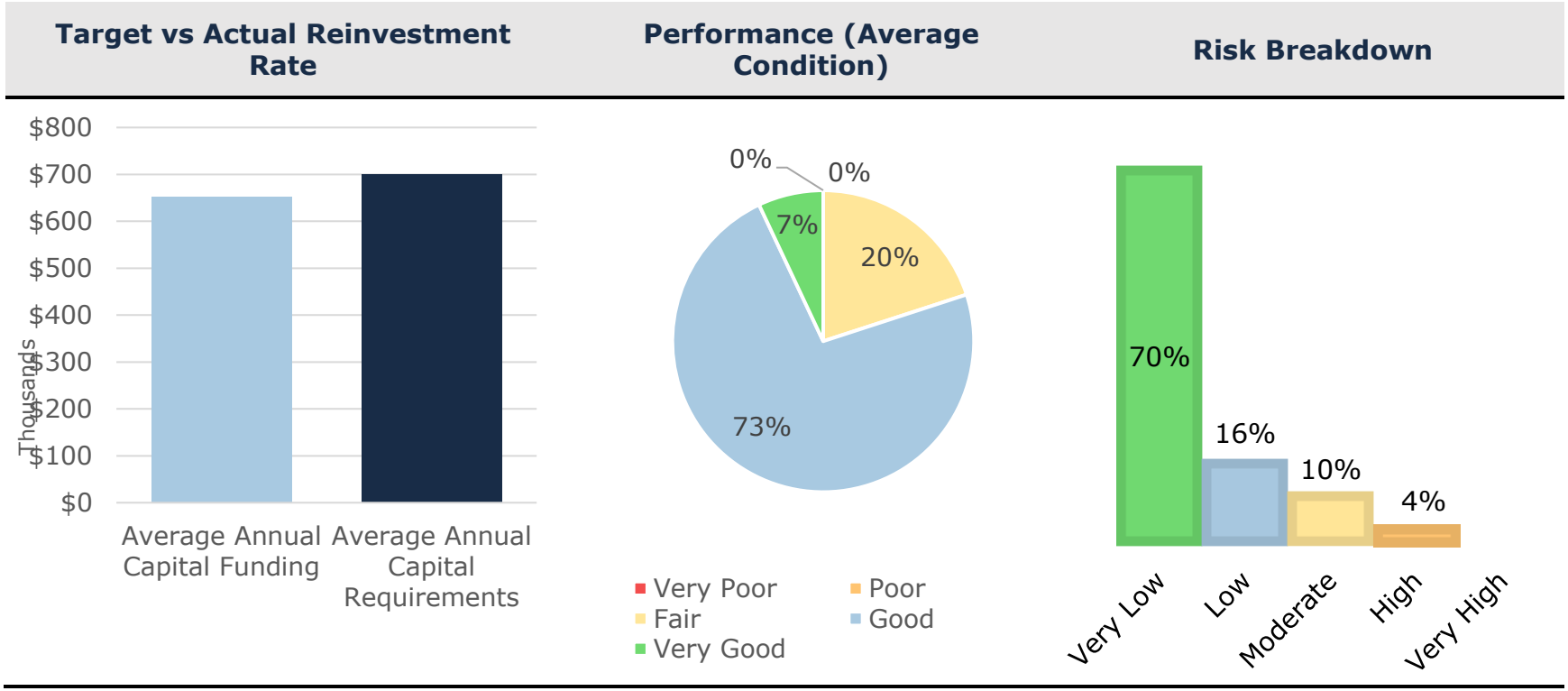
This is a high-level model developed by municipal staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets allows the Municipality to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Levels of Service

The following tables identify the Municipality's metrics to identify their current level of service for the roads. By comparing the cost, performance (average condition) and risk year-over-year, Morris-Turnberry will be able to evaluate how their services/assets are trending. The Municipality will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 19: Road Network Strategic Levels of Service



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

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the road network.

Table 13 Ontario Regulation 588/17 Road Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Affordable	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Figure 20 and Figure 21
Reliable	Description or images that illustrate the different levels of road class pavement condition	See Figure 2 for the description of road condition

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the road network.

Table 14 Ontario Regulation 588/17 Road Network Technical Levels of Service

Service Attribute	Technical Metric	2021 LOS	2022 LOS
Reliable	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0	0
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	1.57 km/km^2	1.57 km/km^2
	Average pavement condition index for paved roads	74.6 (Good)	70.7 (Good)
	Average surface condition for unpaved roads (e.g. excellent, good, fair, poor)	Good	Good

Figure 20 Map of Roads

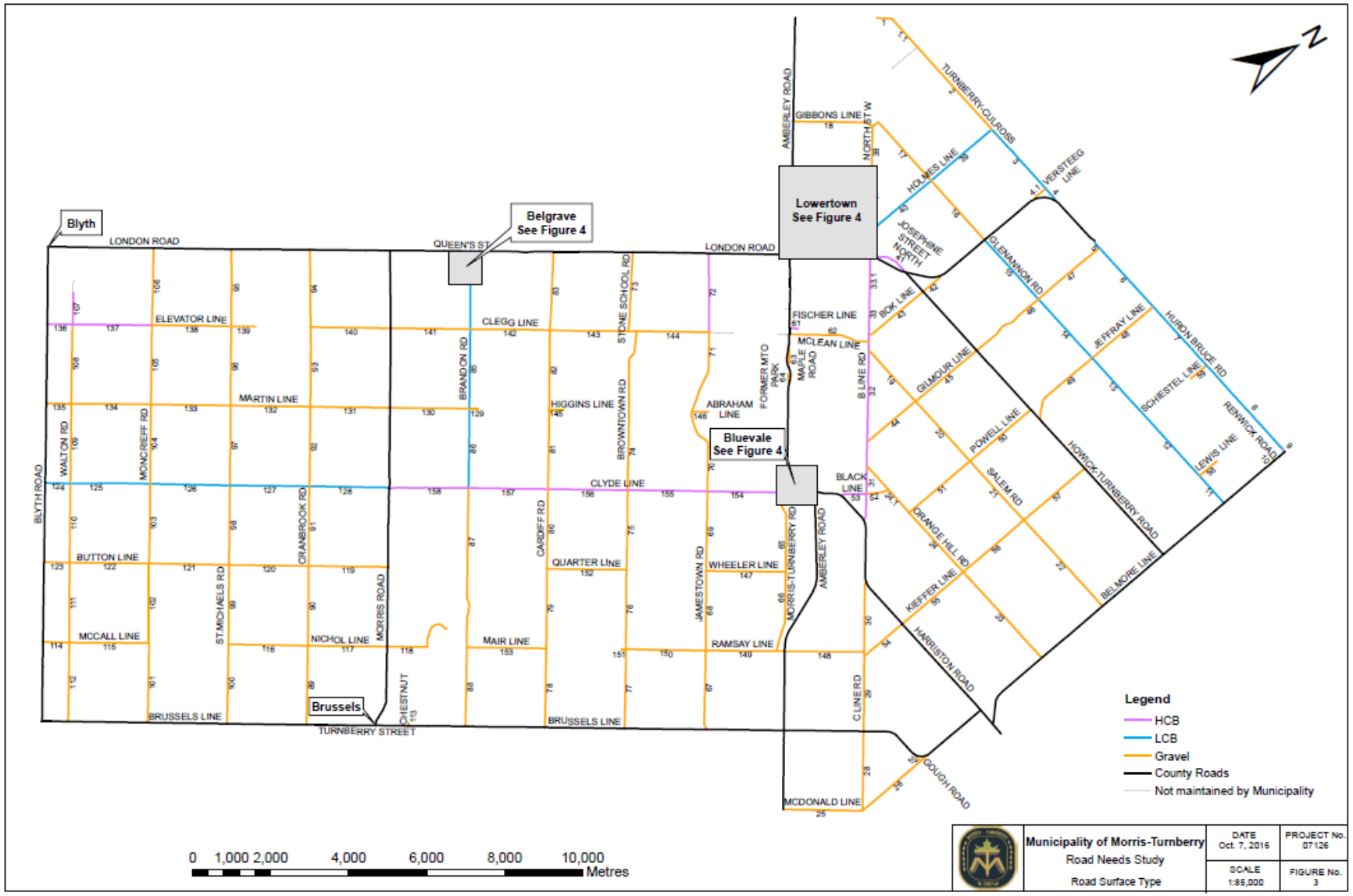
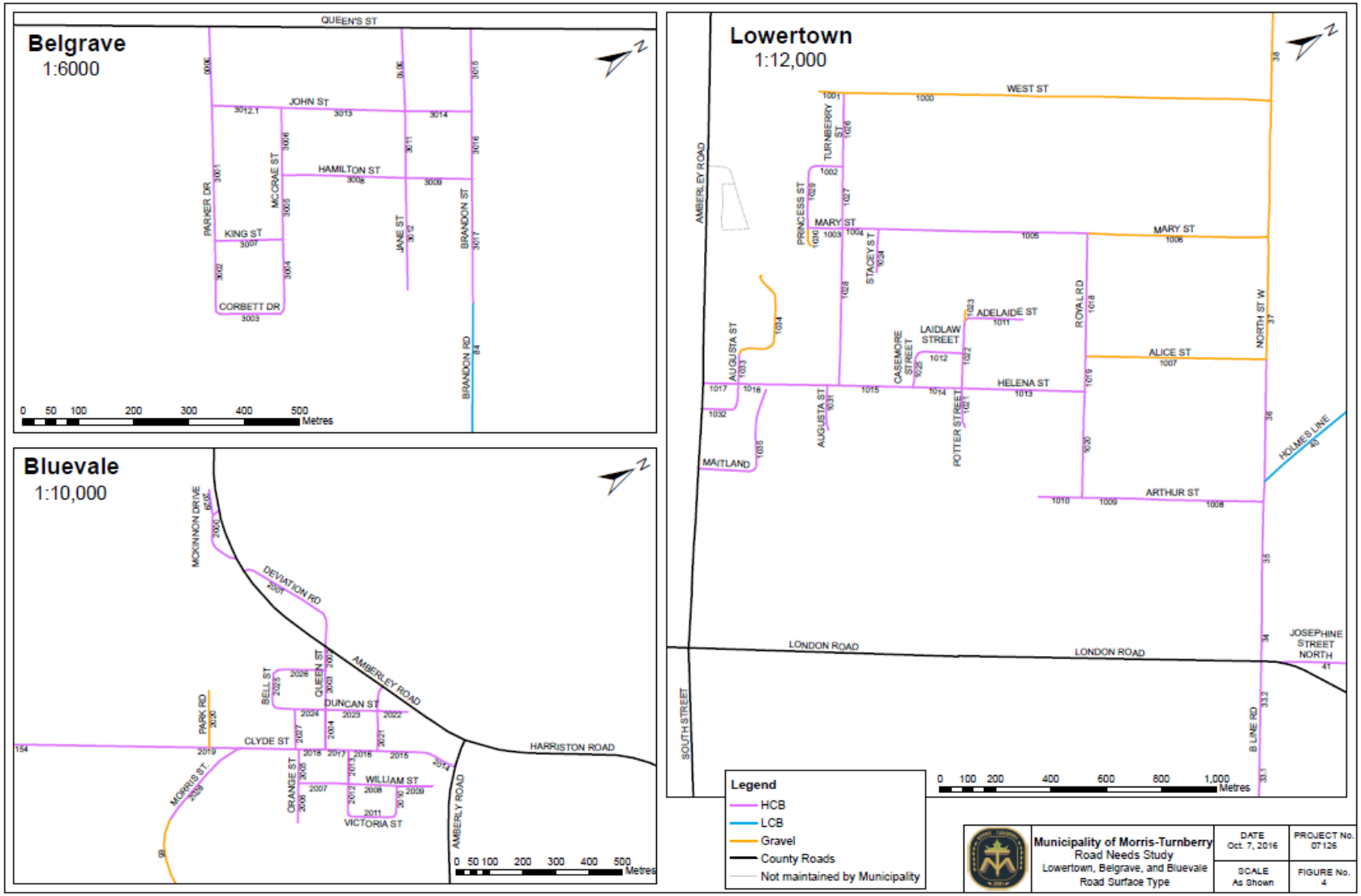


Figure 21 Detail Map of Roads



Appendix B: Bridges & Culverts

State of the Infrastructure

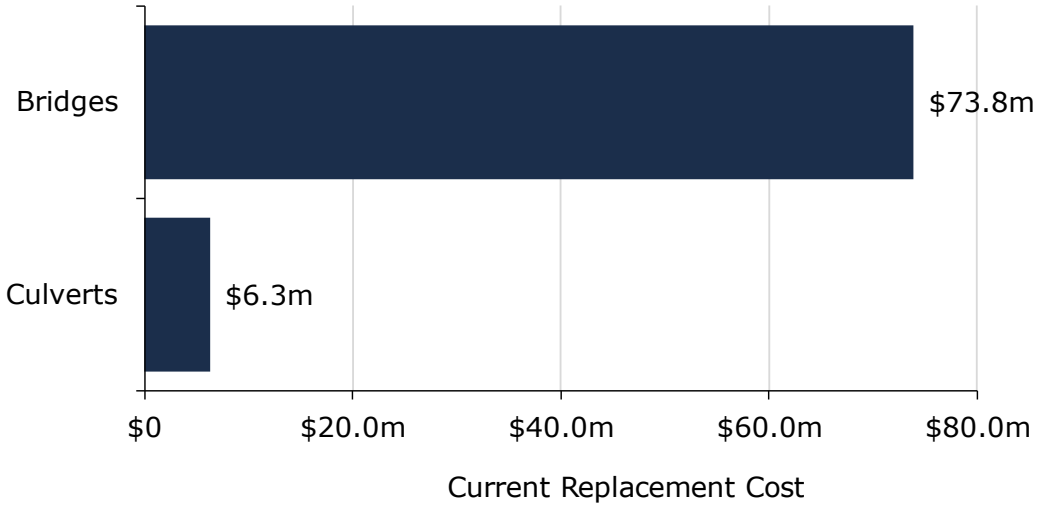
Bridges and culverts (B&C) represent the largest and critical portion of the transportation services provided to the community. The state of the infrastructure for bridges and culverts is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$80,105,333	Good (71%)	Annual Requirement:	$1,312,985
		Funding Available:	$250,000
		Annual Deficit:	$1,062,985

