

Asset Management Plan

Township of Macdonald,
Meredith & Aberdeen Add'l

2021

Document Revision History

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This Asset Management Plan was prepared by:



Empowering your organization through advanced
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Key Statistics

Replacement cost of
asset portfolio

\$77.9 million

Replacement cost of
infrastructure per household

\$96,980 (2021 Census)

Percentage of assets in
fair or better condition

88%

Percentage of assets with
assessed condition data

58%

Annual capital
infrastructure deficit

0.88 million

Recommended timeframe for
eliminating annual
infrastructure deficit

10-20 Years

Target reinvestment rate

2.16%

Actual reinvestment rate

1.03%

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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 critical services. The goal of asset management is to deliver an adequate level of service in the most cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

Scope

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

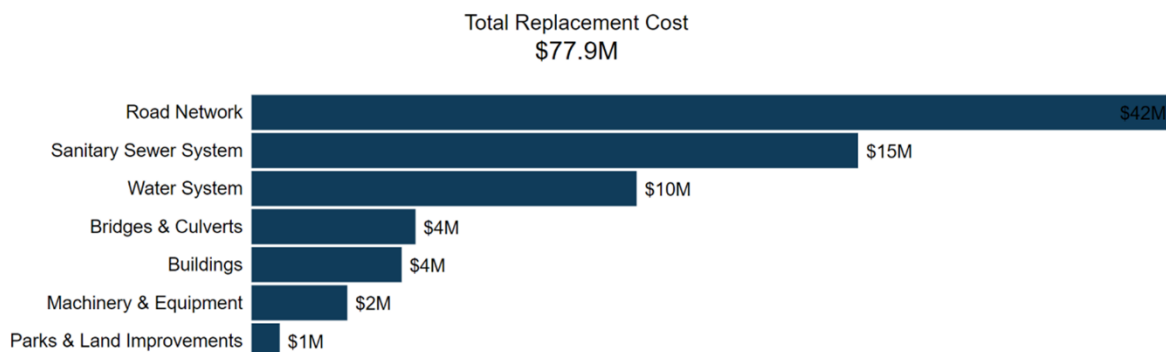
This AMP include the following asset categories:



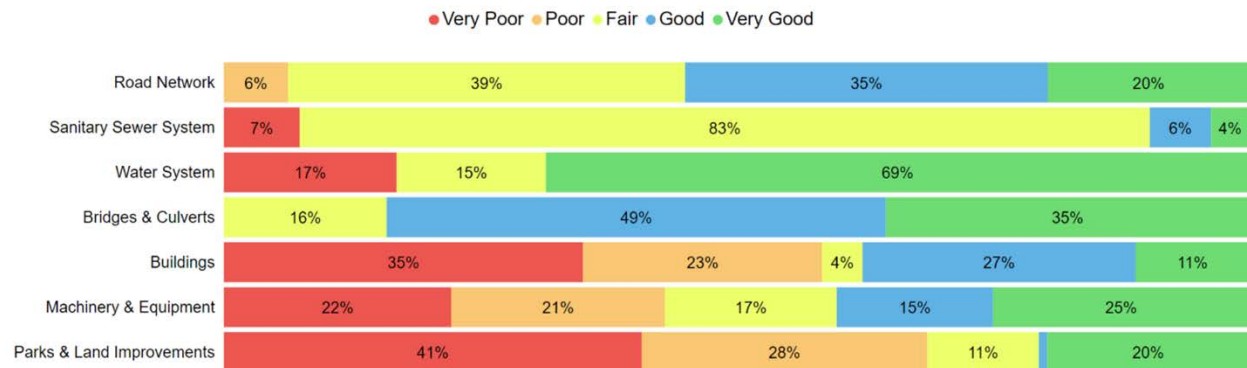
With the development of this AMP the Township of Macdonald, Meredith & Aberdeen Add'l has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2022. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2024 and 2025.

Findings

The overall replacement cost of the asset categories includes in this AMP totals to \$77.9 million. This is based on asset information in the portfolio as of the end of 2020.



About 88% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 58% of assets.



For the remaining 42% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

The accuracy and completeness of the asset inventory is another critical input to accurate asset management planning. It is important to review and update the primary asset inventory to ensure that it is at a higher level of data maturity for the next iteration of the AMP.

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

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Township's average annual capital requirement totals \$1.68 million. Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately \$0.8 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of \$0.88 million.

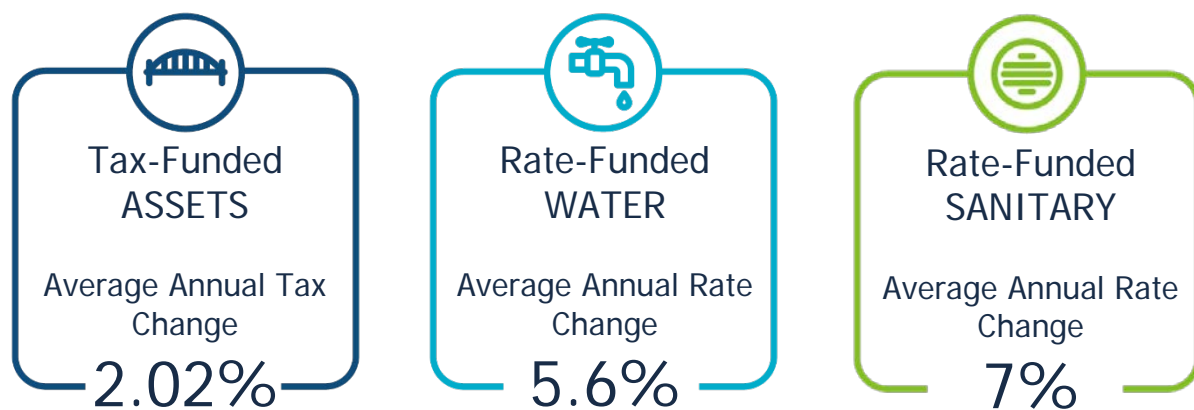
Annual Capital Requirements Per Household



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

Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to eliminate the Township's infrastructure deficit based on a 10-year period for tax funded assets and a 20-year period for rate funded assets:



Recommendations to guide continuous refinement of the Township's asset management program. These include:

- Reviewing asset data to update and maintain a complete and accurate centralized asset inventory
- Developing a condition assessment strategy with a regular schedule
- Reviewing and updating lifecycle management strategies

-
- Developing and regularly reviewing short- and long-term plans to meet capital requirements
 - Continuing to measure current levels of service and identify sustainable proposed levels of service

1

Introduction & Context

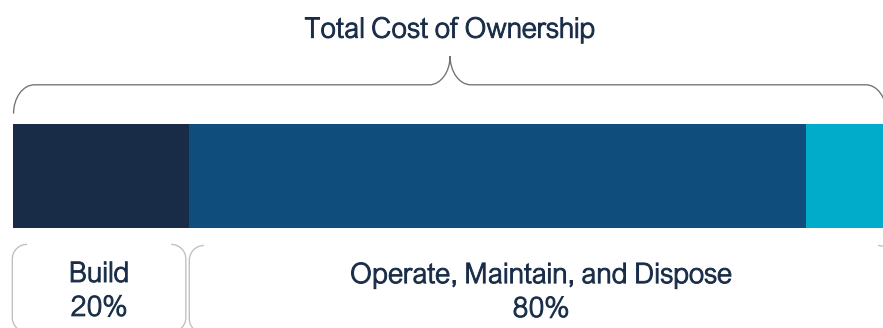
Key Insights

- The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio
- A municipal asset management program is a combination of several disciplines or business functions, including management, financial and economic analyses, engineering and operations and maintenance
- The Township's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management
- An asset management plan is a dynamic document that should be updated regularly to inform long-term planning
- Ontario Regulation 588/17 outlines several key milestone and requirements for asset management plans in Ontario between July 1, 2022 and 2025

1.1 An Overview of Asset Management

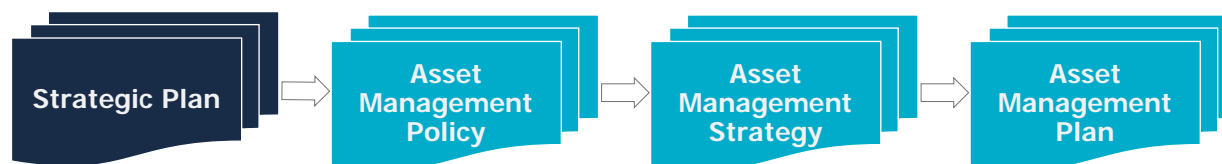
Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers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

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



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program.

The diagram below depicts an industry standard approach and sequence developing a practical asset management program. Beginning with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.



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

1.1.1 Asset Management Policy

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

The Township of Macdonald, Meredith & Aberdeen Add'l adopted **Policy Number: AMP 2019.7.1**, on July, 2019 in accordance with Ontario Regulation 588/17.

The stated objectives of the policy are to:

- Provide a framework for implementing asset management to enable a consistent and strategic approach to all levels of the organization
- Demonstrate Council's commitment to support the implementation of asset management methods that are consistent with their priorities and objectives
- Provide guidance to staff responsible for asset management
- Provide transparency and accountability and demonstrate the validity of the decision-making process which combine strategic plans, budgets, service levels and risks

The policy provides a foundation for the development of an asset management program within the Township. It covers key components that define a comprehensive asset management policy:

- The policy's objectives dictate the use of asset management practices to ensure all assets meet the agreed levels of service in the most efficient and effective manner;
- the policy commits to, where appropriate, incorporating asset management in the Township's other plans;
- there are formally defined roles and responsibilities of internal staff and stakeholders;
- the policy statements are well defined.

1.1.2 Asset Management Strategy

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

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

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

1.1.3 Asset Management Plan (AMP)

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

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

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

This document is an AMP that uses the updated asset inventory and has been prepared in accordance with O. Reg. 588/17.

1.2 Key Concepts in Asset Management

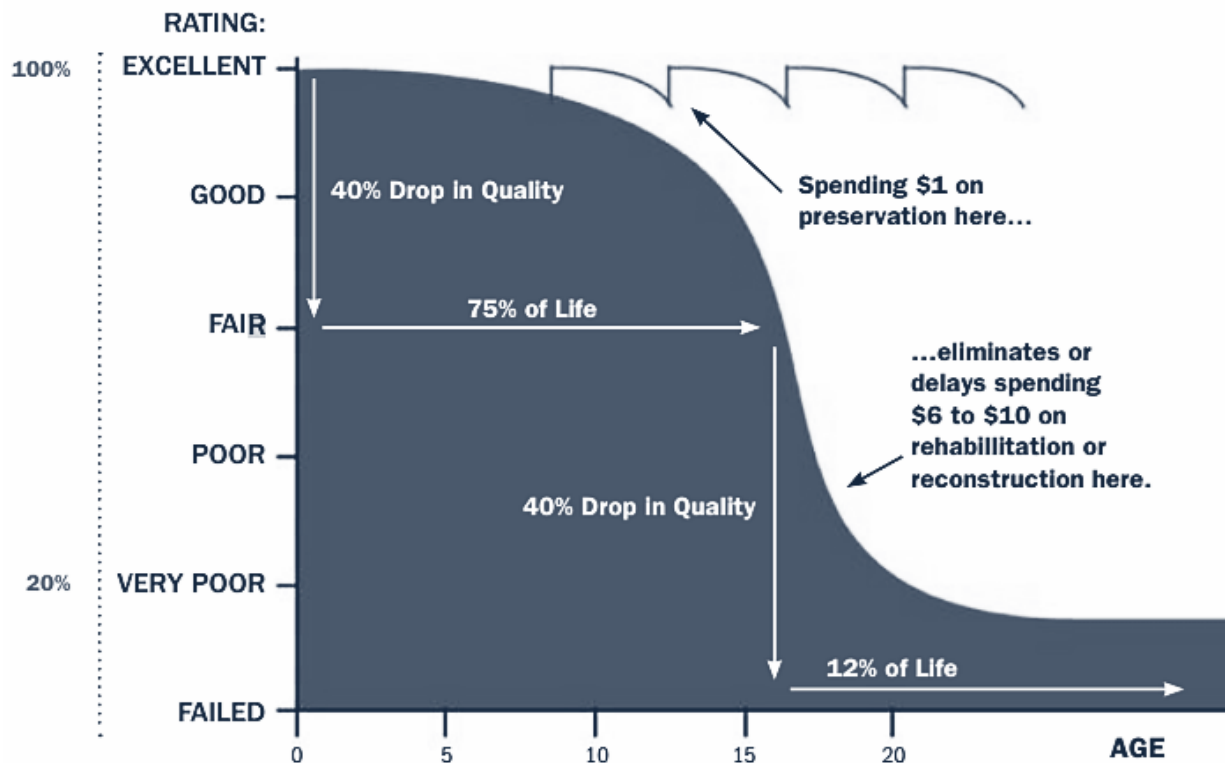
Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

1.2.1 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. Since costs to rehabilitate tend to increase towards the end of life of an asset, proactive and timely intervention will lead to lower lifecycle costs.

This concept is further illustrated by the graphic below, highlighting the cost impact of a maintenance activity contrasted by the cost impact of a rehabilitative activity later in the life of the asset.



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.

Lifecycle Activity	Description	Example (Roads)	Cost
Preventative Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	\$
General Maintenance	Activities that focus on current defects or inhibit deterioration	Pothole Repairs	\$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	\$\$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	\$\$\$
Replacement Upgrade	Asset end-of-life activities that involve the replacement of an asset to an 'upgraded' asset	Gravel Road to a Surface Treated Road	\$\$\$

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.

The Township's approach to lifecycle management is described within each asset category outlined in this AMP. Developing and implementing proactive lifecycle strategies 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.

1.2.2 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 than that of others. 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.

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

1.2.3 Levels of Service

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

These measures include a combination of those that have been outlined in O. Reg. 588/17 in addition to performance measures identified by the Township as worth measuring and evaluating. The Township measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives.

For core asset categories (Roads, Bridges & Culverts, Water, Sanitary, Storm Water) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP.

For non-core asset categories, the Township will define the qualitative descriptions that will be used to determine the community level of service by the July 2024 deadline.

Technical Levels of Service

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

For core asset categories (Roads, Bridges & Culverts, Water, Sanitary Sewer, Stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP.

For non-core asset categories, the Township will define the technical metrics that will be used to determine the technical level of service by the July 2024 deadline.

Current and Proposed Levels of Service

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

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

1.3 Ontario Regulation 588/17

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

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

2019

Strategic Asset Management Policy

2024

Asset Management Plan for Core and Non-Core Assets (same components as 2022)

2022

Asset Management Plan for Core Assets with the following components:

1. Current levels of service
2. Inventory analysis
3. Lifecycle activities to sustain LOS
4. Cost of lifecycle activities
5. Population and employment forecasts
6. Discussion of growth impacts

2025

A Strategic Asset Management Policy update and an Asset Management Plan for All Assets with the following additional components:

1. Proposed levels of service for next 10 years
2. Updated inventory analysis
3. Lifecycle management strategy
4. Financial strategy and addressing shortfalls
5. Discussion of how growth assumptions impacted lifecycle and financial

1.3.1 O. Reg. 588/17 Compliance Review

The following table identifies the requirements outlined in Ontario Regulation 588/17 for municipalities to meet by July 1, 2022. Next to each requirement a page or section reference is included in addition to any necessary commentary.

Requirement	O. Reg. Section	AMP Section Reference	Status
Summary of assets in each category	S.5(2), 3(i)	4.1.1 - 5.2.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	4.1.1 - 5.2.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	4.1.3 - 5.2.3	Complete
Condition of core assets in each category	S.5(2), 3(iv)	4.1.2 – 5.2.2	Complete
Description of Township's approach to assessing the condition of assets in each category	S.5(2), 3(v)	4.1.2 – 5.2.2	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	4.1.6 - 5.2.6	Complete for Core Assets Only
Current performance measures in each category	S.5(2), 2	4.1.6 - 5.2.6	Complete for Core Assets Only
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	4.1.4 - 5.2.4	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	Appendix A	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	6.1-6.2	Complete

2 Scope and Methodology

Key Insights

- This asset management plan includes 7 asset categories and is divided between tax-funded and rate-funded categories
- Asset data from various data sources was consolidated into the Township's tangible capital asset inventory to establish it as the primary asset inventory
- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation
- 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

2.1 Asset categories included in this AMP

This asset management plan for the Township of Macdonald, Meredith & Aberdeen Add'l is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs—requires analysis of only core assets (roads, bridges & culverts, water, and sanitary).

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

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges & Culverts	
Buildings	
Machinery & Equipment	
Land Improvements	
Water System	User Rates
Sanitary Sewer System	

2.2 The Asset Inventory

The asset information presented in this AMP has been developed from the asset inventory in CityWide Asset Manager™.

The asset inventory was restructured through the establishment of an industry standard asset hierarchy, and critical asset fields were standardized. In addition to this, and where possible, duplicate data was removed and asset data gaps were addressed.

2.3 Deriving Replacement Costs

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

User-Defined Cost and Cost/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/Adjusted 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 Township incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

2.4 Estimated Useful Life and Service Life Remaining

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

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

$$\text{Service Life Remaining (SLR)} = \text{In Service Date} + \text{Estimated Useful Life (EUL)} - \text{Current Year}$$

2.5 Deriving Annual Capital Requirements

By dividing the replacement cost of an asset with the asset's estimated useful life and factoring in the cost and impact of any lifecycle activities, the average annual capital requirements can be derived. The average annual requirement is calculated as follows:

$$\begin{aligned} \text{Annual Capital Requirement (Lifecycle Scenario)} &= \\ &= \frac{(\text{Replacement Cost} + \text{Cost of Lifecycle Activities})}{(\text{Estimated Useful Life (EUL)} + \text{Impact of Lifecycle Activities})} \end{aligned}$$

$$\text{Annual Capital Requirement (Replacement Only Scenario)} = \frac{\text{Replacement Cost}}{\text{Estimated Useful Life (EUL)}}$$

2.6 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 Township can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

$$\text{Target Reinvestment Rate} = \frac{\text{Annual Capital Requirement}}{\text{Total Replacement Cost}}$$

$$\text{Actual Reinvestment Rate} = \frac{\text{Annual Capital Funding}}{\text{Total Replacement Cost}}$$

2.7 Deriving 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 Township's asset portfolio. The table below outlines the condition rating system used in this AMP to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition.

