Asset Management Plan

Township of Mulmur

2021

This Asset Management Program was prepared by:

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

Key Statistics

Replacement cost of asset portfolio
$75.0 million

Replacement cost of infrastructure per household
$44,000 (2021)

Percentage of assets in fair or better condition
76%

Percentage of assets with assessed condition data
69%

Annual capital infrastructure deficit
$1.1 million

Recommended timeframe for eliminating annual infrastructure deficit
15-20 Years

Target reinvestment rate
3.1%

Actual reinvestment rate
1.7%

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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 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 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 Asset Management Plan (AMP) the Township 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 included in this AMP totals $75 million. Seventy six percent (76%) of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 69% of assets. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

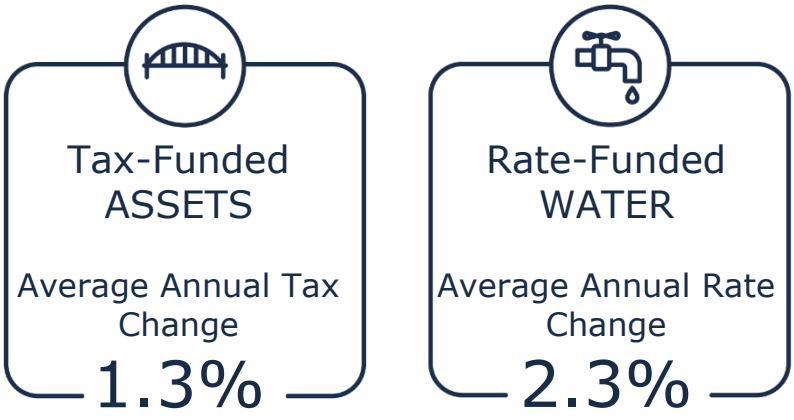
The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads and bridges & culverts) and replacement only strategies (all other assets) to determine the lowest cost option to maintain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

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Township's average annual capital requirement totals $2.3 million. Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately $1.3 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $1.1 million.

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 15-year plan for tax-funded assets and 20-year plan for rate-funded assets:



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

- Develop a data governance framework to ensure data quality and integrity is maintained within the asset management database. Couple this with a condition assessment strategy that would allow for more accurate and consistent strategic capital planning.
- Develop and regularly review risk and lifecycle models to develop a more proactive asset management program within Mulmur.
- Measure current levels of service for core assets and identify sustainable proposed levels of service in preparation for 2025 O.Reg. 588/17 requirements.
- Develop levels of service metrics for non-core assets and expand the analysis of these assets in preparation for 2024 O.Reg. 588/17 requirements.

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.

- The Township's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management.

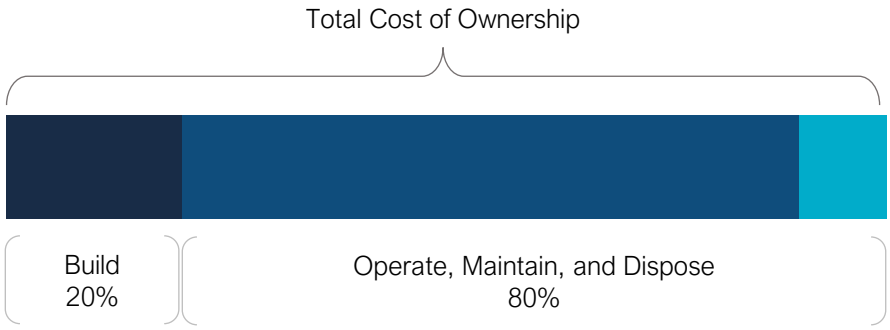
- An asset management plan is a living document that should be updated regularly to inform long-term planning.

- Ontario Regulation 588/17 outlines several key milestone and requirements for asset management plans in Ontario between July 1, 2022, and 2025.

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

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

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 adopted a Strategic Asset Management Policy on June 5th, 2019, in accordance with Ontario Regulation 588/17. The asset management plan satisfies the Guiding Principles, Section 4, of the Strategic Asset Management Policy:

> *"Management will oversee the policy implementation and ensure both the Asset Management Plan and the Asset Management Policy follow Provincial Asset Management regulations. Management will ensure that current year and long-range asset requirements are incorporated into the budget presented to Council annually. Management will update the Policy and Plan to reflect changes as needed and present them for Council approval."*

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

1.1.3 Asset Management Plan

The asset management plan (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.

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.

1.1.4 Lifecycle Management Strategies

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

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

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

Lifecycle Activity	Description	Example (Roads)	Cost
Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	$$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	$$$

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 a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

1.1.5 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.

1.1.6 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 and culverts, 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 has determined the qualitative descriptions that will be used to determine the community level of service provided. These descriptions can be found in the Levels of Service subsection within each asset category.

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 and culverts, water) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP.

Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the 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.

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

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

2024

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

2025

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

1.1.7 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 municipality'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 4 asset categories and is divided between tax-funded and rate-funded categories.

- 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.

Asset Categories Included in this AMP

This asset management plan for the Township of Mulmur 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 and culverts, water).

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	
Non-Core Assets	
Water Network	User Rates

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 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.

Estimated Useful Life

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.

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:

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

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

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.

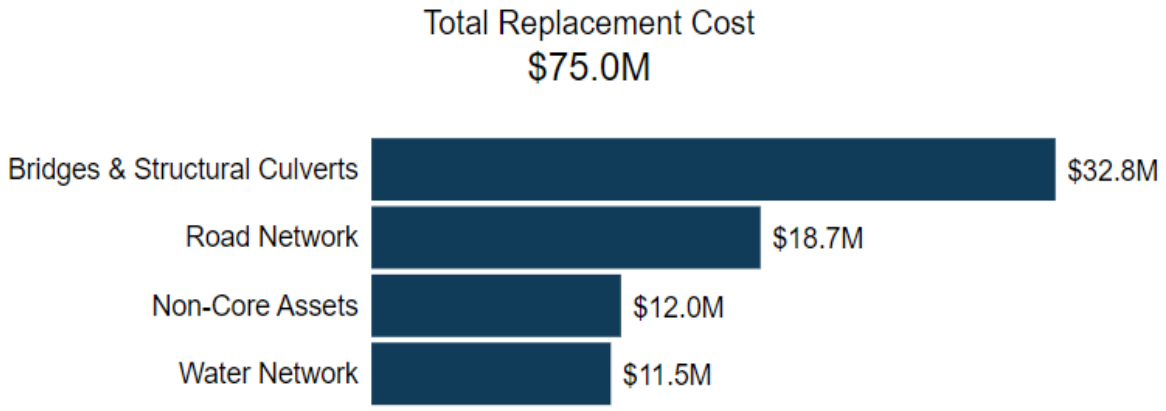
3 Portfolio Overview

Key Insights

- The total replacement cost of the Township's asset portfolio is $75 million.
- The Township's target re-investment rate is 3.1%, and the actual re-investment rate is 1.69%, contributing to an expanding infrastructure deficit.
- 76% of all assets are in fair or better condition.
- Average annual capital requirements total $2.3 million per year across all assets.

Total Replacement Cost of Asset Portfolio

The asset categories analysed in this AMP have a total replacement cost of $75.0 million based on inventory data from 2021. 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.

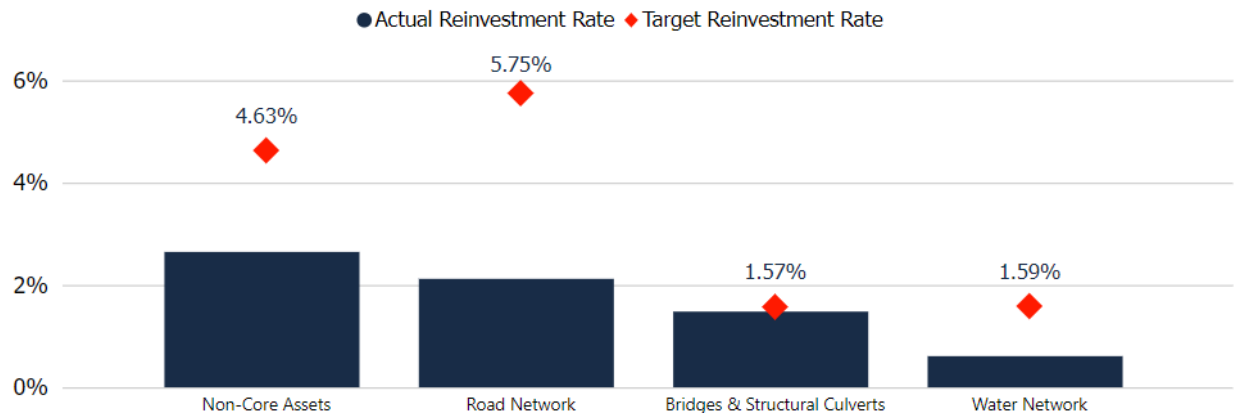


The following table identifies the methods employed to determine replacement costs across each asset category:

Asset Category	Replacement Cost Method	
	User-Defined	Notes
Road Network	95%	Staff Estimates
Bridges & Culverts	100%	Data source is 2020 Ontario Structure Inspection Manual (OSIM) report
Water Network	74%	Staff Estimates
Non-Core Assets	0%	Historical Inflation
Overall	**79%**	

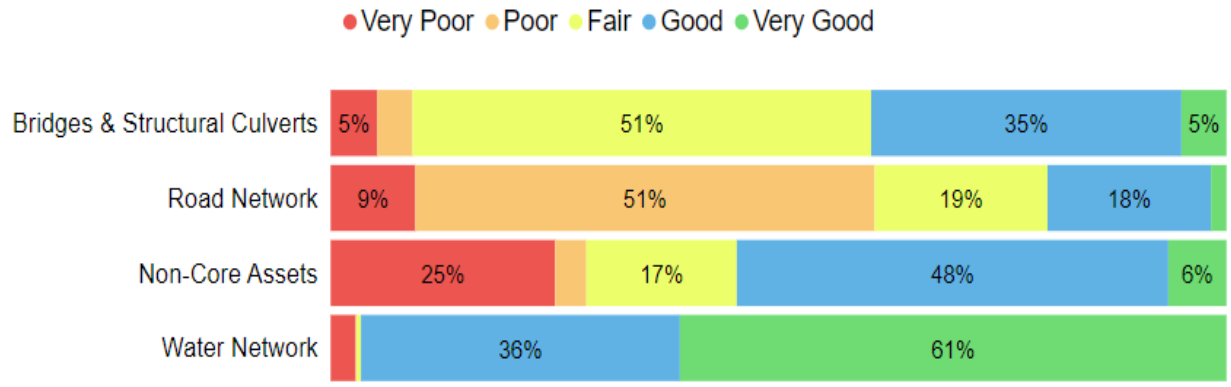
Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Township should be allocating approximately $2.3 million annually, for a target reinvestment rate of 3.1%. Actual annual spending on infrastructure totals approximately $1.3 million, for an actual reinvestment rate of 1.69%.



Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 76% of assets in Mulmur are in fair or better condition. This estimate relies on both age-based and field condition data.



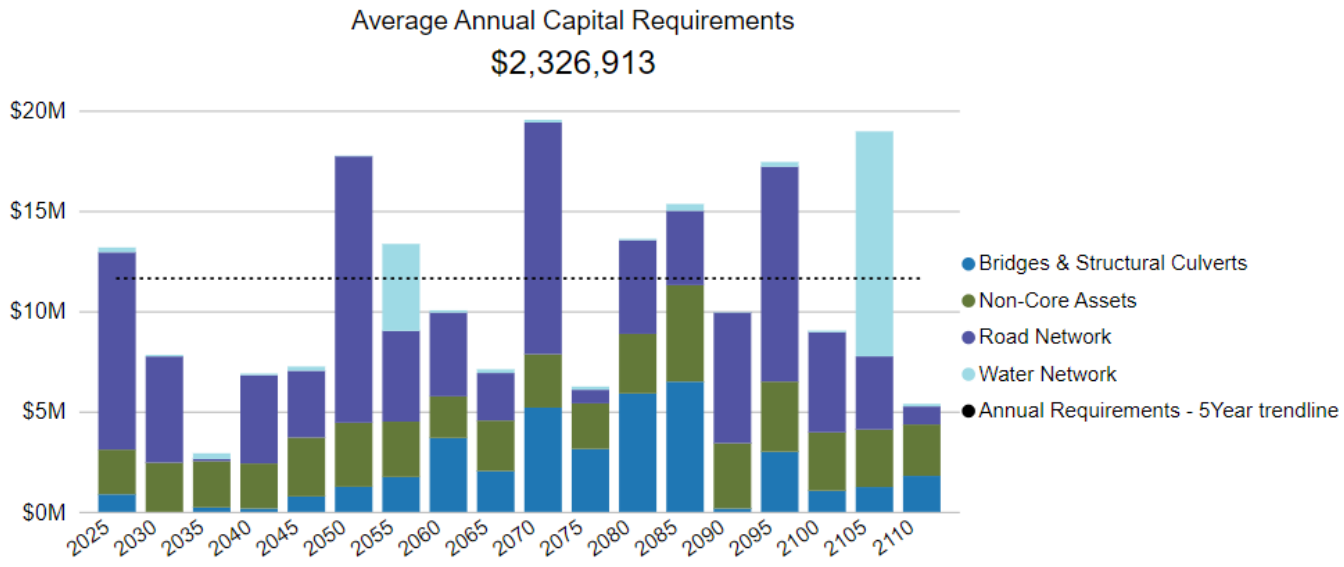
This AMP relies on assessed condition data for 69% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Road Network	Paved Roads	96%	Staff Assessments
Bridges & Culverts	Bridges Structural Culverts	100%	2020 OSIM Report
Water Network	All	3%	Staff Assessments
Non-Core Assets	All	34%	Staff Assessments

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, the Township can produce an accurate long-term capital forecast.

The following graph identifies capital requirements over the next 100 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



4 Road Network

The road network is a critical component of the provision of safe and efficient transportation services. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure like streetlights, small culverts, and road signs.

The Township's roads are maintained by the Public Works department who is also responsible for winter snow clearing, ice control and snow removal operations.

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

Replacement Cost	Condition	Financial Capacity	
$18.7 million	Fair (53%)	Annual Requirement:	$1.1 million
		Funding Available:	$396,000
		Annual Deficit:	$678,000

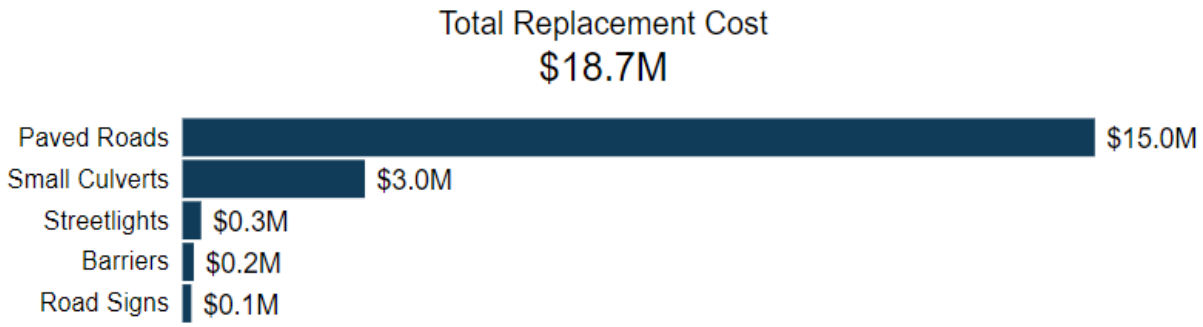
The following core values and level of service statements are a key driving force behind the Township's asset management planning:

Service Attribute	Level of Service Statement
Scope	The road network service is conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and is available under all weather conditions.
Quality	The road network is in fair condition with minimal unplanned service interruptions and road closures.

Asset Inventory & Costs

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Unpaved Roads	177.2 km	Not Planned for Replacement[1]	
Paved Roads	55.7 km	$15,030,000	$964,000
Barriers	2.4 km	$187,000	$7,000
Road Signs	625	$147,000	$15,000
Small Culverts	Pooled	$3,006,000	$75,000
Streetlights	92	$308,000	$12,000
Total		**$18,677,000**	**$1,074,000**



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

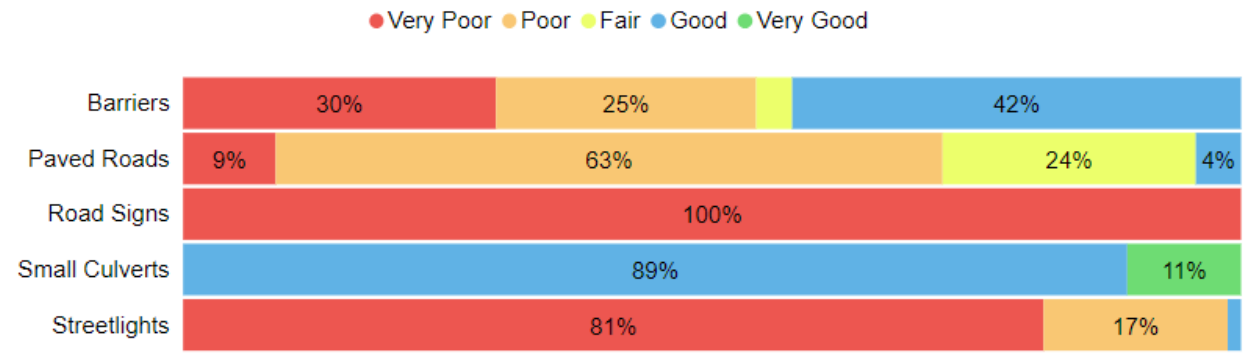
[1] Gravel roads undergo perpetual operating and maintenance activities. If maintained properly, they can theoretically have a limitless service life.

Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Paved Roads	15	18.8	49% (Fair)
Barriers	25	23.0	38% (Poor)
Road Signs	10	18.9	0% (Very Poor)
Small Culverts	40	4.8	80% (Very Good)
Streetlights	25	29.1	6% (Very Poor)
Average		**20.2**	53% (Fair)

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



To ensure that the Township's road network 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 roads.

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

4.1.1 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 conduct regular condition assessments on their paved and unpaved roads.
- Other roadside assets are inspected as needed in accordance with Minimum Maintenance Standards (MMS).

In this AMP the following rating criteria is used to determine the current condition of road segments and forecast future capital requirements:

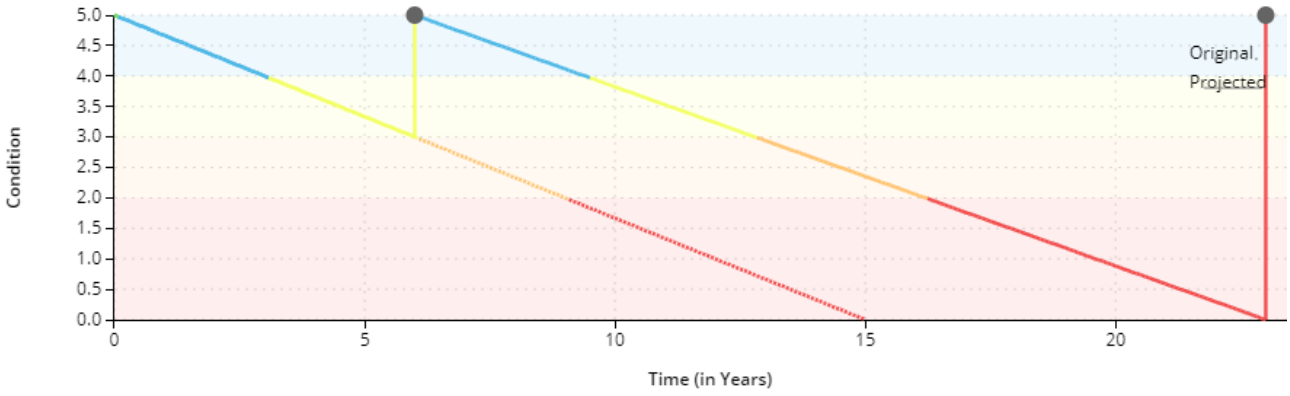
Condition	Rating
Very Good	5
Good	4
Fair	3
Poor	2
Very Poor	0

Lifecycle Management Strategy

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

The following lifecycle strategy has been developed as a proactive approach to managing the lifecycle of paved 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.

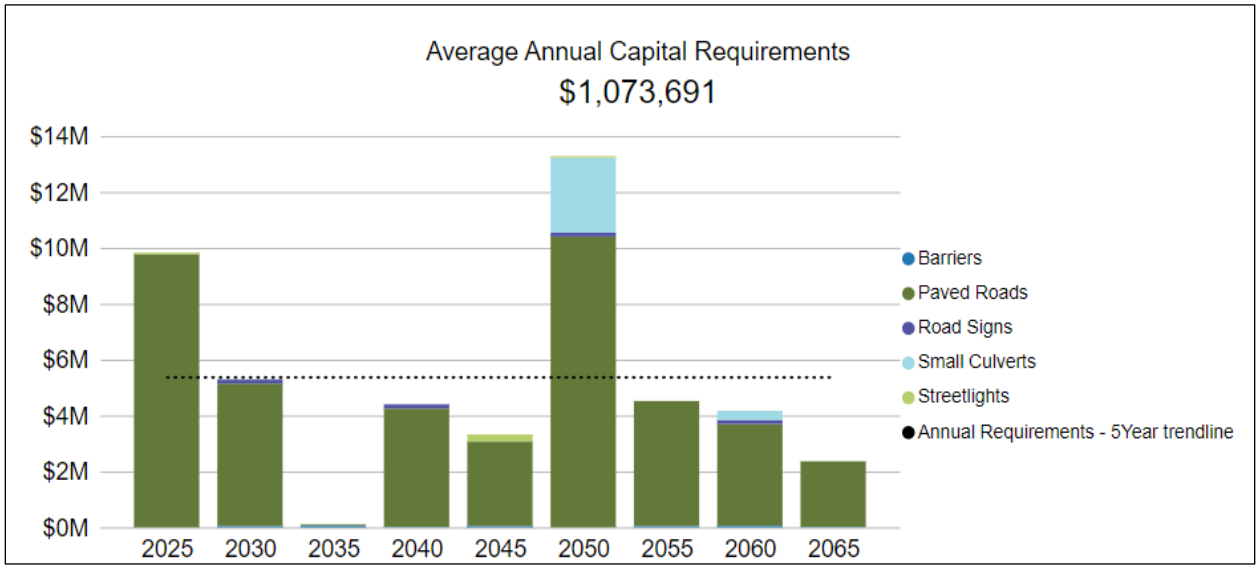
Paved Roads		
Event Name	**Event Class**	**Event Trigger**
Shave & Pave	Rehabilitation	2-3 Condition
Replacement	Replacement	End-of-Life



4.1.2 Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for paved roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the road network.

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 50 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The 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.

Risk & Criticality

4.1.3 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 2021 inventory data.

This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the roads are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Average Daily Traffic Counts (Operational)

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

4.1.4 Risks to Current Asset Management Strategies

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

Infrastructure Reinvestment

The current level of financial reinvestment does not sufficiently address maintenance and capital rehabilitation requirements to ensure roads remain in an adequate state of repair and achieve their intended service life. The financial strategy in this report addresses the extent of this underfunding.

Organizational Resources

The Township has a large inventory of roads which require regular maintenance and assessment. Staff capacity and expertise are sometimes insufficient to deploy optimal maintenance and assessment strategies.

Climate Change & Extreme Events

An increase in freeze/thaw cycles has been impacting the Township's roads. This causes the accelerated deterioration of road surfaces leading to a heightened need for maintenance and rehabilitation as well as reducing the useful life of the roads.

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.

4.1.5 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 (2021)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	The Township conducts regular visual condition assessment for all Paved and Gravel Roads. Every road receives a condition rating (1-5). 1 – Very Poor. Road requires immediate reconstruction within the next 1-2 years. 2-3 – Poor/Fair. Road requires major rehabilitation and/or replacement in the next 3-6 years. 4-5 – Good/Very Good – Roads are functioning as required. Preventative maintenance is recommended.

4.1.6 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 (2021)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0 km / 287 km^2
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0 km / 287 km^2
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	424 km / 287 km^2
Quality	Average pavement condition index for paved roads in the municipality	49%
	Average surface condition for unpaved roads in the municipality (e.g., excellent, good, fair, poor)	Fair
Performance	Capital reinvestment rate	2.12%

Recommendations

Asset Inventory

- Continue to refine and update asset attribute information, such as traffic counts, road type, or drainage adequacy, to ensure accuracy of the risk and lifecycle strategy outcomes. Review road signs and barriers inventory to determine if a comprehensive and accurate inventory has been compiled.
- Update replacement cost information on a regular basis, every 1-2 years, especially for the linear road segments.

Condition Assessment Strategies

- The last comprehensive assessment of the road network was completed in 2020. Consider completing an updated assessment of all roads every 5-7 years as part of a dedicated condition strategy program. The information should be uploaded into the Citywide database promptly to drive strategic capital planning.

Risk & Lifecycle Management Strategies

- Evaluate the efficacy of the Township's lifecycle management strategies at regular intervals to determine the impact cost, condition, and risk.
- 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.

5 Bridges & Structural Culverts

Bridges and structural culverts represent a critical portion of the transportation services provided to the community. The Public Works department is responsible for the maintenance of all bridges and culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

The state of the infrastructure for bridges and culverts is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$32.8 million	Fair (65%)	Annual Requirement:	$516,000
		Funding Available:	$486,000
		Annual Deficit:	$30,000

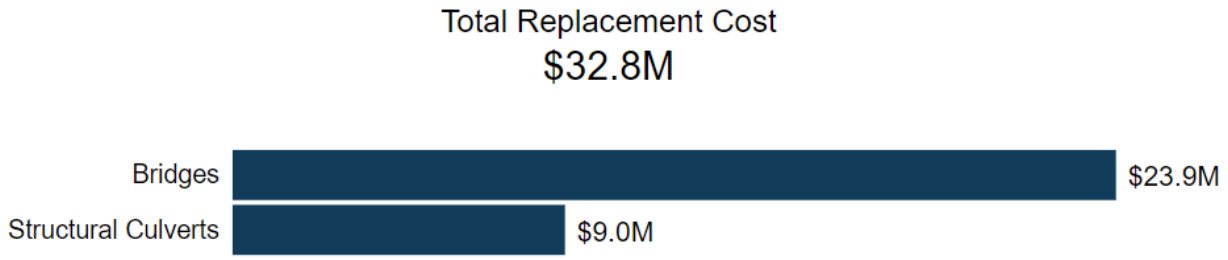
The following core values and level of service statements are a key driving force behind the Township's asset management planning:

Service Attribute	Level of Service Statement
Scope	Bridges and culverts are conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and are available under all weather conditions.
Quality	The bridges and culverts are in fair condition with minimal unplanned service interruptions and closures.

Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Township's bridges and structural culverts inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Bridges	28	$23,859,000	$396,000
Structural Culverts	16	$8,977,000	$120,000
Total		**$32,837,000**	**$516,000**



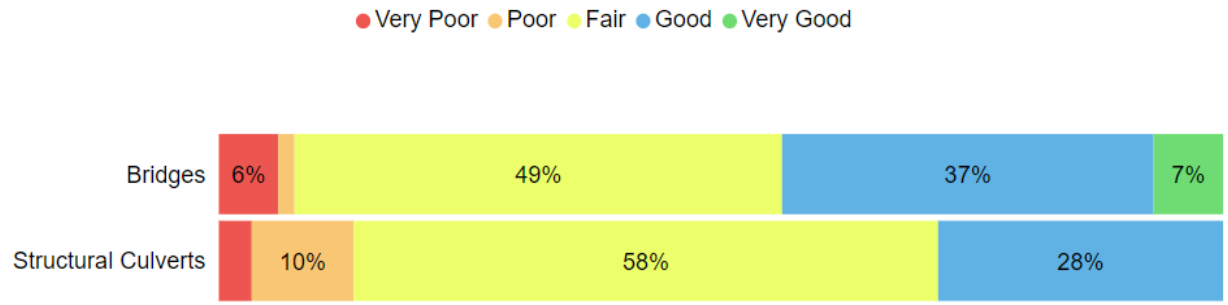
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Bridges	50 – 75	56.0	66% (Fair)
Structural Culverts	75	38.2	62% (Fair)
Average		**51.5**	**65% (Fair)**

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



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

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

5.1.1 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 structural culverts, with a span greater than or equal to 3 meters, are completed every 2-4 years in accordance with the Ontario Structure Inspection Manual (OSIM).
- Staff perform visual inspections of bridges and structural culverts on an as-needed basis between OSIMs inspections.

In this AMP, the following rating criteria is used to determine the current condition of bridges and structural culverts and forecast future capital requirements:

Condition	Rating
Very Good	90
Good	70
Fair	50
Poor	30
Very Poor	0

Lifecycle Management Strategy

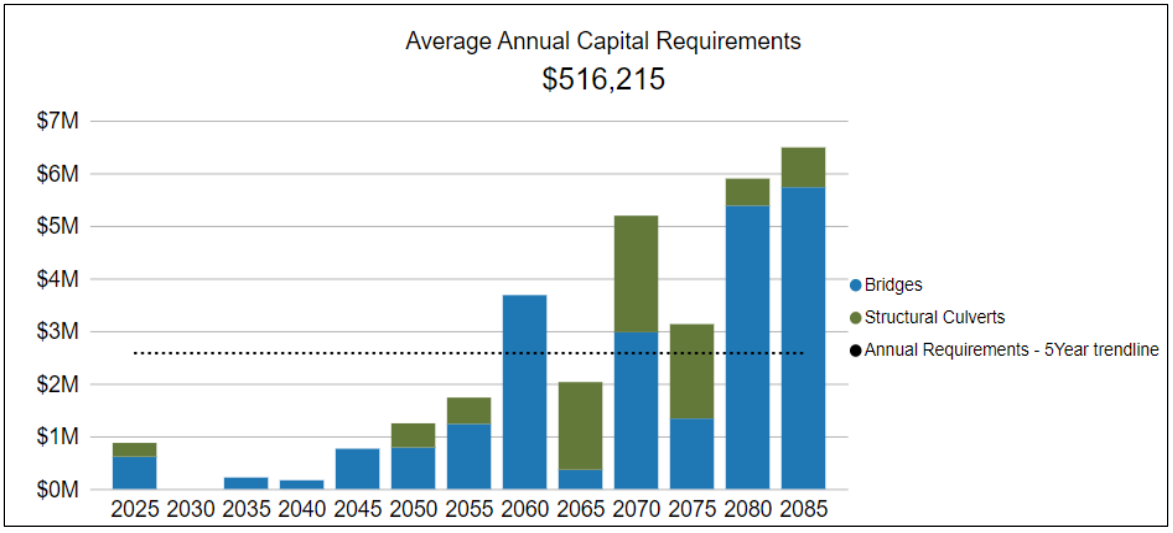
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation/ Replacement	All lifecycle activities are driven by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIM) Washing and dusting of bridges is completed annually in Spring. Bridges are swept on a regular basis.

5.1.2 Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 70 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The 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.

Risk & Criticality

5.1.3 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 2021 inventory data.

This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of bridges and structural culverts are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Detour Distance (Operational)

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

5.1.4 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 Events

Washouts, steep slopes, high banks, and flooding causes damage to multiple components of the Townships bridges. The rising levels of freshwater and the increased frequency and intensity of precipitation events are likely to increase the deterioration of bridge components. Future bridge and structural culvert designs may need to consider upsizing in anticipation of handling bigger storm events. Over time, this risk is expected to become more impactful. Existing infrastructure may not be sufficiently sized to manage these conditions and may eventually require replacement.

Organizational Resources

The Township has a large inventory of bridges which require regular maintenance and assessment. Staff capacity and expertise are sometimes challenged to deploy optimal maintenance and assessment strategies.

Levels of Service

The following tables identify the Township's current level of service for bridges and structural 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.

5.1.5 Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2021)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the municipal transportation network. None of the Township's structures currently have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, emergency vehicles, and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	Bridges and structural culverts receive a bridge condition index (BCI) during OSIM inspections. BCI values range from 0 to 100 and are broken into the following ranges: 70-100 BCI: Considered to be in good/excellent condition and only routine maintenance is recommended. 50-70 BCI: Considered to be in fair condition and rehabilitation is recommended within the next 5 years. <50 BCI: Considered to be in poor/very poor condition with imminent replacement required in the next 1-3 years.

5.1.6 Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Scope	% of bridges in the Township with loading or dimensional restrictions	0%
Quality	Average bridge condition index value for bridges in the Township	66
	Average bridge condition index value for structural culverts in the Township	62
Performance	Capital re-investment rate	1.48%

Recommendations

Asset Inventory

- 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.
- Review the classification structure of bridges and structural culvert assets, and how they should be componentized moving forward for better lifecycle management.

Risk/Lifecycle Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.
- This AMP only includes capital costs associated with the rehabilitation and reconstruction of bridges and structural culverts. The Township should continue to identify and integrate projected capital rehabilitation and renewal events for bridges and culverts into Citywide for more proactive long-term planning.

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.

6 Non-Core Assets

This AMP primarily focuses on core asset categories in order to meet 2022 O. Reg. 588/17 requirements. The following asset categories are considered non-core infrastructure, and have been included in this AMP to provide a comprehensive analysis of the Township's asset portfolio. Staff will work on improving the data quality and analysis of these assets in preparation for the 2024 O.Reg. 588/17 requirements.

- Facilities
- Vehicles
- Land Improvements
- Machinery & Equipment

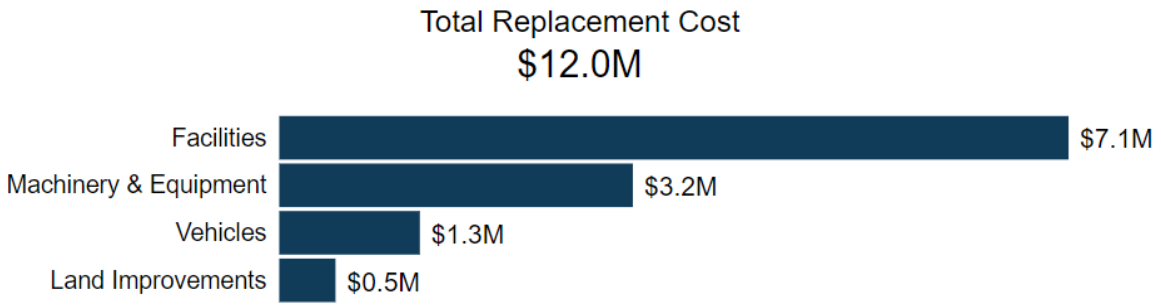
The state of the infrastructure for the non-core assets is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$12.0 million	Fair (48%)	Annual Requirement:	$555,000
		Funding Available:	$317,000
		Annual Deficit:	$238,000

Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Township's non-core assets inventory.

Asset Segment	Quantity (components)	Replacement Cost	Annual Capital Requirement
Facilities	8 (29)	$7,057,000	$121,000
Land Improvements	Pooled Assets[2]	$503,000	$25,000
Machinery & Equipment	70	$3,162,000	$281,000
Vehicles	9	$1,257,000	$129,000
Total		**$11,979,000**	**$555,000**



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

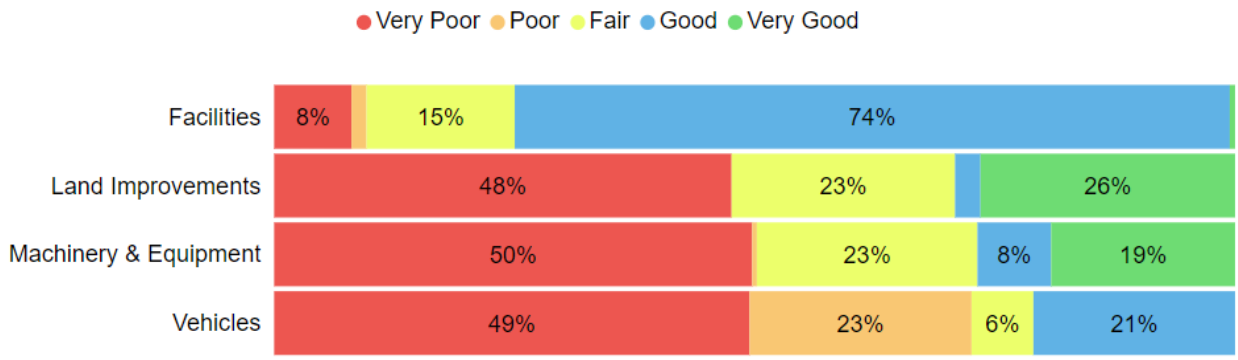
[2] Many of the land improvement assets are pooled due to their low individual costs. Staff will verify the quantity of these assets in future AMP iterations.

Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Facilities	10-100	23.8	58% (Fair)
Land Improvements	10-75	12.9	39% (Poor)
Machinery & Equipment	5-30	15.9	36% (Poor)
Vehicles	8-10	8.2	29% (Poor)
Average		**17.5**	**48% (Fair)**

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



To ensure that the Township's non-core assets continue 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.

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

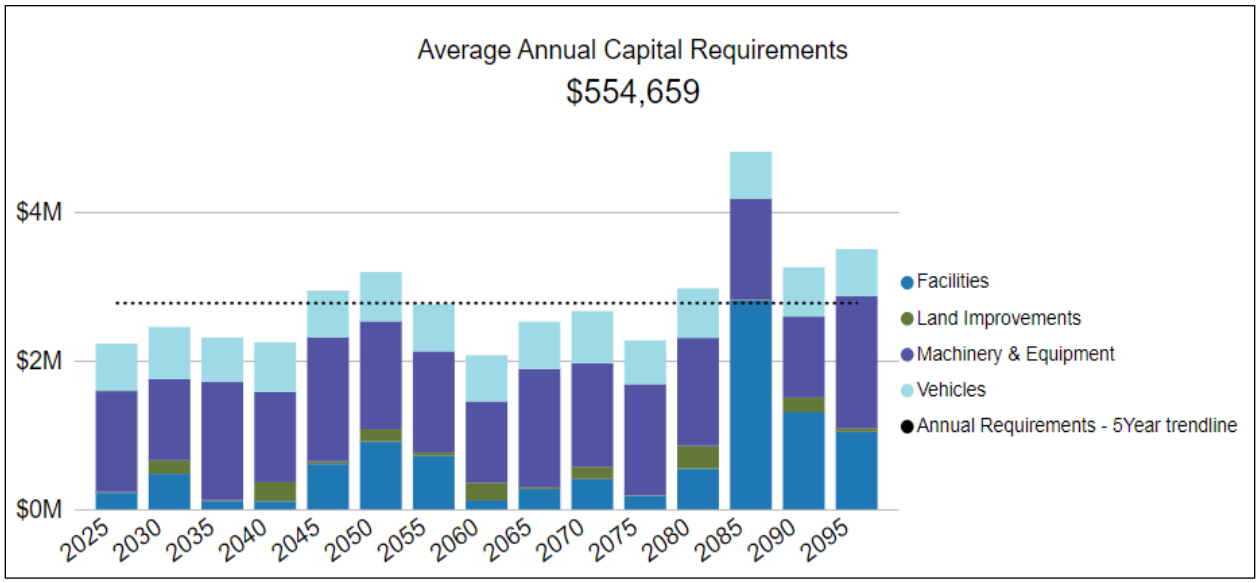
Lifecycle Management Strategy

The documentation of lifecycle management strategies, current levels of service, and risk are critical to the development of a comprehensive asset management program. These components of the asset management plan support effective short-term and long-term capital planning and contribute to more proactive asset management practices, thus extending the estimated useful life of many assets and providing a higher level of service.

In accordance with O. Reg. 588/17, the Township will continue to gather data and information in order to detail and review the lifecycle management strategies, levels of service, and risk of all non-core asset categories by July 1, 2024

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



The 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.

7 Water Network

The Township of Mulmur provides water services to the municipality through the Mansfield Water system. Staff work with Dufferin Water Co. to supply of clean, safe drinking water through the management of water assets such as watermains, hydrants, wells, and water buildings & equipment.

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

Replacement Cost	Condition	Financial Capacity	
$11.5 million	Good (77%)	Annual Requirement:	$182,000
		Funding Available:	$70,000
		Annual Deficit:	$112,000

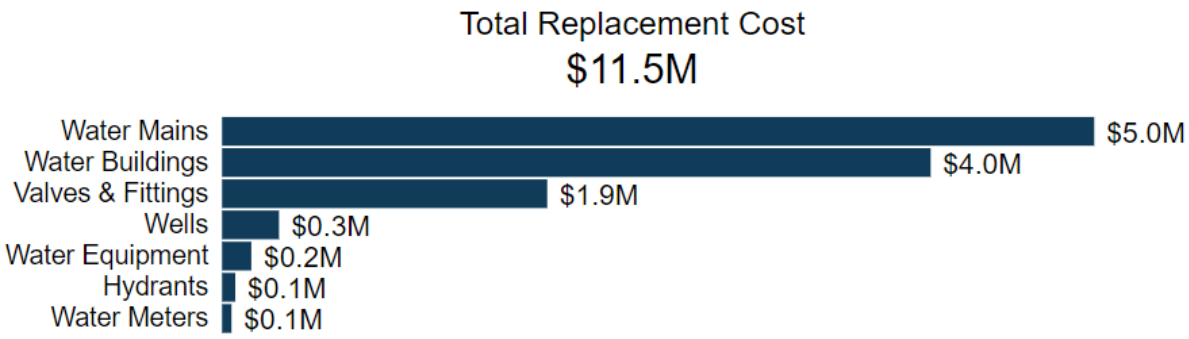
The following core values and level of service statements are a key driving force behind the Township's asset management planning:

Service Attribute	Level of Service Statement
Scope	Municipal water is conveniently accessible and in sufficient capacity (does not exceed maximum use) to users connected to the water system Fire flow protection is adequate for those users as well.
Quality/Reliability	The water network is in good condition with minimal unplanned service interruptions (i.e., minimal main breaks or boil water advisories)

Asset Inventory & Costs

The table below includes the quantity, replacement cost method, and annual capital requirements of each asset segment in the Township's water network inventory.

Asset Segment	Quantity (components)	Replacement Cost	Annual Capital Requirement
Hydrants	21	$76,000	$2,000
Valves & Fittings	385	$1,855,000	$20,000
Water Buildings	2 (8)	$4,041,000	$83,000
Water Equipment	3	$167,000	$16,000
Water Mains	8.7 kms	$4,974,000	$50,000
Water Meters	154	$54,000	$1,000
Wells	3 (6)	$325,000	$11,000
Total		**$11,492,000**	**$182,000**



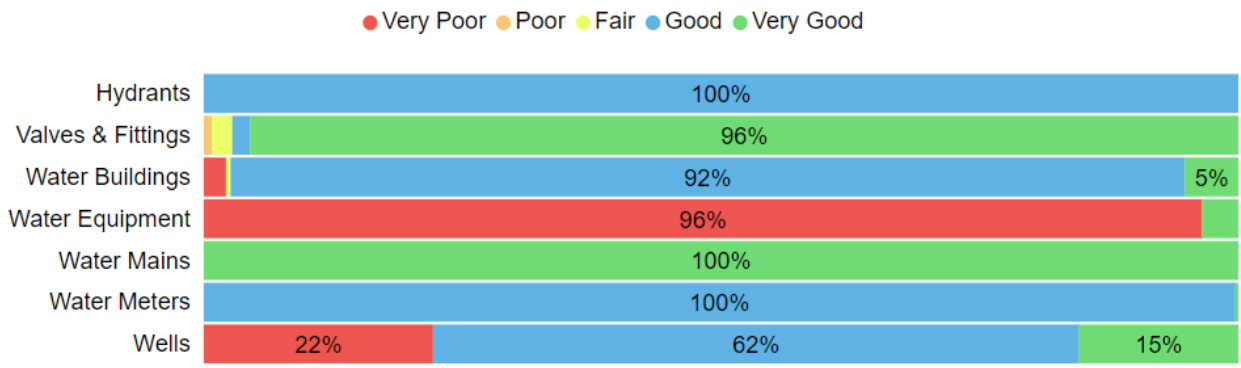
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Hydrants	50	13.5	73% (Good)
Valves & Fittings	25-100	14.3	84% (Very Good)
Water Buildings	15-100	16.2	67% (Good)
Water Equipment	10-100	14.3	3% (Very Poor)
Water Mains	100	14.0	86% (Very Good)
Water Meters	50	12.9	74% (Good)
Wells	15-50	14.9	56% (Fair)
Average		**14.0**	**77% (Good)**

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



To ensure that the Township's water network 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 network.

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

7.1.1 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 age, pipe material, pipe size and number of breaks per segment to determine the projected condition of watermains.
- Point assets such as hydrants and valves are inspected on an as-needed basis to comply with the Safe Drinking Water Act (SDWA).
- Water buildings and equipment are inspected by Township staff and Dufferin Water Co. staff on a regular basis in compliance with manufacturer recommendations, the Building Code Act, and the Drinking Water Quality Management Standard (DWQMS).

In this AMP the following rating criteria is used to determine the current condition of water network assets and forecast future capital requirements:

Condition	Rating
Very Good	80
Good	60
Fair	40
Poor	20
Very Poor	0

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.

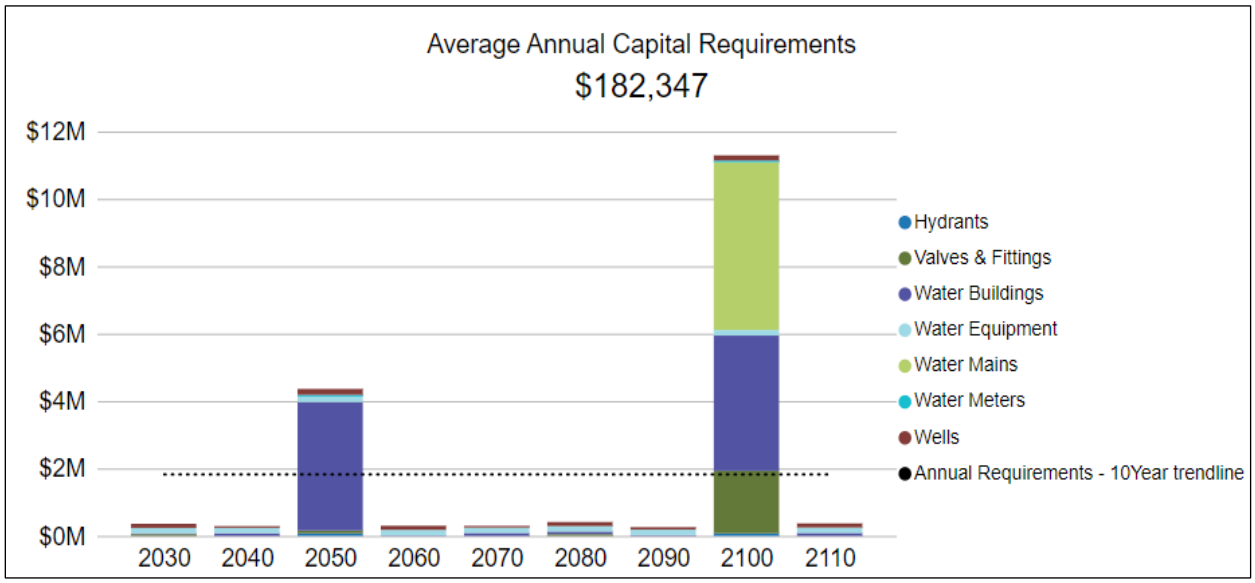
The following table outlines the Township's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Main flushing is completed bi-annually using in-house resources
	Valve exercising is completed every 3 years
	Regular monitoring and sampling of water is performed by Dufferin Water Co. staff to meet or exceed O.Reg. 170/03 regulatory requirements
	Pressure testing to identify deficiencies and potential leaks is completed on an as-needed basis
Rehabilitation/ Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once they reach end-of-life. Main replacements are identified based on an analysis of the main break rate as well as any issues identified during regular maintenance activities
	Vertical assets such as the wells, pumping stations or buildings are rehabilitated and/or replaced based on their physical condition, capacity issues , funding availability, and risk of failure to the water operations.

7.1.2 Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 90 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 the trend line represents the average 10-year capital requirements.



The 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.

Risk & Criticality

7.1.3 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 2021 inventory data.

This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the water network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
Pipe Size	Structure Type (Operational)

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

7.1.4 Risks to Current Asset Management Strategies

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

Assessed Condition Data

Watermains are much more difficult to inspect unlike sanitary and storm sewer mains where CCTV camera inspection is possible. At present, staff rely on age-based estimates of current condition to try and predict when pipes need to be replaced. There is some uncertainty as to whether this is an effective approach to determine the current condition of watermains. Increasing the accuracy and reliability of asset data and information can allow staff to confidently develop data-driven strategies to address infrastructure needs.

Levels of Service

The following tables identify the Township's current level of service for water 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.

7.1.5 Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2021)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	The Mansfield Water System currently serves 153 service connections within Mulmur Township, and is classified as a large municipal residential water system. The user groups that are connected to the water system have adequate fire flow protection.
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	
Reliability	Description of boil water advisories and service interruptions	The Township experienced no boil water advisories in 2021. However, water service interruptions may occur due to main breaks, maintenance activities or reconstruction projects. Staff attend to these interruptions in a timely manner, when possible.

7.1.6 Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Scope	% of properties connected to the municipal water system	10%
	% of properties where fire flow is available	10%
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	0:153
	# 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	0:153
Performance	Capital re-investment rate	0.61%

Recommendations

Asset Inventory

- Vertical assets such as the water buildings and wells should be broken down into their major elemental components (i.e., HVAC, electrical, plumbing, etc.) in order to assist Staff in developing more accurate capital plans.
- Replacement cost information, especially for linear underground assets and critical high-risk water buildings/equipment, should be updated on a regular basis (every 1-2 years) to ensure reliability of asset management outcomes.
- Staff should continue to review their asset inventory and verify that the asset quantities are fulsome and realistic.

Condition Assessment Strategies

- Incorporate condition information, where possible, to improve risk and lifecycle strategy models. Staff should collect cursory condition information (very good-very poor rating scale) for all visible assets and integrate it into the asset management database.

Risk/Lifecycle Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.
- Incorporate scheduled lifecycle activities into the Citywide database for more proactive strategic planning.

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.

8 Impacts of Growth

Key Insights

- Understanding the key drivers of growth and demand will allow the Township to plan for new infrastructure more effectively, and the upgrade or disposal of existing infrastructure.

- Moderate population and employment growth is expected.

- The costs of growth should be considered in long-term funding strategies that are designed to maintain the current level of service

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.

8.1.1 Township of Mulmur Official Plan (2012)

The Township of Mulmur adopted an Official Plan to guide development within the Township between the years of 2009 and 2029. The policies included in the Plan are consistent with the Provincial Policy Statement and do not conflict with Provincial Plans. Such policies are intended to encourage new development that does not add additional financial burden on the Township and will balance the costs of providing necessary additional municipal services, facilities, and infrastructure.

The Official Plan was approved by the Ministry of Municipal Affairs and Housing on April 24th, 2012.

The Township of Mulmur is primarily a rural area. The Official Plan considers the desire of the public to preserve the natural features of the Township and maintain the open landscape. A steady influx of recreational property owners and young families have begun to migrate to the Township, due to the availability of quality housing in an attractive rural environment. Demand for rural properties and rural community living has also been driven by the ability to work from home. New residents require expanded municipal services, infrastructure, and facilities, however, new residents from urban areas often demand more advanced municipal services, infrastructure, and facilities as well.

The Township is responsible for population and employment growth, as allocated by the province. Identified settlement areas are the focus of growth in the Township, and the vitality and regeneration of these settlement areas are promoted.

8.1.2 Growth Plan for the Greater Golden Horseshoe (2020)

Growth management planning for the Township of Mulmur is conducted on a County-wide basis following the Growth Plan for the Greater Golden Horseshoe. Future growth is controlled and managed in accordance with the objectives outlined in the Official Plan and the Growth Plan for the Greater Golden Horseshoe, within the regional context of the County of Dufferin.

The County of Dufferin's Official Plan Consolidation was adopted on May 15th, 2017. Population growth for the Township of Mulmur is defined in the County Plan. A population increase to approximately 4,290 people is expected in the Township by 2031, and the Township's employment is expected to grow to approximately 820 jobs by 2031. This results in a future growth rate of approximately 0.5% per year for the 20-year planning period.

The following table outlines the population and employment forecasts allocated to the Township of Mulmur.

	2011	2031	2036
Historical & Forecast Total Population	3,391	4,290	4,340
Historical & Forecast Total Jobs	640	820	820

The above projections are based on 2011 Census data. More recent population statistics from the 2016 and 2021 Census align with the suggested projections. The recorded population in the Township of Mulmur 3,478 in 2016 and 3,571 in 2021.

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 Town's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Town will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

9 Financial Strategy

Key Insights

- The Township is committing approximately $1,269,000 towards capital projects per year from sustainable revenue sources.

- Given the annual capital requirement of $2,327,000, there is currently a funding gap of $1,058,000 annually.

- For tax-funded assets, we recommend increasing tax revenues by 1.3% each year for the next 15 years to achieve a sustainable level of funding.

- For the water network, we recommend increasing rate revenues by 2.3% annually for the next 20 years to achieve a sustainable level of funding.

Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow Township of Mulmur 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
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:

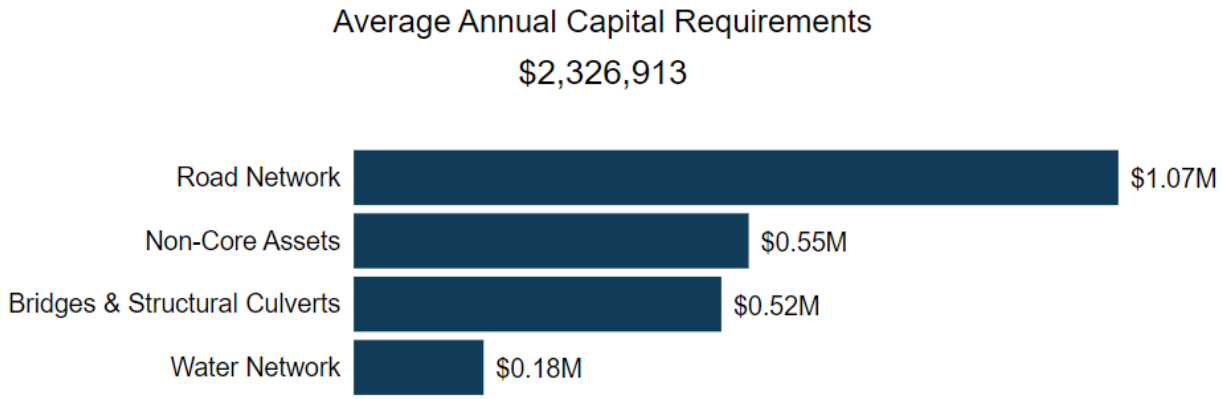
1. In order to reduce financial requirements, consideration has been given to revising service levels downward.

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.

9.1.1 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 $2.3 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.

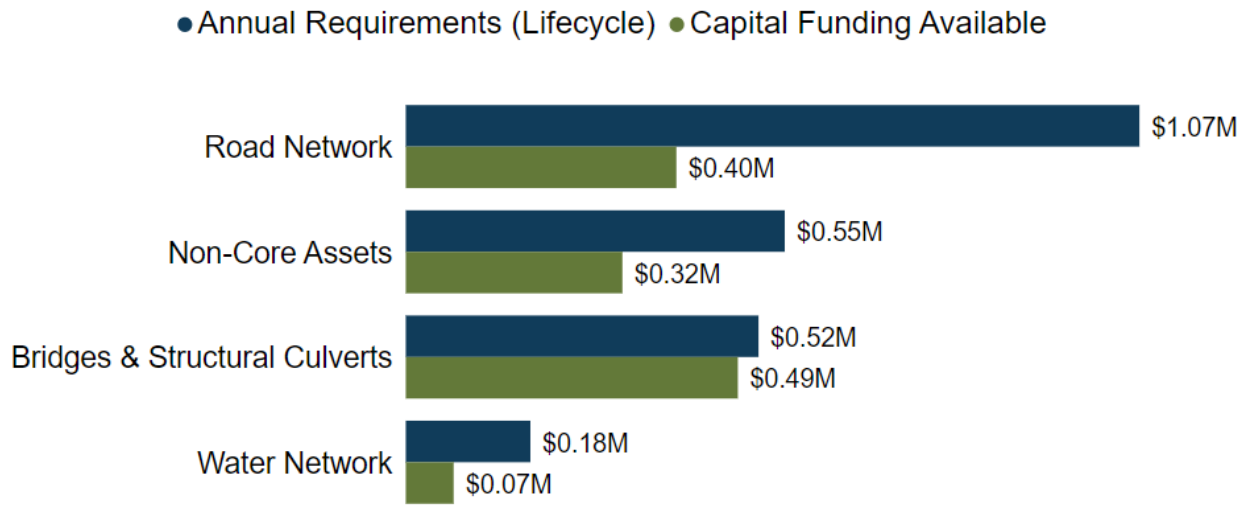
However, for the Road Network and Bridges & Culverts, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Township's roads and bridges & culverts respectively. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented.

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.

The implementation of a proactive lifecycle strategy can lead to direct and indirect cost savings. Potential cost savings are influenced by current rehabilitation and reconstruction costs, the coordination of projects, and the criticality of the assets. Beyond cost avoidance, having proactive lifecycle strategies can also improve other valuable levels of service to the Township such as lowering health and safety hazards, decreasing the number of complaints received, and meeting public expectations.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately $1,269,000 towards capital projects per year. Given the annual capital requirement of $2,327,000, there is currently a funding gap of $1,058,000 annually.



Funding Objective

We have developed a scenario that would enable Mulmur to achieve full funding within 1 to 20 years for the following assets:

- **Tax Funded Assets:** Road Network, Bridges & Structural Culverts, Non-Core Assets
- **Rate-Funded Assets:** Water Network

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.

Financial Profile: Tax Funded Assets

9.1.2 Current Funding Position

The following tables show, by asset category, Mulmur's average annual asset 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
		Taxes to Cap. Res.	Gas Tax	OCIF	Total Available	
Road Network	1,074,000	290,000	106,000		396,000	678,000
Bridges & Structural Culverts	516,000	338,000		149,000	486,000	30,000
Non-Core Assets	555,000	317,000			317,000	238,000
	2,145,000	**945,000**	**106,000**	**149,000**	**1,200,000**	**945,000**

The average annual investment requirement for the above categories is $2,145,000. Annual revenue currently allocated to these assets for capital purposes is $1,200,000 leaving an annual deficit of $945,000. Put differently, these infrastructure categories are currently funded at 56% of their long-term requirements.

9.1.3 Full Funding Requirements

In 2021, Township of Mulmur has annual tax revenues of $4,255,000. 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
Road Network	15.9%
Bridges & Structural Culverts	0.7%
Non-Core Assets	5.6%
Total	**22.2%**

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

a) Mulmur's formula based OCIF grant is scheduled to remain at $149,000 in 2021 to 2022.
b) Mulmur's debt payments for these asset categories will be decreasing by $26,000 over the next 5 years and by $32,000 over the next 10 years. Although not shown in the table, debt payment decreases will be $64,000 over the next 15 and 20 years respectively.

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	945,000	945,000	945,000	945,000	945,000	945,000	945,000	945,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-26,000	-32,000	-64,000	-64,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	0	0	0	0
Resulting Infrastructure Deficit	**945,000**	**945,000**	**945,000**	**945,000**	**919,000**	**913,000**	**881,000**	**881,000**
Tax Increase Required	22.2%	22.2%	22.2%	22.2%	21.6%	21.5%	20.7%	20.7%
Annually	**4.1%**	**2.1%**	**1.4%**	**1.1%**	**4.0%**	**2.0%**	**1.3%**	**1.0%**

9.1.4 Financial Strategy Recommendations

Considering all the above information, we recommend the 15-year option. This involves full CapEx funding being achieved over 15 years by:

a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
b) increasing tax revenues by 1.3% each year for the next 15 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax and OCIF revenue as outlined previously.
d) should the scheduled OCIF grant increase, the Township should reduce the annual tax increase by an amount equal to the grant increase as it occurs.
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 OCIF formula-based funding, if applicable since this funding is a multi-year commitment[3].
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 15 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 $386,345 for the Road Network, $0 for Bridges & Structural Culverts, and $1,772,613 for Non-Core Assets.

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.

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

Financial Profile: Rate Funded Assets

9.1.5 Current Funding Position

The following tables show, by asset category, Mulmur's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by rates.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Operations	OCIF	Total Available	
Water Network	182,000	201,000	-131,000	0	70,000	112,000
	182,000	**201,000**	**-131,000**	**0**	**70,000**	**112,000**

The average annual investment requirement for the above categories is $182,000. Annual revenue currently allocated to these assets for capital purposes is $70,000 leaving an annual deficit of $112,000. Put differently, these infrastructure categories are currently funded at 39% of their long-term requirements.

9.1.6 Full Funding Requirements

In 2021, Mulmur had annual water revenues of $201,000. 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	Tax Change Required for Full Funding
Water Network	55.7%

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 Network				
	5 Years	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	112,000	112,000	112,000	112,000
Change in OCIF Grants	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit	**112,000**	**112,000**	**112,000**	**112,000**
Rate Increase Required	55.7%	55.7%	55.7%	55.7%
Annually	**9.3%**	**4.6%**	**3.0%**	**2.3%**

9.1.7 Financial Strategy Recommendations

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

a) increasing rate revenues by 2.3% for the Water Network each year for the next 20 years.
b) these rate revenue increases are solely for the purpose of phasing in full funding to the respective asset categories covered in this AMP.
c) 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. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
2. 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.
3. 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 no pent-up investment demand for the Water Network.

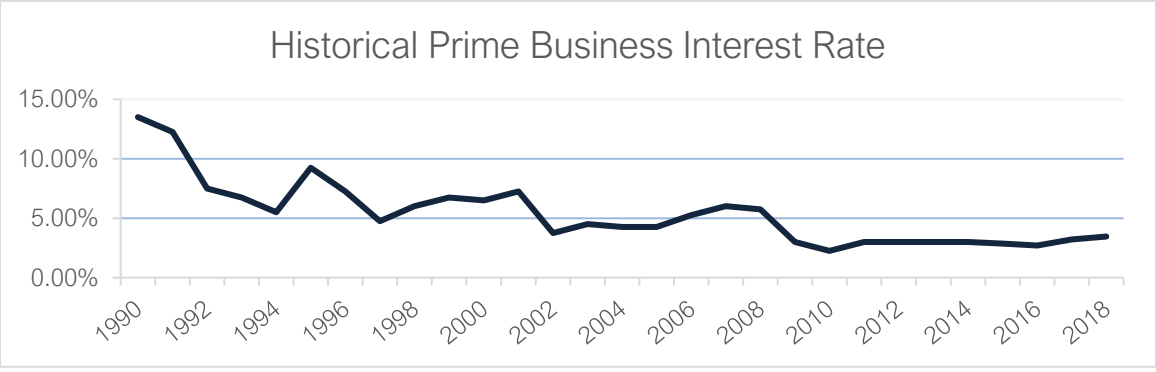
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

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%[4] 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:



[4] 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 Mulmur has historically used debt for investing in the asset categories as listed. There is currently $440,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $64,000, well within its provincially prescribed maximum of $1,231,384.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2016	2017	2018	2019	2020
Road Network	0	0	0	0	0	0
Bridges & Structural Culverts	373,000	0	0	0	0	0
Non-Core Assets	67,000	0	0	0	0	0
Total Tax Funded:	**440,000**	**0**	**0**	**0**	**0**	**0**
Water Network	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
Road Network	0	0	0	0	0	0	0
Bridges & Structural Culverts	45,000	43,000	42,000	41,000	39,000	38,000	32,000
Non-Core Assets	19,000	19,000	18,000	17,000	0	0	0
Total Tax Funded:	**64,000**	**62,000**	**60,000**	**58,000**	**39,000**	**38,000**	**32,000**
Water Network	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 Mulmur to fully fund its long-term infrastructure requirements without further use of debt.

Use of Reserves

9.1.8 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 Mulmur.

Asset Category	Balance on December 31, 2021
Road Network	600,000
Bridges & Structural Culverts	1,130,000
Non-Core Assets	2,653,000
Total Tax Funded:	**4,383,000**
Water Network	491,000
Total Rate Funded:	**491,000**

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 Mulmur'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.

9.1.9 Recommendation

In 2025, Ontario Regulation 588/17 will require Mulmur 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.

10 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 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	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Barriers	$55,429	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Paved Roads	$0	$0	$42,852	$1,610,431	$1,314,789	$0	$94,500	$304,742	$6,770,351	$371,714	$623,307
Road Signs	$136,796	$4,868	$4,853	$0	$0	$0	$0	$0	$0	$0	$0
Streetlights	$194,120	$0	$0	$56,304	$0	$0	$0	$0	$53,635	$0	$0
	$386,345	**$4,868**	**$47,705**	**$1,666,735**	**$1,314,789**	**$0**	**$94,500**	**$304,742**	**$6,823,986**	**$371,714**	**$623,307**

Bridges & Culverts

Asset Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Bridges	$0	$834,225	$0	$311,850	$1,386,525	$612,150	$0	$0	$0	$0	$0
Structural Culverts	$0	$40,950	$0	$0	$520,275	$262,500	$0	$0	$0	$0	$0
	$0	**$875,175**	**$0**	**$311,850**	**$1,906,800**	**$874,650**	**$0**	**$0**	**$0**	**$0**	**$0**

Non-Core Assets											
Asset Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Facilities	$173,402	$65,881	$1,029	$0	$0	$49,976	$102,526	$0	$14,084	$57,315	$33,167
Land Improvements	$198,605	$22,751	$0	$0	$0	$0	$0	$0	$0	$9,970	$24,609
Machinery & Equipment	$804,442	$17,712	$62,187	$356,851	$24,670	$26,161	$498,299	$187,638	$239,106	$407,717	$29,941
Vehicles	$410,099	$0	$211,775	$0	$0	$329,984	$41,404	$0	$0	$263,785	$36,158
	$1,586,548	**$106,344**	**$274,991**	**$356,851**	**$24,670**	**$406,121**	**$642,229**	**$187,638**	**$253,190**	**$738,787**	**$123,875**

Water Network											
Asset Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Water Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$79,653	$0
Water Equipment	$0	$0	$0	$0	$0	$0	$0	$5,628	$155,490	$0	$0
Wells	$0	$22,028	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$22,028**	**$0**	**$0**	**$0**	**$0**	**$0**	**$5,628**	**$155,490**	**$79,653**	**$0**

Appendix B: Level of Service Maps

Road Network Map