Inventory & Valuation

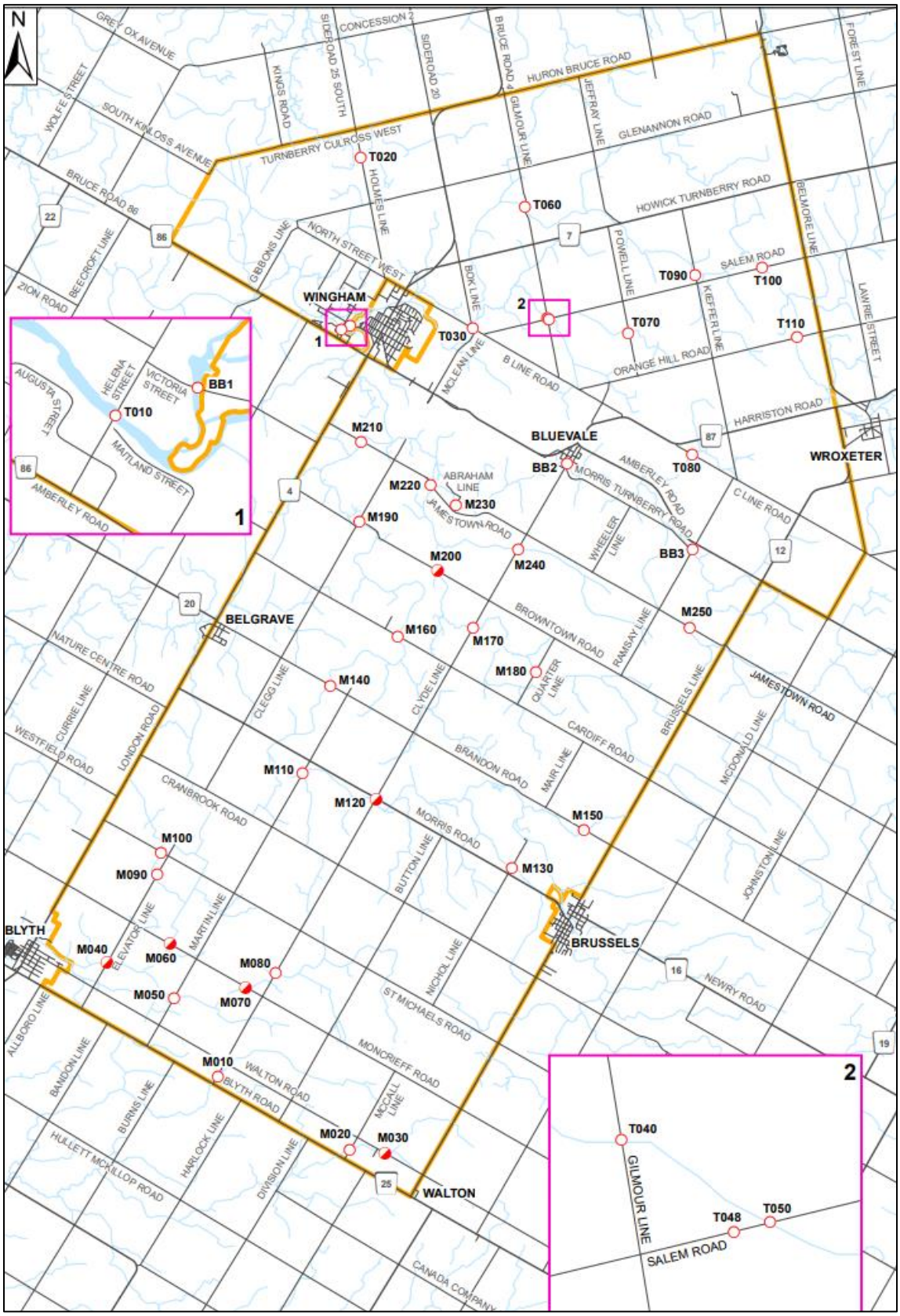
Figure 22 below displays the replacement cost of each asset segment in the Municipality's bridges and culverts inventory.

Figure 22 Bridges & Culverts Replacement Cost



Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed. This can be included in the Ontario Structures Inspection Manual (OSIM) inspections as the replacement cost is part of the calculation for the bridge condition index (BCI).

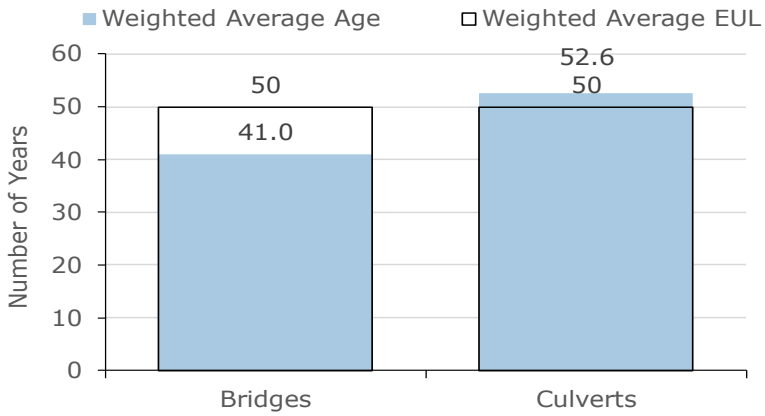
Figure 23 Map of Bridges and Culverts



Asset Condition & Age

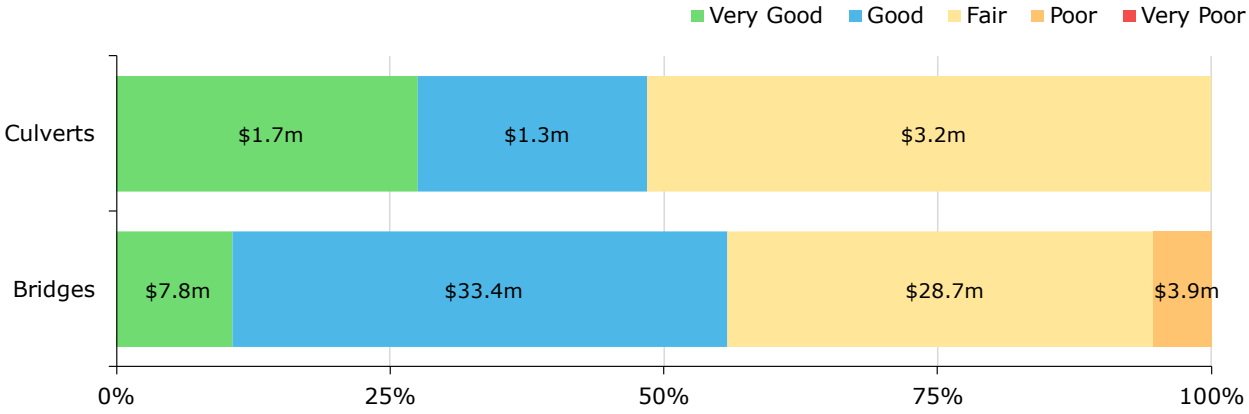
The graph below identifies the average age and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 24 B&C Average Age vs Average EUL



The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

Figure 25 B&C Condition Breakdown



To ensure that the Municipality's bridges and culverts continue to provide an acceptable level of service, the staff should monitor the average condition of all assets. Each asset's Estimated Useful Life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Morris-Turnberry's current approach is to assess the 40 bridges and culverts every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM). The most recent assessment was completed in 2022 by BM Ross & Associates.

The condition scale for bridges and culverts utilized is from 0 to 100 from Very Poor to Very Good. See the following images as examples of a very good bridge and structural culvert as well as a bridge and structural culvert in Fair condition.

Figure 26 T030 B Line Bridge (BCI=95 Very Good)

Figure 27 T100 Willit Bridge (BCI=52 Fair)

Figure 28 M020 McCall Line (BCI=100 Very Good)

Figure 29 M080 Clyde Line Culvert (BCI=53 Fair)

Lifecycle Management Strategy

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

Figure 30 B&C Current Lifecycle Strategy

Maintenance

- All maintenance and repair activities are driven by the results of inspections competed according to the Ontario Structure Inspection Manual (OSIM) as well as internal staff monitoring

Rehabilitation / Renewal / Replacement

- 30 year rehabilitation occurs at an approximate condition of 40-50
- 60 year major rehabilitation occurs at approximately 40-50
- Replacement occurs at an approximate condition of 30-40

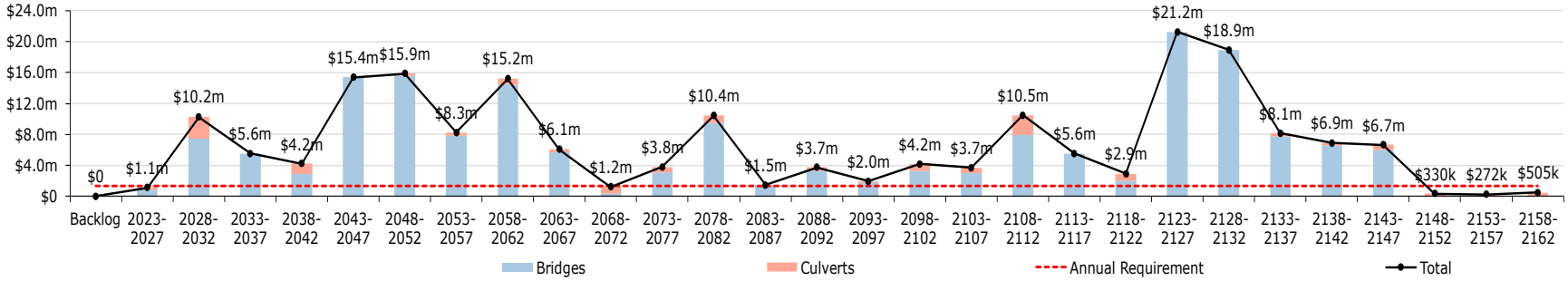
Forecasted Capital Requirements

Figure 31 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 2162 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Morris-Turnberry's average annual requirements (red dotted line) for bridges and culverts total $1.3 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.

OSIM condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including rehabilitation and replacement activities.

Figure 31 B&C Forecasted Capital Replacement Requirements



These are represented at the major asset level.

Table 15 below summarizes the projected cost of lifecycle activities (as previously described) that may need to be undertaken over the next 10 years to support current levels of service. These are represented at the major asset level.

Table 15 B&C System-generated 10-Year Capital Costs

Segment	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Bridges	$8.4m	$91k	$145k	$510k	$0	$148k	$0	$581k	$5.0m	$1.2m	$618k
Culverts	$3.0m	$102k	$0	$0	$121k	$0	$0	$150k	$2.5m	$109k	$0

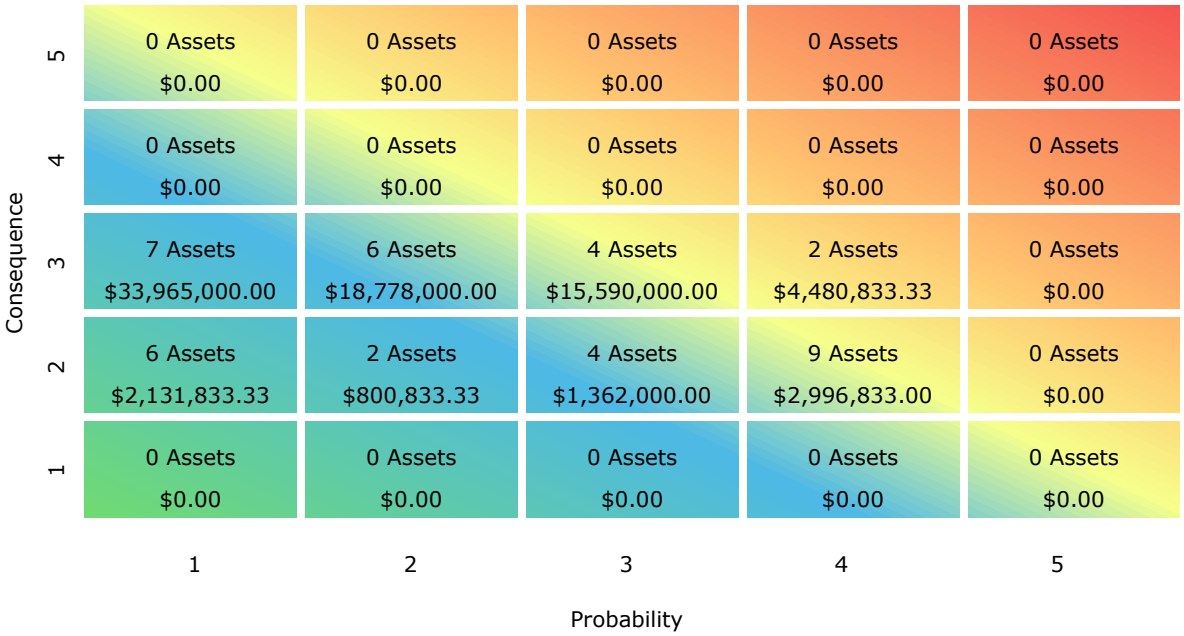
These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for bridges and structural culverts.