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

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix D includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

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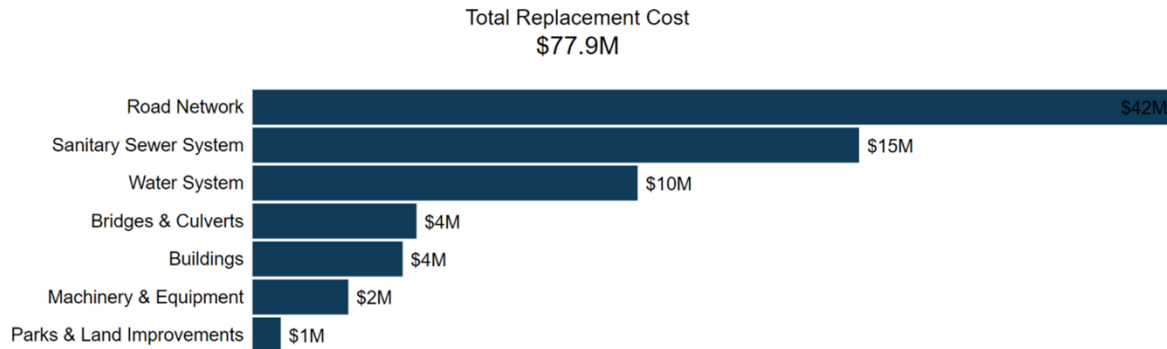
Portfolio Overview

Key Insights

- The total replacement cost of the Township's asset portfolio is \$77.9 million
- The Township's target re-investment rate is 2.17%, and the actual re-investment rate is 1.03%, contributing to an expanding infrastructure deficit
- 88% of all assets are in fair or better condition
- 24% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements total \$1.69 million per year across all assets
- Annual capital funding available by the Township totals \$0.8 million across all assets

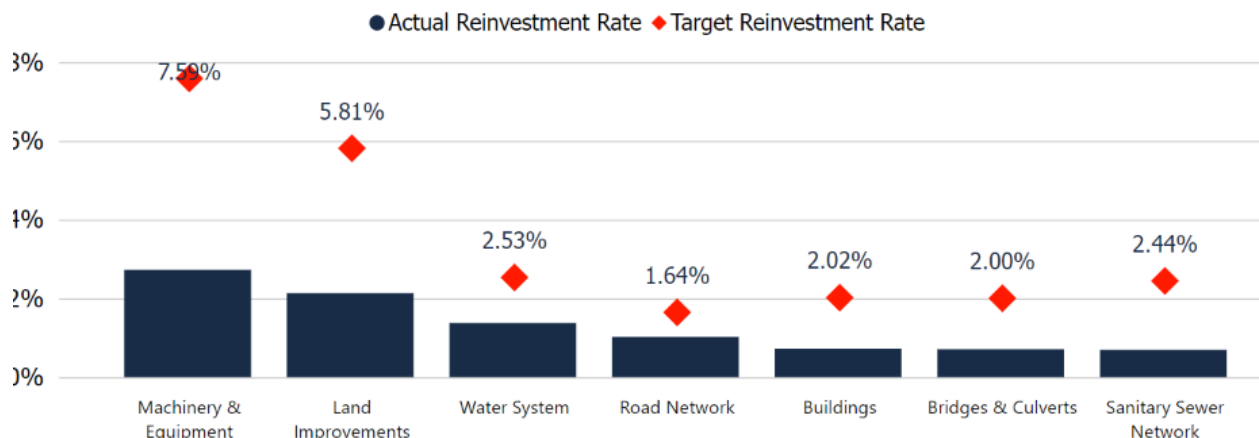
3.1 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of \$77.9 million based on inventory data at the end of 2020. 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.



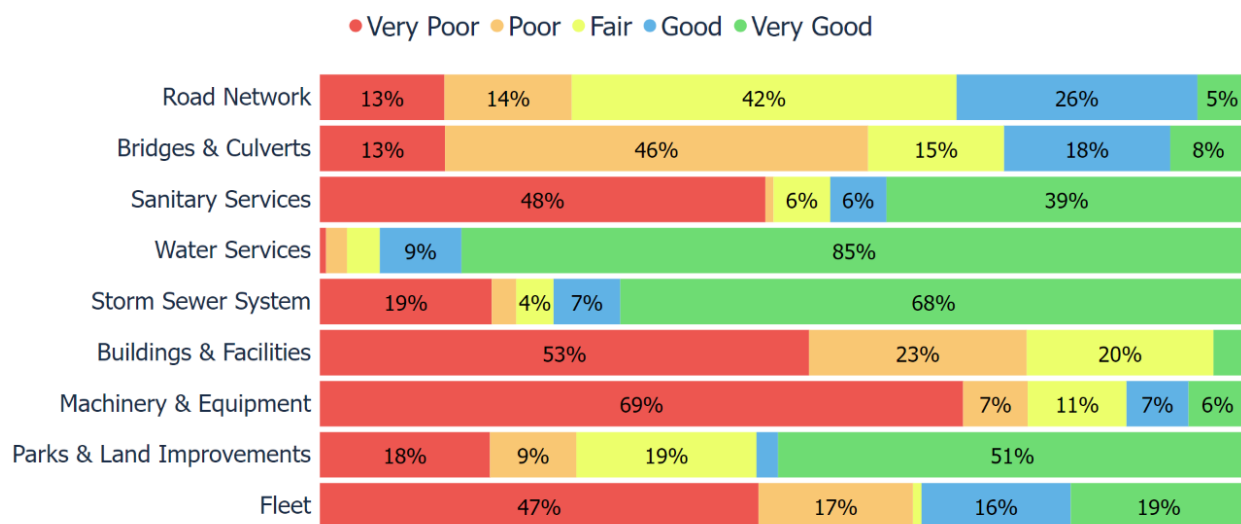
3.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing the target vs the actual reinvestment rate. To meet the long-term replacement needs, the Township should be allocating approximately \$1.69 million annually, for a target reinvestment rate of 2.17%. Actual annual spending on infrastructure totals approximately \$0.8 million, for an actual reinvestment rate of 1.03%.



3.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 65% of assets in Macdonald, Meredith & Aberdeen Add'l are in fair or better condition. This estimate relies on both age-based and field condition data. It is also important to acknowledge that for certain larger assets such as Buildings and park structures, having a componentized inventory will produce a more accurate condition and forecast, rather than just an asset.

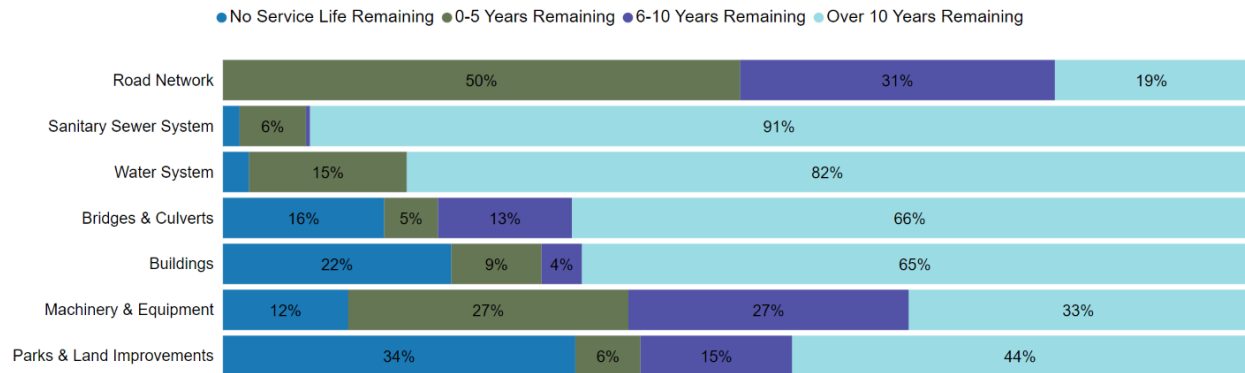


This AMP relies on assessed condition data for 57% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	% of Assets with Assessed Condition	Source of Condition Data
Road Network	99%	Road Needs Assessment 2021
Bridges & Culverts	65%	2020 OSIM Report
Buildings	0%	Age-based
Machinery & Equipment	0%	Age-based
Parks & Land Improvements	0%	Age-based
Water System	0%	Age-based
Sanitary Sewer System	0%	Age-based

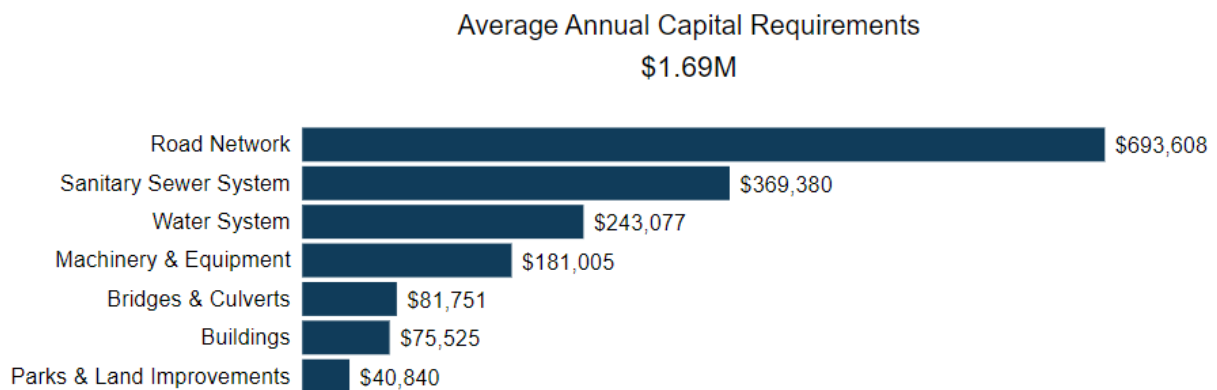
3.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 24% of the Township's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix A.



3.5 Annual Capital Requirements

Based on the replacement cost of the assets, the estimated useful life, the cost and impact of lifecycle activities, the average annual capital requirements can be calculated for each category in the asset portfolio. This is the average annual amount required to maintain the current level of service that the Township is providing.

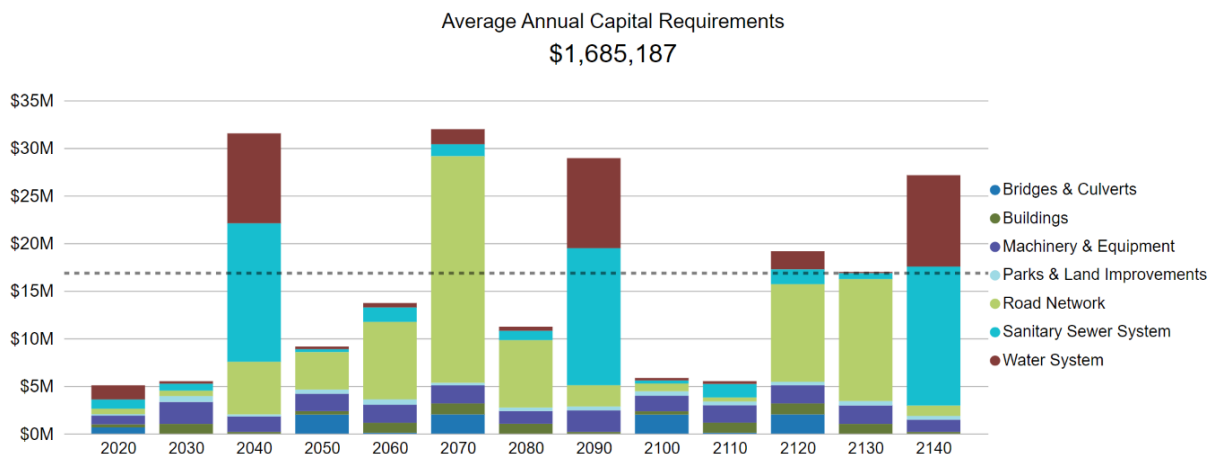


3.6 Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events and the refinement of the asset inventory, the Township can produce an accurate short- and long-term capital forecast.

The following graph identifies the average annual capital requirements required over the next 120 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 10-year bins and are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 10-year capital requirements.



The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

3.7 Risk & Criticality

Advanced risk models for core linear assets and high-level risk models for all other assets were developed as part of this asset management plan. The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the asset portfolio based on 2020 inventory data.

Municipal staff also identified and grouped assets based on service areas, including those that support the delivery of fire and emergency services, with a higher risk rating attribute to ensure that a prioritization process is in place.

Consequence	5	9 Assets 6,453.00 unit(s), m \$6,438,483.00	1 Asset 15.50 m \$711,798.00	4 Assets 1,320.30 m, unit(s) \$7,736,313.00	1 Asset 1,000.00 m \$750,000.00	2 Assets 2.00 unit(s) \$1,480,230.00
	4	17 Assets 18,483.00 m \$14,600,257.00	9 Assets 13,405.80 m \$10,572,590.00	6 Assets 9,600.00 m \$7,544,000.00	1 Asset 1,300.00 m \$975,000.00	1 Asset 1.00 unit(s) \$405,690.00
	3	17 Assets 5,880.00 unit(s), m \$4,759,995.00	3 Assets 1,851.00 unit(s), m \$1,758,433.00	4 Assets 421.50 m, unit(s) \$1,468,967.00	1 Asset 600.00 m \$708,000.00	2 Assets 2.00 unit(s) \$663,635.00
	2	25 Assets 5,188.00 m \$4,254,579.00	14 Assets 1,027.30 m, unit(s) \$3,456,897.00	16 Assets 4,603.00 unit(s), m \$5,056,517.00	4 Assets 4.00 unit(s) \$508,794.00	11 Assets 11.00 unit(s) \$1,703,753.00
	1	32 Assets 271.00 unit(s), m \$1,102,166.00	20 Assets 3,033.00 unit(s), m \$1,510,981.00	17 Assets 454.00 unit(s), m \$760,516.00	12 Assets 998.00 unit(s), m \$886,042.00	61 Assets 61.00 unit(s) \$1,804,212.00
		1	2	3	4	5
		Probability				

See Appendix C for the criteria used to determine the risk rating of each asset.

4 Analysis of Tax-funded Assets

Key Insights

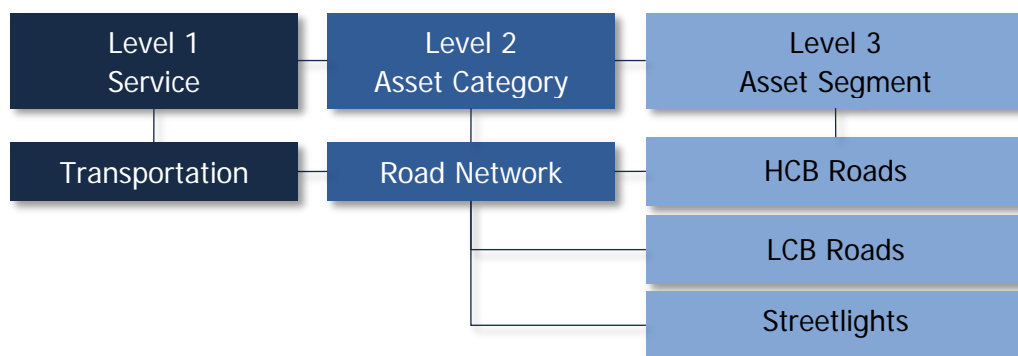
- Tax-funded assets are valued at \$53.1 million
- 88% of tax-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately \$1 million
- To reach sustainability, tax revenues need to be increased by 2.02% annually for the next 10 years to eliminate annual deficits

4.1 Road Network

The Township's Road Network inventory is managed in CityWide™, and comprises of 53 kilometres of LCB and HCB roads and roadway appurtenances such as streetlights.

4.1.1 Asset Hierarchy and Segmentation

Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



4.1.2 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's road network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
HCB Roads	6,580 m	User - Defined Cost	\$7,764,400
LCB Roads	46,730 m	User - Defined Cost	\$34,398,987
Streetlights	1	CPI Tables	\$66,325
			\$42,229,712

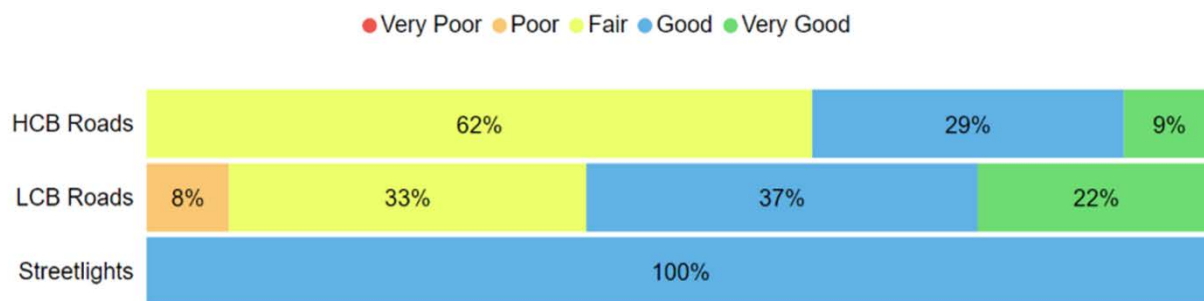
Total Replacement Cost
\$42.2M

LCB Roads	\$34.40M
HCB Roads	\$7.76M
Streetlights	\$0.07M

4.1.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
HCB Roads	65%	Good	Assessed
LCB Roads	68%	Good	Assessed
Streetlights	70%	Good	Age Based
	68%	Poor	



Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

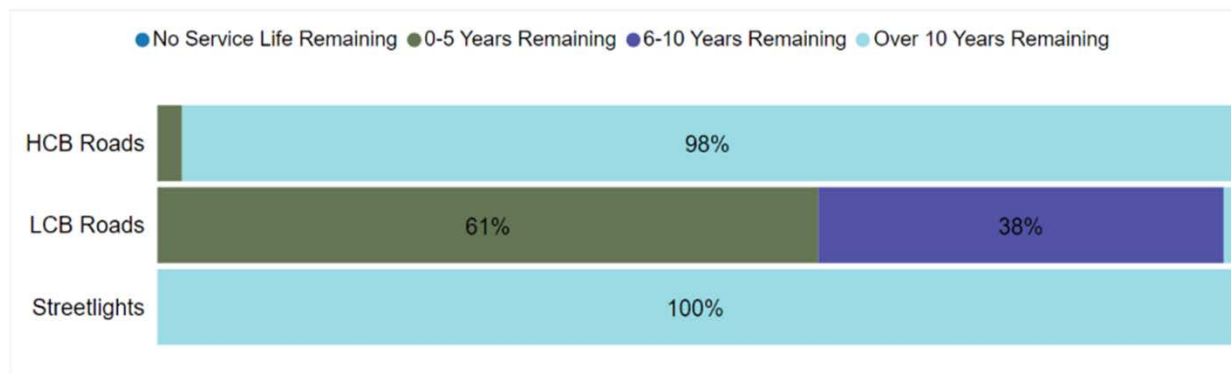
- Route patrols and inspections occur on all our roads year-round. The route patrols and inspections are completed twice a week during winter, bi-weekly in summer by internal staff.
- A Road Needs Assessment Study is completed every 10 years. The most recent one was completed in 2021 by a contractor. This data is used for budgeting to determine what roads require attention and associated costs for repairs/maintenance. The assessment completed by the contractor outlines what work needs to be completed on the road network in which year. However, it is worth noting that projects are budget dependant. If the assessment indicates that replacement is required in a certain year, but the

condition of the asset is still acceptable, the maintenance/repairs will be delayed for another year.