Risk & Criticality

The risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

This is a high-level model developed by municipal staff and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

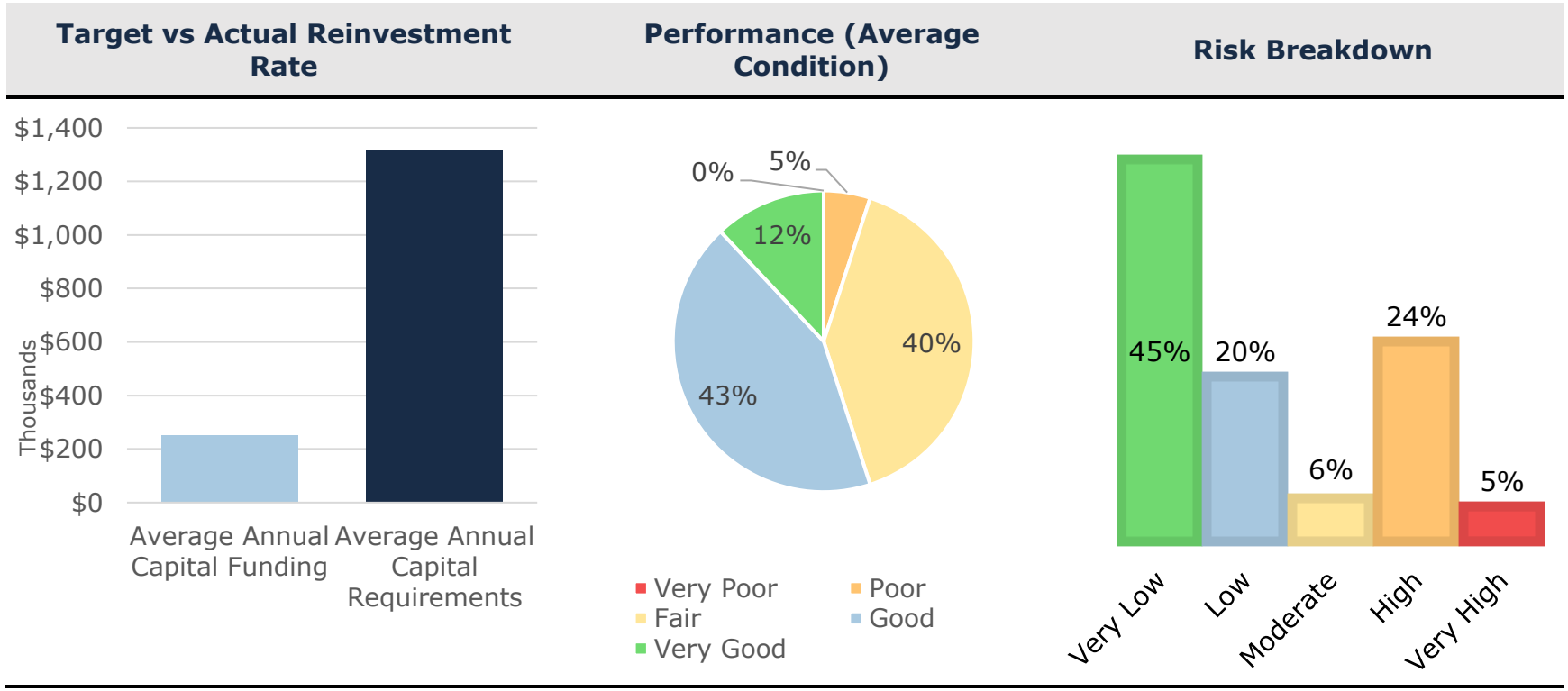
Figure 32 B&C Risk Matrix



Levels of Service

The following graphs identify the Municipality's metrics to identify their current level of service for the bridges and culverts. By comparing the cost, performance (average condition) and risk year-over-year Morris-Turnberry will be able to evaluate how their services/assets are trending. The Municipality will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 33: B&C Strategic Levels of Service



The metrics included below are the technical and community level of service metrics that are required as part of O. Reg. 588/17.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by bridges and culverts.

Table 16 Ontario Regulation 588/17 B&C Community Levels of Service

Core Values	Qualitative Description	Current LOS
Affordable	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	The traffic supported by the municipal bridges is varied. Large agricultural equipment, heavy transport vehicles, motor vehicles, emergency vehicles, cyclists and pedestrians all utilize the bridges to travel throughout the municipality.
Reliable	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	See Figure 26 T030 B Line Bridge (BCI=95 Very Good), Figure 27 T100 Willit Bridge (BCI=52 Fair), Figure 28 M020 McCall Line (BCI=100 Very Good)and Figure 29 M080 Clyde Line Culvert (BCI=53 Fair)

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by bridges and culverts.

Table 17 Ontario Regulation 588/17 B&C Technical Levels of Service

Core Values	Technical Metric	2021 LOS	2022 LOS
Reliable	% of bridges in the municipality with loading or dimensional restrictions	5% (2 out of 40)	2.5% (1 out of 40)
	Average bridge condition index value for bridges	70.8	68.8
	Average bridge condition index value for structural culverts	72.8	70.9

Appendix C: Water Network

State of the Infrastructure

The Hamlet of Belgrave is split along London Road (County Road 4) between the Municipality of Morris-Turnberry and the Township of North Huron. The Belgrave Water System provides services to all users located in Belgrave.

The Belgrave Water System consists of two groundwater wells (Jane Well and McCrea Well) a pumphouse containing treatment and control facilities, and an in-ground storage reservoir and distribution system.

The system is sized such that it could serve the entire Hamlet of Belgrave rather than just the current serviced areas. The capacity is sufficient to accommodate additional users as they connect in the future. The daily operation of the system is contracted to a third-party operator Veolia Water Canada.

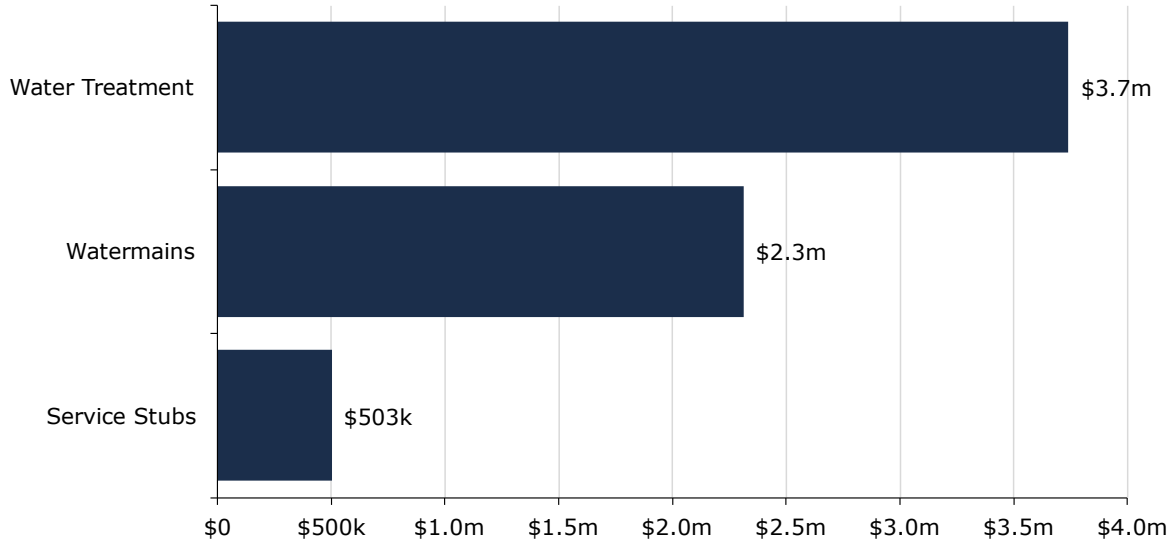
The state of the infrastructure for the water network is summarized in the following table:

Replacement Cost	Condition	Financial Capacity	
		Annual Requirement:	$147,064
$6,554,784	Very Good (90%)	Funding Available:	$62,000
		Annual Deficit:	$85,064

Inventory & Valuation

The graph below displays the replacement cost of each asset segment in the Municipality's water network inventory.

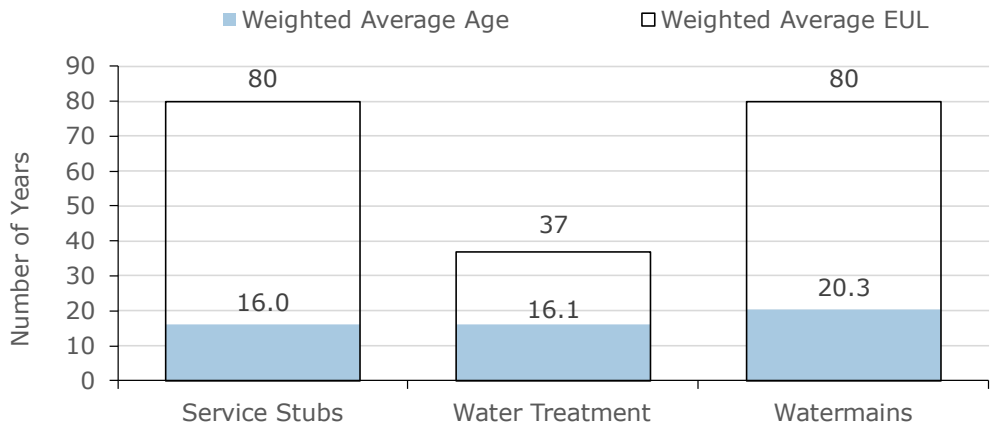
Figure 34 Water Network Replacement Cost



Asset Condition & Age

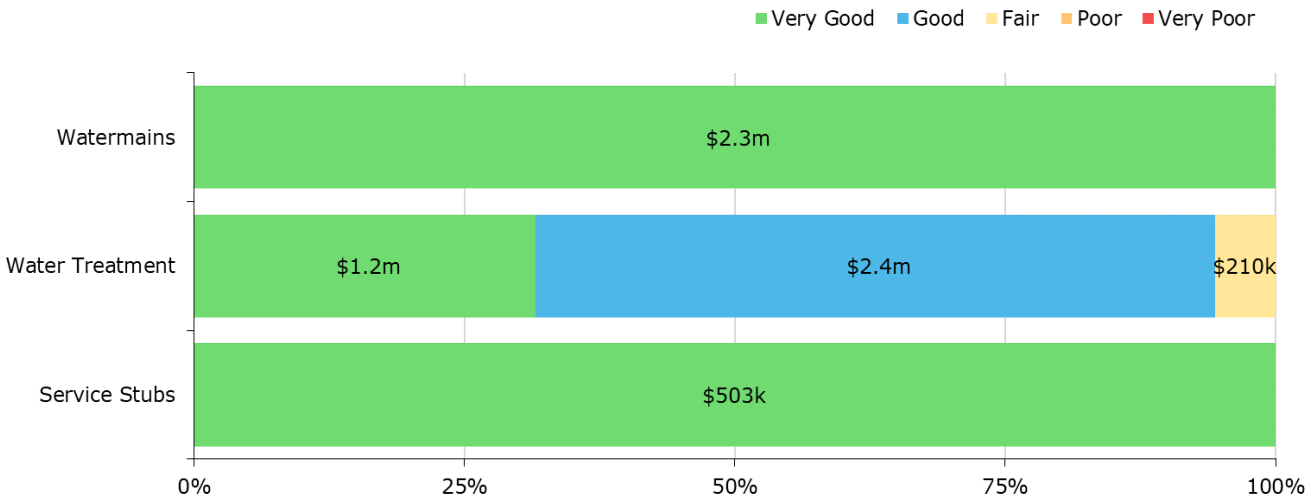
The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 35 Water Network Average Age vs Average EUL



The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

Figure 36 Water Network Condition Breakdown



To ensure that Morris-Turnberry's water network continues to provide an acceptable level of service, the Municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate the lifecycle management strategy to determine what combination of activities is required to increase the overall condition of the water network.

Each asset's Estimated Useful Life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

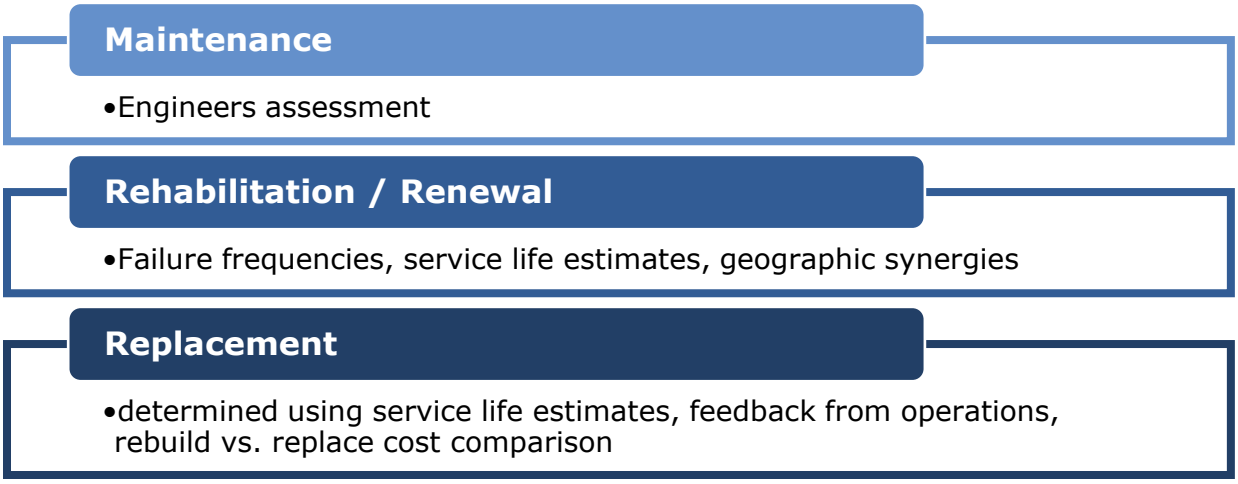
Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Water network assets are all assets based on the age and service life only.

Lifecycle Management Strategy

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following figures outline Morris-Turnberry's current lifecycle management strategy.

Figure 37 Water Network Current Lifecycle Strategy



Forecasted Capital Requirements

Figure 38 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Municipality's water system portfolio. This analysis was run until 2091 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Morris-Turnberry's average annual requirements (red dotted line) total $147 thousand for all water network 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.

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 38 Water Network Forecasted Capital Replacement Requirements

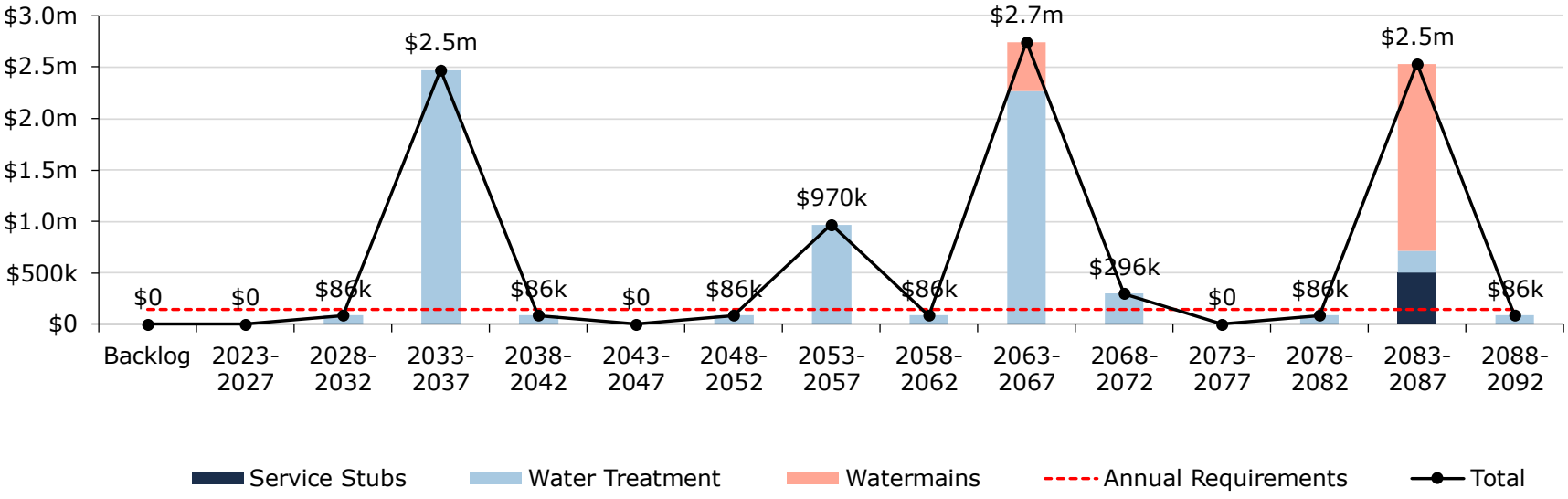


Table 18 below summarizes the projected cost of lifecycle activities (capital replacement only) that will need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register, which was limited to asset age, replacement cost, and useful life.

Table 18 Water Network System-Generated 10-Year Capital Costs

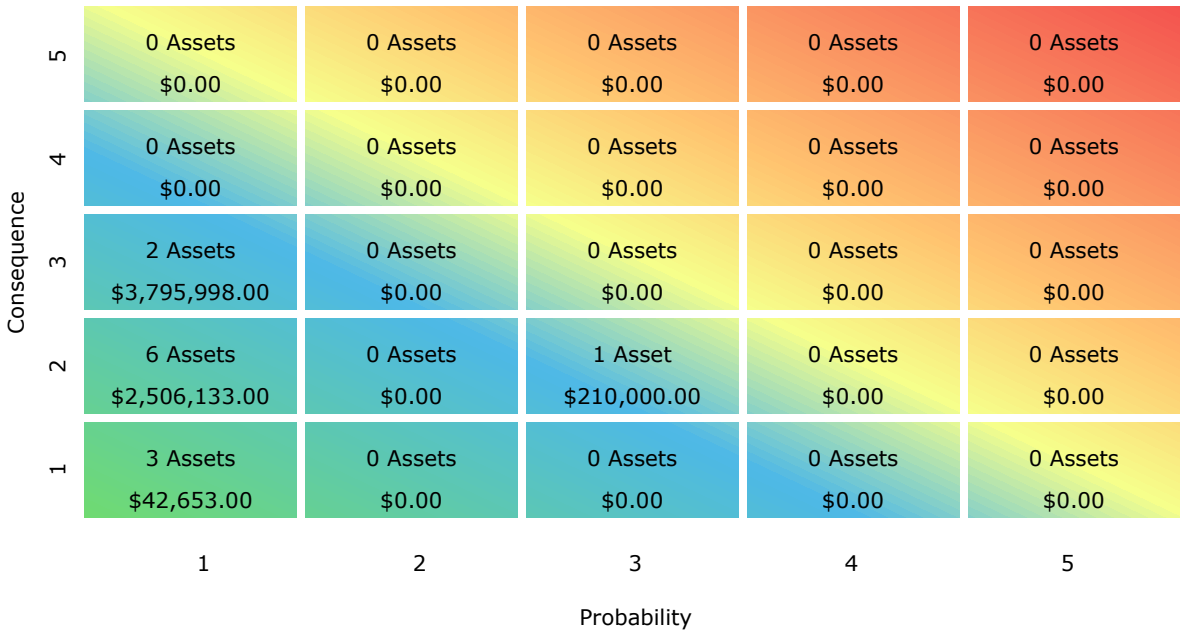
Segment	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Service Stubs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Treatment	$86k	$0	$0	$0	$0	$0	$86k	$0	$0	$0	$0
Watermains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Municipality's capital expenditure forecasts.

Risk & Criticality

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 39 Water Network Risk Matrix

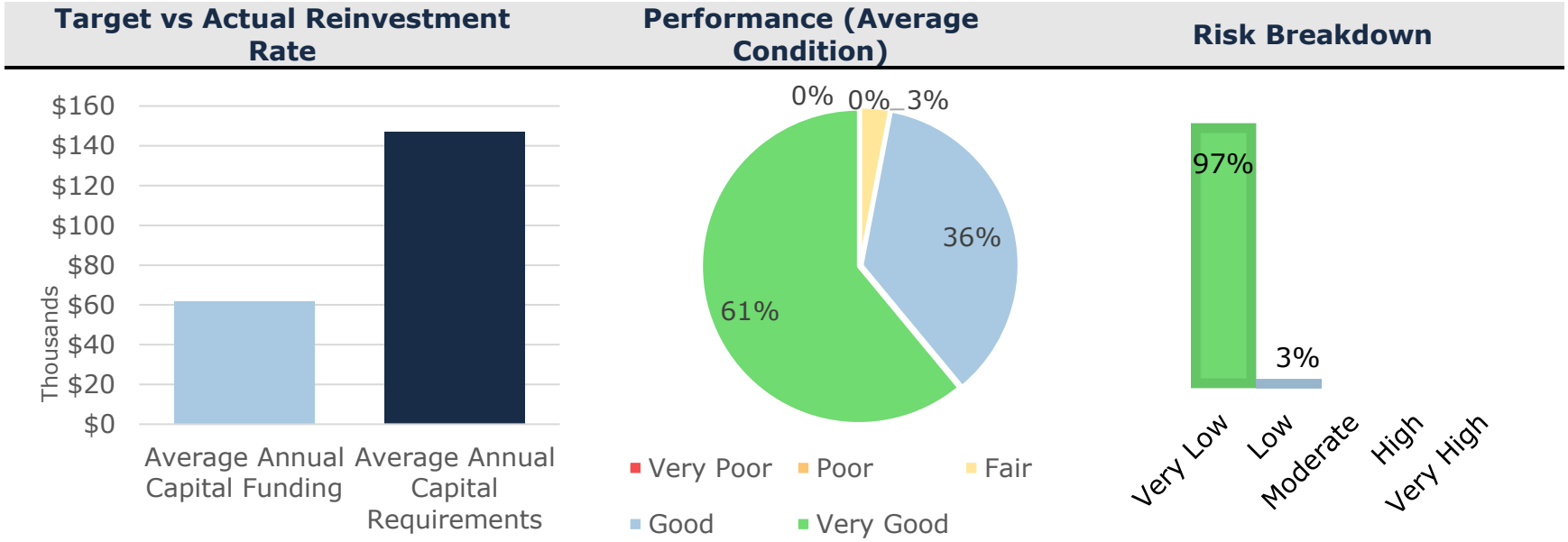


This is a high-level model developed by municipal staff and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

Levels of Service

The following tables identify the Municipality's metrics to identify their current level of service for the water network. By comparing the cost, performance (average condition) and risk year-over-year the Municipality will be able to evaluate how their services/assets are trending. The Municipality will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 40 Water Network Strategic Levels of Service



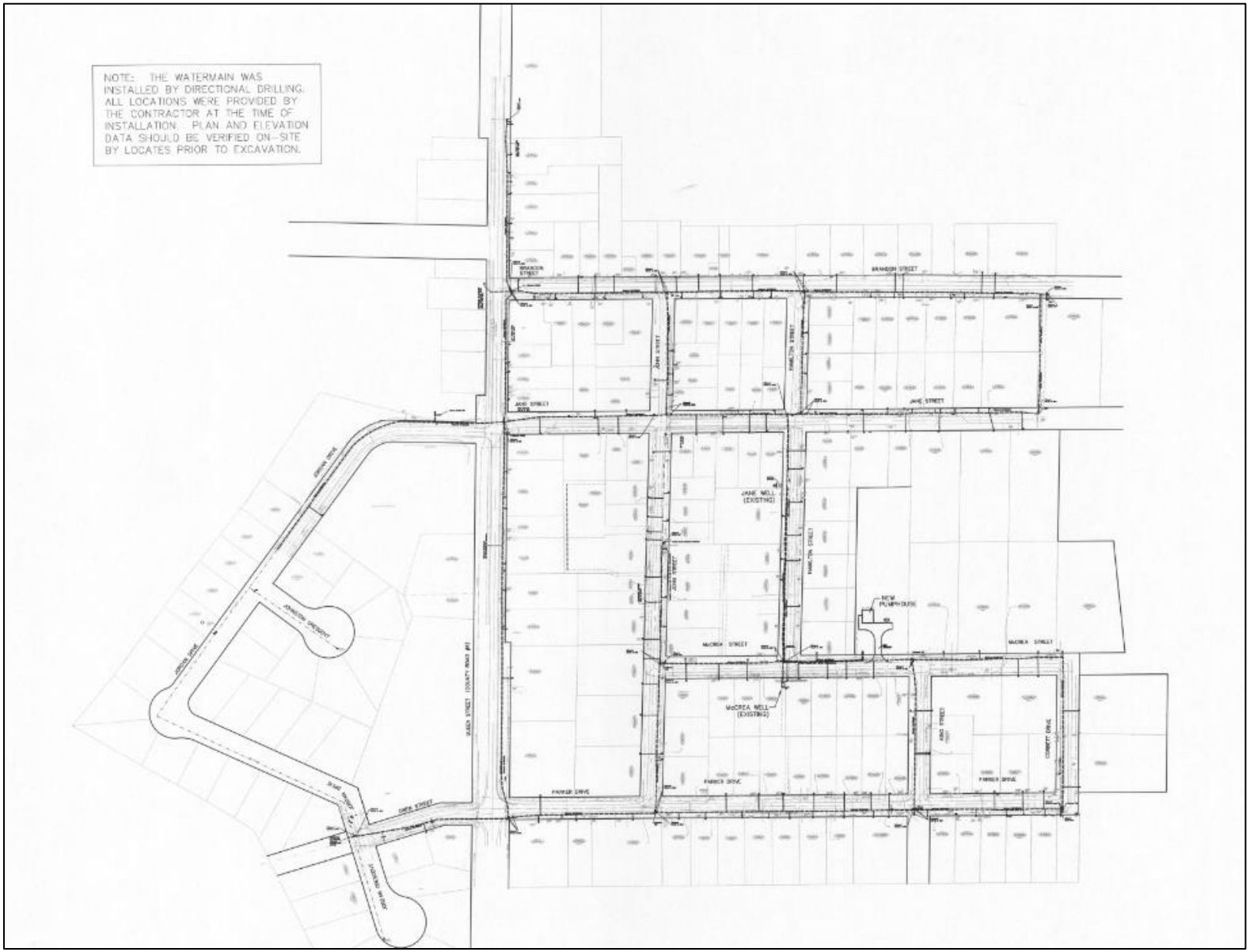
Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by water network.

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

Core Value	Qualitative Description	Current LOS
Affordable	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Figure 41
Reliable	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	There is no fire flow available
	Description of boil water advisories and service interruptions	There have been no boil water advisories or water main breaks

Figure 41 Belgrave Water Network Map



Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the water network.

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

Service Attribute	Technical Metric	2021 LOS	2022 LOS
Affordable	% of properties connected to the municipal water system	11% - properties 70% - available	11.5% - properties 73% - available
Reliability	% of properties where fire flow is available	0%	0%
	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0	0
	# of connection-days per year where water is not available to water main breaks compared to the total number of properties connected to the municipal water system	0	0

Appendix D: Stormwater Network

State of the Infrastructure

Morris-Turnberry's stormwater network infrastructure is in the hamlets of Belmore, Belgrave, Bluevale and Lower Town, Wingham. The pipes vary in length, diameter, materials used, date constructed and design. The municipality separates its stormwater assets into mains and catch basins.

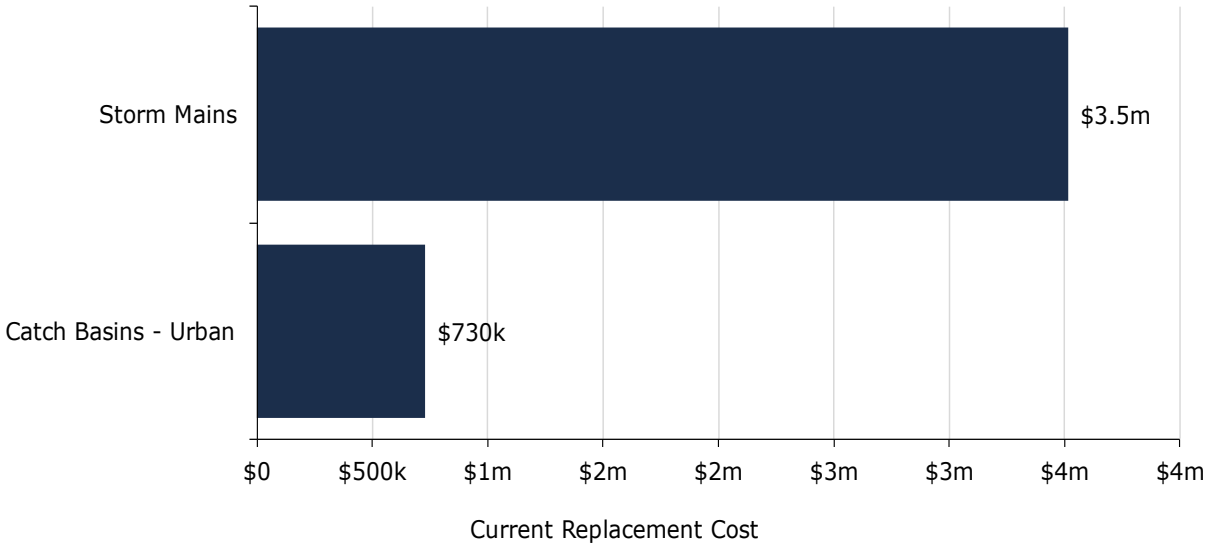
The state of the infrastructure for the stormwater network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
		Annual Requirement:	$53,060
$4,244,795	Very Good (83%)	Funding Available:	$0
		Annual Deficit:	$53,060

Asset Inventory & Valuation

The graph below displays the replacement cost of each asset segment in the Municipality's stormwater network inventory.