4.1.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Road Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
HCB Roads	40	16.8	21.8
LCB Roads	10 - 40	12.8	6.1
Streetlights	20	6.0	14.0
		14.0	11.5



Each asset's Estimated Useful Life should 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.

4.1.5 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 Township uses a proactive approach for renewal and rehabilitation projects based on Roads Need Studies. Road assessments from road crews would use a reactive approach based on visual inspections.

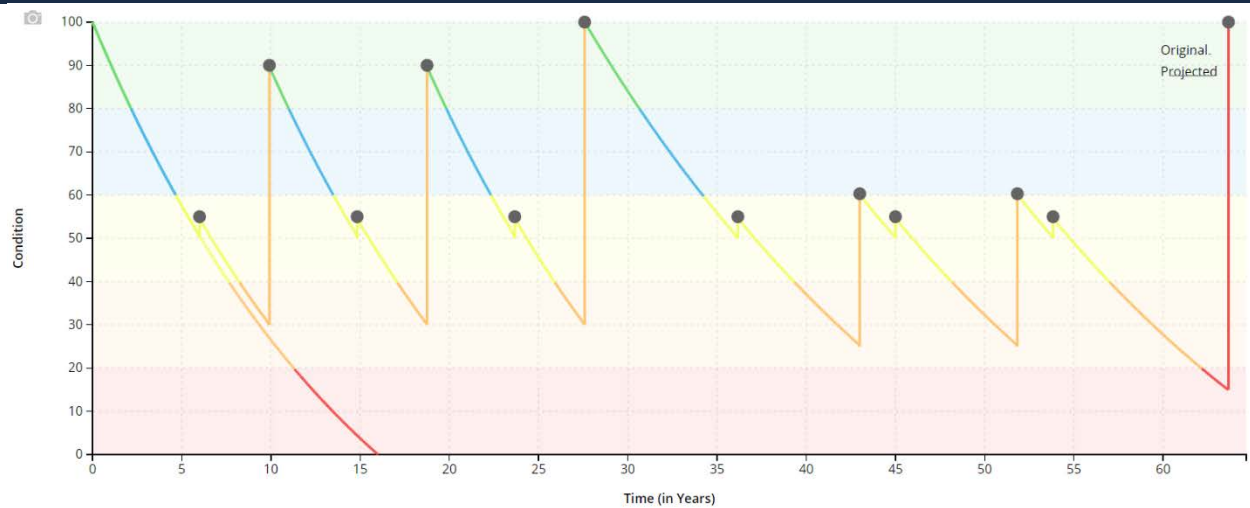
The following table outlines the Township's current lifecycle management strategy.

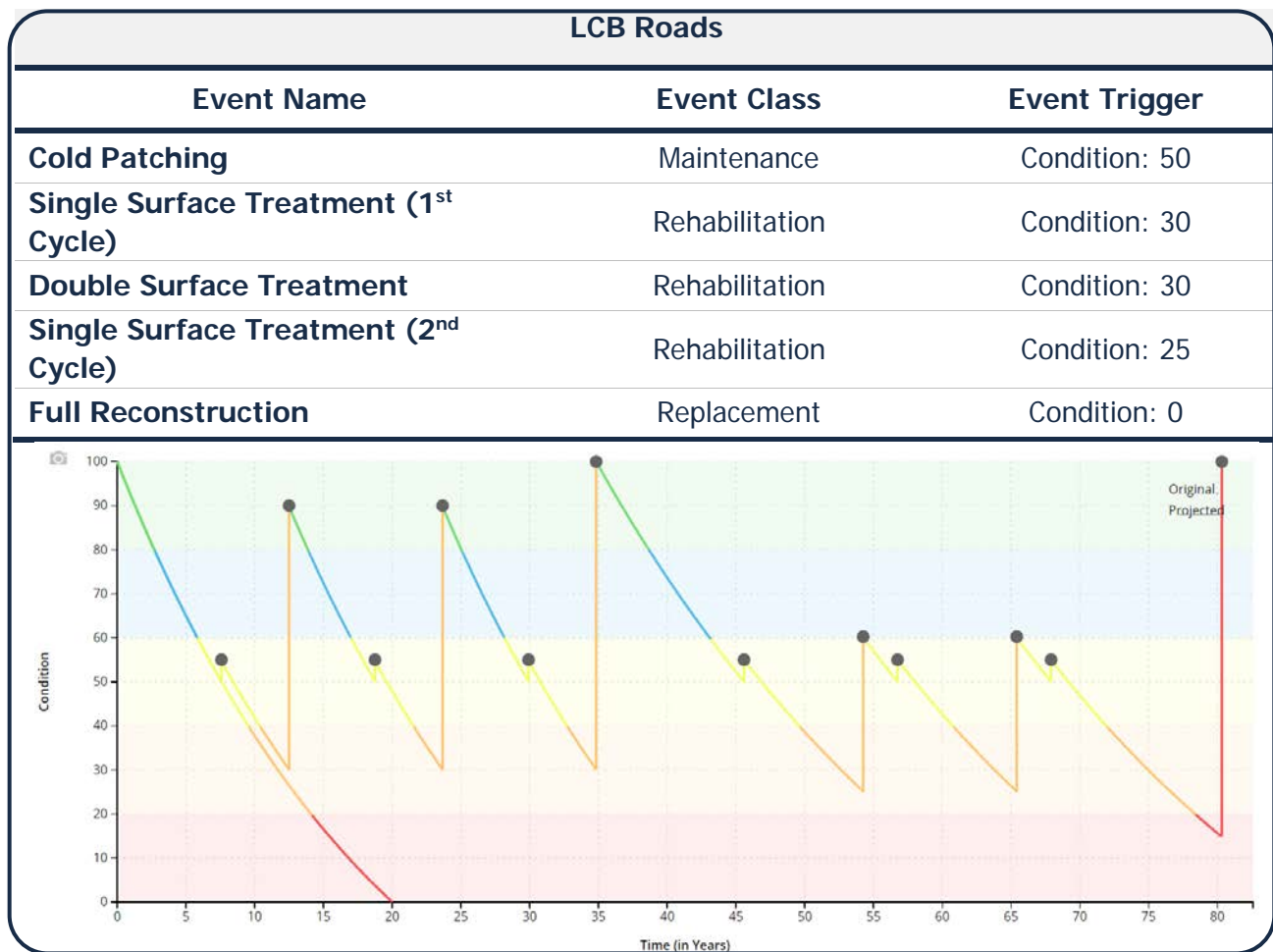
Activity Type	Description of Current Strategy
Maintenance	Municipal roads crews apply cold patching on an as needed basis. Frequency is determined based on the condition of the asset. When holes are found during road tours, patching is completed. Frequency is also dependent on weather. When the asset has reached fair condition, patching is performed.
Rehabilitation	The Township follows the standards provided by the Roads Needs Studies and Provincial Regulation procedures. This will include single and double surface treatment procedures. Traffic counts and road conditions influence the prioritization of activities. Usually, When a LCB road is first constructed, it has double surface, followed by single surface treatment 10 years later, another single surface treatment is performed 10 years after this, then a double surface treatment is performed after another 10 years. Then, single surface treatment is performed every 10 years for two consecutive 10 year periods.
Replacement	Asphalt roads use a run to failure strategy. Road reconstruction projects are identified based on the results of the Road Needs Study, road condition, and traffic count. Replacement is usually performed when lifecycle activities are not effective anymore.

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

LCB Roads (High Traffic)

Event Name	Event Class	Event Trigger
Cold Patching	Maintenance	Condition: 50
Single Surface Treatment (1 st Cycle)	Rehabilitation	Condition: 30
Double Surface Treatment	Rehabilitation	Condition: 30
Single Surface Treatment (2 nd Cycle)	Rehabilitation	Condition: 25
Full Reconstruction	Replacement	Condition: 0

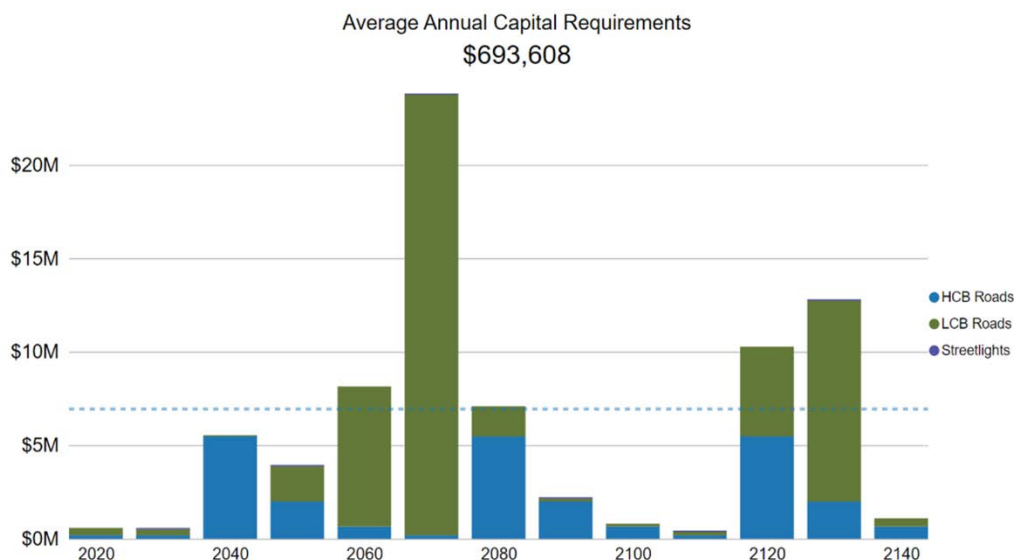




Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for LCB roads, and assuming the end-of-life replacement of all other assets in this category

The following graph identifies the average annual capital requirements required over the next 120 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 10-year bins and are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 10-year capital requirements.



The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.1.6 Risk & Criticality

Risk Matrix

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	2 Assets 2,700.00 m \$2,025,000.00	0 Assets - \$0.00	1 Asset 1,300.00 m \$975,000.00	1 Asset 1,000.00 m \$750,000.00	0 Assets - \$0.00
	4	8 Assets 13,150.00 m \$10,612,500.00	8 Assets 13,400.00 m \$10,050,000.00	6 Assets 9,600.00 m \$7,544,000.00	1 Asset 1,300.00 m \$975,000.00	0 Assets - \$0.00
	3	1 Asset 500.00 m \$590,000.00	2 Assets 1,850.00 m \$1,387,500.00	1 Asset 400.00 m \$472,000.00	1 Asset 600.00 m \$708,000.00	0 Assets - \$0.00
	2	8 Assets 2,220.00 m \$2,133,700.00	2 Assets 1,000.00 m \$836,000.00	13 Assets 4,600.00 m \$4,525,000.00	0 Assets - \$0.00	0 Assets - \$0.00
	1	1 Asset 240.00 m \$180,000.00	8 Assets 3,021.00 m, unit(s) \$1,057,512.00	3 Assets 440.00 m \$416,000.00	4 Assets 990.00 m \$742,500.00	0 Assets - \$0.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Climate Change and Extreme Weather

The Township staff indicated that the increasing frequency of 100-year storms has been causing damage to road network.



Infrastructure Re-investment

The Township is always looking for acquiring grants/additional external funding for the road network capital projects. Some projects related to rehabilitation and renewal could be subject to funding opportunities.

4.1.7 Levels of Service

The following tables identify the Township's current level of service for the Road Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Township has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the road network in the Township and its level of connectivity	See Appendix B

Quality	Description or images that illustrate the different levels of road class pavement condition	The Township completed an urban Roads Need Assessment Study in 2021. The Condition Rating number is a visual assessment of the structural condition or integrity of the road. The rating numbers were assigned on a scale of 1 to 10 with the lower numbers describing those roads with the most structural distress or poorest shaped road cross section. (1-5) Road surface exhibits moderate to significant deterioration and requires improvement. (6-10) Road surface is in generally good condition, with localized deficiencies.
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Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km ²)	0 km/km ²
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km ²)	0.1506 km/km ²
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km ²)	0.1744 km/km ²
Quality	Average pavement condition index for paved roads in the Township	6.9
	Average surface condition for unpaved roads in the Township (e.g., excellent, good, fair, poor)	Good
Performance	Capital reinvestment rate	1.02%

4.1.8 Recommendations

Asset Inventory

- Review inventory to determine whether all municipal assets within all asset segments have been accounted for.
- Continue to consolidate critical asset information from other asset data sources into the Township's centralized asset inventory.

Lifecycle Management Strategies

- Gather unit costs for assets that have relied primarily on historical inflation such as streetlights and review periodically to ensure a higher level of accuracy and within the context of current market condition.
- Evaluate the efficacy of the Township's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Township believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

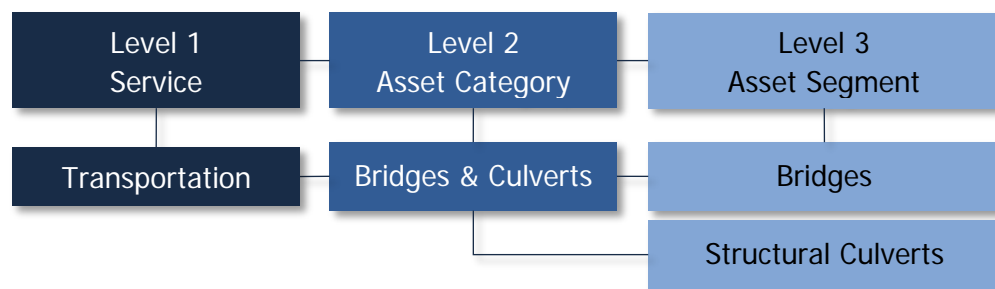
4.2 Bridges & Culverts

The Township's Bridges and Culverts inventory is managed in CityWide™ and comprises of 10 structures that have a span of 3 meters or more and are therefore categorized as a bridge or a structural culvert asset.

The Public Works staff are responsible for the planning and managing of all bridges and structural culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

4.2.1 Asset Hierarchy and Segmentation

Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



4.2.2 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's Bridges & Culverts inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	6	CPI Tables	\$2,638,200
Structural Culverts	4	CPI Tables	\$1,447,576
			\$4,085,776

Total Replacement Cost
\$4.1M

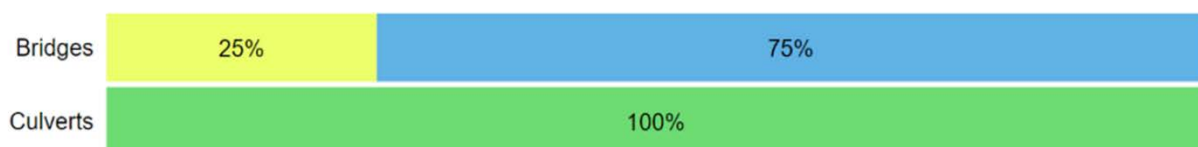


4.2.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Bridges	65%	Good	Assessed
Structural Culverts	98%	Very Good	Age-Based
	76%	Good	

● Very Poor ● Poor ● Fair ● Good ● Very Good



To ensure that the Township’s Bridges & Culverts continues to provide an acceptable level of service, the Township 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 Bridges & Culverts.

Current Approach to Condition Assessment

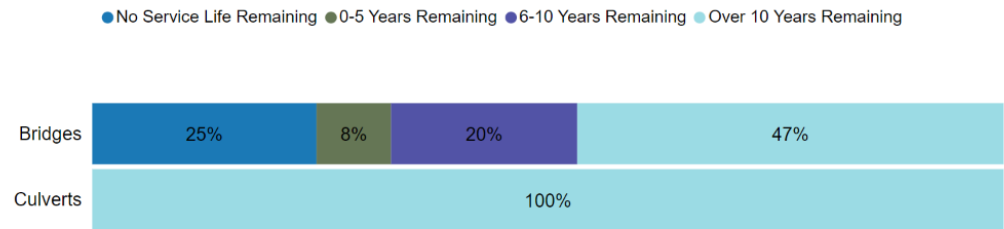
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township’s current approach:

- Condition assessments of all bridges and culverts with a span greater than or equal to 3 meters are completed every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM).

4.2.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Bridges & Culverts assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges	50	35.0	32.1
Structural Culverts	49 - 50	0.6	48.9
		20.4	38.8



Each asset’s Estimated Useful Life should 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.

4.2.5 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 the Township's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	The Township performs maintenance activities and treatments such as guardrail inspections, grass cutting, debris removal, patching/sealing on a need's basis. Load weights and traffic volumes are usually collected periodically.
Rehabilitation / Replacement	Biennial OSIM inspection identifies recommended rehabilitation and replacement activities with estimated costs. OSIM reports will determine priority bridges and culverts to address based on traffic counts, condition ratings, and types of traffic. The Township relies on our OSIM reports to identify highest priority bridges and culverts. The highest priority bridges and culverts will inform and influence capital project investments.

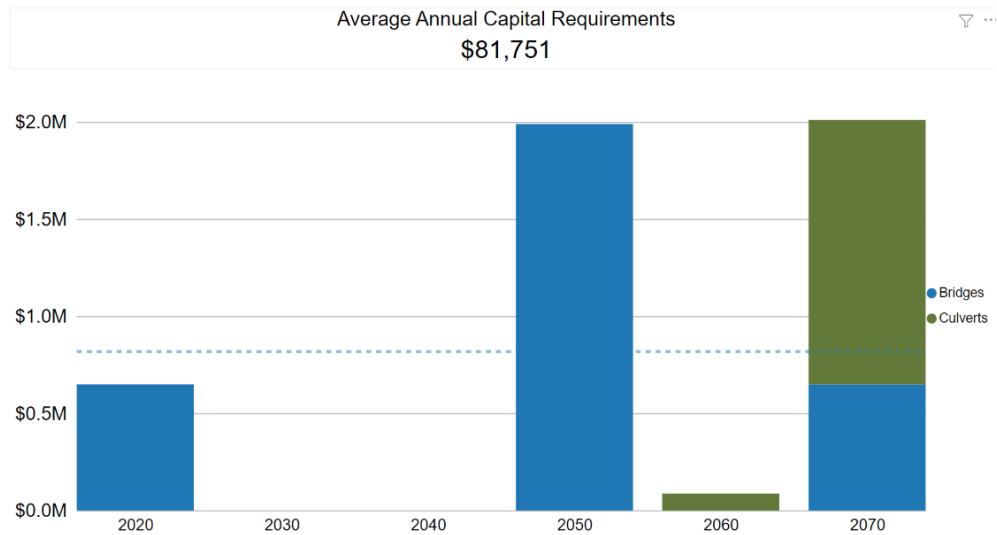
Forecasted Capital Requirements

Based on the lifecycle activities identified in the 2020 inspection report, and assuming end-of-life replacement for all assets, the following graph forecasts short- and long-term capital requirements for the Bridges & Culverts category.

The annual capital requirement represents the average amount per year that the Macdonald, Meredith & Aberdeen Add'l should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

The graph below provides a 50-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 10-year bins and are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 10-year capital requirements.



4.2.6 Risk & Criticality

Risk Matrix

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	2 Assets 2.00 unit(s) \$1,360,878.00	1 Asset 15.50 m \$711,798.00	1 Asset 18.30 m \$649,065.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	1 Asset 5.80 m \$522,590.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	0 Assets - \$0.00	0 Assets - \$0.00	1 Asset 19.50 m \$324,533.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	0 Assets - \$0.00	2 Assets 17.30 m \$430,214.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	1	2 Assets 2.00 unit(s) \$86,698.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Climate Change & Extreme Weather Events

Flooding and extreme weather can cause damage to multiple elements of the Township's bridges including the deck, superstructure, substructure, and approaches. Flooding events have washed out structures recently.

Infrastructure Re-investment



The Township is always looking for acquiring grants/additional external funding for the road network capital projects. Some projects related to rehabilitation and renewal could be subject to funding opportunities.

4.2.7 Levels of Service

The following tables identify the Township's current level of service for Bridges & Culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Township has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Bridges & Culverts.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	The majority of the bridges in the Township of Macdonald, Meredith & Aberdeen Add'l supports local residential traffic, emergency vehicles, pedestrians and cyclists. Many of the rural bridges and culverts are used by farming equipment and vehicles supporting agricultural transport. Most heavy transport vehicles use the municipal and Provincial roads throughout the Township.
Quality	Description or images of the condition of bridges & culverts and how this would affect use of the bridges & culverts	Good (BCI 70-100): Generally considered to be in good-excellent condition, and repair or rehabilitation work is not usually required within the next 5 years. Routine maintenance, such as sweeping, cleaning, and washing are still recommended. Fair (BCI 50-70): Generally considered to be in good-fair condition. Repair or rehabilitation work recommended is ideally scheduled to be completed within the next 5 years. Poor (BCI Less than 50): Generally considered poor with lower numbers representing structures nearing the end of their service life. The repair or rehabilitation of these structures is ideally best scheduled to be completed within approximately 1 year. However, if it is determined that the replacement of the structure would be a more viable, the structure can be identified for continued monitoring and scheduled for replacement within the short-term.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by Bridges & Culverts.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges in the Township with loading or dimensional restrictions	8%
Quality	Average bridge condition index value for bridges in the Township	Good
	Average bridge condition index value for structural culverts in the Township	Very Good
Performance	Capital re-investment rate	0.71%

4.2.8 Recommendations

Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2 years.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- Continue to incorporate the recommended maintenance, rehabilitative and renewal activities from the OSIM inspections.

Levels of Service

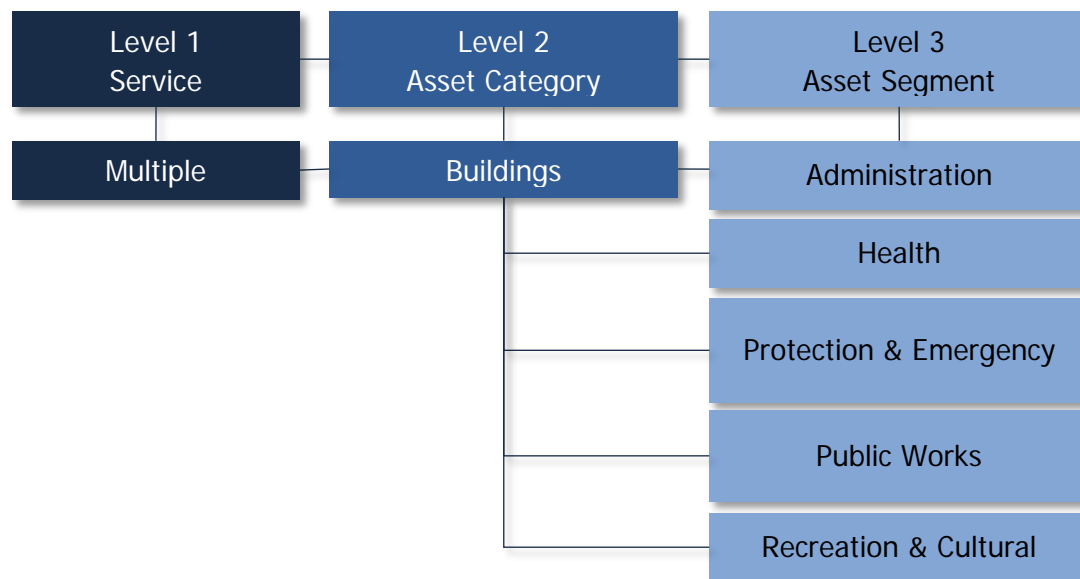
- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Township believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.3 Buildings

The Township's Buildings inventory is managed in CityWide™, and comprises of 16 individual Buildings. These are owned by the Township and maintained by various departments that provide key administrative, protective, health, as well as recreational and cultural services to the community.

4.3.1 Asset Hierarchy and Segmentation

Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



4.3.2 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's Buildings inventory.

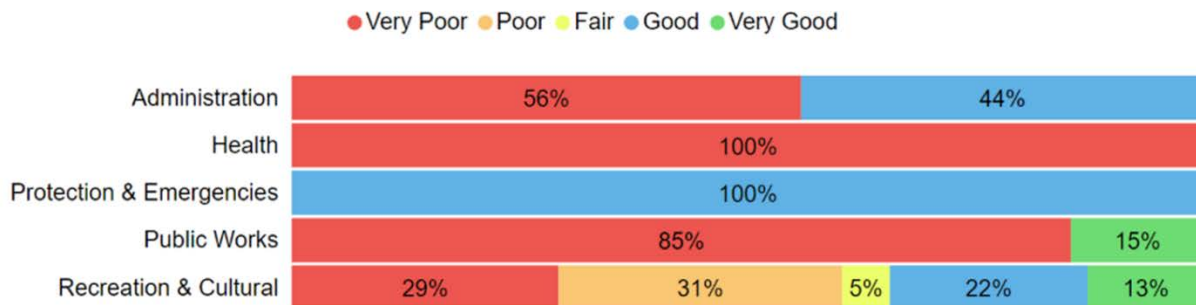
Asset Segment	Number of Buildings	Replacement Cost Method	Total Replacement Cost
Administration	2	CPI Tables	\$263,843
Health	1	CPI Tables	\$12,005
Protection & Emergency	1	CPI Tables	\$270,420
Public Works	2	CPI Tables	\$385,570
Recreation & Cultural	10	CPI Tables	\$2,809,524
			\$3,741,362



4.3.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Administration	45%	Fair	Age-Based
Health	0%	Very Poor	Age-Based
Protection & Emergency	62%	Good	Age-Based
Public Works	21%	Poor	Age-Based
Recreation & Cultural	39%	Poor	Age-Based
	39%	Poor	



To ensure that the Township's Buildings continues to provide an acceptable level of service, the Township 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.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

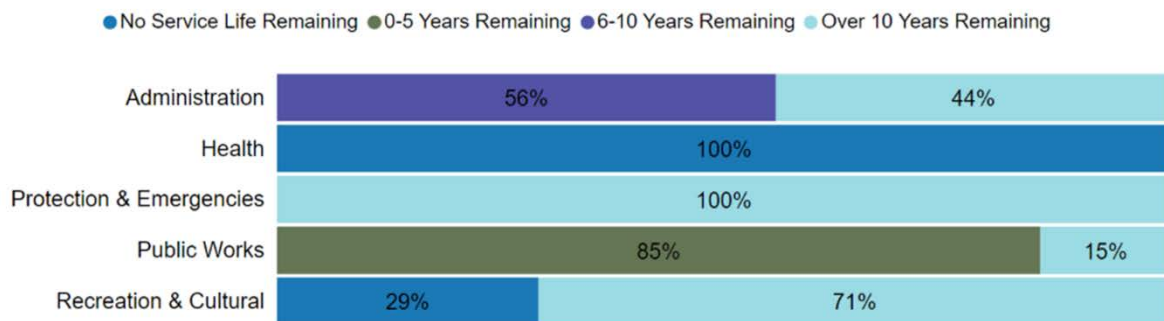
- There is no formal condition assessment process for Buildings. Maintenance is performed as needed.

4.3.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Buildings assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when

an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Administration	50	26.0	24.0
Health	33	76.0	-43.0
Protection & Emergency	50	19.0	31.0
Public Works	50	26.5	23.5
Recreation & Cultural	50	27.0	20.4
		29.4	18.0



Each asset's Estimated Useful Life should 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.

4.3.5 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 the Township's current lifecycle management strategy.

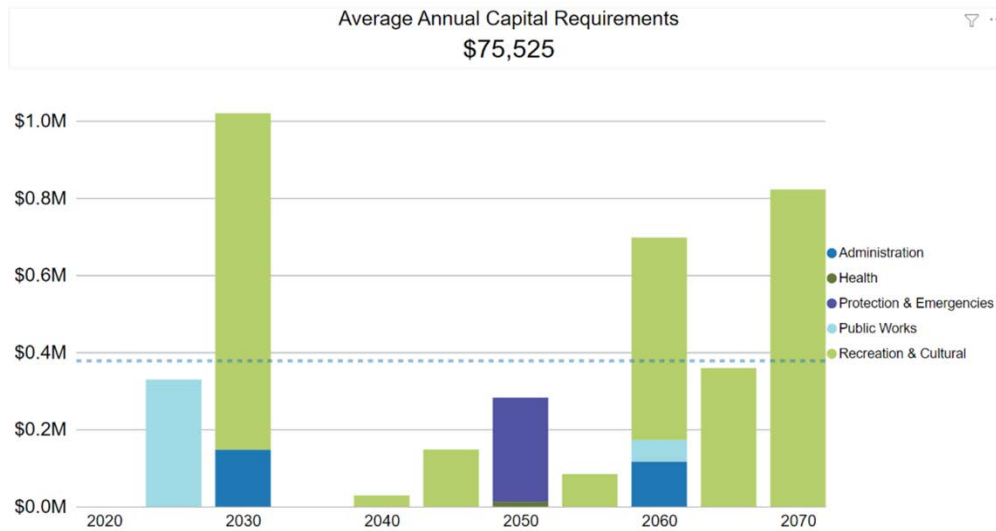
Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Structural deficiencies that require additional attention are identified as they occur. The inspection is usually completed by a Chief Building Official and the repair work is outsourced to engineers/contractors.
Replacement	A decision is made as buildings approach their end-of-life on whether replacement or rehabilitation is appropriate.

Forecasted Capital Requirements

Based on the current Buildings inventory and assuming end-of-life replacement for all assets, the AMP forecasts short- and long-term capital requirements for the Buildings category.

The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

The graph below provides a 50-year forecast. 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 are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 5-year capital requirements.



4.3.6 Risk & Criticality

Buildings is considered a non-core asset category. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the risk and criticality associated to assets within this category.

4.3.7 Levels of Service

Buildings is considered a non-core asset category. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

4.3.8 Recommendations

Asset Inventory

- The Township's asset inventory represents individual buildings as individual assets which does not take into account individual components of building assets. Buildings consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a component-based inventory of all Buildings to allow for component-based lifecycle planning.

Condition Assessment Strategies

- A comprehensive structural assessment of all Buildings is highly recommended to gain a better understanding of the overall health and condition of each facility to identify accurate short- and long-term capital requirements.

Risk Management Strategies

- Work towards developing risk models and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Work towards identifying current and proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.4 Machinery & Equipment

The Township's Machinery & Equipment inventory is managed in CityWide™ and comprises of 50 assets. In order to maintain the high quality of public infrastructure and support the delivery of core and non-core services.

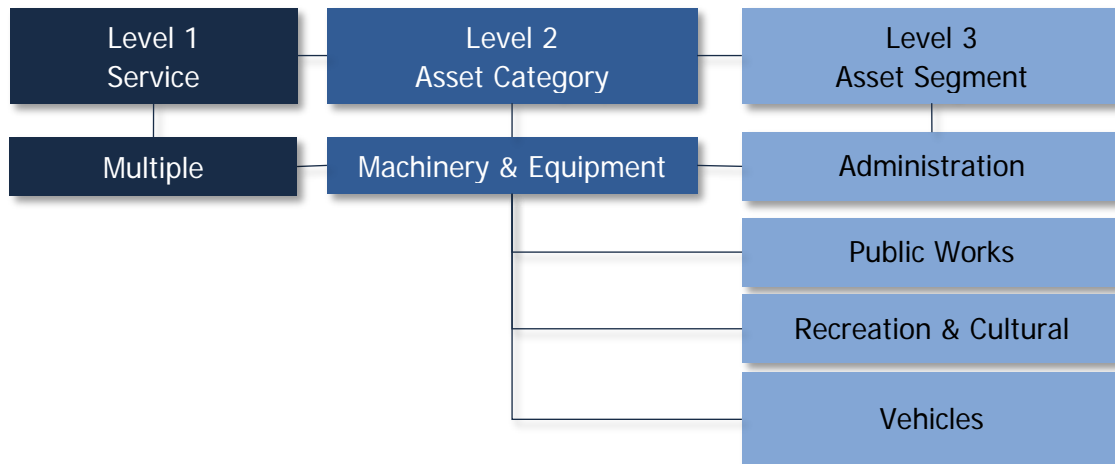
Administration

- Protection & Emergency
- Public Works
- Recreation & Cultural
- Vehicles

Keeping machinery & equipment in an adequate state of repair is important to maintain a high level of service.

4.4.1 Asset Hierarchy and Segmentation

Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



4.4.2 Asset Inventory & Replacement Cost

The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's Machinery & Equipment inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Administration	7	CPI Tables	\$125,625
Protection & Emergency	21	CPI Tables	\$607,442
Public Works	14	CPI Tables	\$643,444
Recreation & Cultural	3	CPI Tables	\$460,135
			\$2,386,033

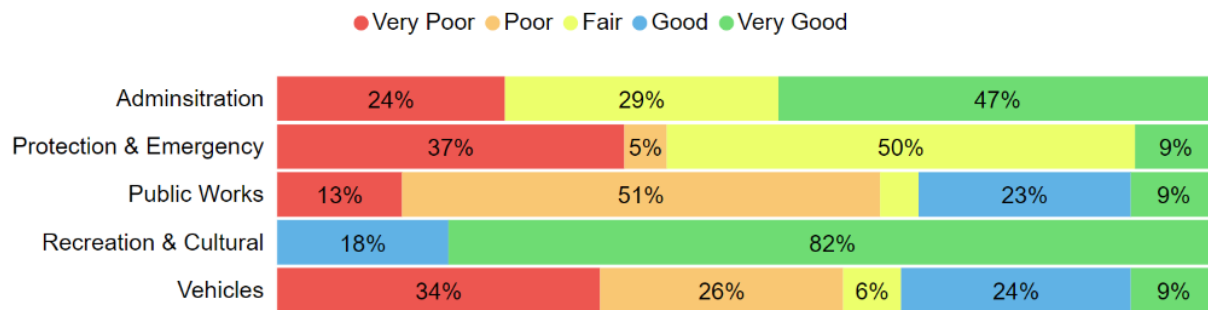
Total Replacement Cost
\$2.4M



4.4.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Administration	55%	Fair	Age-Based
Protection & Emergency	34%	Poor	Age-Based
Public Works	40%	Fair	Age-Based
Recreation & Cultural	78%	Good	Age-Based
46%		Fair	



To ensure that the Township's Machinery & Equipment continues to provide an acceptable level of service, the Township 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 Machinery & Equipment.

Current Approach to Condition Assessment

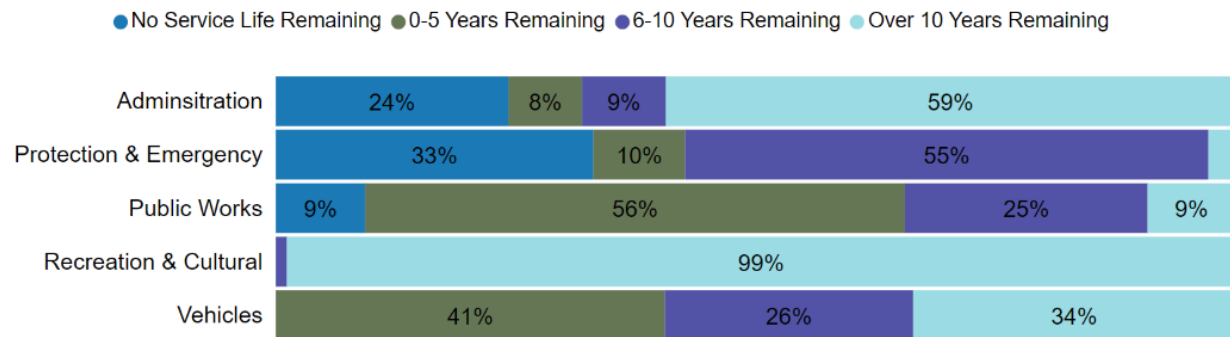
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Staff complete a service life remaining analysis for machinery and equipment on an annual basis. Assets are replaced at the end of their useful life.

4.4.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Machinery & Equipment assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Administration	4 - 25	7.3	4.8
Protection & Emergency	7 - 25	12.7	-1.7
Public Works	7 - 20	8.2	2.7
Recreation & Cultural	10 - 15	2.9	10.3
Vehicles	7 - 20	7.3	8.1
		9.5	2.2



Each asset's Estimated Useful Life should 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.

4.4.5 Lifecycle Management Strategy

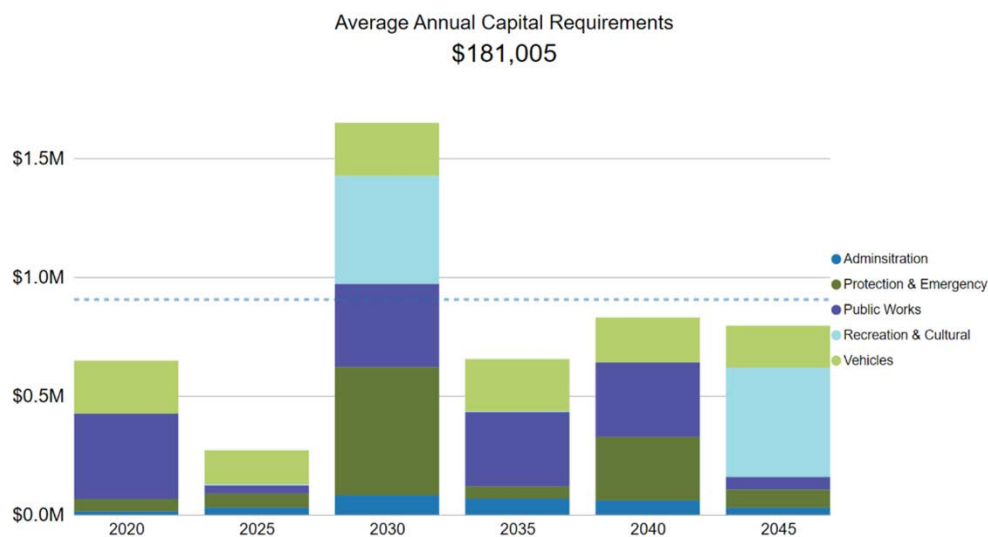
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance/Rehabilitation	Machinery & equipment are maintained according to manufacturer recommended actions and supplemented by the expertise of municipal staff
Replacement	The replacement of machinery & equipment depends on deficiencies identified by operators. If the inspection results show that the equipment deficiencies may impact their ability to complete required tasks, the assets get replaced if they can not be fixed.