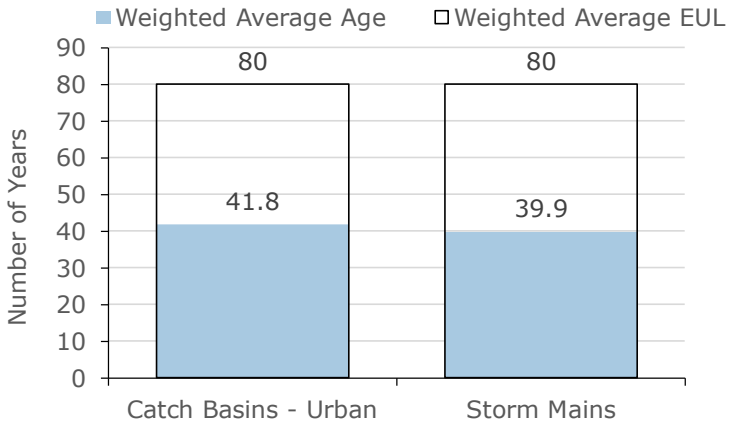
Figure 42 Stormwater Network Replacement Cost



Asset Condition & Age

The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

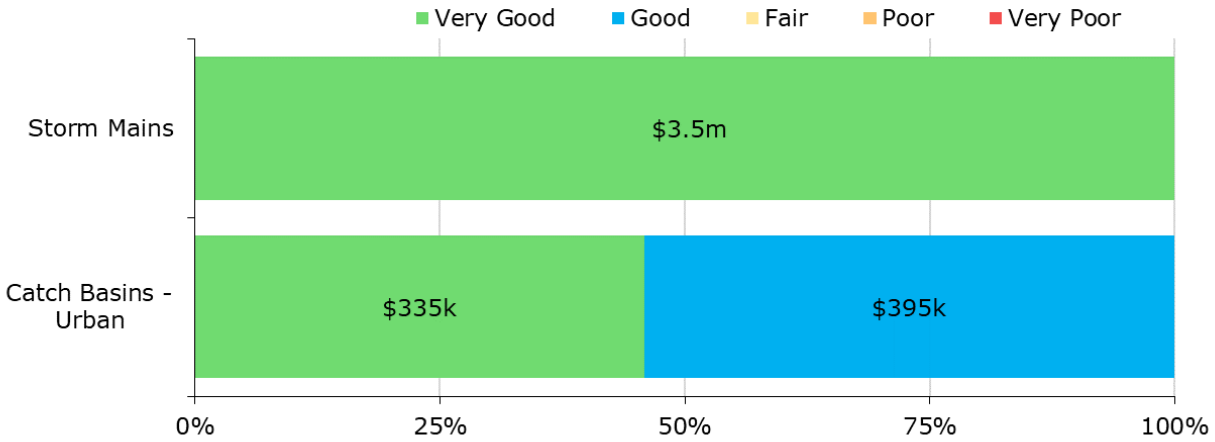
Figure 43 Stormwater Network Average Age vs Average EUL



Each asset's Estimated Useful Life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

Figure 44 Stormwater Network Condition Breakdown



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

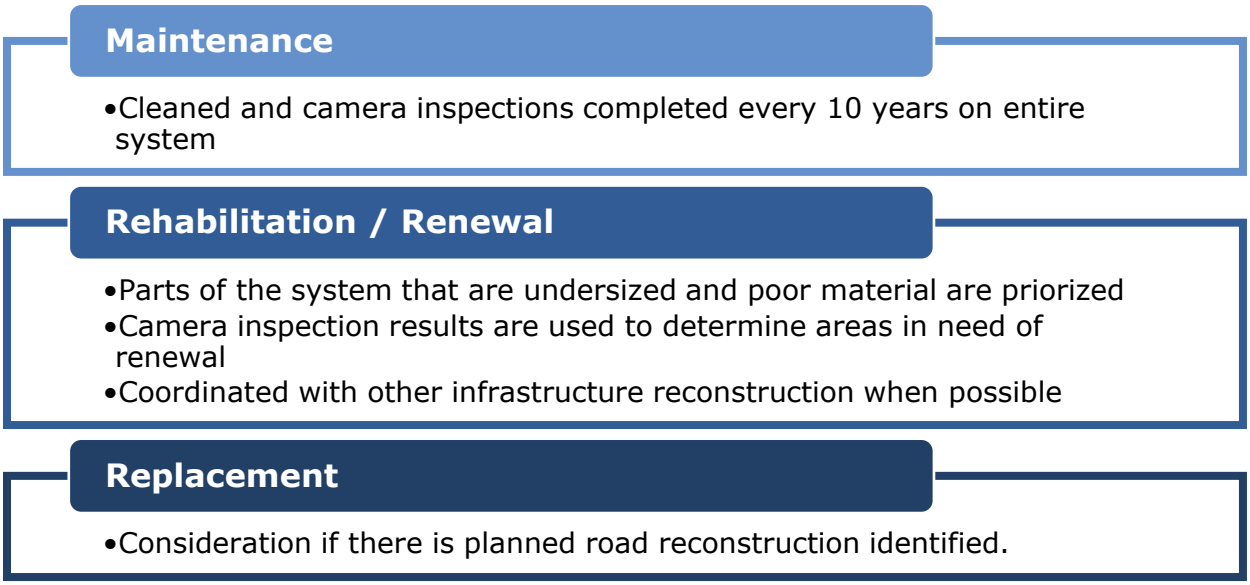
Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The entire stormwater system is flushed, and camera inspected every 10 years.

Lifecycle Management Strategy

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following figures outline Morris-Turnberry's current lifecycle management strategy.

Figure 45 Stormwater Network Current Lifecycle Strategy

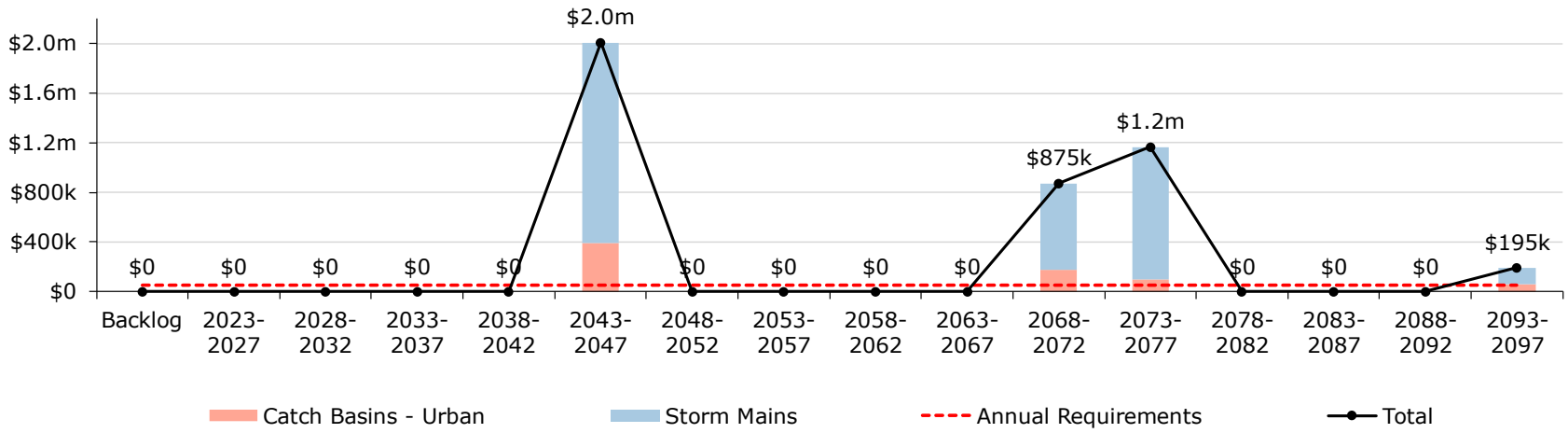


Forecasted Capital Requirements

Figure 46 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Municipality's stormwater infrastructure. This analysis was run until 2097 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Morris-Turnberry's average annual requirements (red dotted line) total $53 thousand for all stormwater network 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 long-term time horizon and peaking at $2 million between 2043 and 2047 as a substantial portion of stormwater main assets reach the end of their useful life. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 46 Stormwater Network Forecasted Capital Replacement Requirements



Like water assets, particularly mains, it is unlikely that all mains will need to be replaced as forecasted. Coordinated projects, along with camera inspection data, may help drive replacements and rehabilitations.

Table 21 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, which was limited to asset age, replacement cost, and useful life.

Table 21 Stormwater Network System-Generated 10-Year Capital Costs

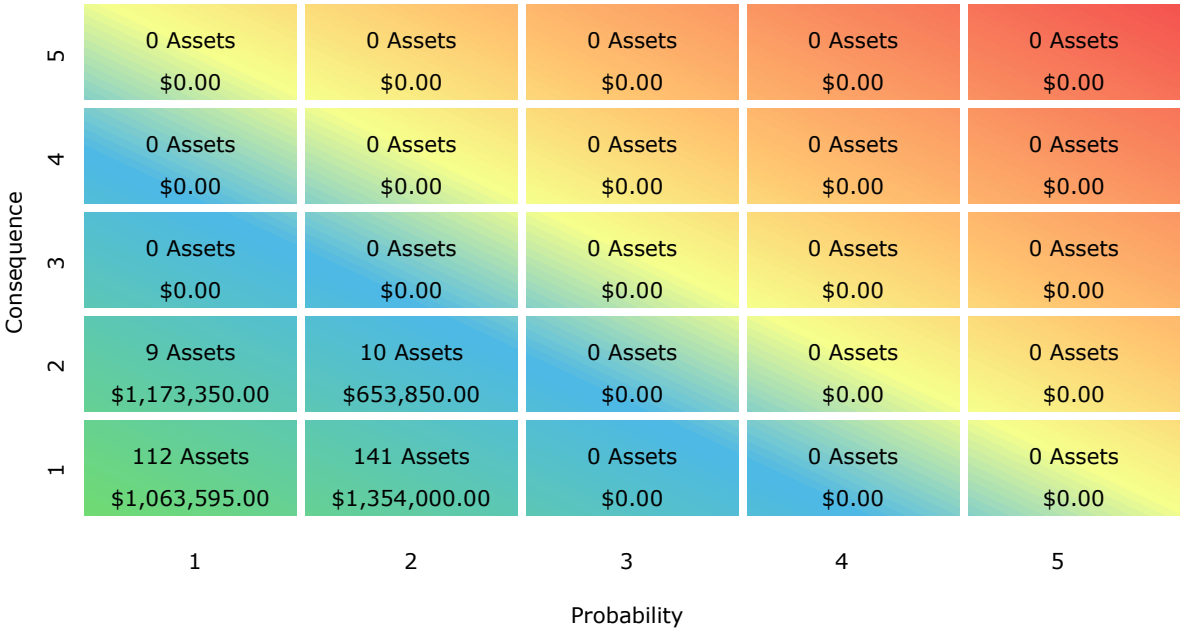
Segment	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Catch Basins - Urban	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Municipality's capital expenditure forecasts.

Risk & Criticality

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 47 Stormwater Network Risk Matrix

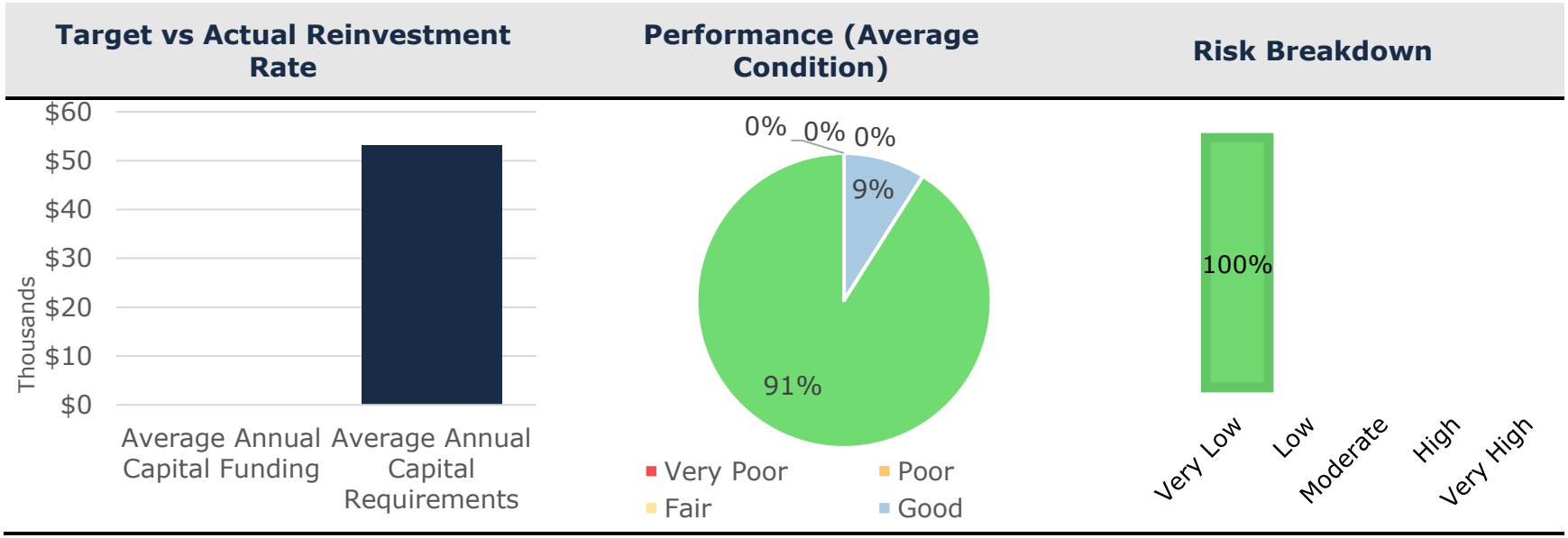


This is a high-level model developed by municipal staff and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The identification of critical assets allows the Municipality to determine appropriate risk mitigation strategies and treatment options.

Levels of Service

The following tables identify Morris-Turnberry's metrics to identify the current level of service for the stormwater network. By comparing the cost, performance (average condition) and risk year-over-year the Municipality will be able to evaluate how their services/assets are trending. Morris-Turnberry will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 48: Stormwater Network Strategic Levels of Service



Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the stormwater network.

Table 22 Ontario Regulation 588/17 Stormwater Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Reliable	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater management system	The municipality estimates 54.80% of its stormwater assets would be resilient to a 5-year storm. Based on staff observation and the actual performance of the existing stormwater assets, it is not believed the stormwater assets were designed for, or provide protection from, a 100-year storm.
Affordable	A description of the areas with storm systems or a map of the storm system	See Figure 49

Figure 49 Belgrave Stormwater System

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the stormwater network.