Forecasted Capital Requirements

Based on the current machinery & equipment inventory, and assuming end-of-life replacement for all assets, The graph below provides a 25-year forecast for the Machinery & Equipment category. 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 are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 5-year capital requirements.



The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.4.6 Risk & Criticality

Risk Matrix

Machinery & Equipment is considered a non-core asset category. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the risk and criticality associated to assets within this category.

4.4.7 Levels of Service

Machinery & Equipment is considered a non-core asset category. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

4.4.8 Recommendations

Asset Inventory

- The Township should conduct an inventory review, collect, and consolidate asset data to ensure all relevant assets are accounted for.

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

- Identify condition assessment strategies for high value machinery and equipment assets.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

Risk Management Strategies

- Work towards developing risk models and adjust these models according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

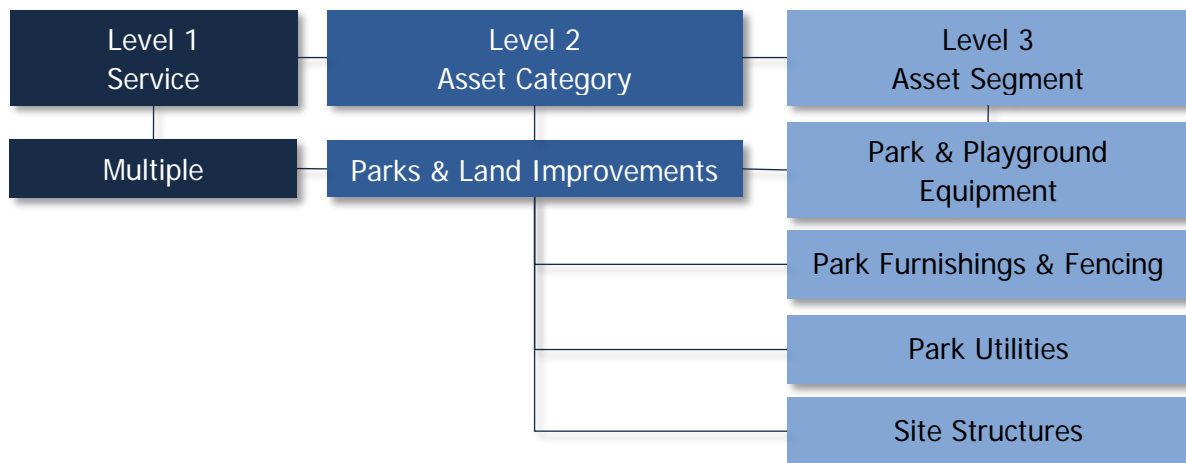
- Work towards identifying current and proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.5 Parks & Land Improvements

The Parks & Land Improvements inventory is managed in CityWide™ and is comprised of 25 assets that assist the Township in providing community recreation, cultural and natural outdoor space.

4.5.1 Asset Hierarchy and Segmentation

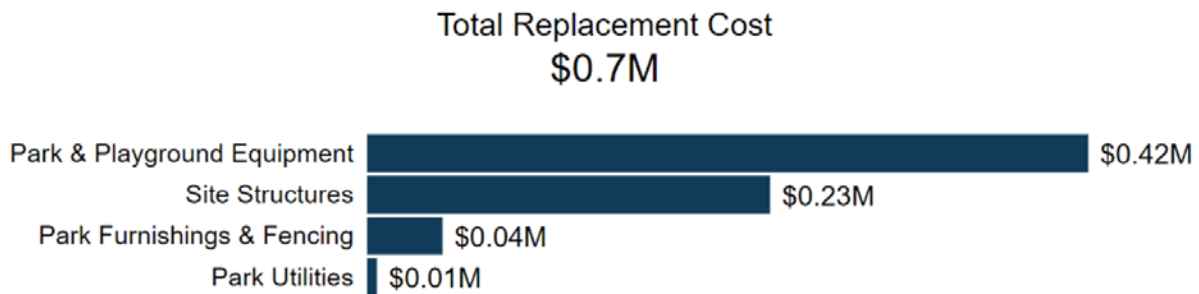
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



4.5.2 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's Land Improvements inventory.

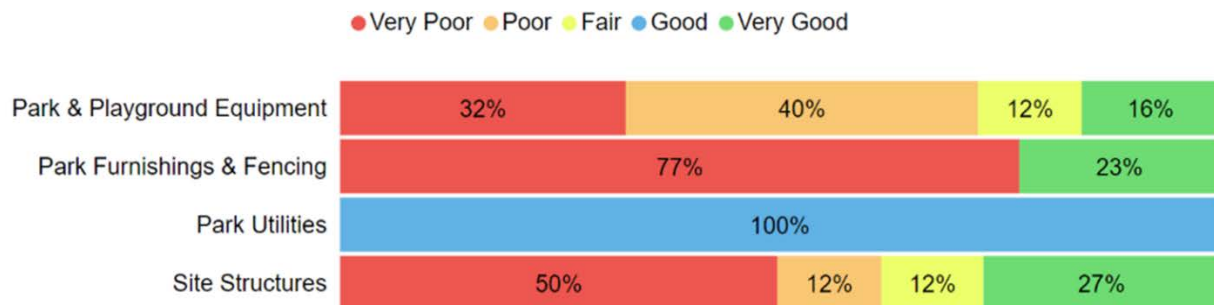
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Park & Playground Equipment	13	CPI Tables	\$419,007
Park Furnishings & Fencing	2	CPI Tables	\$43,825
Park Utilities	1	CPI Tables	\$5,711
Site Structures	9	CPI Tables	\$234,229
			\$702,772



4.5.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Park & Playground Equipment	37%	Poor	Age-Based
Park Furnishings & Fencing	26%	Poor	Age-Based
Park Utilities	63%	Good	Age-Based
Site Structures	35%	Poor	Age-Based
	36%	Poor	



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

Current Approach to Condition Assessment

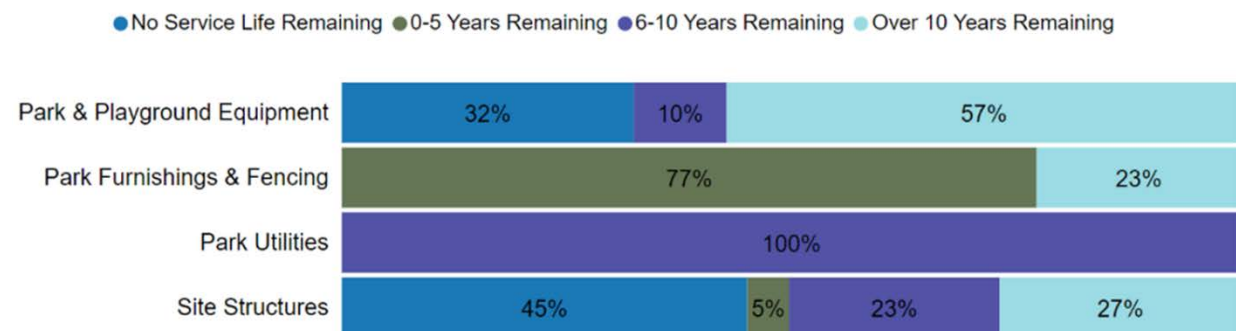
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Staff complete regular visual inspections of parks and land improvements assets to ensure they are in state of adequate repair
- Staff contract formal inspections of outdoor play space, fixed play structures and surfacing to a Canadian Certified Playground Inspector on a yearly basis in accordance with CAN/CSA-Z614 and required as per O. Reg. 137/15
- There are no formal condition assessment programs in place for other parks and land improvements assets

4.5.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Land Improvements assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Park & Playground Equipment	5 - 35	10.8	4.8
Park Furnishings & Fencing	15 - 25	7.3	12.8
Park Utilities	10	3.8	6.3
Site Structures	15 - 40	19.8	1.4
		13.5	4.3



Each asset's Estimated Useful Life should 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.

4.5.5 Lifecycle Management Strategy

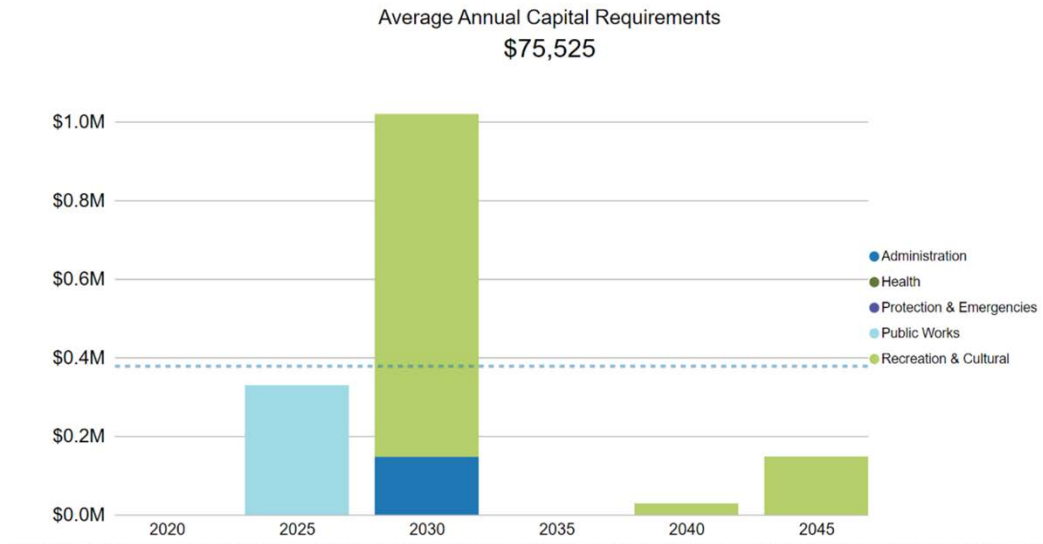
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation & Replacement	The Parks & Land Improvements asset category includes several unique asset types and lifecycle requirements are dealt with on a case-by-case basis.

Forecasted Capital Requirements

Based on the current parks and land improvements inventory, and assuming end-of-life replacement for all assets, the graph below provides a 25-year forecast. 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 are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 5-year capital requirements.



The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.5.6 Risk & Criticality

Fleet is considered a non-core asset category. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the risk and criticality associated to assets within this category.

4.5.7 Levels of Service

Parks & Land Improvements is considered a non-core asset category. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

4.5.8 Recommendations

Asset Inventory

- The Township should conduct an inventory review, collect, and consolidate asset data to ensure all relevant assets are accounted for.

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk assets.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

Risk Management Strategies

- Work towards developing risk models and adjust these models according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Work towards identifying current and proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

5

Analysis of Rate-funded Assets

Key Insights

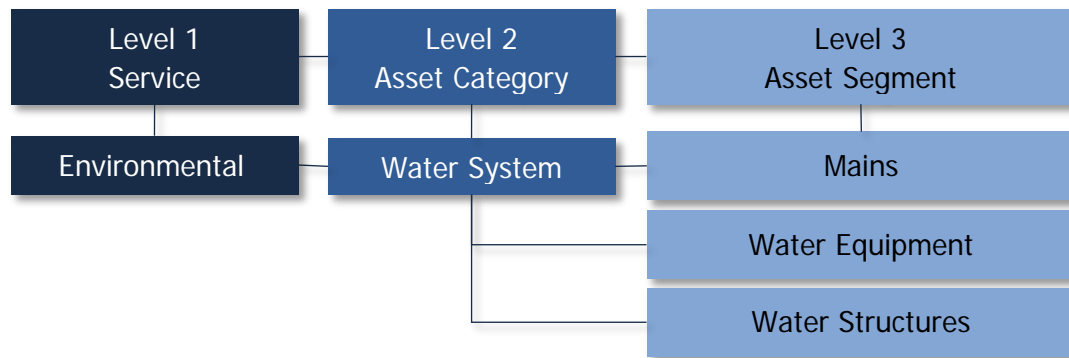
- Rate-funded assets are valued at \$24.73 million
- 89% of rate-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately \$612,000

5.1 Water System

The Township's Water System inventory is managed in CityWide™, and comprises of 50 unique assets, including 8.7 kilometres of water mains, approximately 19 water equipment, and five water structures. The Plant is managed by Ontario Clean Water Agency (OCWA). The system is currently at 20% of its maximum capacity.

5.1.1 Asset Hierarchy and Segmentation

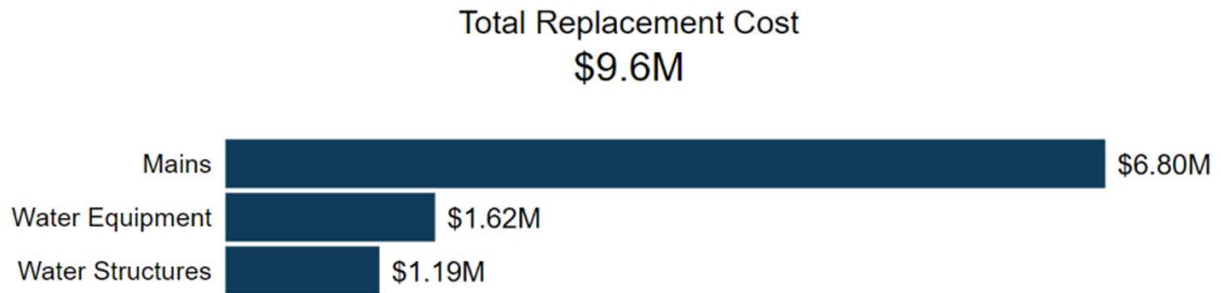
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



5.1.2 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's Water System inventory.

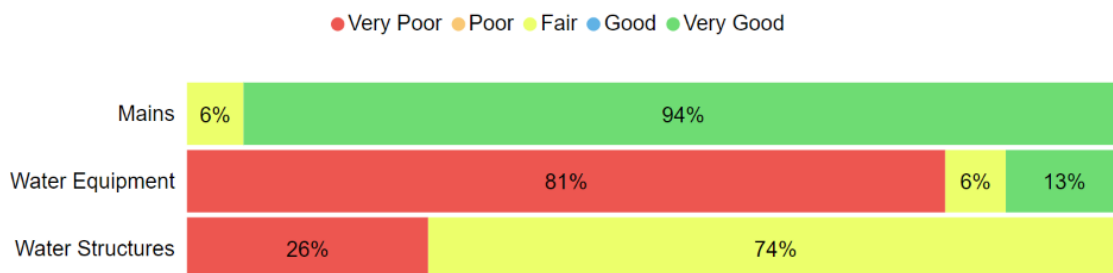
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Mains	8,701 (m)	CPI Tables	\$6,795,763
Water Equipment	19	CPI Tables	\$1,619,676
Water Structures	5	CPI Tables	\$1,189,437
			\$9,604,876



5.1.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Mains	86%	Very Good	Age-Based
Water Equipment	22%	Poor	Age-Based
Water Structures	42%	Fair	Age-Based
	70%	Good	



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

Current Approach to Condition Assessment

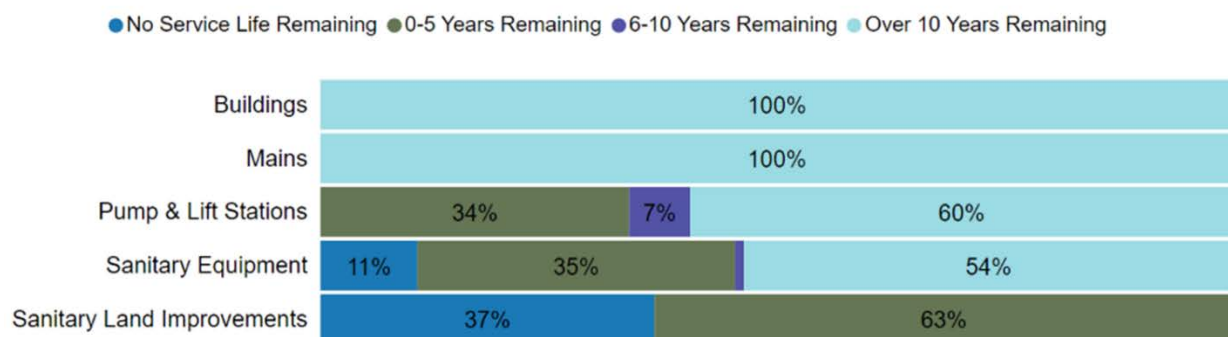
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Staff primarily rely on the quarterly list provided by Kresin Engineering and OCWA. The list includes a summary of findings and a list of maintenance activities that are required or recommended. OCWA is contracted to run the water plant.

5.1.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Water System assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Mains	50	23.8	26.3
Water Equipment	10 - 25	13.7	8.2
Water Structures	10 - 50	22.6	2.4
		19.7	16.8



Each asset's Estimated Useful Life should 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.

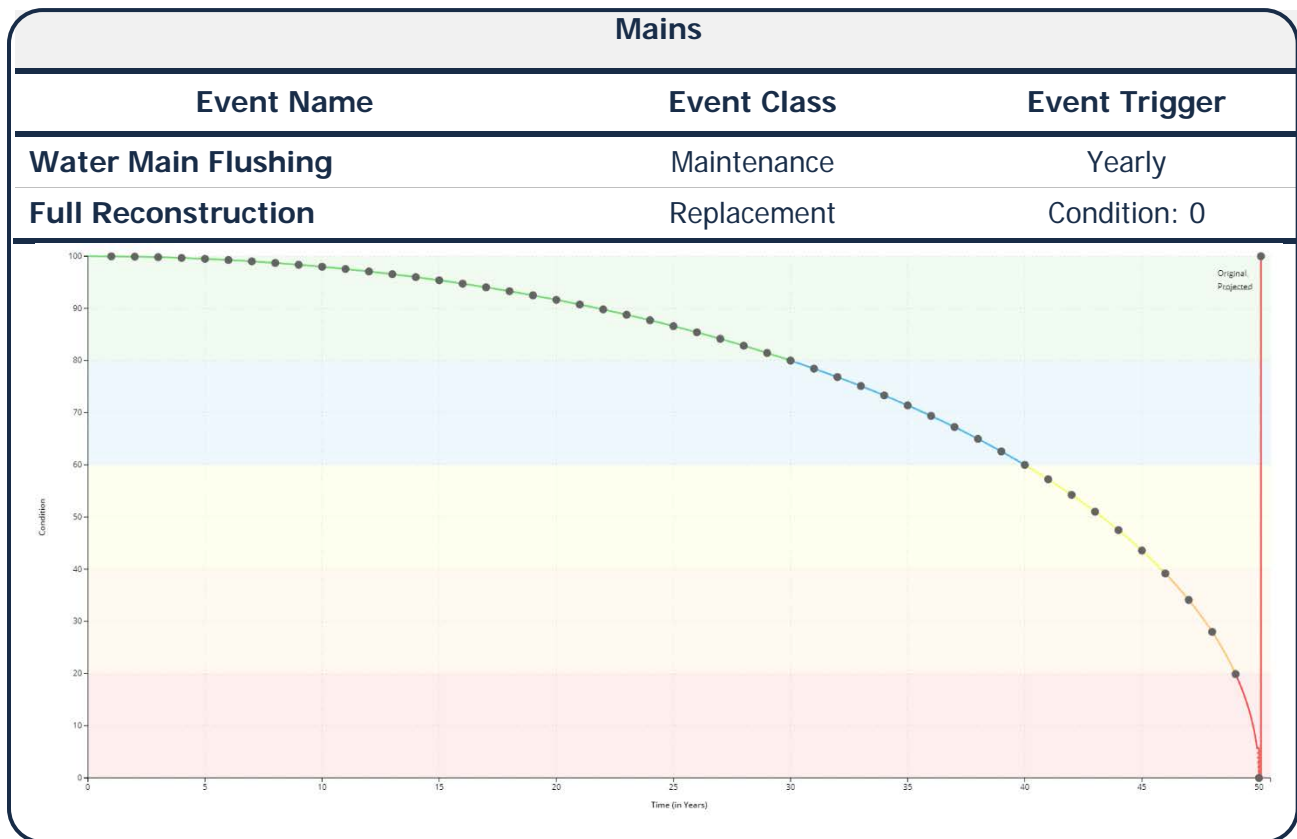
5.1.5 Lifecycle Management Strategy

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 the Township's current lifecycle management strategy.

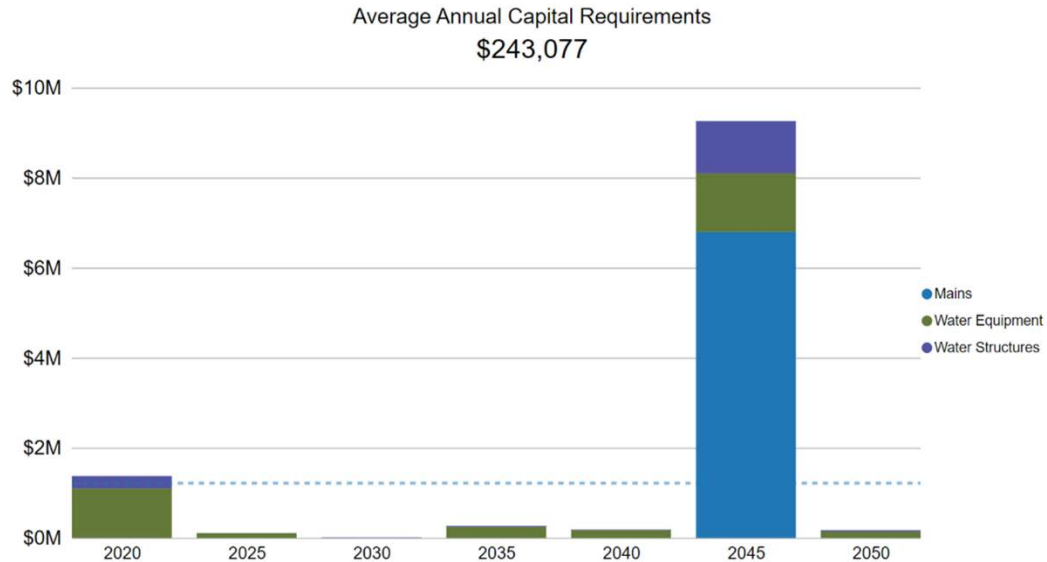
Activity Type	Description of Current Strategy
Maintenance	OCWA flushes the main pipes annually. Hydrant flow tests are performed annually on all hydrants. OCWA is at water plant daily to perform any required maintenance activities. Cost of maintenance is included in contract with OCWA, which is \$ 10,300 monthly for both water and sanitary network.
Rehabilitation & Replacement	As the system is relatively new, no rehabilitation and replacement strategies have been developed yet.

The following lifecycle strategies have been developed to formalize the current approach to manage the lifecycle of water mains.



Forecasted Capital Requirements

Based on the current Water System inventory, and assuming end-of-life replacement for all assets, the graph below provides a 30-year forecast. 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 are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 5-year capital requirements.



The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.1.6 Risk & Criticality

Risk Matrix

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	2 Assets 1,762.00 m \$1,413,082.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$882,852.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$608,114.00
	4	4 Assets 2,654.00 m \$1,971,479.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	6 Assets 2,245.00 m \$1,597,894.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$336,217.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	10 Assets 2,037.00 m \$1,402,680.00	0 Assets - \$0.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$104,756.00	5 Assets 5.00 unit(s) \$692,788.00
	1	7 Assets 7.00 unit(s) \$202,815.00	0 Assets - \$0.00	2 Assets 2.00 unit(s) \$74,411.00	0 Assets - \$0.00	9 Assets 9.00 unit(s) \$317,788.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Lifecycle Management Strategies

As the system is still relatively new, there are no lifecycle management strategies. However, it is best practice to start developing these strategies.

5.1.7 Levels of Service

The following tables identify the Township’s current level of service for Water System. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Township has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the Township that are connected to the municipal Water System	See Appendix B
	Description, which may include maps, of the user groups or areas of the Township that have fire flow	There is a total of 53 Hydrants in the Township of Macdonald, Meredith & Aberdeen Add'l as seen in Appendix B.
Reliability	# of customer complaints related to the water system	0

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal Water System	30%
	% of properties where fire flow is available	30%
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal Water System	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal Water System	0
Performance	Capital re-investment rate	1.37%

5.1.8 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data into the central asset inventory to ensure all relevant assets are accounted for.

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk Water System assets.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

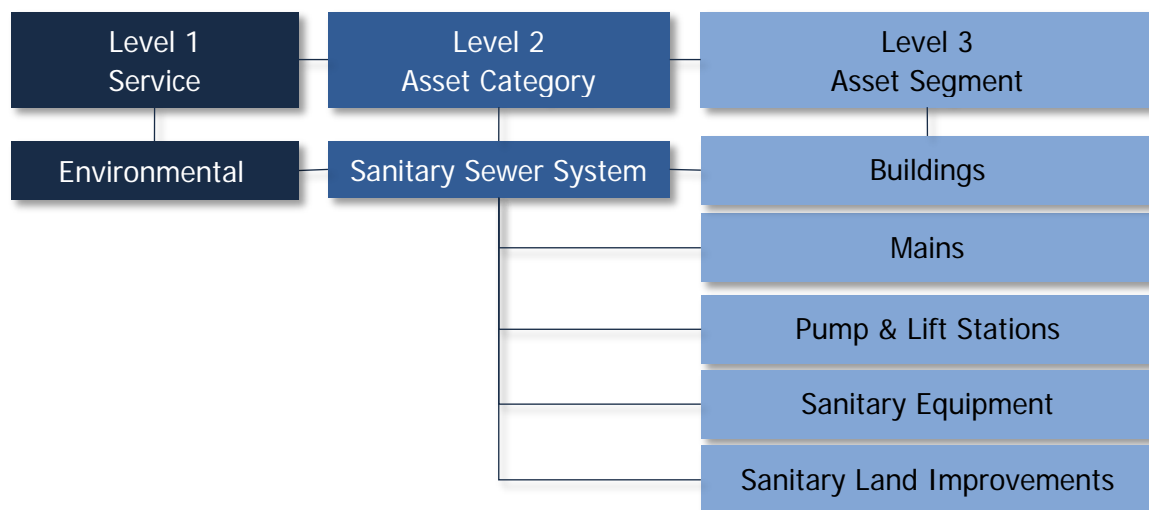
- Continue to measure current levels of service in accordance with the metrics that the Township has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

5.2 Sanitary Sewer System

The Township's Sanitary Sewer System inventory is managed in CityWide™, and comprises 8.7 kilometres of sanitary mains, approximately 15 pump and lift stations, three buildings, and several sanitary equipment and land improvements. The Plant is managed by Ontario Clean Water Agency (OCWA). The system is currently at 20% of its maximum capacity.

5.2.1 Asset Hierarchy and Segmentation

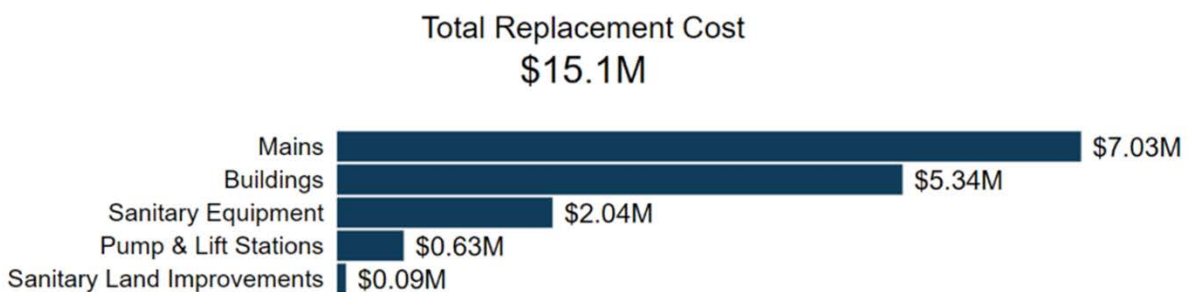
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis. Most reports and analytics presented in this AMP are summarized at the Asset Segment and/or Asset Category Levels.



5.2.2 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township's Sanitary Sewer System inventory.

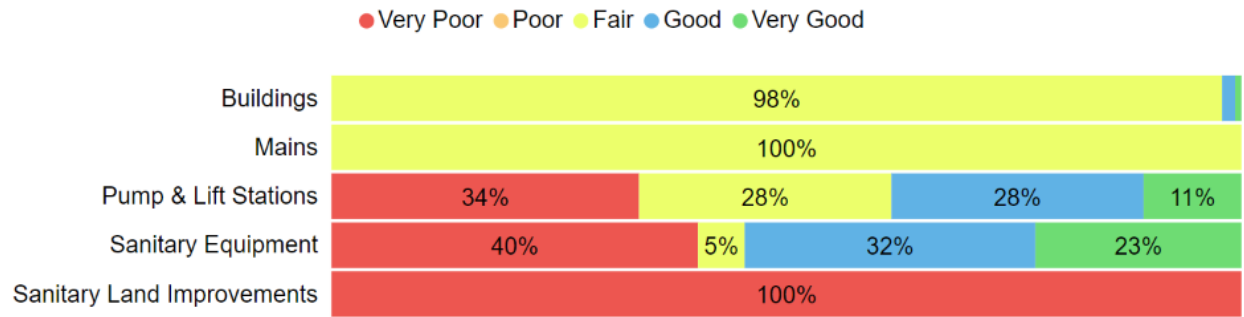
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Buildings	3	CPI Tables	\$5,342,640
Mains	8,736 (m)	CPI Tables	\$7,026,729
Pump & Lift Stations	15	CPI Tables	\$632,010
Sanitary Equipment	21	CPI Tables	\$2,037,448
Sanitary Land Improvements	3	CPI Tables	\$85,872
			\$15,124,699



5.2.3 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Buildings	56%	Fair	Age-Based
Mains	53%	Fair	Age-Based
Pump & Lift Stations	49%	Fair	Age-Based
Sanitary Equipment	49%	Fair	Age-Based
Sanitary Land Improvements	7%	Very Poor	Age-Based
53%		Fair	



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

Current Approach to Condition Assessment

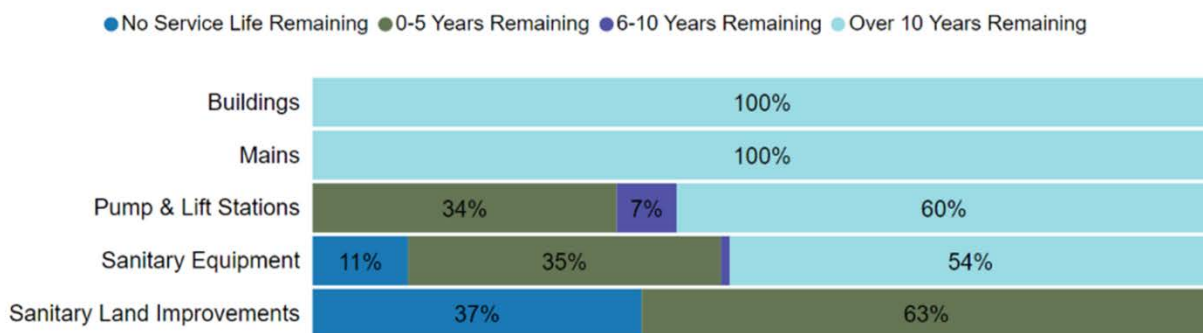
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

There is no condition assessment program in place for the sanitary system currently. Age-based estimates of condition are used to project current condition, although confidence in accuracy of these estimates is low.

5.2.4 Estimated Useful Life & Average Age

The Estimated Useful Life for Sanitary Sewer System assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Buildings	32 - 50	12.6	28.1
Mains	50	23.6	26.4
Pump & Lift Stations	10 - 50	17.0	11.0
Sanitary Equipment	10 - 25	14.4	7.5
Sanitary Land Improvements	10 - 25	22.3	-5.6
		18.8	16.0



Each asset's Estimated Useful Life should 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.

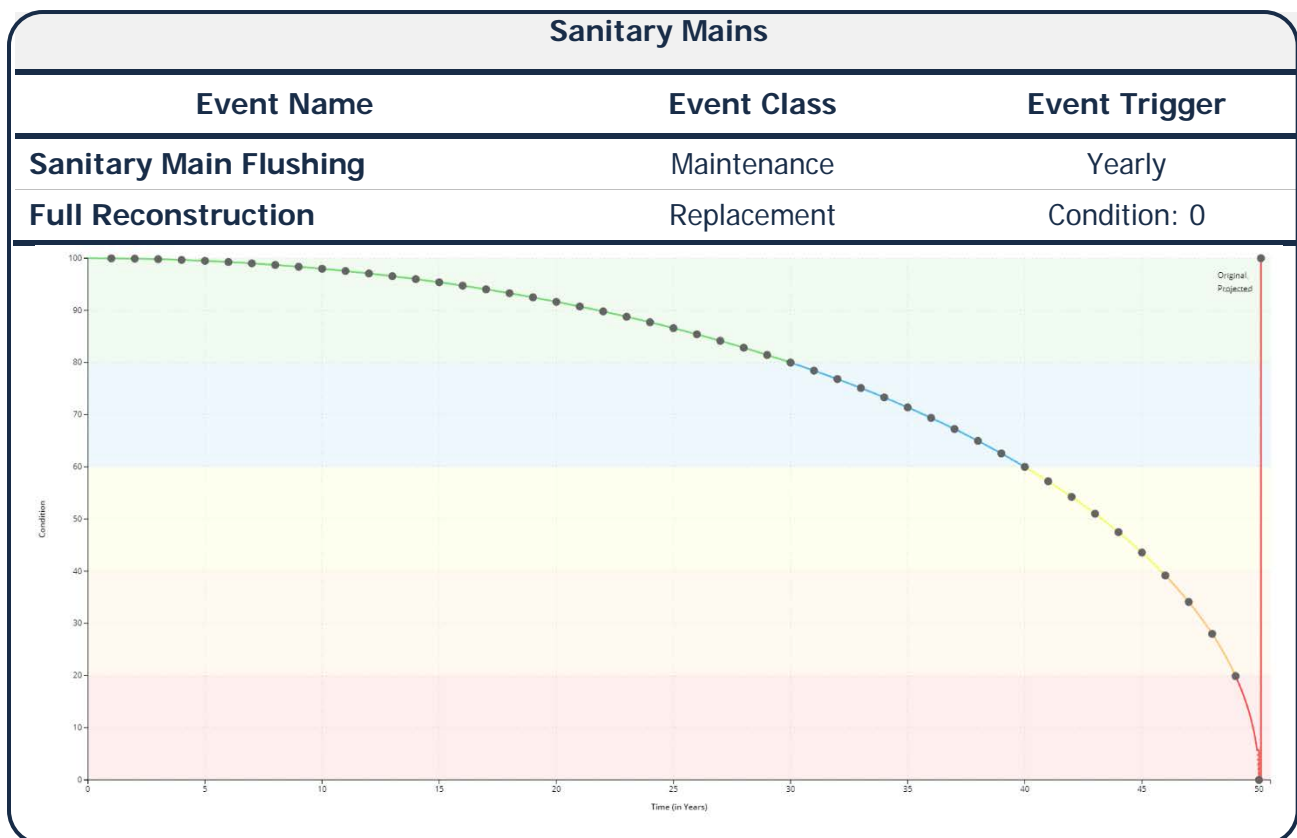
5.2.5 Lifecycle Management Strategy

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 the Township's current lifecycle management strategy.

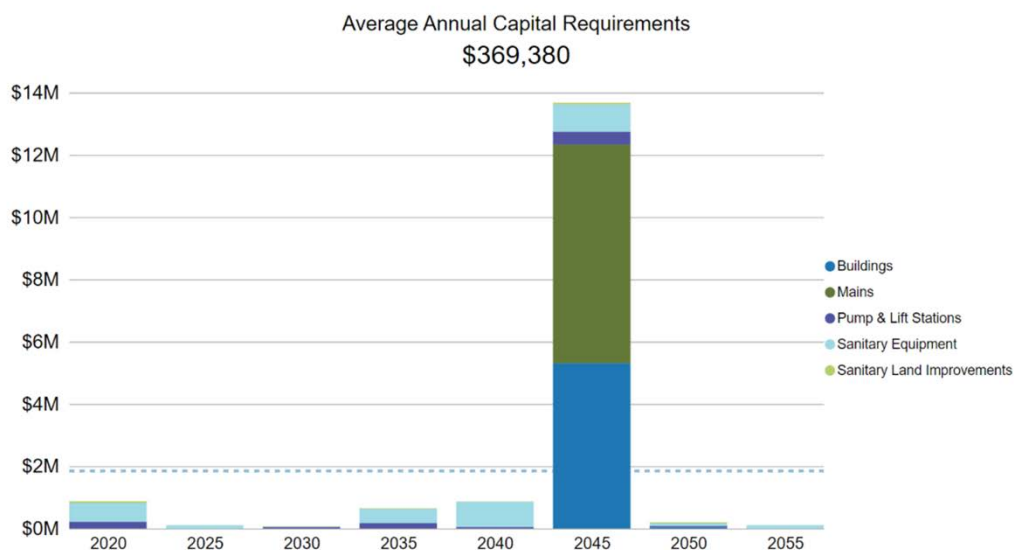
Activity Type	Description of Current Strategy
Maintenance	OCWA flushes the main pipes annually. Hydrant flow tests are performed annually on all hydrants. OCWA is at water plant daily to perform any required maintenance activities. Cost of maintenance is included in contract with OCWA, which is \$ 10,300 monthly for both water and sanitary network.
Rehabilitation & Replacement	As the system is relatively new, no rehabilitation and replacement strategies have been developed yet.