Table 23 Ontario Regulation 588/17 Stormwater Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Reliable	% of properties in municipality resilient to a 100-year storm	0%
	% of the municipal stormwater management system resilient to a 5-year storm	54.8%

Appendix E: Buildings

State of the Infrastructure

Morris-Turnberry owns and maintains several facilities that provide key services to the community. These include:

- administrative offices
- landfill operations
- public works garages and storage sheds
- community centres

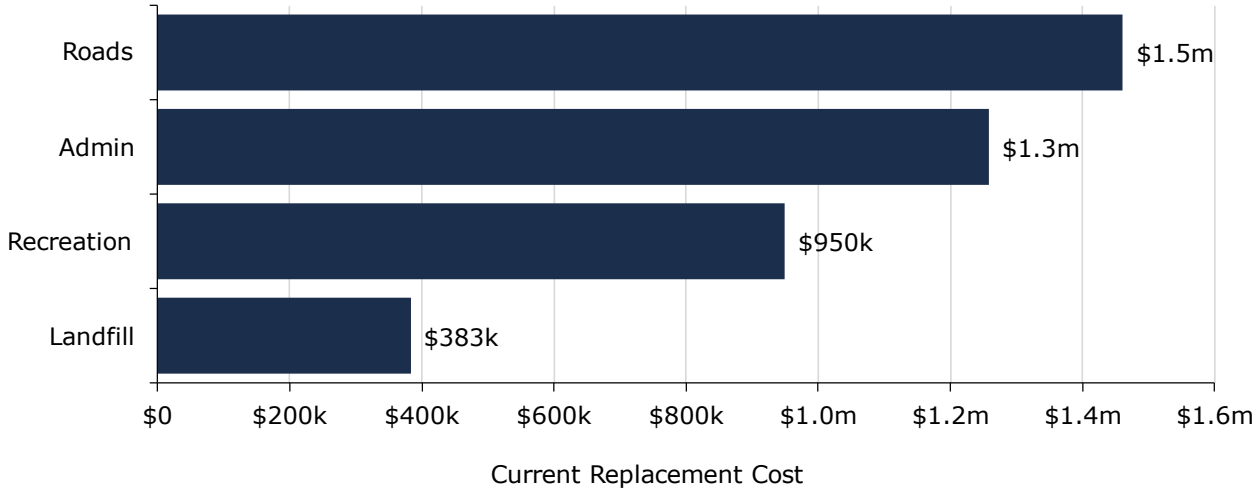
The state of the infrastructure for the buildings and facilities is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$4,051,304	Good (74%)	Annual Requirement:	$110,192
		Funding Available:	$65,898
		Annual Deficit:	$44,293

Inventory & Valuation

The graph below displays the total replacement cost of each asset segment in Morris-Turnberry's buildings inventory. As the Municipality has not had a complete componentization of their buildings their inventory tracks buildings as a main asset with some small as replaced componentization.

Figure 50 Buildings Replacement Cost

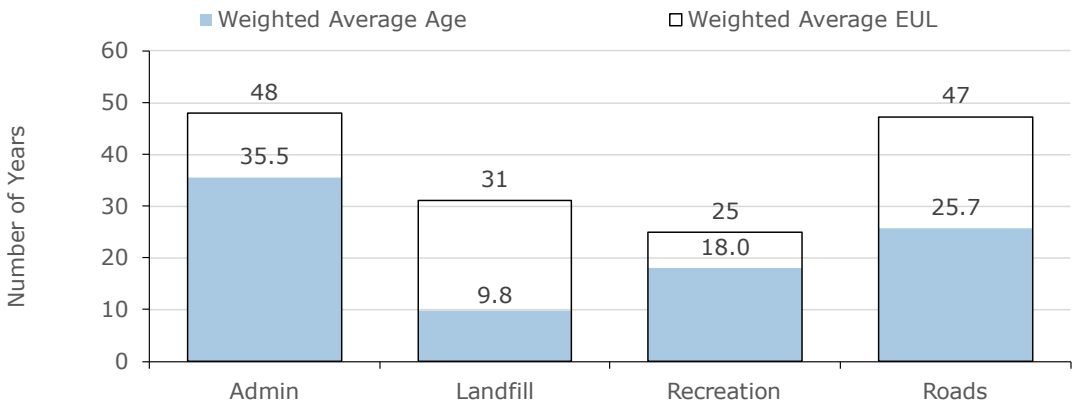


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

Asset Condition & Age

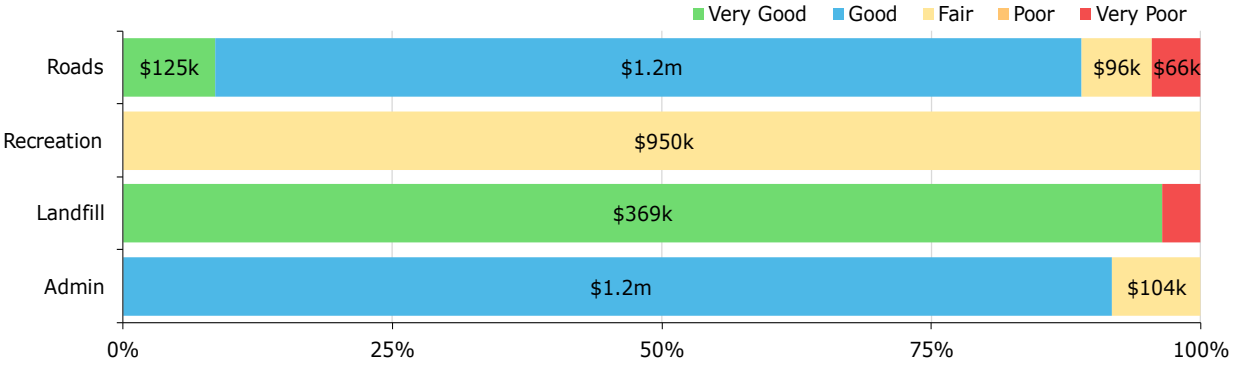
The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 51 Buildings Average Age vs Average EUL



The graph below visually illustrates the average condition for each asset segment on a very good to very poor.

Figure 52 Buildings Condition Breakdown



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

Each asset's estimated useful life should also be reviewed to determine whether adjustments need to be made to better align with the observed service life.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Buildings are repaired as required based on deficiencies identified by outside experts, staff, or residents.

Lifecycle Management Strategy

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following table outlines the Municipality's current lifecycle management strategy.

Figure 53 Buildings Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Maintenance of buildings is identified by staff in a reactive breakdown response

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Morris-Turnberry should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 65 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average capital requirements at $110 thousand.

Figure 54 Buildings Forecasted Capital Replacement Requirements

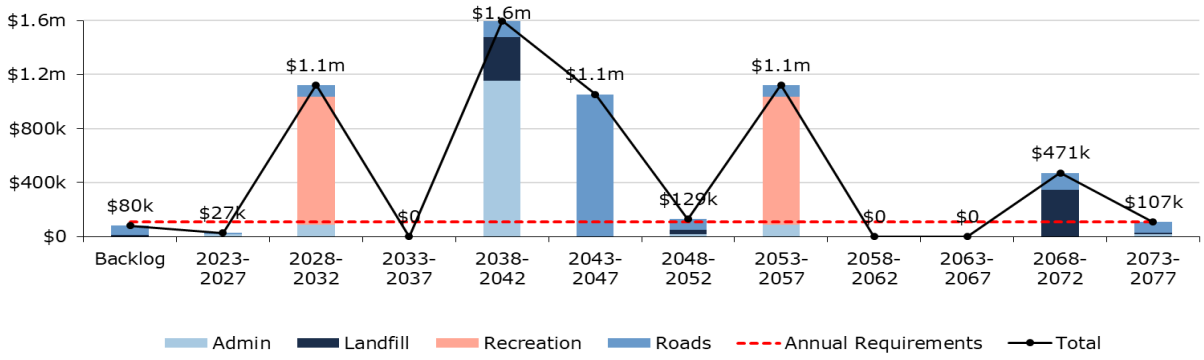


Table 24 below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service.

Table 24 Buildings System-Generated 10-Year Capital Costs

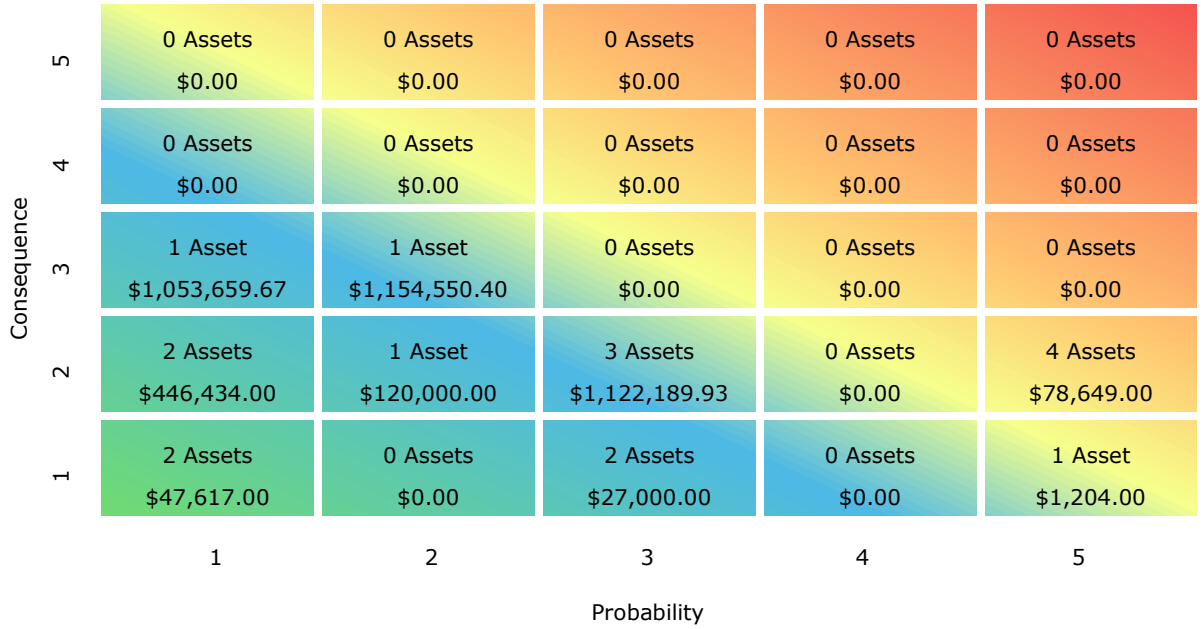
Segment	Backlog	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Admin	$0	$0	$0	$0	$15k	$0	$89k	$0	$0	$0	$0
Landfill	$14k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recreation	$0	$0	$0	$0	$0	$0	$0	$950k	$0	$0	$0
Roads	$66k	$0	$0	$0	$12k	$0	$84k	$0	$0	$0	$0

These projections are generated in Citywide and rely on the data available in the asset register, which was limited to asset age, replacement cost, and useful life.

Risk & Criticality

The risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 55 Buildings Risk Matrix



This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

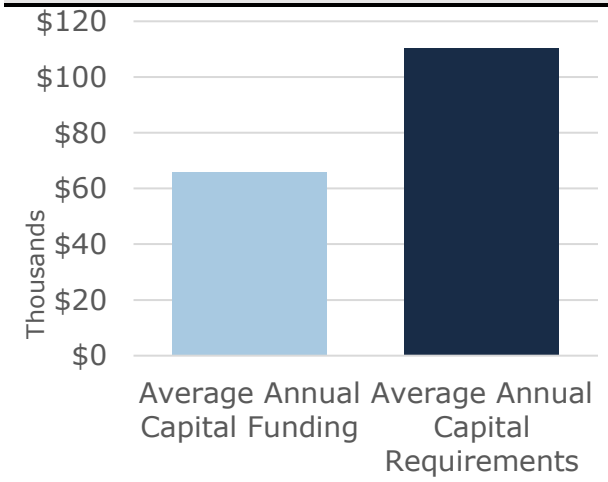
The identification of critical assets allows the Municipality to determine risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Levels of Service

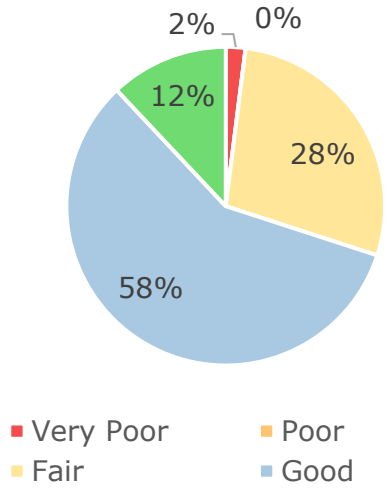
By comparing the cost, performance (average condition) and risk year-over-year, the Municipality will be able to evaluate how their services/assets are trending. The Municipality will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 56: Buildings Strategic Levels of Service

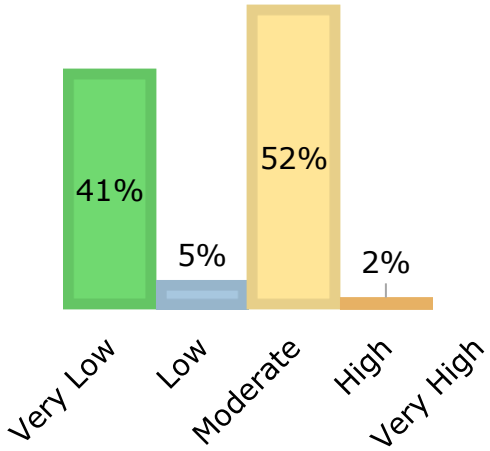
Target vs Actual Reinvestment Rate



Performance (Average Condition)



Risk Breakdown



Community Levels of Service

The qualitative descriptions that determine the community levels of service provided by the municipal buildings are based on the types of facilities outlined below:

- administrative offices – general government services
- landfill operations – solid waste disposal services
- public works garages and storage sheds – roadway and winter control services
- community centres – recreation and cultural services

Technical Levels of Service

The quantitative metrics that determine the technical level of service provided by the buildings in Morris-Turnberry are going to be the analysis of reinvestment rates, asset condition and asset risk levels.

Table 25 Buildings Technical Levels of Service

Service Attribute	Technical Metric	2021 LOS	2022 LOS
Affordable	Reinvestment Rate		1.6%
Reliability	Average Condition	75.98%	73.64%
	Average Risk	6.55	6.55

Appendix F: Vehicles

State of the Infrastructure

Vehicles allow staff to efficiently deliver municipal services and personnel. Municipal vehicles are used to support several service areas, including:

- Roads vehicles for winter control activities
- Landfill vehicles to provide solid waste disposal management
- Admin vehicles for building permit and inspection services

The state of the infrastructure for the vehicles is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$5,306,378	Good (67%)	Annual Requirement:	$381,345
		Funding Available:	$150,000
		Annual Deficit:	$231,345

Inventory & Valuation

The graph below displays the total replacement cost of each asset segment in the vehicle inventory.