The following lifecycle strategy has been documented to formalize the current strategy used to manage the lifecycle of sanitary mains.



Forecasted Capital Requirements

Based on the current Sanitary Sewer System inventory, and assuming end-of-life replacement for all assets, the graph below provides a 35-year forecast. 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 are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth. The trend line represents the average 5-year capital requirements.



The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.2.6 Risk & Criticality

Risk Matrix

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	3 Assets 1,989.00 m \$1,639,523.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$5,229,396.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	5 Assets 2,679.00 m \$2,016,278.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	9 Assets 3,134.00 m \$2,242,101.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$336,217.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	7 Assets 931.00 m \$718,199.00	4 Assets 4.00 unit(s) \$999,327.00	1 Asset 1.00 unit(s) \$111,354.00	1 Asset 1.00 unit(s) \$104,756.00	3 Assets 3.00 unit(s) \$381,269.00
	1	8 Assets 8.00 unit(s) \$295,200.00	2 Assets 2.00 unit(s) \$173,843.00	4 Assets 4.00 unit(s) \$138,273.00	0 Assets - \$0.00	20 Assets 20.00 unit(s) \$738,963.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Lifecycle Management Strategies

As the system is still relatively new, there are no lifecycle management strategies. However, it is best practice to start developing these strategies.

5.2.7 Levels of Service

The following tables identify the Township's current level of service for Sanitary Sewer System. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Township has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Sanitary Sewer System.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the Township that are connected to the municipal Sanitary Sewer System	See Appendix B
	Description of how combined sewers in the municipal Sanitary Sewer System are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	The Township has combined sewers. It was highly recommended to install back check valves at the time of connection. However, There was no by-law to enforce the recommendation previously. Now, this has become a requirement for new buildings
Reliability	Description of the frequency and volume of overflows in combined sewers in the municipal Sanitary Sewer System that occur in habitable areas or beaches	No combined sewers
	Description of how stormwater can get into sanitary sewers in the municipal Sanitary Sewer System, causing sewage to overflow into streets or backup into homes	stormwater can enter the sanitary system though private connections (sump pumps and roof drains etc). Ground water can access through manhole seams and lids. The water table is high in Township due to lake levels.

Service Attribute	Qualitative Description	Current LOS (2020)
	Description of how sanitary sewers in the municipal Sanitary Sewer System are designed to be resilient to stormwater infiltration	Sanitary systems are not sealed perfectly. They are susceptible to stormwater through manhole lids. There is no Stormwater system in Echo Bay.
	Description of the effluent that is discharged from sewage treatment plants in the municipal Sanitary Sewer System	Effluent water is closely monitored to meet all regulations.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Sanitary Sewer System.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal Sanitary Sewer System	30%
Reliability	# of events per year where combined sewer flow in the municipal Sanitary Sewer System exceeds system capacity compared to the total number of properties connected to the municipal Sanitary Sewer System	0
Reliability	# of customer complaints related to the sanitary sewer system	0
Reliability	# of connection-days per year having Sanitary Sewer backups compared to the total number of properties connected to the municipal Sanitary Sewer System	0
Reliability	# of connection-days per year due to sanitary service backups compared to the total number of properties connected to the municipal Sanitary Sewer System	0

Reliability	# of effluent violations per year due to Sanitary Sewer discharge compared to the total number of properties connected to the municipal Sanitary Sewer System	0
Sustainability	% of the Sanitary Sewer System that is in good or very good condition	10%
Sustainability	% of the Sanitary Sewer System that is fair condition	83%
Sustainability	% of the Sanitary Sewer System that is in poor or very poor condition	7%
Sustainability	Average Risk Rating associated to the Sanitary Sewer System	Moderate
Performance	Capital re-investment rate	0.69%

5.2.8 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data into the central asset inventory to ensure all relevant assets are accounted for.

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk sanitary sewer assets.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- A trenchless re-lining strategy is expected to extend the service life of sanitary mains at a lower total cost of ownership and should be implemented to extend the life of infrastructure at the lowest total cost of ownership.
- Evaluate the efficacy of the Township's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Township has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

6

Impacts of Growth

Key Insights

- Understanding the key drivers of growth and demand will allow the Township to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure
- The population of the Township is expected to remain stable
- The costs of growth should be considered in long-term funding strategies that are designed to maintain the current level of service

6.1 Description of Growth Assumptions

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 Township to more effectively plan for new infrastructure, 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.

6.1.1 Township of Macdonald, Meredith & Aberdeen Add'l - Official Plan (September 2004)

The Township adopted its Official Plan in 2006. The plan was last modified in August of 2006. This plan is intended to serve as a guide to both public and private agencies in the Township by the establishment of various policies for future developments in the area. In conjunction with other means of land use and development controls, the Official Plan aims to help the township to achieve multiple goals in the following fields:

- Environmental
- Growth
- Agriculture and Resources
- Lakes
- Constraints
- Transportation
- Provincial Policy

At the time when the plan was developed, the majority of new development was planned to be directed in village service area serviced by municipal water and sewage systems. Other development outside the serviced area included recreational activities. Furthermore, industrial development was planned to be located within or near the village area with access from the existing Highway 17 corridor.

The following map illustrates the land use plan adopted by the Township at the time:

6.1.2 Population and Demand Trends

According to Stat Canada, The population of the Township increased from 1,464 in 2011 to 1,609 in 2016 which is equivalent to 9.9% increase in a period of 5-years. However, the population dropped to 1,513 in 2021 which represents a 6% decline. Staff have indicated that the Water and Sanitary Sewer Systems are at 20% of their maximum capacity. Therefore, these systems can support more growth.

6.2 Impact of Growth on Lifecycle Activities

By July 1, 2025, the Township'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.

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Township's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Township 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.

7

Financial Strategy

7.1 Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with a long-term financial plan (LTFP). The development of a comprehensive financial plan will allow Township of Macdonald, Meredith & Aberdeen Add'l to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

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

- 1) The financial requirements for:
 - a) Existing assets
 - b) Existing service levels
 - c) Requirements of contemplated changes in service levels (none identified for this plan)
 - d) Requirements of anticipated growth (none identified for this plan)
- 2) Use of traditional sources of municipal funds:
 - a) Tax levies
 - b) User fees
 - c) Reserves
 - d) Debt
 - e) Development charges
- 3) Use of non-traditional sources of municipal funds:
 - a) Reallocated budgets
 - b) Partnerships
 - c) Procurement methods
- 4) Use of Senior Government Funds:
 - a) Gas tax
 - b) Annual grants

Note: Periodic grants are normally not included due to Provincial requirements for firm commitments. However, if moving a specific project forward is wholly dependent on receiving a one-time grant, the replacement cost included in the financial strategy is the net of such grant being received.

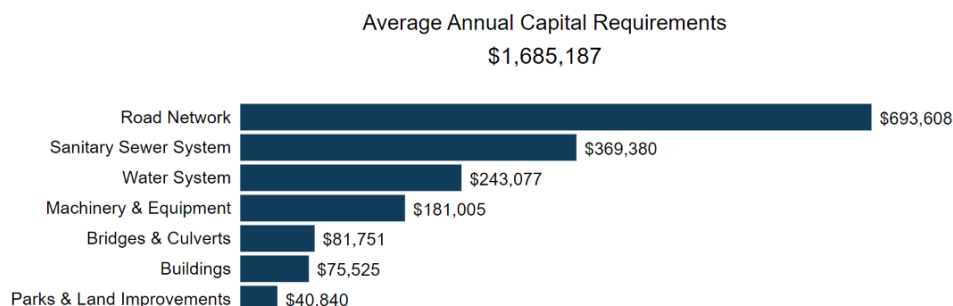
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Township's approach to the following:

- 1) In order to reduce financial requirements, consideration has been given to revising service levels downward.
- 2) All asset management and financial strategies have been considered. For example:
 - a) If a zero-debt policy is in place, is it warranted? If not the use of debt should be considered.
 - b) Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the Township should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the Township must allocate approximately \$1.69 million annually to address capital requirements for the assets included in this AMP.



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

However, for the Road Network, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the

Township's roads. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented. The following table compares two scenarios for the Road Network:

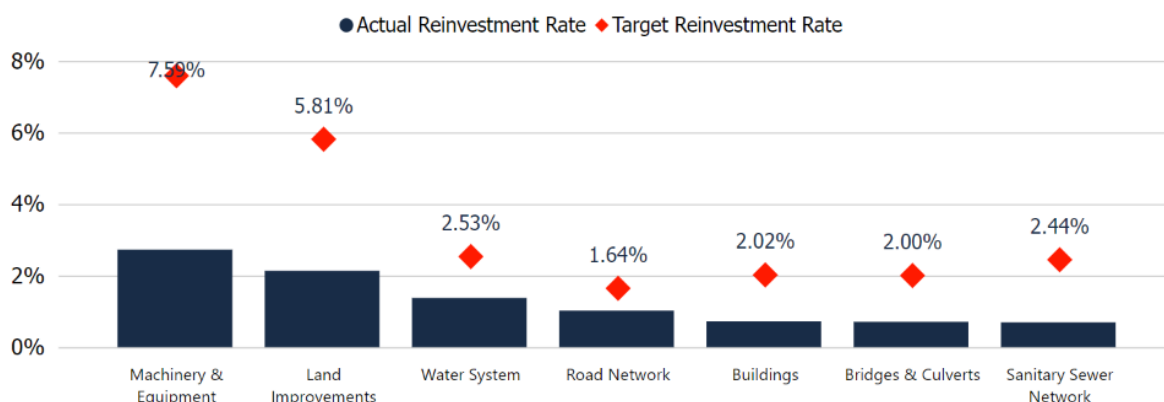
1. **Replacement Only Scenario:** Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario:** Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	\$2,098,000	\$693,000	\$1,404,000

The implementation of a proactive lifecycle strategy roads leads to an annual cost avoidance of \$1,404,000 for Road Network. This represents an overall decrease of the annual requirement of 67% for Road Network. As the lifecycle strategy scenario represents the lowest cost option available to the Township, we have used these annual requirements in the development of the financial strategy.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately \$803,000 towards capital projects per year. Given the annual capital requirement of \$1.69 million, there is currently a funding gap of \$882,000 annually.



7.2 Funding Objective

We have developed a scenario that would enable Macdonald, Meredith & Aberdeen Add'l to achieve full funding within 1 to 20 years for the following assets:

1. **Tax Funded Assets:** Bridges & Culverts, Buildings, Machinery & Equipment, Parks & Land Improvements, and Road Network
2. **Rate-Funded Assets:** Sanitary Sewer System and Water System

Note: For the purposes of this AMP, we have excluded gravel roads since they are a perpetual maintenance asset and end of life replacement calculations do not normally apply. If gravel roads are maintained properly, they can theoretically have a limitless service life.

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

7.3 Financial Profile: Tax Funded Assets

7.3.1 Current Funding Position

The following tables show, by asset category, Macdonald, Meredith & Aberdeen Add'l's average annual asset capital expenditure (CapEx) requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Avg. Annual Requirement	Annual Funding Available					Annual Deficit
		Taxes	Gas Tax	OCIF	Capital Reserve	Total Available	
Bridges & Culverts	\$82,000	\$29,000	\$0	\$0	\$0	\$29,000	\$53,000
Buildings	\$76,000	\$27,000	\$0	\$0	\$0	\$27,000	\$49,000
Parks & Land Improvements	\$41,000	\$15,000	\$0	\$0	\$0	\$15,000	\$26,000
Machinery & Equipment	\$181,000	\$65,000	\$0	\$0	\$0	\$65,000	\$116,000
Road Network	\$699,000	\$251,000	\$98,000	\$302,000	\$81,000	\$430,000	\$269,000
	\$1,079,000		\$98,000	\$302,000	\$81,000	\$566,000	\$513,000

The average annual investment requirement for the above categories is approximately \$ one million. Annual revenue currently allocated to these assets for capital purposes is \$566,000 leaving an annual deficit of \$513,000. Put differently, these infrastructure categories are currently funded at 52% of their long-term requirements.

7.3.2 Full Funding Requirements

In 2020, Township of Macdonald, Meredith & Aberdeen Add'l has annual tax revenues of \$2.32 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Bridges & Culverts	2.3%
Buildings	2.1%
Parks & Land Improvements	1.1%
Machinery & Equipment	5.0%
Road Network	11.6%
Total	22.1%

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

- a) No debt or change in OCIF

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

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-	-	-	-
Change in OCIF Grants	N/A	N/A	N/A	N/A	-	-	-	-
Resulting Infrastructure Deficit:	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000	\$513,000
Tax Increase Required	22.1%	22.1%	22.1%	22.1%	22.1%	22.1%	22.1%	22.1%
Annually:	4.07%	2.02%	1.34%	1.00%	4.07%	2.02%	1.34%	1.00%

7.3.3 Financial Strategy Recommendations

Considering all the above information, we recommend the 10-year option. This involves full CapEx funding being achieved over 10 years by:

- a. increasing tax revenue by 2.02% each year for the next 10 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- b. adjusting tax revenue increases in future year(s) when allocations to CapEx exceed or fail to meet budgeted amounts.
- c. allocating the current gas tax and OCIF revenue as outlined previously.
- d. allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
- e. reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
- f. increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included any applicable OCIF formula-based funding since this funding is a multi-year commitment¹.
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full CapEx funding on an annual basis in 10 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of \$834,000 for Buildings, \$242,000 for Parks & Land Improvements, \$284,000 for Machinery & Equipment.

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

¹ The Township should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. This review may impact its availability.

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

The following tables show, by asset category, Macdonald, Meredith & Aberdeen Add'l's average annual CapEx investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	Allocated to Reserves	OCIF	Total Available	
Water System	\$243,000	\$141,000	\$(142,000)	\$87,000	\$86,000	\$157,000
Sanitary Sewer System	\$369,000	\$76,000	\$(58,000)	\$133,000	\$151,000	\$218,000
	\$612,000	\$217,000	\$(200,000)	\$220,000	\$237,000	\$375,000

The average annual CapEx requirement for the above categories is \$612,000. Annual revenue currently allocated to these assets for capital purposes is \$237,000 leaving an annual deficit of \$375,000. Put differently, these infrastructure categories are currently funded at 38.7% of their long-term requirements.

7.4.2 Full Funding Requirements

In 2020, Macdonald, Meredith & Aberdeen Add'l had annual water revenues of \$141,000 and annual sanitary revenues of \$76,000. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Rate Change Required for Full Funding
Sanitary Sewer System	286.8%
Water System	111.3%

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

	Water System				Sanitary Sewer System			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	\$157,000	\$157,000	\$157,000	\$157,000	\$218,000	\$218,000	\$218,000	\$218,000
Tax Increase Required	111.3%	111.3%	111.3%	111.3%	286.8%	286.8%	286.8%	286.8%
Annually:	16.14%	7.77%	5.11%	3.81%	31.07%	14.49%	9.44%	7.00%

7.4.3 Financial Strategy Recommendations

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

- increasing rate revenues by 5.6% for Water System & by 7% for Sanitary Sewer System each year for the next 20 years.
- these rate revenue increases are solely for the purpose of phasing in full funding to the respective asset categories covered in this AMP.
- these rate revenue increases are solely for the purpose of phasing in full funding to the respective asset categories covered in this AMP.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

- As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
- We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.
- Any increase in rates required for operations would be in addition to the above recommendations.

Although this strategy achieves full CapEx funding for rate-funded assets over 20 years, the recommendation does require prioritizing capital projects to fit the annual funding available. Current data shows a pent-up investment demand of \$245,000 for the Water System and \$247,000 for the Sanitary Sewer System.

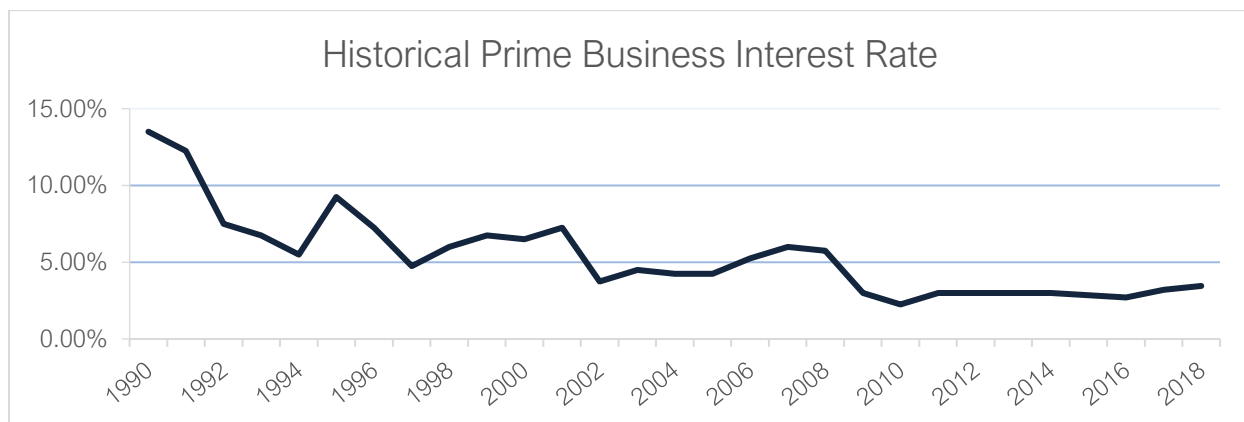
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

7.5 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%² 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.

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

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



² Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

A change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

The following tables outline how Macdonald, Meredith & Aberdeen Add'l has historically used debt for investing in the asset categories as listed. There is currently no outstanding debt for the assets covered by this AMP.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2014	2015	2016	2017	2018
Bridges & Culverts	\$0	\$0	\$0	\$0	\$0	\$0
Buildings	\$0	\$0	\$0	\$0	\$0	\$0
Park & Land Improvements	\$0	\$0	\$0	\$0	\$0	\$0
Machinery & Equipment	\$0	\$0	\$0	\$0	\$0	\$0
Road Network	\$0	\$0	\$0	\$0	\$0	\$0
Total Tax Funded:	\$0	\$0	\$0	\$0	\$0	\$0
Sanitary Sewer System	\$0	\$0	\$0	\$0	\$0	\$0
Water System	\$0	\$0	\$0	\$0	\$0	\$0
Total Rate Funded:	\$0	\$0	\$0	\$0	\$0	\$0

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2019	2020	2021	2022	2023	2024	2029
Bridges & Culverts	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Buildings & Facilities	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fleet	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Park & Land Improvements	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Machinery & Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Road Network	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Storm Sewer System	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Tax Funded:	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sanitary Sewer System	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Water System	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Rate Funded:	\$0	\$0	\$0	\$0	\$0	\$0	\$0

The revenue options outlined in this plan allow Macdonald, Meredith & Aberdeen Add'l to fully fund its long-term infrastructure requirements without further use of debt.

7.6 Use of Reserves

7.6.1 Available Reserves

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

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

By asset category, the table below outlines the details of the reserves currently available to Macdonald, Meredith & Aberdeen Add'l.

Asset Category	Balance at December 31, 2020
Bridges & Culverts	\$210,000
Buildings & Facilities	\$212,000
Fleet	\$365,000
Machinery & Equipment	\$849,000
Parks & Land Improvements	\$1,795,000
Total Tax Funded:	\$3,431,000
Sanitary Sewer System	\$1,009,000
Water System	\$665,000
Total Rate Funded:	\$1,674,000

There is considerable debate in the municipal sector as to the appropriate level of reserves that a Township should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should consider when determining their capital reserve requirements include:

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

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Macdonald, Meredith & Aberdeen Add'l's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

7.6.2 Recommendation

In 2024, Ontario Regulation 588/17 will require Macdonald, Meredith & Aberdeen Add'l to integrate proposed levels of service for all asset categories in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

Appendices

Key Insights

- Appendix A identifies projected 10-year capital requirements for each asset category
- Appendix B includes several maps that have been used to visualize the current level of service
- Appendix C identifies the criteria used to calculate risk for each asset category
- Appendix D provides additional guidance on the development of a condition assessment program

Appendix A: 10-Year Capital Requirements

The following tables identify the capital cost requirements for each of the next 10 years in order to meet projected capital requirements and maintain the current level of service.

Road Network											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
HCB Roads	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$177,000	\$0	\$0	\$0
LCB Roads	\$0	\$164,117	\$3,221	\$0	\$27,645	\$23,798	\$29,070	\$20,805	\$31,578	\$27,645	\$13,253
Streetlights	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total:	\$0	\$164,117	\$3,221	\$0	\$27,645	\$23,798	\$29,070	\$197,805	\$31,578	\$27,645	\$13,253

Bridges & Culverts											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges	\$0	\$0	\$0	\$0	\$0	\$649,065	\$0	\$0	\$0	\$0	\$0
Culverts	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$0	\$0	\$0	\$0	\$649,065	\$0	\$0	\$0	\$0	\$0

Buildings

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Administration	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Health	\$12,005	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Protection & Emergency	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public Works	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$329,295	\$0	\$0	\$0
Recreation & Cultural	\$822,013	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total:	\$834,018	\$0	\$0	\$0	\$0	\$0	\$0	\$329,295	\$0	\$0	\$0

Machinery & Equipment

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Administration	\$30,470	\$0	\$0	\$0	\$0	\$14,219	\$9,638	\$0	\$0	\$14,219	\$5,577
Protection & Emergency	\$201,005	\$0	\$0	\$23,427	\$11,565	\$15,922	\$7,245	\$23,269	\$8,125	\$0	\$20,487
Public Works	\$52,946	\$7,020	\$0	\$14,138	\$29,908	\$308,945	\$8,978	\$0	\$25,753	\$0	\$0
Recreation & Cultural	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,308
Vehicles	\$0	\$0	\$0	\$188,825	\$0	\$33,873	\$0	\$142,193	\$0	\$0	\$0
Total:	\$284,421	\$7,020	\$0	\$226,390	\$41,473	\$372,959	\$25,861	\$165,462	\$33,878	\$14,219	\$31,372

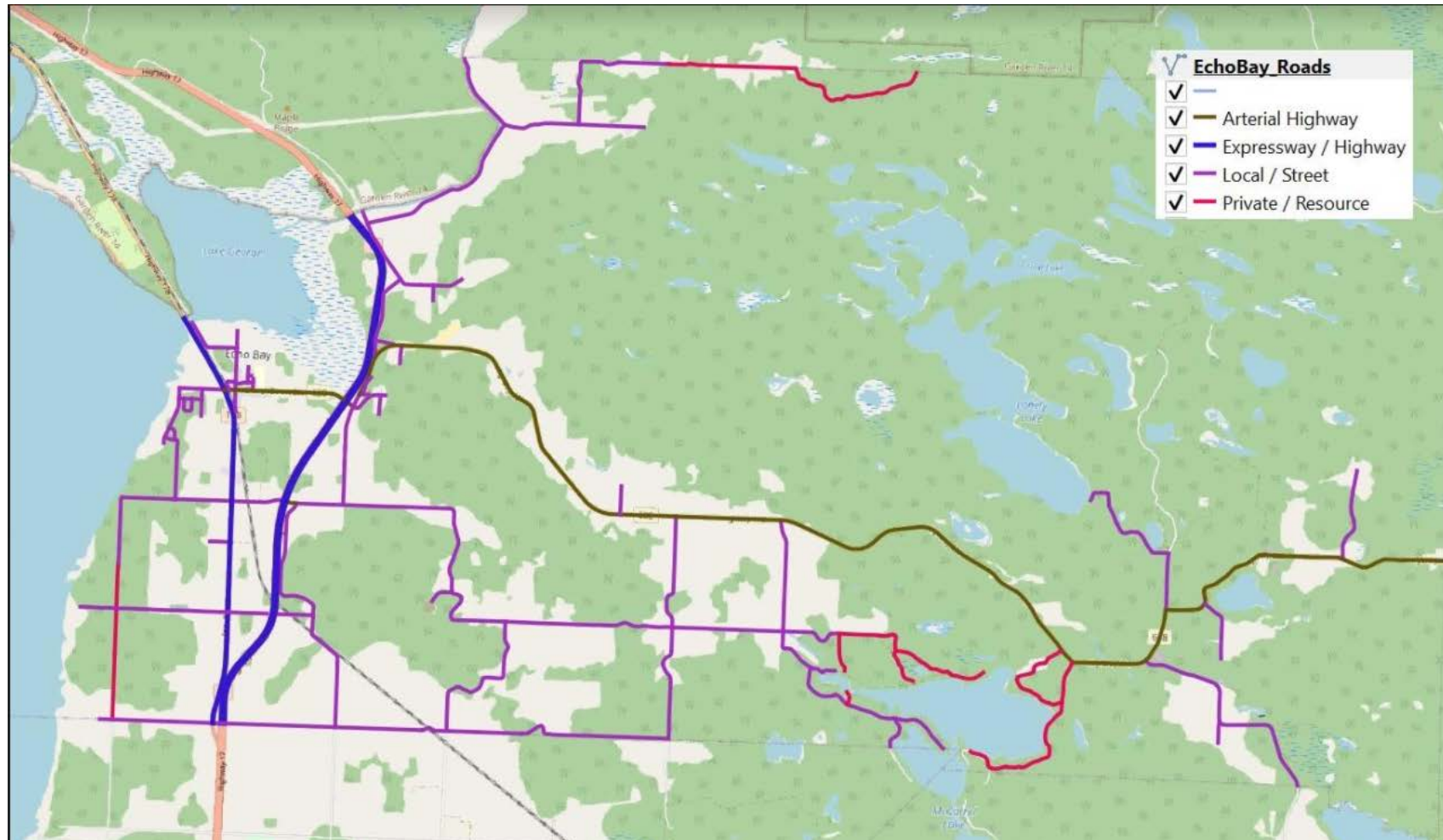
Parks & Land Improvements											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Park & Playground Equipment	\$136,002	\$0	\$0	\$0	\$0	\$0	\$27,664	\$0	\$0	\$10,938	\$20,419
Park Furnishings & Fencing	\$0	\$0	\$33,855	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Park Utilities	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,711	\$0	\$0
Site Structures	\$105,629	\$0	\$0	\$0	\$10,827	\$0	\$0	\$4,063	\$14,896	\$8,717	\$0
Total:	\$241,631	\$0	\$33,855	\$0	\$10,827	\$0	\$27,664	\$4,063	\$20,607	\$19,655	\$20,419

Water System											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Mains	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Water Equipment	\$213,355	\$0	\$0	\$0	\$1,098,750	\$0	\$104,756	\$0	\$0	\$0	\$0
Water Structures	\$31,421	\$0	\$0	\$220,713	\$54,451	\$0	\$0	\$0	\$0	\$0	\$0
Total:	\$244,776	\$0	\$0	\$220,713	\$1,153,201	\$0	\$104,756	\$0	\$0	\$0	\$0

Sanitary Sewer System											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Buildings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Mains	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pump & Lift Stations	\$0	\$0	\$0	\$0	\$213,681	\$0	\$0	\$0	\$0	\$0	\$0
Sanitary Equipment	\$216,020	\$0	\$0	\$0	\$604,659	\$0	\$104,756	\$0	\$0	\$0	\$0
Sanitary Land Improvements	\$31,421	\$0	\$0	\$0	\$54,451	\$0	\$0	\$0	\$0	\$0	\$0
Total:	\$247,441	\$0	\$0	\$0	\$872,791	\$0	\$104,756	\$0	\$0	\$0	\$0

Appendix B: Level of Service Maps/Images

Road Network Maps



Bridges & Culverts Images

Jarrel Bridge





Muddy Creek Bridge



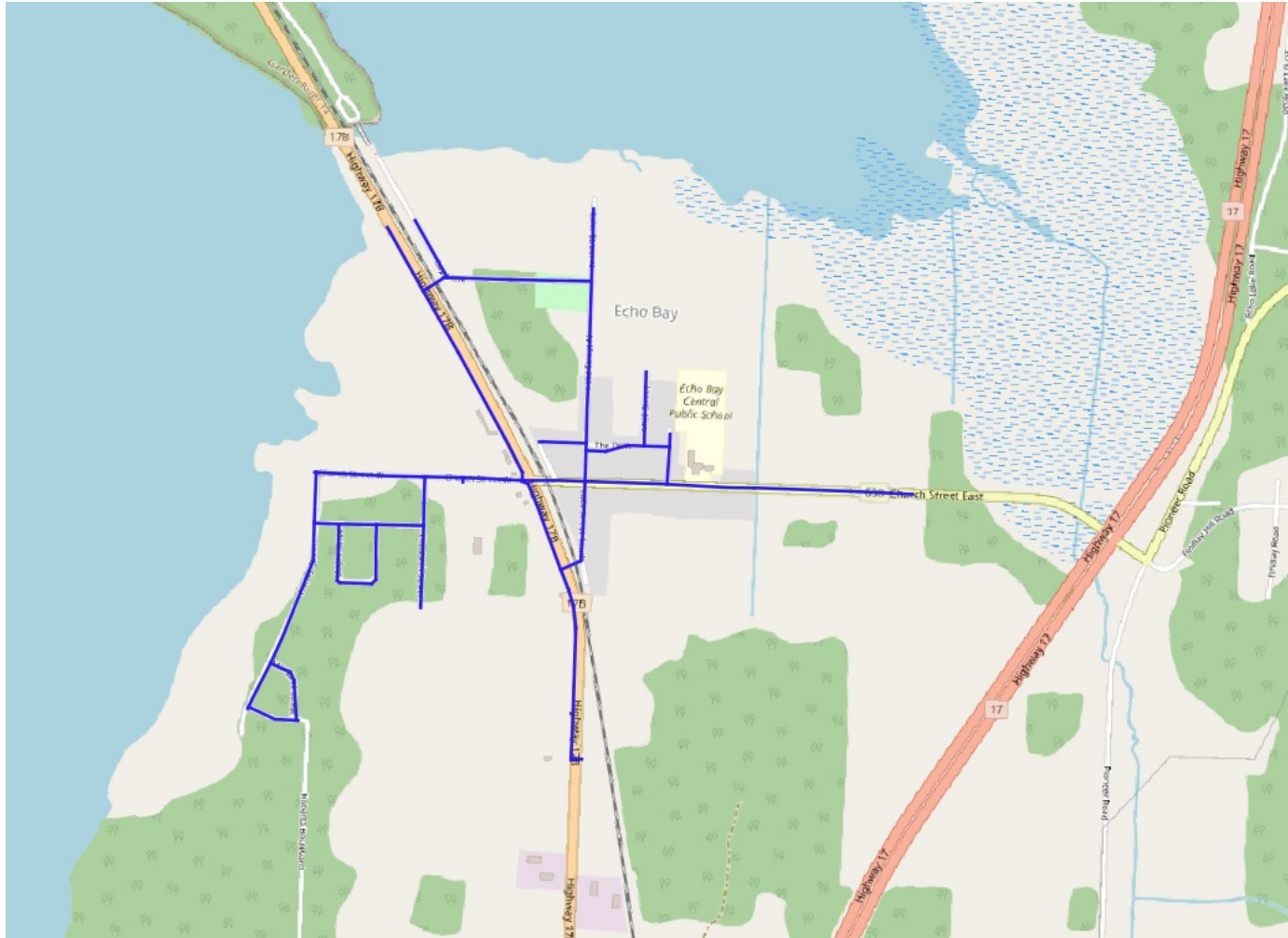


Roberts Creek Culvert

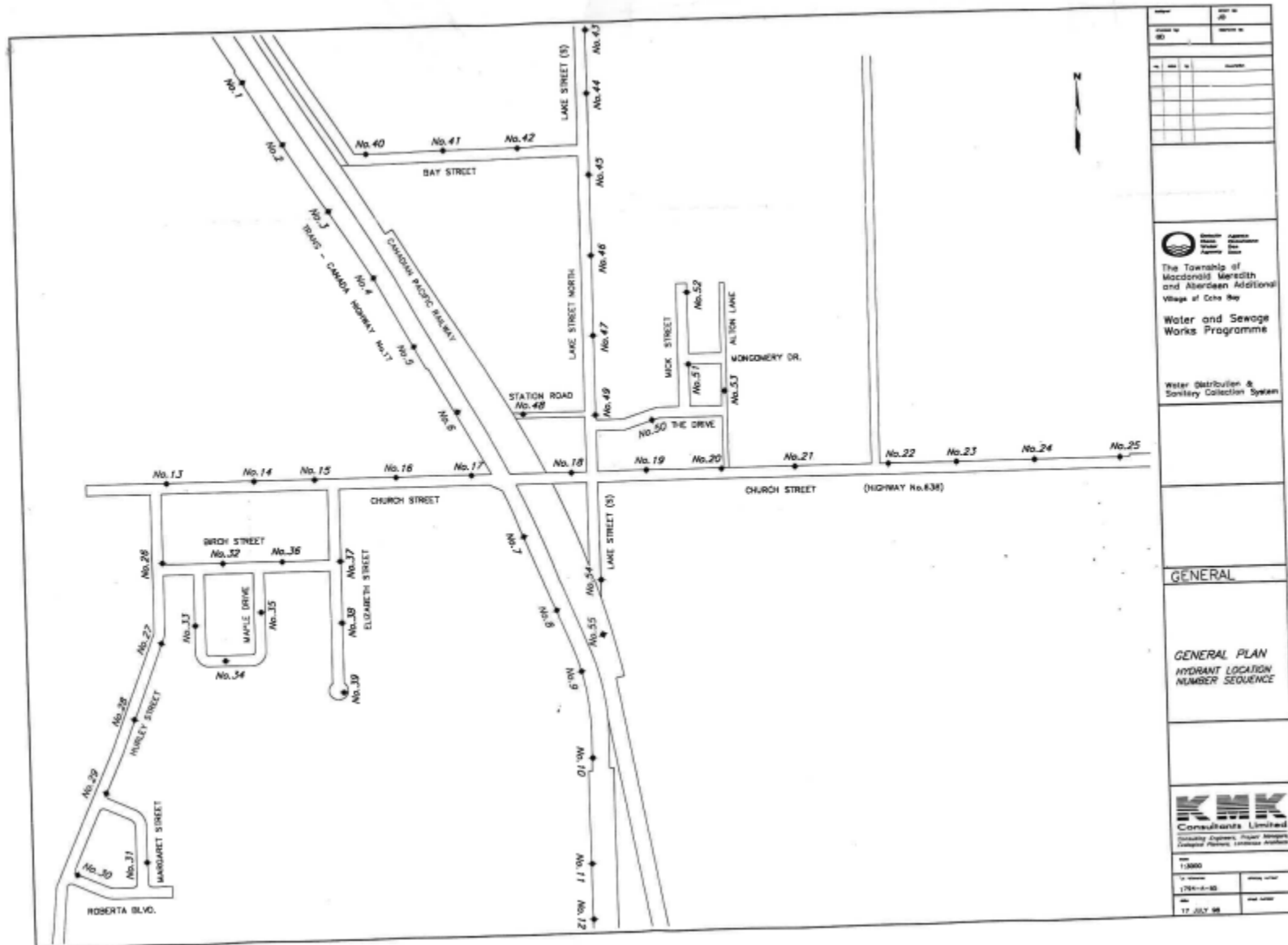




Water System Map



Hydrants Map



Sanitary Sewer System Map



Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Network (Roads)	Condition	100%	8-10	1
			6-7	2
			5-6	3
			4-5	4
			0-4	5
Bridges & Culverts	Condition	10%	80-100	1
			60-80	2
			40-60	3
			20-40	4
			0-20	5
Water Services (Linear)	Condition	80%	80-100	1
			60-80	2
			40-60	3
			20-40	4
			0-20	5
	Material	20%	PVC	2
			Ductile Iron	3
			Cast Iron	4
			80-100	1
			60-80	2
Sanitary Sewer Systems (Linear)	Condition	80%	40-60	3
			20-40	4
			0-20	5
			PVC	2
			Ductile Iron	3
	Material	20%	Cast Iron	4
			20-39	4

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
All Other	Condition	100%	80-100	1
			60-80	2
			40-60	3
			20-40	4
			0-20	5

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Roads)	Economic (80%)	Replacement Cost (100%)	\$0-\$100,000	1
			\$100,000-\$300,000	2
			\$300,000-\$600,000	3
			\$600,000-\$800,000	4
			\$800,000+	5
	Social (20%)	Traffic Range (V.P.D) (70%)	0-49	1
			50-199	3
			200+	5
		Road Classification (30%)	6	1
			5	2
			3-4	3
			2	4
Bridges & Culverts	Economic (100%)	Replacement Cost (100%)	1	5
			\$0-\$50,000	1
			\$50,000-\$250,000	2
			\$250,000-\$400,000	3
			\$400,000-\$550,000	4
Water System (Mains)	Economic (80%)	Replacement Cost (100%)	\$550,000+	5
			\$0-\$50,000	1
			\$50,000-\$200,000	2
			\$200,000-\$350,000	3
			\$350,000-\$500,000	4
	Operational (20%)	Pipe Diameter (100%)	\$500,000+	5
			0-50	1
			50-100	2
			100-150	3
			150-200	4
Sanitary Sewer System (Mains)	Economic (80%)	Replacement Cost	200+	5
			\$0-\$50,000	1
			\$50,000-\$150,000	2

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score	
		(100%)	\$150,000-\$300,000	3	
			\$300,000-\$450,000	4	
			\$450,000+	5	
	Operational (20%)	Pipe Diameter (100%)	0-75	1	
			75-100	2	
			100-150	3	
			150-200	4	
			200+	5	
	All Other	Economic (100%)	Replacement Cost (100%)	\$0-\$100,000	1
				\$100,000-\$300,000	2
				\$300,000-\$400,000	3
				\$400,000-\$500,000	4
				\$500,000+	5

Appendix D: 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 Township'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 Township'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 Township 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 Township 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 Township 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 Township 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:

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