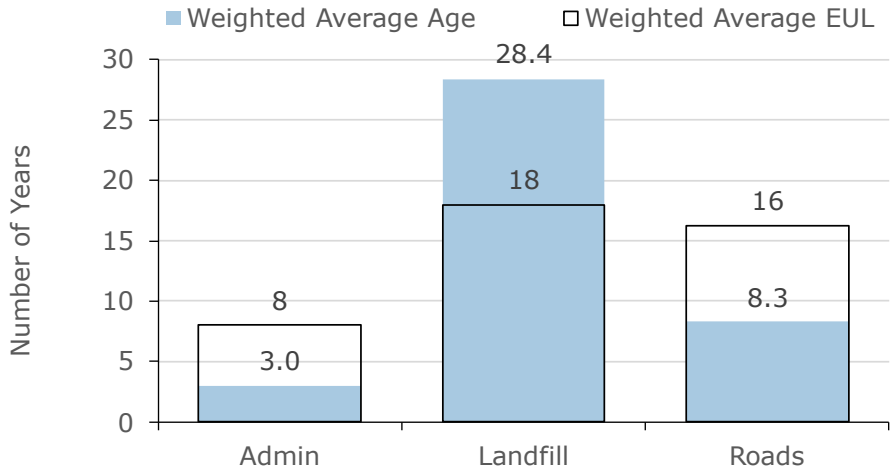
Figure 57 Vehicle Replacement Costs

Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

Asset Condition & Age

The graph below identifies the average age and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

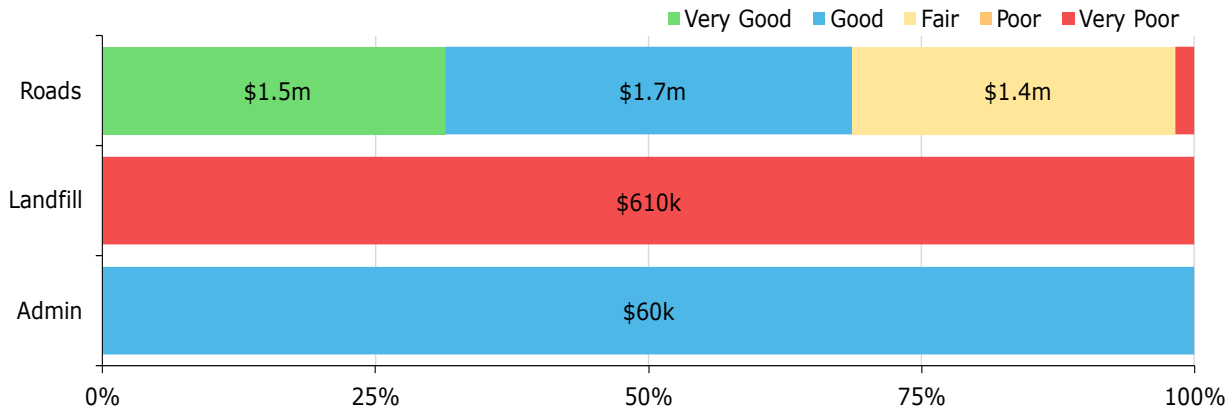
Figure 58 Vehicles Average Age vs Average EUL



Each asset's estimated useful life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

Figure 59 Vehicles Condition Breakdown



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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. An example of the Municipality's current approach is staff complete regular visual inspections of vehicles to ensure they are in state of adequate repair prior to operation.

Lifecycle Management Strategy

The condition or performance of assets will deteriorate over time. To ensure vehicles are performing as expected, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

Figure 60 Vehicles Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- operations and maintenance is completed by internal staff
- replacements are completed based on useful life estimates

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 25 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average annual capital requirements at $381 thousand.

Figure 61 Vehicle Forecasted Capital Replacement Requirements

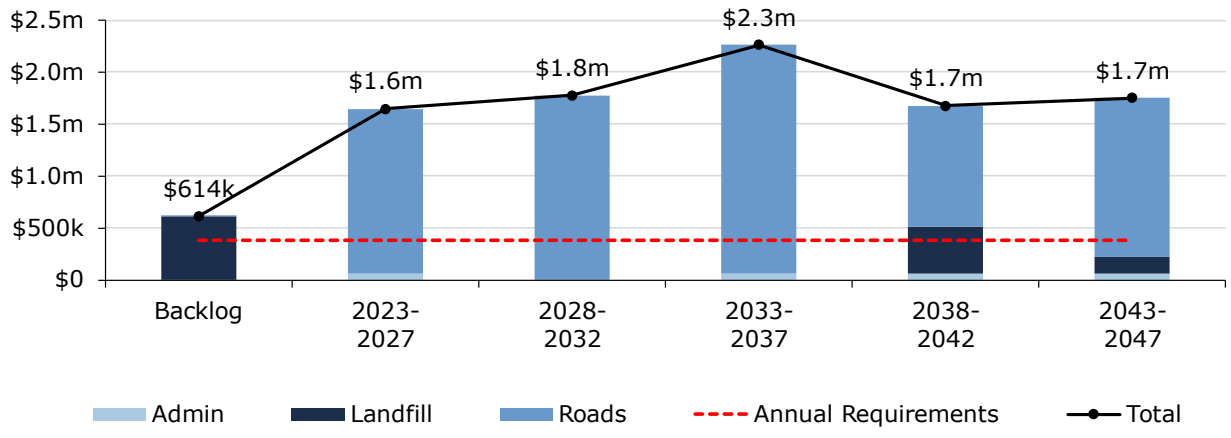


Table 26 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 26 Vehicles System-Generated 10-Year Capital Costs

Segment	Backlog	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Admin	$0	$0	$0	$0	$60k	$0	$0	$0	$0	$0	$0
Landfill	$610k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Roads	$4k	$78k	$0	$660k	$760k	$87k	$270k	$1.3m	$80k	$20k	$80k

As no assessed condition data was available for the vehicles, only age was used to determine forthcoming replacement needs. 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.

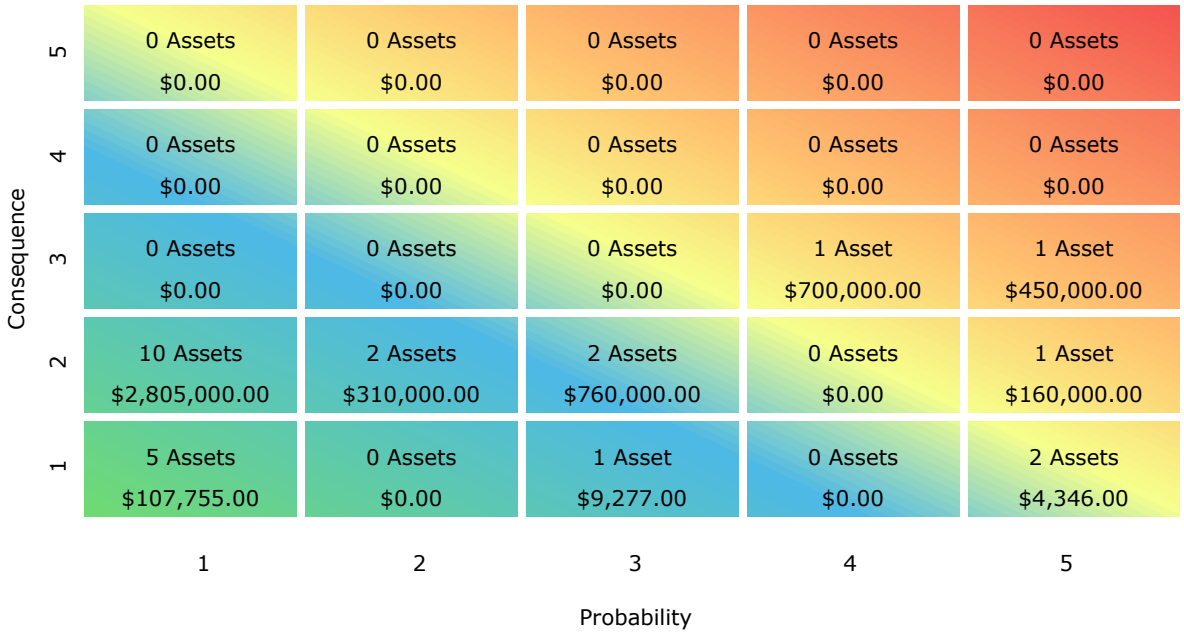
Risk & Criticality

The risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets allows the Municipality to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Figure 62 Vehicles Risk Matrix

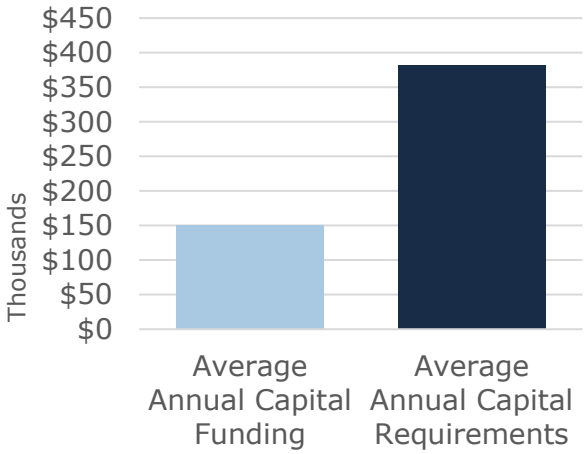


Levels of Service

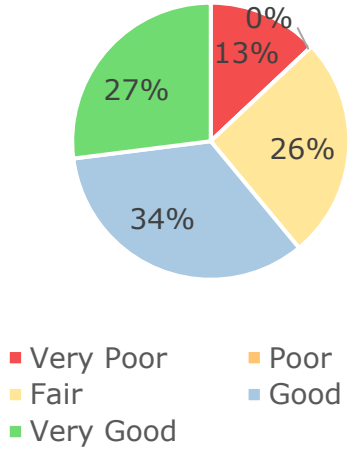
By comparing the cost, performance (average condition) and risk year-over-year, the Municipality will be able to evaluate how their services/assets are trending. The Municipality will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 63: Vehicles Strategic Levels of Service

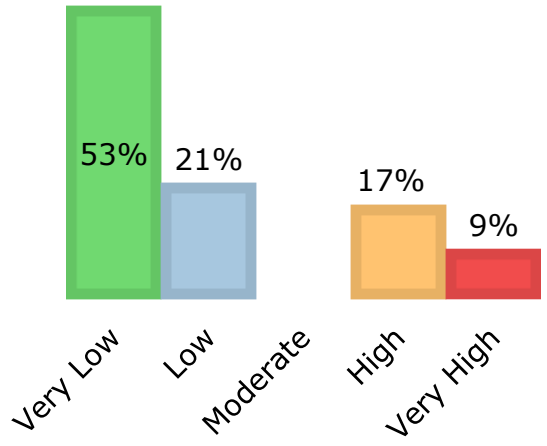
Target vs Actual Reinvestment Rate



Performance (Average Condition)



Risk Breakdown



Community Levels of Service

The qualitative descriptions that determine the community levels of service provided by vehicles are based on the types of vehicles outlined below:

- Admin vehicles– general government services
- Landfill vehicles – solid waste disposal services
- Roads vehicles – roadway and winter control services

Technical Levels of Service

The quantitative metrics that determine the technical level of service provided by the vehicles in Morris-Turnberry are going to be the analysis of reinvestment rates, asset condition and asset risk levels.

Table 27 Vehicles Technical Levels of Service

Service Attribute	Technical Metric	2021 LOS	2022 LOS
Affordable	Reinvestment Rate		2.8%
Reliability	Average Condition	72.65%	67.43%
	Average Risk	5.96	6.57

Appendix G: Equipment

State of the Infrastructure

To maintain the quality stewardship of Morris-Turnberry's infrastructure and support the delivery of services, municipal staff own and employ various types of equipment. This includes:

- Computers, furniture and phone systems to support all municipal services
- Roads equipment to support roadway maintenance
- Landfill equipment to support solid waste disposal management

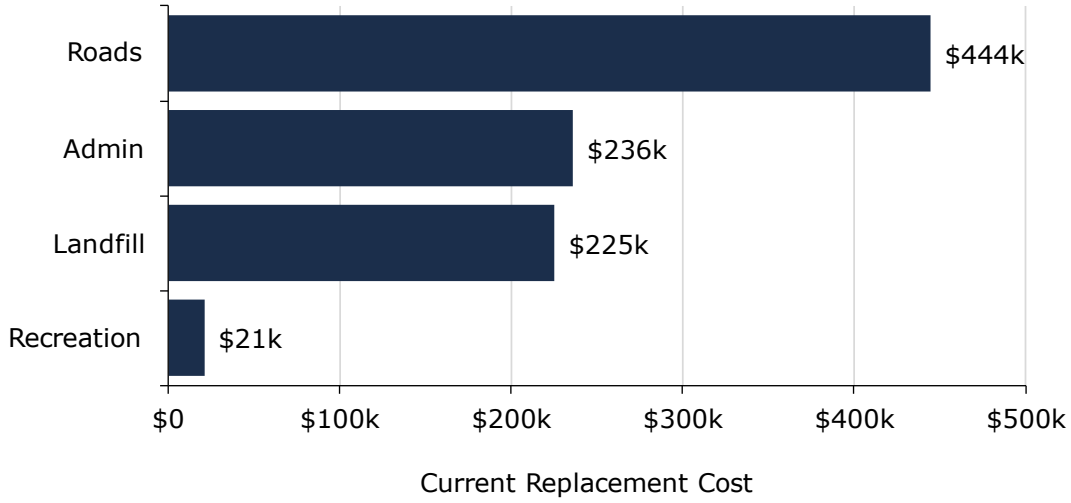
The state of the infrastructure for equipment is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$926,725	Poor (35%)	Annual Requirement:	$72,025
		Funding Available:	$50,000
		Annual Deficit:	$22,025

Inventory & Valuation

The graph below displays the total replacement cost of each asset segment in the Morris-Turnberry's equipment inventory.

Figure 64 Equipment Replacement Costs

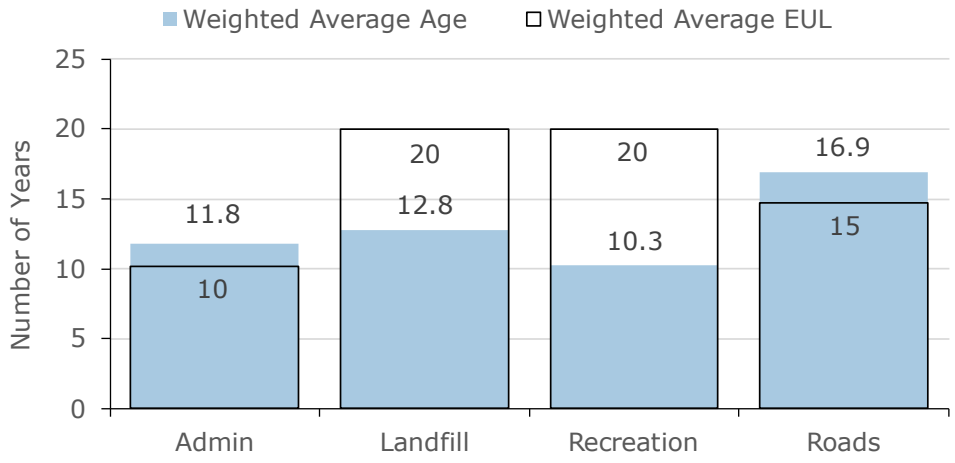


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent capital requirements.

Asset Condition & Age

The graph below identifies the average age and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

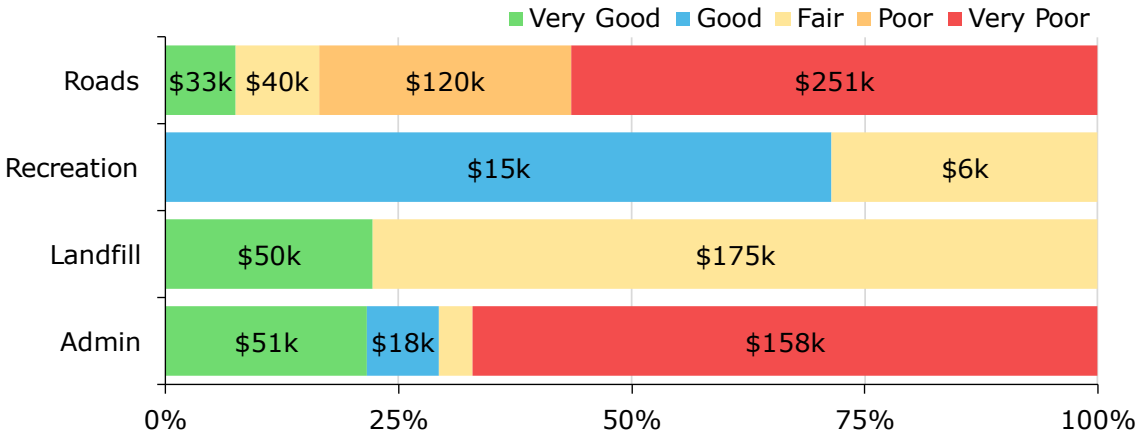
Figure 65 Equipment Average Age vs Average EUL



Each asset's estimated useful life should also be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

Figure 66 Equipment Condition Breakdown



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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The current approach is varied because of the broad range of types of equipment included in this category.

Lifecycle Management Strategy

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

Figure 67 Equipment Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Similar to condition it is equipment type and department dependant

Forecasted Capital Requirements

The following graph identifies capital requirements over the next 25 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average annual capital requirements at $72 thousand.

Figure 68 Equipment Forecasted Capital Replacement Requirements

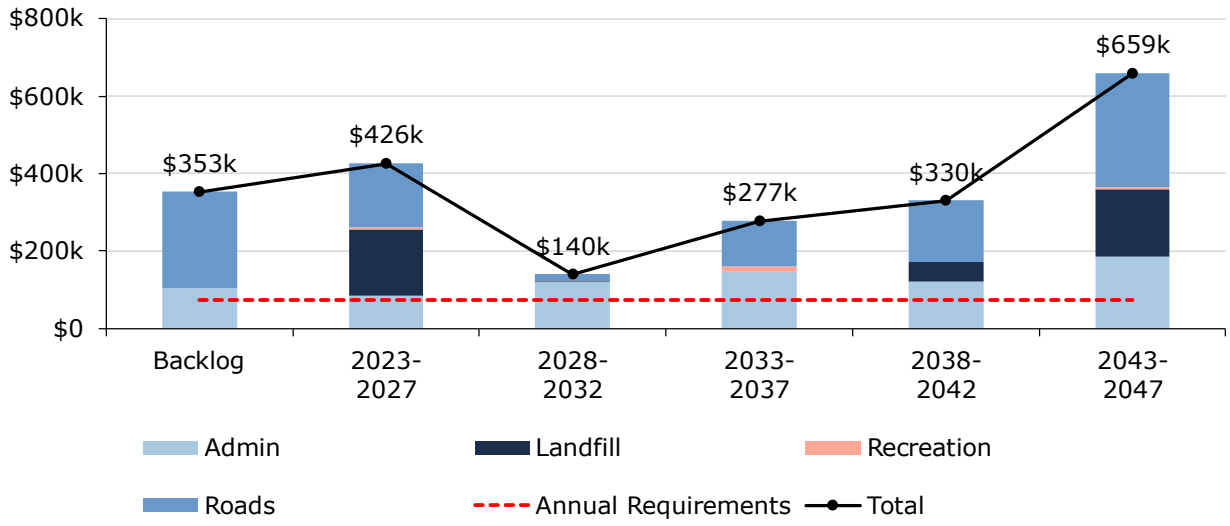


Table 28 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 28 Equipment System-Generated 10-Year Capital Costs

Segment	Backlog	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Admin	$103k	$55k	$9k	$4k	$6k	$9k	$57k	$39k	$4k	$12k	$8k
Landfill	$0	$0	$0	$0	$154k	$18k	$3k	$0	$0	$0	$0
Recreation	$0	$0	$0	$0	$6k	$0	$0	$0	$0	$0	$0
Roads	$250k	$1k	$120k	$0	$43k	$0	$7k	$0	$7k	$3k	$0

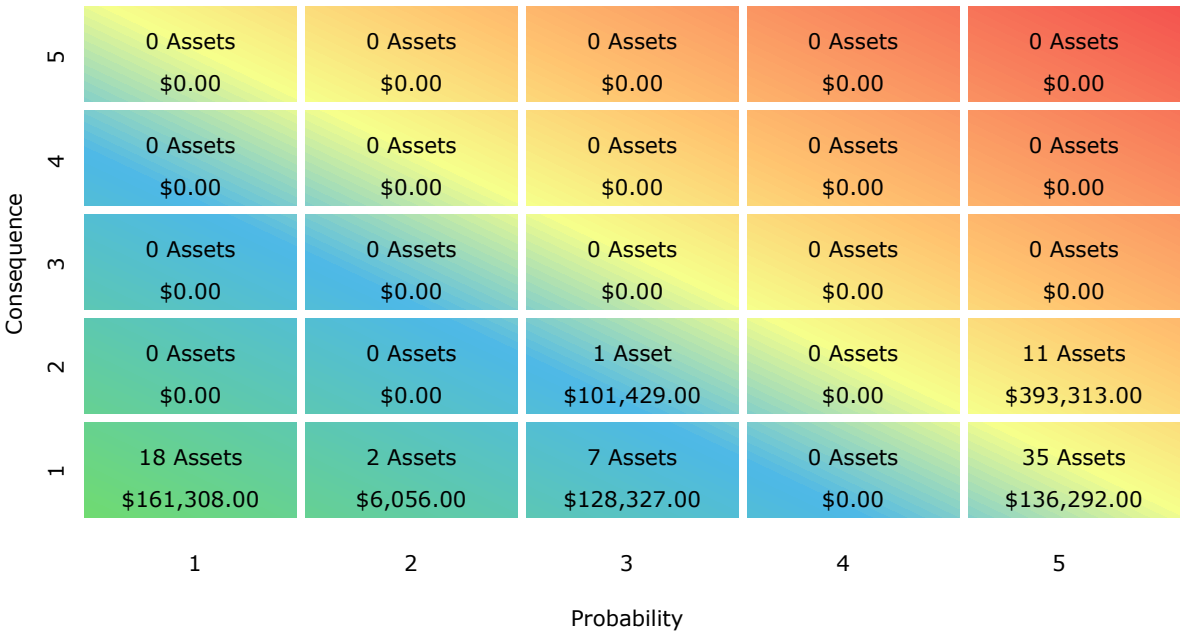
As no assessed condition data was available for the equipment, only age was used to determine forthcoming replacement needs. These projections can be different from actual capital forecasts. Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Municipality's capital expenditure forecasts.

Risk & Criticality

The risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on available inventory data. See Appendix I: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

Figure 69 Equipment Risk Matrix

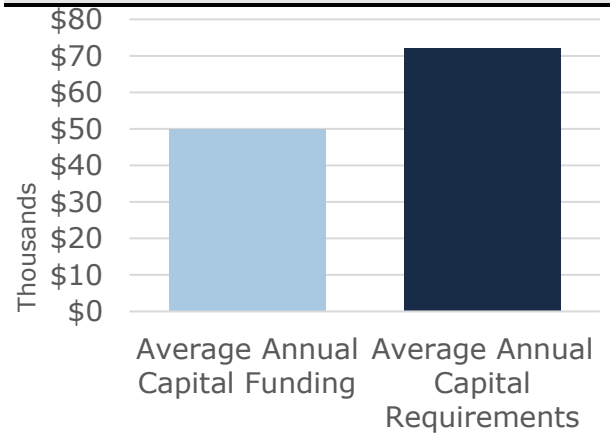


Levels of Service

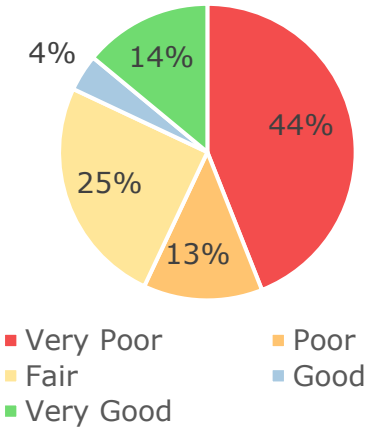
By comparing the cost, performance (average condition) and risk year-over-year, Morris-Turnberry will be able to evaluate how their services/assets are trending. The Municipality will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Figure 70: Equipment Strategic Levels of Service

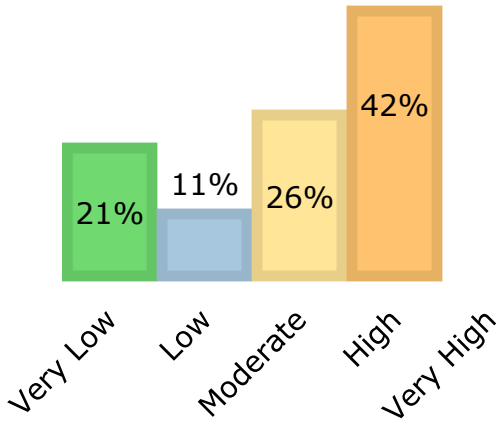
Target vs Actual Reinvestment Rate



Performance (Average Condition)



Risk Breakdown



Community Levels of Service

The qualitative descriptions that determine the community levels of service provided by equipment utilized in the municipality are based on the general types outlined below:

- Computers, furniture and phone systems to support all municipal services
- Roads equipment to support roadway maintenance
- Landfill equipment to support solid waste disposal management

Technical Levels of Service

The quantitative metrics that determine the technical level of service provided by equipment utilized in Morris-Turnberry are going to be the analysis of reinvestment rates, asset performance (condition breakdown) and asset risk levels.

Table 29 Equipment Technical Levels of Service

Service Attribute	Technical Metric	2021 LOS	2022 LOS
Affordable	Reinvestment Rate		5.4%
Reliability	Average Condition	40.82%	34.77%
	Average Risk	7.6	8.27

Appendix H: Condition Assessment Guidelines

The foundation of good asset management practice is accurate and reliable data on the current condition of infrastructure. Assessing the condition of an asset at a single point in time allows staff to have a better understanding of the probability of asset failure due to deteriorating condition.

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the Municipality's condition assessment strategy should outline several key considerations, including:

- The role of asset condition data in decision-making
- Guidelines for the collection of asset condition data
- A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the Municipality's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the Municipality can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the Municipality can develop long-term financial strategies with higher accuracy and reliability.

Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that

should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.

There are many options available to the Municipality to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the Municipality should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

- Relevance: every data item must have a direct influence on the output that is required
- Appropriateness: the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
- Reliability: the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
- Affordability: the data should be affordable to collect and maintain

Appendix I: Risk Rating Criteria

Risk Definitions

Risk	Integrating a risk management framework into your asset management program requires the translation of risk potential into a quantifiable format. This will allow you to compare and analyze individual assets across your entire asset portfolio. Asset risk is typically defined using the following formula: **Risk = Probability of Failure (POF) x Consequence of Failure (COF)**
Probability of Failure (POF)	The probability of failure relates to the likelihood that an asset will fail at a given time. The current physical condition and service life remaining are two commonly used risk parameters in determining this likelihood.
POF - Structural	The likelihood of asset failure due to aspects of an asset such as load carrying capacity, condition or breaks
POF - Functional	The likelihood of asset failure due to its performance
POF - Range	**1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain**
Consequences of Failure (COF)	The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from non-eventful to impactful: a small diameter water main break in a subdivision may cause several rate payers to be without water service for a short time. However, a larger trunk water main may break outside a hospital, leading to significantly higher consequences.
COF - Financial	The monetary consequences of asset failure for the organization and its customers
COF - Social	The consequences of asset failure on the social dimensions of the community
COF - Environmental	The consequence of asset failure on an asset's surrounding environment
COF - Operational	The consequence of asset failure on the Town's day-to-day operations
COF - Health & safety	The consequence of asset failure on the health and well-being of the community
COF - Economic	The consequence of asset failure on strategic planning
COF - Range	**1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe**

Risk Frameworks

Risk Criteria	Criteria	Weighting (%)	Sub-Criteria	Weighting (%)	Value/Range	Score
COF	Economic	20%	Capacity Restrictions	100%	No Yes	1 - Insignificant 4 - Major
	Financial	50%	Replacement Cost	100%	0 - 10,000 10,000 - 50,000 50,000 - 250,000 250,000 - 1,000,000 >1,000,000	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
	Reputational	20%	Condition	100%	90 - 100 70 - 89 40 - 69 10 - 39 0 - 9	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
	Health & safety	10%	Construction Considerations	100%	No Yes	1 - Insignificant 4 - Major
POF	Structural	50%	Condition	100%	90 - 100 70 - 89 40 - 69 10 - 39 0 - 9	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain
	Functional	50%	Service Life Remaining	100%	> 40 % 30 - 40 % 20 - 30 % 10 - 20 % < 10 %	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain