

# Asset Management Plan

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Township of Greater  
Madawaska

2022

This Asset Management Program was prepared by:



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

# Key Statistics

Replacement cost of  
asset portfolio

**\$68.5** million

Replacement cost of  
infrastructure per  
household

**\$30,412** (2021)

Percentage of assets in fair  
or better condition

**95%**

Percentage of assets with  
assessed condition data

**65%**

Annual capital  
infrastructure deficit

**\$1.5** million

Recommended  
timeframe for  
eliminating annual  
infrastructure deficit

**20** Years

Target reinvestment  
rate

**3.3%**

Actual reinvestment  
rate

**1.0%**

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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:

### Asset Category

 Road Network	 Buildings
 Vehicles	 Machinery & Equipment
 Land Improvements	

With the development of this 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 and July 1, 2024. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2025.

## Findings

The overall replacement cost of the asset categories included in this AMP totals \$68.5 million. 95% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 65% of assets. For the other 35% of assets age-based condition was used. 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 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 \$2.2 million. Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately \$0.68 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of \$1.5 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.

1

Annual  
Requirements Per  
Household



## 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 20-year plan:



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

- Review data to update and maintain a complete and accurate dataset
- Develop a condition assessment strategy with a regular schedule
- Review and update lifecycle management strategies
- Development and regularly review short- and long-term plans to meet capital requirements
- Measure current levels of service and identify sustainable proposed levels of service

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<sup>1</sup> Average annual requirements divided by the number of households in the Township



# 1 Introduction & Context

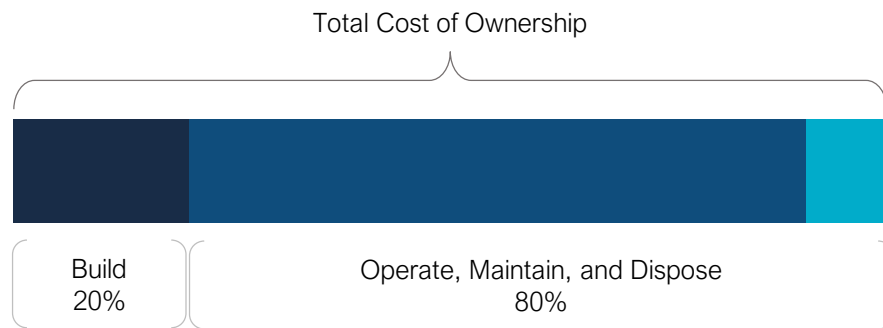
## Key Insights

- 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

# 1.1 An Overview of Asset Management

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

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



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The 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 Policy No. 4-07 "Strategic Asset Management" on June 17<sup>th</sup>, 2019 in accordance with Ontario Regulation 588/17.

The objectives of the policy include:

- Fiscal Responsibilities
- Delivery of Services/Programs
- Public Input/Council Direction
- Risk/Impact Mitigation

### 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.

# 1.2 Key Concepts in Asset Management

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

## 1.2.1 Lifecycle Management Strategies

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

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

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.

<b>Lifecycle Activity</b>	<b>Description</b>	<b>Example (Roads)</b>	<b>Cost</b>
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.

## 1.2.2 Risk Management Strategies

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

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

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

## 1.2.3 Levels of Service

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

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

### Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories (roads, bridges and culverts, water, wastewater, stormwater) 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, wastewater, stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP. For non-core asset categories, the Township has determined the technical metrics that will be used to determine the technical level of service provided. These metrics can be found in the Levels of Service subsection within each asset category.

## Current and Proposed Levels of Service

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

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

# 1.3 Ontario Regulation 588/17

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

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

**2019**

Strategic Asset Management Policy

**2024**

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

**2022**

Asset Management Plan for Core Assets with the following components:

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

**2025**

Asset Management Plan for All Assets with the following additional components:

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

### 1.3.1 O. Reg. 588/17 Compliance Review

The following table identifies the requirements outlined in Ontario Regulation 588/17 for municipalities to meet by July 1, 2022 and July 1, 2024. Next to each requirement a page or section reference is included in addition to any necessary commentary.

<b>Requirement</b>	<b>O. Reg. Section</b>	<b>AMP Section Reference</b>	<b>Status</b>
Summary of assets in each category	S.5(2), 3(i)	3.6.1 – 3.10.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	3.6.2 – 3.10.2	Complete
Average age of assets in each category	S.5(2), 3(iii)	3.6.3 – 3.10.3	Complete
Condition of assets in each category	S.5(2), 3(iv)	3.6.3 – 3.10.3	Complete
Description of municipality’s approach to assessing the condition of assets in each category	S.5(2), 3(v)	3.6.3 – 3.10.3	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	3.6.6 – 3.10.6	Complete
Current performance measures in each category	S.5(2), 2	3.6.6 – 3.10.6	Complete
Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	3.6.4 – 3.10.4	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	Appendix B	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	4.1-4.2	Complete



# 2 Scope and Methodology

## Key Insights

- This asset management plan includes 5 asset 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

## 2.1 Asset Categories Included in this AMP

This asset management plan for the Township of Greater Madawaska is produced in compliance with Ontario Regulation 588/17. The July 2024 deadline under the regulation—the first of three AMPs—requires analysis of both core and non-core assets.

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	
Buildings	
Vehicles	Tax Levy
Machinery & Equipment	
Land Improvements	

## 2.2 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.

## 2.3 Estimated Useful Life and Service Life Remaining

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

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

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

## 2.4 Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. target reinvestment rate the Township can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

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

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

## 2.5 Deriving Asset Condition

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

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

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

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

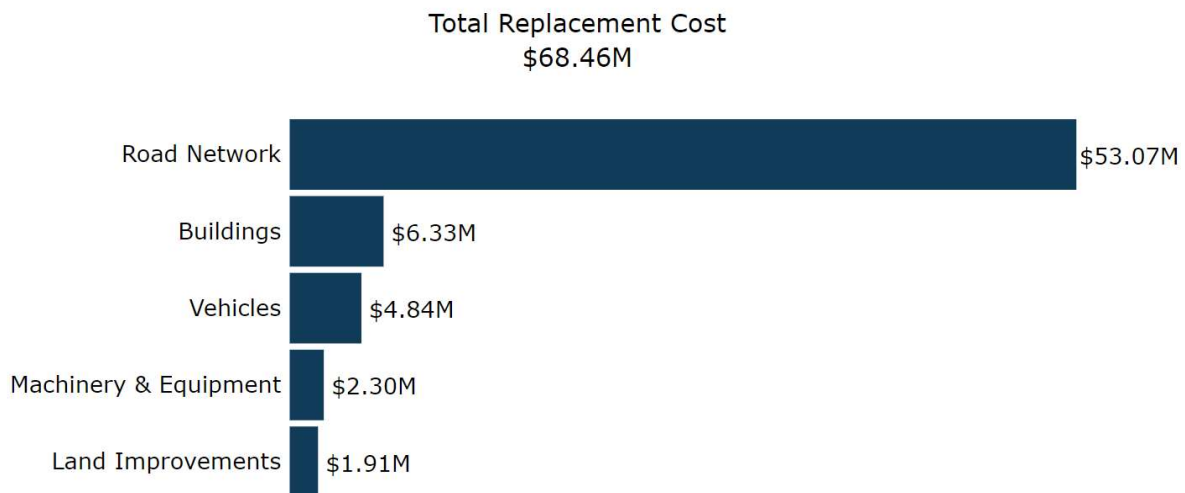
# 3 Portfolio Overview

## Key Insights

- The total replacement cost of the Township's asset portfolio is \$68.5 million
- The Township's target re-investment rate is 3.2%, and the actual re-investment rate is 1.0%, contributing to an expanding infrastructure deficit
- 95% of all assets are in fair or better condition
- Average annual capital requirements total \$2.2 million per year across all assets

## 3.1 Total Replacement Cost of Asset Portfolio

The asset categories analysed in this AMP have a total replacement cost of \$68.5 million based on inventory data from 2021. This total was determined based on a combination of user-defined costs and unit costs. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.

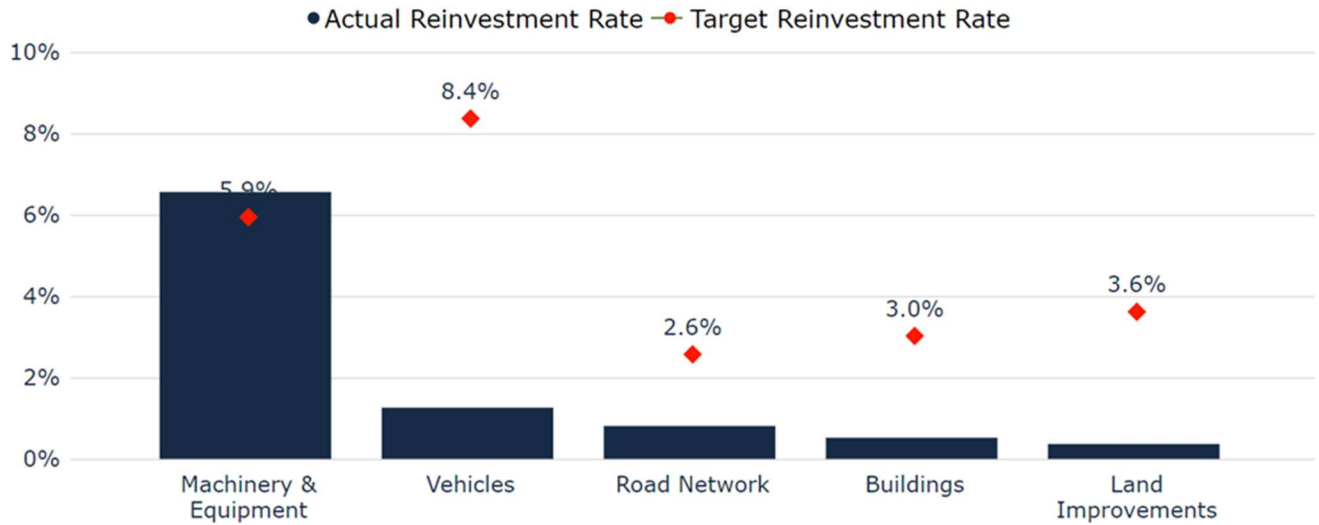


The following table identifies the methods employed to determine replacement costs across each asset category:

Asset Category	Replacement Cost Method	
	User-Defined	Notes
Road Network	100%	Internal staff defined replacement costs. 99% of road network utilized user-defined unit costs
Buildings	100%	Internal staff defined replacement costs
Machinery & Equipment	100%	Internal staff defined replacement costs
Vehicles	100%	Internal staff defined replacement costs
Land Improvements	100%	Internal staff defined replacement costs
<b>Overall</b>	<b>100%</b>	

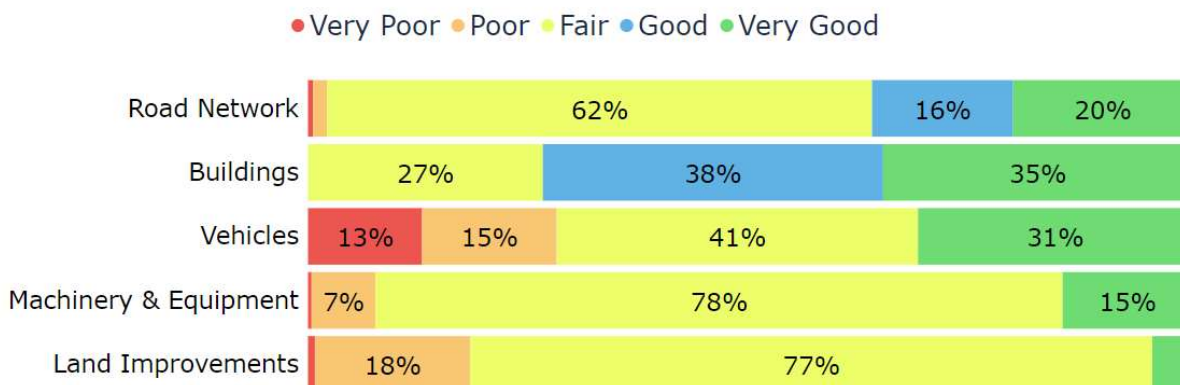
## 3.2 Target vs. Actual Reinvestment Rate

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 \$2.2 million annually, for a target reinvestment rate of 3.2%. Actual annual spending on infrastructure totals approximately \$0.68 million, for an actual reinvestment rate of 1.0%.



### 3.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 95% of assets in Greater Madawaska are in fair or better condition. This estimate relies on field condition data.



This AMP relies on assessed condition data for 65% of assets. 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	All	63%	Staff Assessments and Streetlogix
Buildings	All	65%	Staff Assessments
Machinery & Equipment	All	85%	Staff Assessments
Vehicles	All	68%	Staff Assessments
Land Improvements	All	95%	Staff Assessments

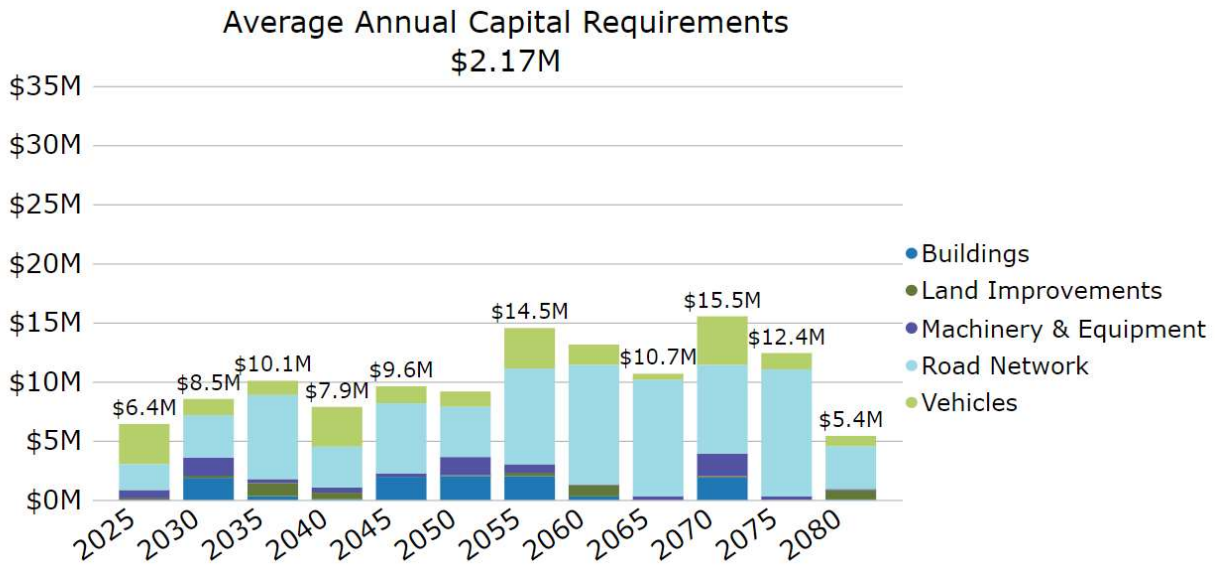
### 3.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 67% of the Township’s assets will require replacement within the next 10 years. This does not take into account the lifecycle management strategies. Capital requirements over the next 10 years are identified in Appendix B.



# 3.5 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 60 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.



## 3.6 Road Network

The Municipality’s Road Infrastructure inventory is managed in CityWide™ and comprises of about 97 kilometres of paved, 132 kilometers of unpaved roads and 1 culvert.

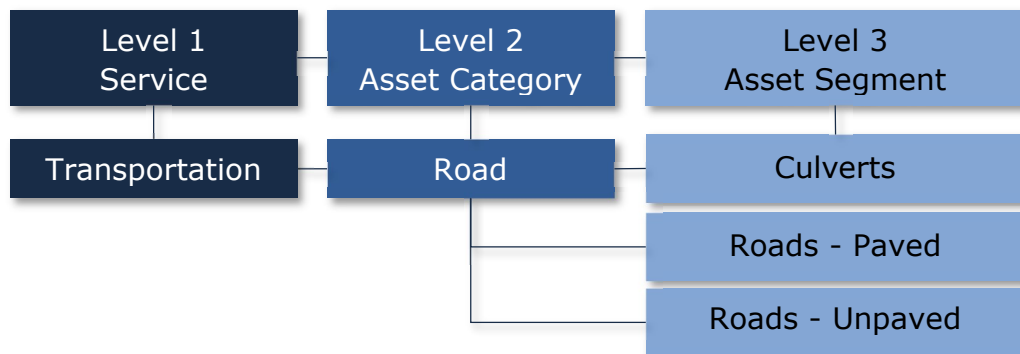
The Greater Madawaska Public Works Department, along with supporting assets such as facilities, vehicles, and machinery & equipment, is responsible for planning and managing the Road Infrastructure.

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

Replacement Cost	Condition	Financial Capacity	
\$53,072,220	Fair (53%)	Annual Requirement:	\$1,365,000
		Funding Available:	\$430,000
		Annual Deficit:	\$935,000

### 3.6.1 Asset Hierarchy and Segmentation

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



### 3.6.2 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
Culverts	1	\$199,180	\$7,967
Roads – Paved	97 (kms)	\$52,873,040	\$1,357,000
Roads – Unpaved	132 (kms)	Not Planned for Replacement <sup>2</sup>	N/A
<b>Total</b>		<b>\$53,072,220</b>	<b>\$1,365,000</b>

Total Replacement Cost  
\$53.07M



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

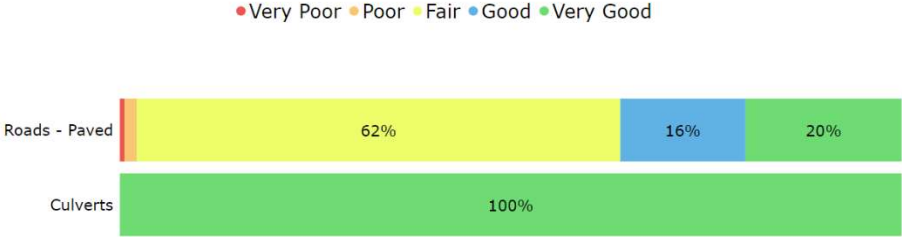
<sup>2</sup> Gravel roads undergo perpetual operating and maintenance activities. If maintained properly, they can theoretically have a limitless service life.

### 3.6.3 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
Culverts	25	1.1	Very Good (95%)
Roads - Paved	15-25	21.3	Fair (58%)
		<b>21.1</b>	<b>Fair (58%)</b>

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



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

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

# Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to 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:

- Monthly road patrols are completed by internal staff, providing a qualitative condition of good, very good, etc.
- A street scan study was recently used to complete a condition assessment by external contractors for the first time. Township staff are planning to continue having external condition assessments on the road network completed every 3-5 years.

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

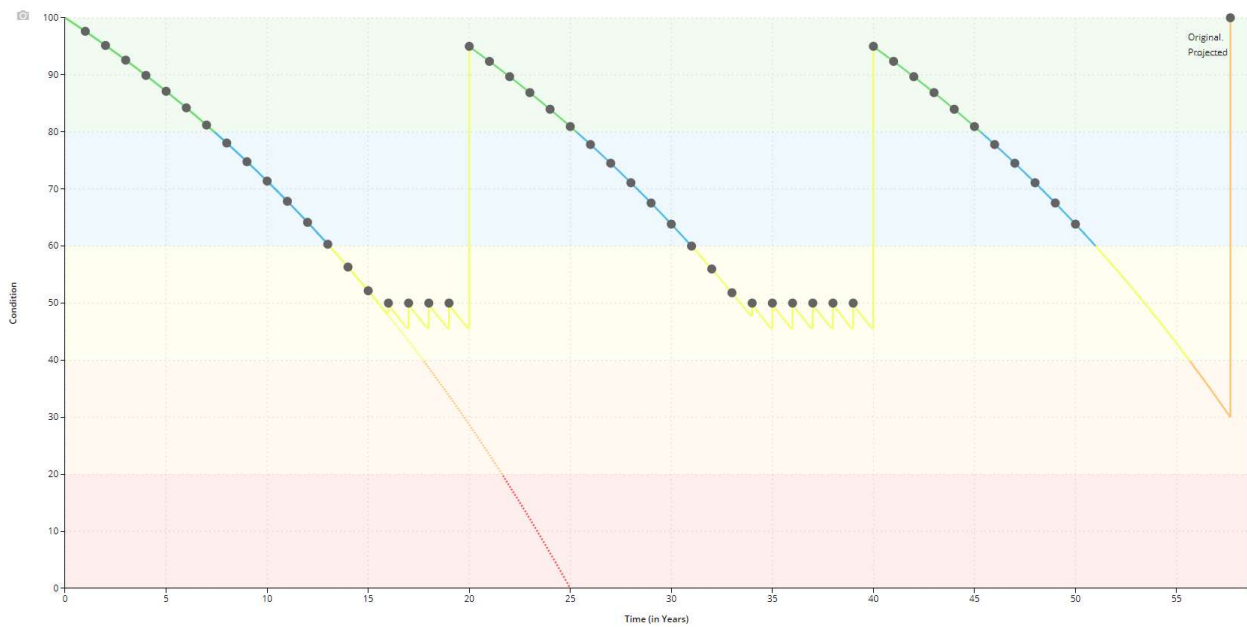
<b>Condition</b>	<b>Rating</b>
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

### 3.6.4 Lifecycle Management Strategy

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

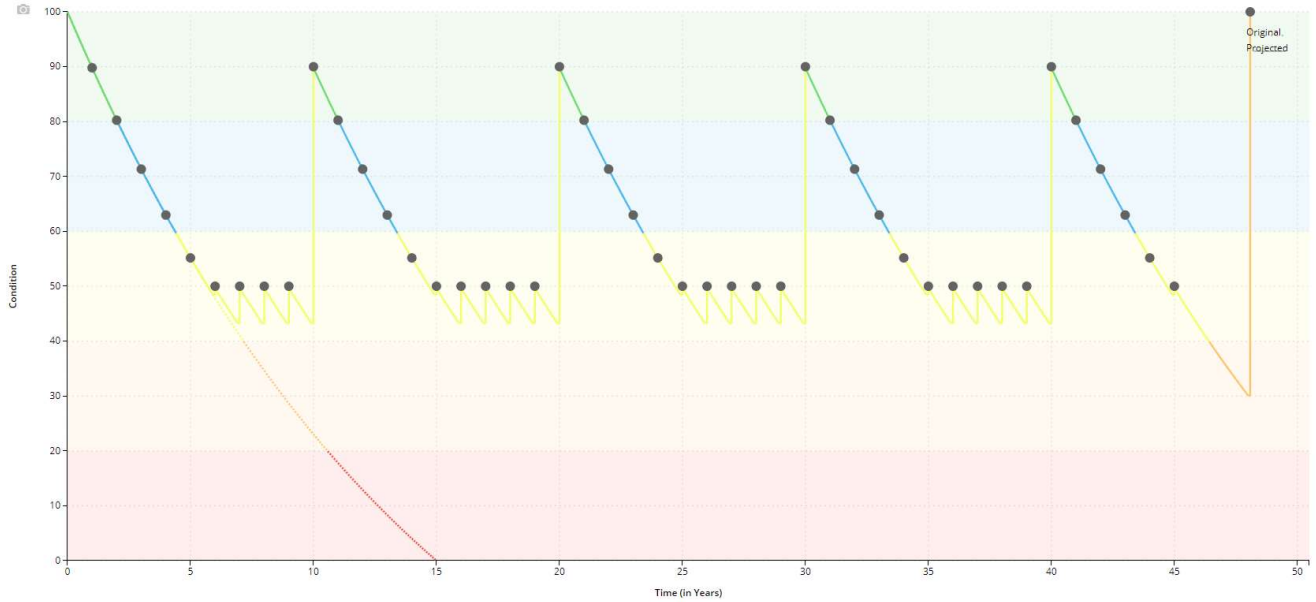
The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of LCB and HL4 roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Paved Roads (HL4)		
Event Name	Event Class	Event Trigger
Cold Patching	Maintenance	1 Year (Repeated)
Single Surface Treatment	Rehabilitation	20 Years (Repeated)
Full Reconstruction	Replacement	30 to 40 Condition



## Paved Roads (LCB)

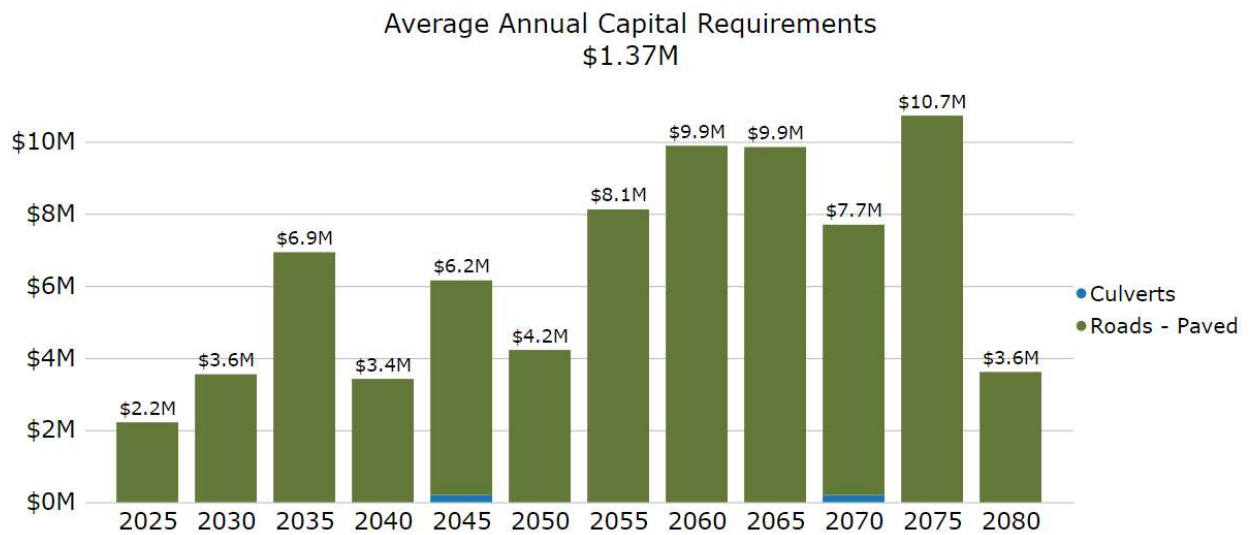
Event Name	Event Class	Event Trigger
Cold Patching	Maintenance	1 Year (Repeated)
Double Surface Treatment	Rehabilitation	10 Years (Repeated)
Full Reconstruction	Replacement	30 to 40 Condition



## Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for HL4 and LCB 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 60 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.



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 B.



### 3.6.5 Risk & Criticality

#### Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data.

- Assets that fall in the upper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the Township.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring.

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



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 road network are documented below:

<b>Probability of Failure (POF)</b>	<b>Consequence of Failure (COF)</b>
Condition	Replacement Cost (Financial)
	Road Class (Social)

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.

## Risks to Current Asset Management Strategies

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



### **Asset Data Confidence**

There is a lack of confidence in the available inventory data and condition data. Staff plan to prioritize data refinement efforts by obtaining more accurate condition data using Street-Scan to increase reliability of asset data and information.



### **Staff Resources & Capacity**

Staff capacity is being stretched thin due to the growing population in the township and the expanding number of roads in the town. Maintenance activities may be difficult to complete on schedule due to staff capacity.



### **Climate Change & Extreme Weather Events**

Asset deterioration is accelerated due to extreme weather, which in some cases can cause unexpected failures. Surface flooding and road washouts from extreme rainfall have been experienced by the Town in recent years. These events make long-term planning difficult and can result in a lower level of service



### **Growth**

The Town is expected to experience a 20% growth in population. Population and employment growth will increase the demand on municipal services, including the road network which is experiencing a higher traffic volume. This can potentially decrease the lifecycle of certain assets. As the population continues to grow, the Town must prioritize expanding its capacity to serve a larger population.



### **Capital Funding Strategies**

Major capital rehabilitation and replacement projects are often entirely dependant on the availability of grant funding opportunities. When grants are not available, rehabilitation and replacement projects may be deferred. An annual capital funding strategy could reduce dependency on grant funding and help prevent deferral of capital works.

### 3.6.6 Levels of Service

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

#### Community Levels of Service

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

<b>Service Attribute</b>	<b>Qualitative Description</b>	<b>Current LOS (2021)</b>
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix C
Quality	Description or images that illustrate the different levels of road class pavement condition	See Appendix C

## Technical Levels of Service

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

<b>Service Attribute</b>	<b>Technical Metric</b>	<b>Current LOS (2021)</b>
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km <sup>2</sup> )	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km <sup>2</sup> )	0
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km <sup>2</sup> )	0.19
Quality	Average pavement condition index for paved roads in the municipality	59%
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Fair
Performance	Capital reinvestment rate	0.81%
	Average Risk Rating	5.82 - Low

## 3.6.7 Recommendations

### Asset Inventory

- Review roads and culverts inventory to determine whether all municipal assets within these asset segments have been accounted for.
- Import the most recent condition assessment score to the system.

### Condition Assessment Strategies

- The first comprehensive assessment of the road network was completed in 2021. Consider completing a regular assessment of all roads every 3-5 years.

### Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for HCB and LCB roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of the Township's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

### Risk Management Strategies

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

### Levels of Service

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

## 3.7 Buildings

The Township of Greater Madawaska owns and maintains several facilities and recreation centres that provide key services to the community. These include:

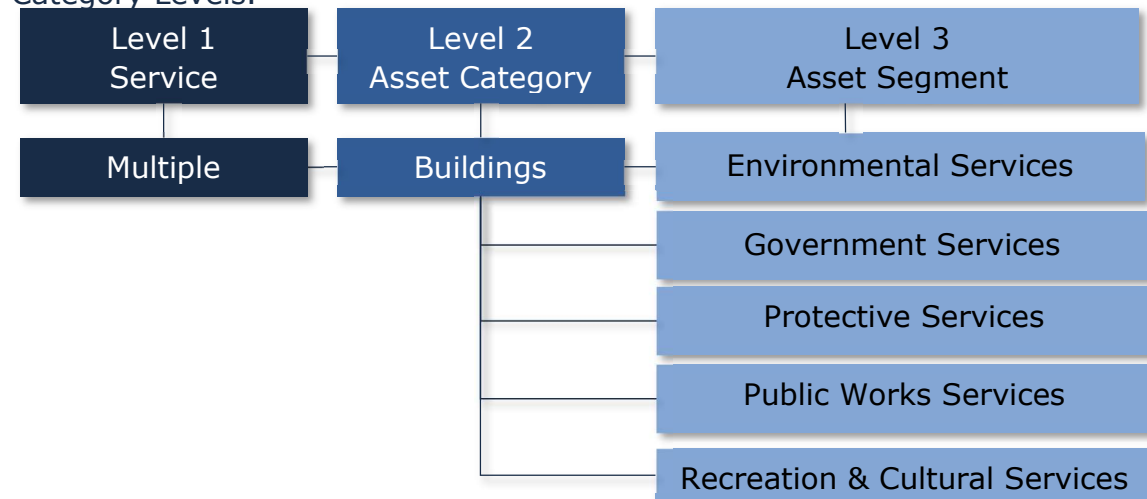
- municipal offices
- public libraries
- fire stations and associated offices and facilities
- medical centre
- public works garages and storage sheds
- rinks and community centres

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

Replacement Cost	Condition	Financial Capacity	
\$6.3 million	Fair (59%)	Annual Requirement:	\$192,000
		Funding Available:	\$33,000
		Annual Deficit:	\$159,000

### 3.7.1 Asset Hierarchy and Segmentation

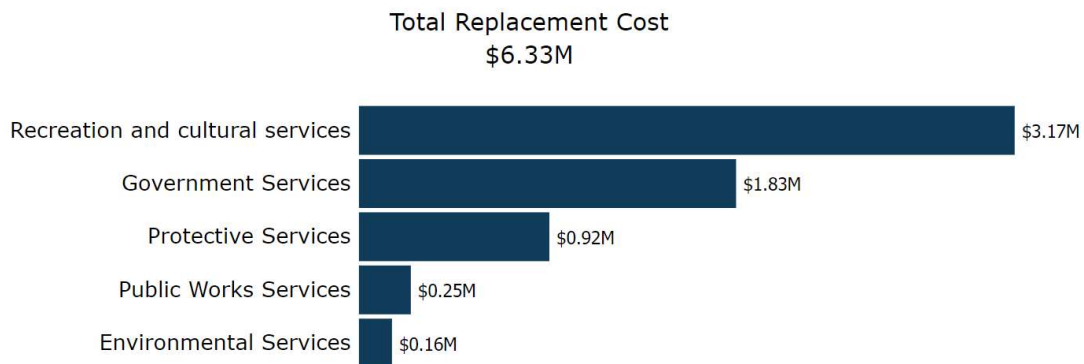
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



### 3.7.2 Asset Inventory & Costs

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Environmental Services	3	\$160,000	\$8,000
Government Services	3 (10)	\$1,825,919	\$72,518
Protective Services	2 (7)	\$922,000	\$18,525
Public Works Services	3 (13)	\$251,154	\$5,437
Recreation & Cultural Services	14 (34)	\$3,174,604	\$87,069
		<b>\$6,333,677</b>	<b>\$191,549</b>



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

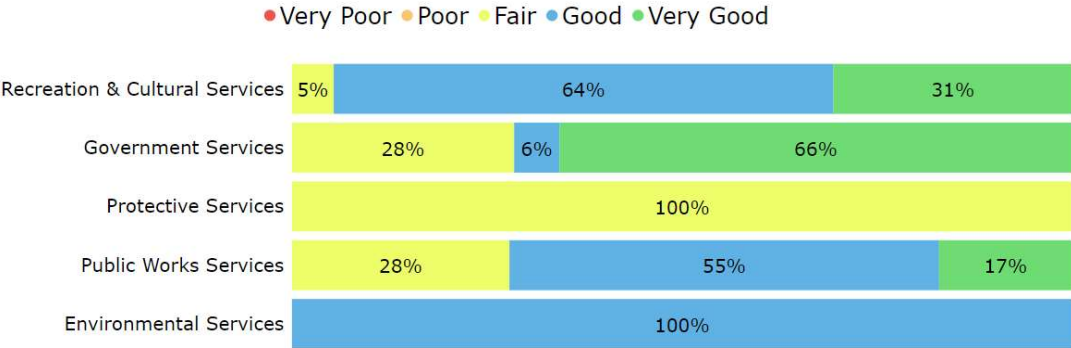


### 3.7.3 Asset Condition & Age

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
Environmental Services	20	12.0	Good (60%)
Government Services	20-50	18.1	Good (75%)
Protective Services	27-50	33.7	Fair (46%)
Public Works Services	20-50	27.5	Good (65%)
Recreation & Cultural Services	20-50	14.8	Good (71%)
		<b>19.6</b>	<b>Good (68%)</b>

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 buildings 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 buildings.

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

# Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to 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:

- Building assessments are completed on a walkthrough basis (monthly) by internal staff and any damages/deficiencies are reported. Contractors are then hired based on the identified deficiencies.

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

<b>Condition</b>	<b>Rating</b>
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

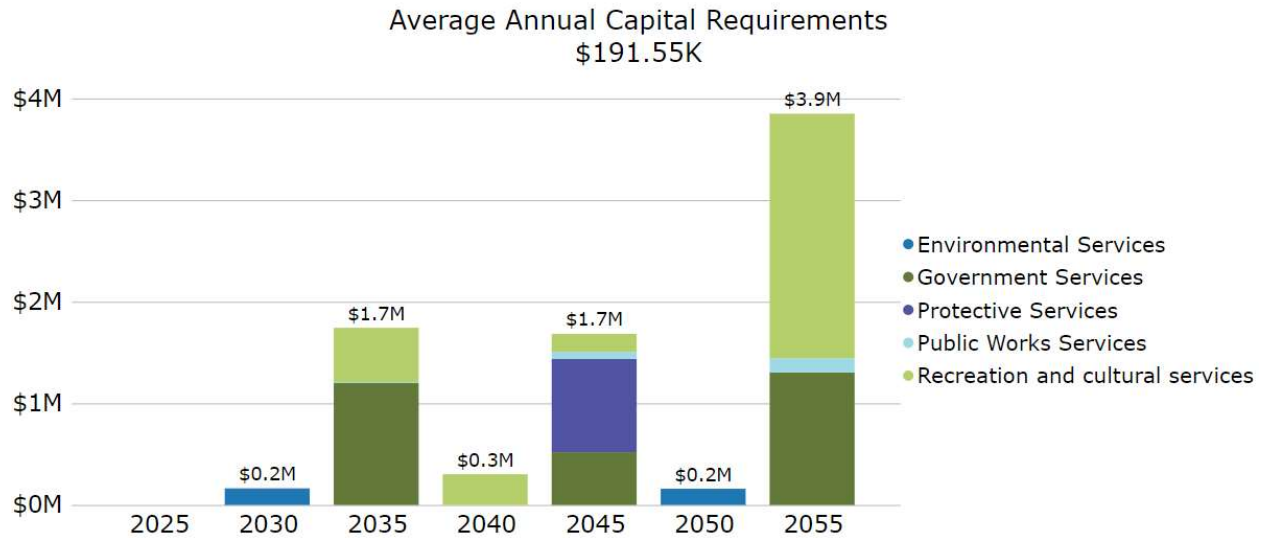
### 3.7.4 Lifecycle Management Strategy

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.

<b>Activity Type</b>	<b>Description of Current Strategy</b>
Maintenance / Rehabilitation	Municipal buildings are subject to regular inspections to identify health & safety requirements as well as structural deficiencies that require additional attention. These inspection include roofing, foundations, lighting fixtures, plumbing fixtures, doors, windows, and hot water tanks. Usualy, furnaces are inspected once every year. The rehabilitation strategy could be decribed as a combination of proactive and reactive.
Replacement	Assessments are completed strategically as buildings approach their end-of-life to determine whether replacement or rehabilitation is appropriate. When the costs are greater than \$25,000, Council approval is required.

## 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 30 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.



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 B.

### 3.7.5 Risk & Criticality

#### Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data.

- Assets that fall in the upper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the Township.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring.

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



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 buildings and facilities are documented below:

<b>Probability of Failure (POF)</b>	<b>Consequence of Failure (COF)</b>
Condition	Replacement Cost (Financial)
	Department (Social)

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.

## Risks to Current Asset Management Strategies

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



### **Growth**

The Town is expected to experience a 20% growth in population. Population and employment growth will increase the demand on municipal services, including the community halls and buildings. This can potentially cause capacity issues from a level of service perspective. As the population continues to grow, the Town must prioritize expanding its capacity to serve a larger population.



### **Capital Funding Strategies**

The funding strategies for the township’s buildings is very dependant on borrowing.

## 3.7.6 Levels of Service

The following tables identify the Township’s current level of service for the buildings. These metrics include the performance measures that the Township has selected for this AMP.

### Community Levels of Service

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

<b>Service Attribute</b>	<b>Qualitative Description</b>	<b>Current LOS (2021)</b>
Quality	Description of the current condition of municipal facilities and the plans that are in place to maintain or improve the provided level of service	The overall condition of the municipally owned buildings is good. Several buildings, including the Public Works garage, are in very good condition. All municipally owned buildings are in fair or better condition.

## Technical Levels of Service

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

<b>Service Attribute</b>	<b>Technical Metric</b>	<b>Current LOS (2021)</b>
Quality	% of facilities that are in good or very good condition	74%
	% of facilities that are in poor or very poor condition	0%
Performance	Capital reinvestment rate	0.52%
	Average Risk Rating	2.02 - Very Low



## 3.7.7 Recommendations

### Asset Inventory

- The Township's asset inventory contains a single record for some facilities. Facilities consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a component-based inventory of all facilities to allow for component-based lifecycle planning.

### Replacement Costs

- Gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.

### Condition Assessment Strategies

- The Township should implement regular condition assessments for all facilities to better inform short- and long-term capital requirements.

### Risk Management Strategies

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

### Levels of Service

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

## 3.8 Vehicles

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

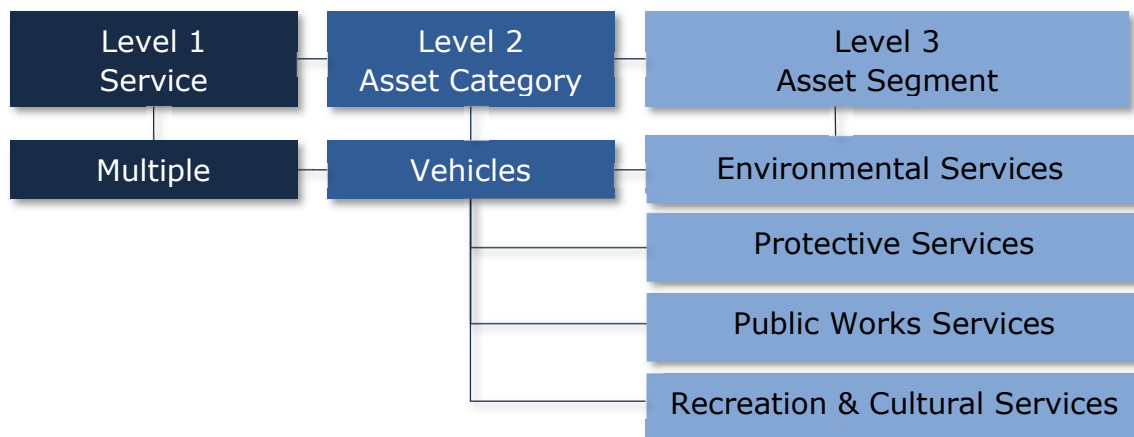
- tandem plow trucks
- fire rescue vehicles to provide emergency services
- pick-up trucks to support the maintenance of the transportation network and address service requests for Parks & Recreation

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

Replacement Cost	Condition	Financial Capacity	
\$4.8 million	Poor (39%)	Annual Requirement:	\$405,000
		Funding Available:	\$61,000
		Annual Deficit:	\$344,000

### 3.8.1 Asset Hierarchy and Segmentation

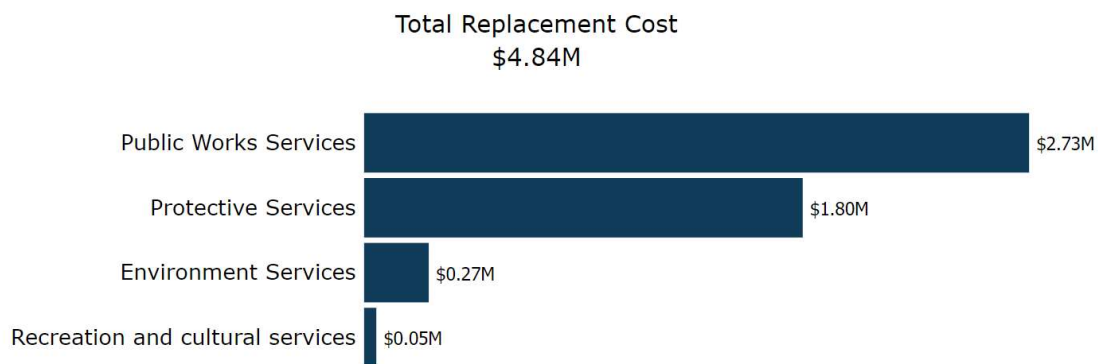
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



### 3.8.2 Asset Inventory & Costs

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Environmental Services	1	\$265,000	\$17,667
Protection Services	8	\$1,798,000	\$137,071
Public Works Services	16	\$2,726,000	\$245,757
Recreation and Cultural Services	2	\$50,000	\$4,500
		<b>\$4,839,000</b>	<b>\$404,995</b>



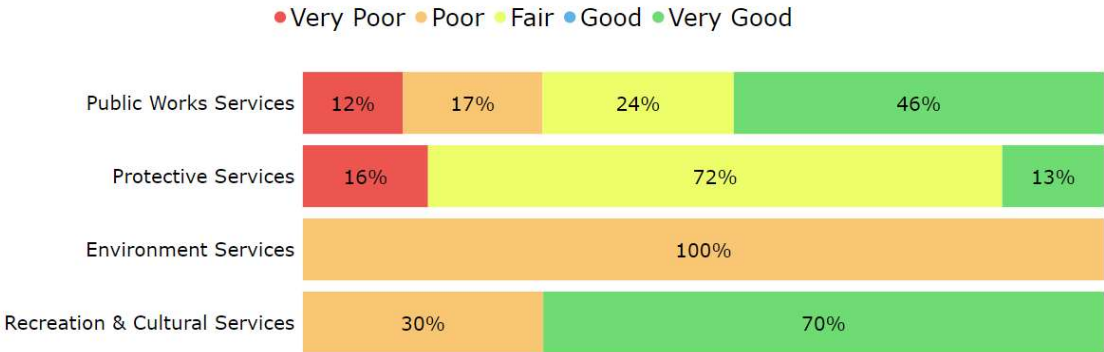
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

### 3.8.3 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
Environmental Services	15	11.0	Poor (27%)
Protection Services	7-20	12.4	Fair (47%)
Public Works Services	5-15	7.9	Fair (58%)
Recreation and Cultural Services	10-15	12.0	Good (64%)
		<b>9.7</b>	<b>Fair (52%)</b>

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 vehicles 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 vehicles.

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

## Current Approach to Condition Assessment

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

- Staff complete annual assessments of vehicles where the entire vehicle is inspected and given a condition rating on a scale of very poor – very good.

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	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

### 3.8.4 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	Visual inspections completed annually
	Annual preventative maintenance activities include oil changes and greasing
Replacement	Vehicle replacements are based on the highest priority vehicles and presented to council with budget
	Vehicle age, kilometres and annual repair costs are taken into consideration when determining appropriate treatment options

## 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 10 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.



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 B.

### 3.8.5 Risk & Criticality

#### Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data.

- Assets that fall in the upper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the Township.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring.

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



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 vehicles are documented below:

<b>Probability of Failure (POF)</b>	<b>Consequence of Failure (COF)</b>
Condition	Replacement Cost (Financial)
	Department (Social)

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.



## Risks to Current Asset Management Strategies

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



### **Growth**

The Township is expected to experience significant growth. Population and employment growth will increase the demand on municipal services and potentially decrease the lifecycle of certain assets. Additionally, more vehicles will be required to accommodate the growing population.



### **Capital Funding Strategies**

Grant will be required to procure the additional required vehicles to accommodate the growing population.

## 3.8.6 Levels of Service

The following tables identify the Township’s current level of service for the vehicles. These metrics include the performance measures that the Township has selected for this AMP.

### Community Levels of Service

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

<b>Service Attribute</b>	<b>Qualitative Description</b>	<b>Current LOS (2021)</b>
Safety	Description of the Fleet Management and Safety Program	Annual safety inspections are completed for vehicles, performed by internal staff. Semi-annual inspections being considered. Grater training and back-hoe training provided. Special license required by operators as job-requirement.
Quality	Description of the current condition of municipal vehicles and the plans that are in place to maintain or improve the provided level of service	The overall condition of the municipalities vehicles is good. Several vehicles, including plow trucks and graders, are very new and in very good condition. Staff plan to have all new trucks by the end of 2022.

## Technical Levels of Service

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

<b>Service Attribute</b>	<b>Technical Metric</b>	<b>Current LOS (2021)</b>
Quality	% of vehicles where asset age exceeds estimate useful life (excluding fire vehicles)	0%
	% of fire vehicles where asset age exceeds estimated useful life	0%
	% of vehicles that are in good or very good condition (excluding fire vehicles)	43%
	% of fire vehicles that are in good or very good condition	13%
	% of vehicles that are in poor or very poor condition (excluding fire vehicles)	36%
	% of fire vehicles that are in poor or very poor condition	16%
Performance	Annual capital reinvestment rate for vehicles	1.26%
	% of vehicles that are fuel efficient (excluding fire vehicles)	67%
	% of fire vehicles that are fuel efficient	56%
	Average Risk Rating associated to vehicles (excluding fire vehicles)	5.05 - Low
	Average Risk Rating associated to fire vehicles	5.76 - Low

## 3.8.7 Recommendations

### Condition Assessment Strategies

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

### Risk Management Strategies

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

### Levels of Service

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

## 3.9 Machinery & Equipment

In order to maintain the high quality of public infrastructure and support the delivery of core services, Township staff own and employ various types of machinery and equipment. This includes:

- IT Equipment to support government services
- Graders, plows, etc. to support the delivery of public works services
- Playground and rink equipment for recreational uses
- Fire equipment to support protective services

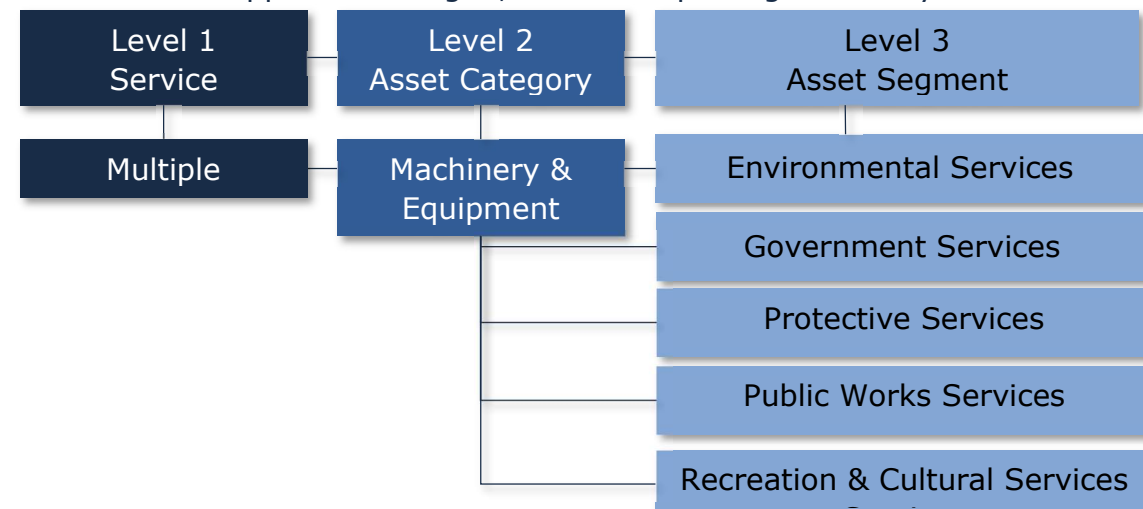
Keeping machinery and equipment in an adequate state of repair is important to maintain a high level of service.

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

Replacement Cost	Condition	Financial Capacity	
\$2.3 million	Fair (45%)	Annual Requirement:	\$137,000
		Funding Available:	\$151,000
		Annual Deficit:	-\$14,000

### 3.9.1 Asset Hierarchy and Segmentation

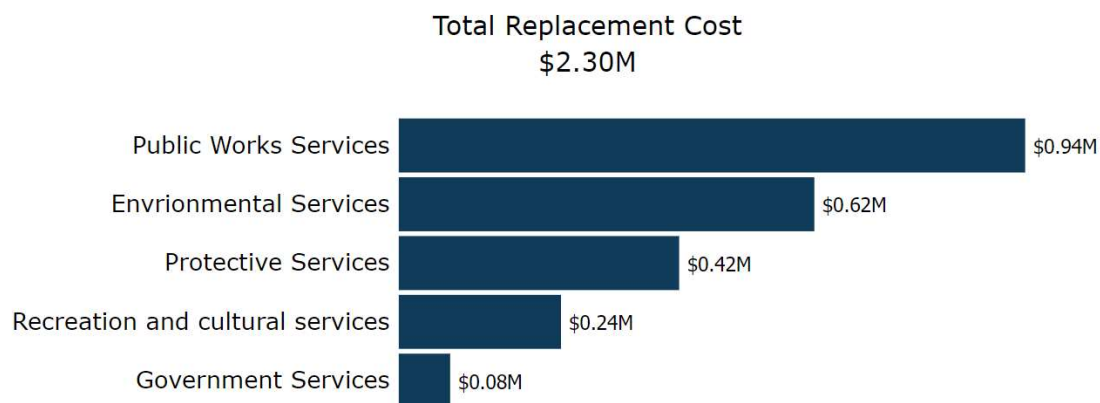
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.



### 3.9.2 Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Township’s machinery and equipment inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Environmental Services	15	\$622,500	\$31,125
Government Services	4	\$77,000	\$6,850
Protective Services	10	\$420,000	\$26,192
Public Works Services	20	\$938,272	\$53,895
Recreation & Cultural Services	10	\$243,000	\$18,733
<b>Total</b>		<b>\$2,300,772</b>	<b>\$136,796</b>



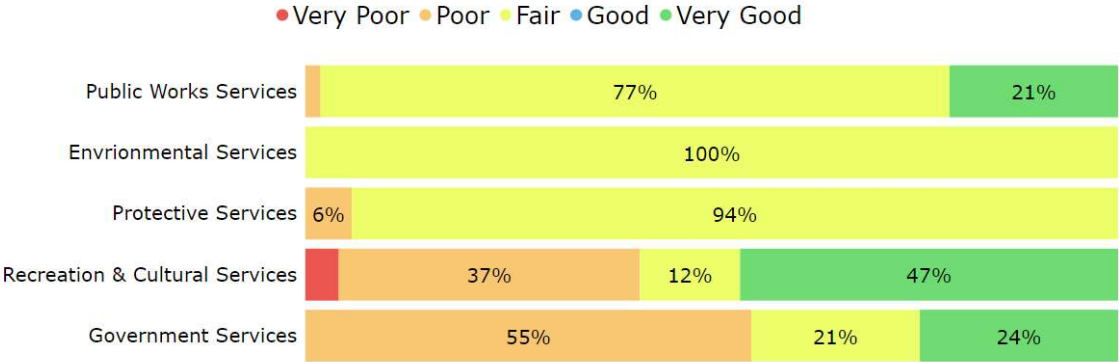
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

### 3.9.3 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Environmental Services	20	17.8	Fair (50%)
Government Services	10-20	8.5	Fair (46%)
Protective Services	10-25	13.5	Fair (41%)
Public Works Services	10-20	7.2	Fair (58%)
Recreation & Cultural Services	10-30	7.3	Fair (58%)
<b>Average</b>		<b>11.1</b>	<b>Fair (53%)</b>

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

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

## Current Approach to Condition Assessment

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

- Staff complete regular visual inspections of machinery and equipment to ensure they are in state of adequate repair
- There are no formal condition assessment programs in place

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	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

### 3.9.4 Lifecycle Management Strategy

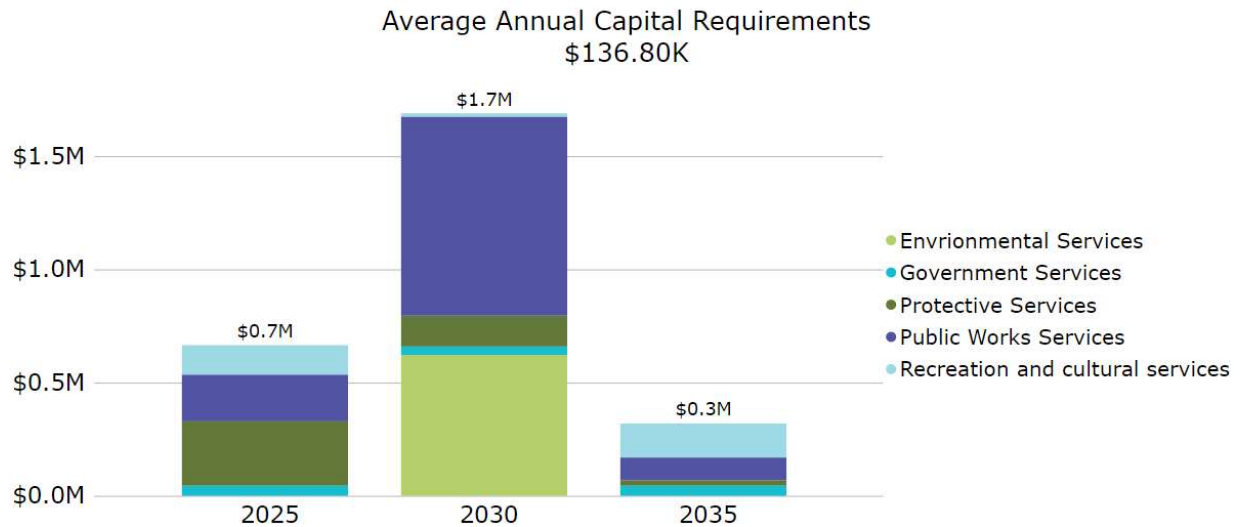
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Visual inspections completed annually
	Annual preventative maintenance activities include oil changes and greasing
Replacement	Machinery & equipment replacements are based on the highest priority vehicles assets and presented to council with budget
	Equipment age and annual repair costs are taken into consideration when determining appropriate treatment options

## 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 10 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.



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 B.



### 3.9.5 Risk & Criticality

#### Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data.

- Assets that fall in the upper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the Township.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring.

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



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 machinery and equipment are documented below:

<b>Probability of Failure (POF)</b>	<b>Consequence of Failure (COF)</b>
Condition	Replacement Cost (Financial)
	Department (Social)

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.

## Risks to Current Asset Management Strategies

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



### **Growth**

The Township is expected to experience significant growth. Population and employment growth will increase the demand on municipal services and potentially decrease the lifecycle of certain assets. Additionally, more equipment will be required to accommodate the growing population.



### **Capital Funding Strategies**

Grant will be required to procure the additional required equipment to accommodate the growing population.

## 3.9.6 Levels of Service

The following tables identify the Township’s current level of service for the vehicles. These metrics include the performance measures that the Township has selected for this AMP.

### Community Levels of Service

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

<b>Service Attribute</b>	<b>Qualitative Description</b>	<b>Current LOS (2021)</b>
Quality	Description of the current condition of machinery and equipment and the plans that are in place to maintain or improve the provided level of service	The overall condition of the equipment is fair. New equipment has been acquired in the last few years. Majority of the equipment is new. There are no plans to increase the frequency of equipment replacement. The dates of replacement are assessed every year based on the condition of the asset.

## Technical Levels of Service

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

<b>Service Attribute</b>	<b>Technical Metric</b>	<b>Current LOS (2021)</b>
Quality	% of machinery & equipment in good or very good condition	15%
	% of machinery & equipment in poor or very poor condition	8%
Performance	Annual capital reinvestment rate for machinery & equipment	6.56%
	Average Risk Rating associated to machinery & equipment	3.97 – Very Low

## 3.9.7 Recommendations

### Condition Assessment Strategies

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

### Risk Management Strategies

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

### Levels of Service

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

## 3.10 Land Improvements

The Township of Greater Madawaska owns a small number of assets that are considered land improvements. This category includes:

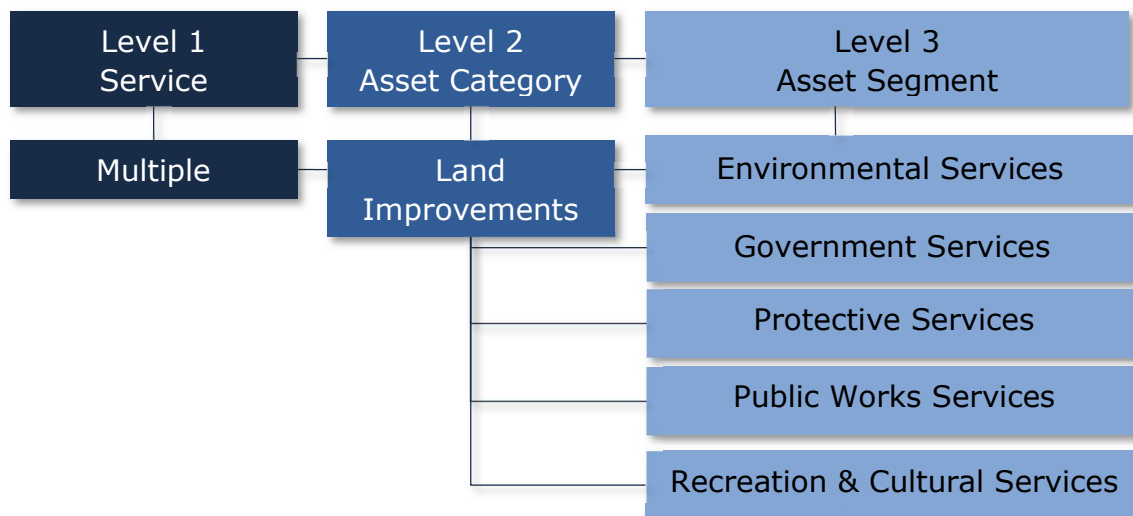
- Parking lots for municipal facilities
- Miscellaneous landscaping and other assets

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

Replacement Cost	Condition	Financial Capacity	
\$1.91 million	Fair (49%)	Annual Requirement:	\$69,000
		Funding Available:	\$7,000
		Annual Deficit:	\$62,000

### 3.10.1 Asset Hierarchy and Segmentation

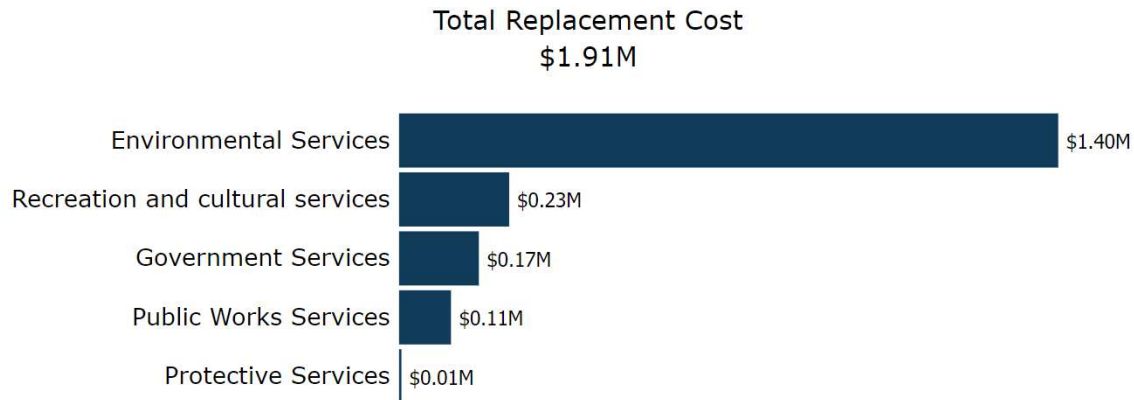
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.



### 3.10.2 Asset Inventory & Costs

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Township’s land improvements inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Environmental Services	12	\$1,396,020	\$49,101
Government Services	6	\$169,000	\$8,022
Protective Services	1	\$5,000	\$200
Public Works Services	6	\$110,000	\$5,111
Recreation & Cultural Services	11	\$233,212	\$6,776
<b>Total</b>		<b>\$1,913,232</b>	<b>\$69,211</b>



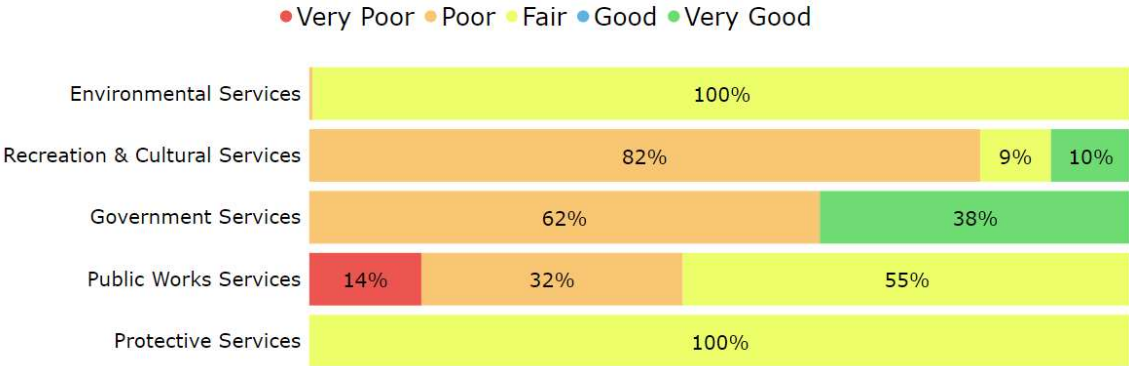
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

### 3.10.3 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
Environmental Services	20-45	20.0	Fair (53%)
Government Services	15-45	22.7	Fair (53%)
Protective Services	25	28.0	Fair (52%)
Public Works Services	15-40	30.7	Poor (39%)
Recreation & Cultural Services	25-50	28.9	Fair (42%)
<b>Average</b>		<b>25.8</b>	<b>Fair (51%)</b>

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 land improvement 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.

### Current Approach to Condition Assessment

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

- Staff complete regular visual inspections of land improvements assets to ensure they are in state of adequate repair
- There are no formal condition assessment programs in place for land improvements

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

<b>Condition</b>	<b>Rating</b>
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

### 3.10.4 Lifecycle Management Strategy

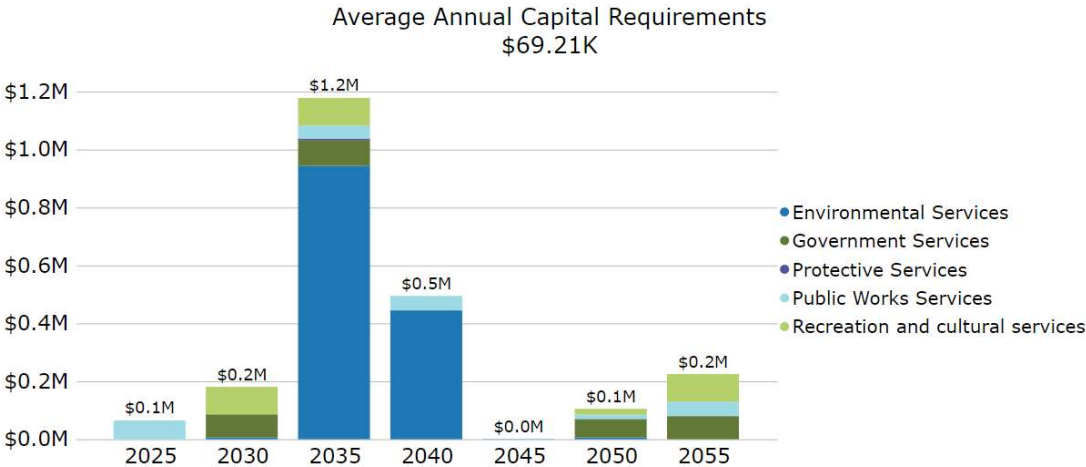
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation & Replacement	The Land improvements asset category includes several unique asset types and lifecycle requirements are dealt with on a case-by-case basis. Usually, land improvement asstes receive a monthly inspection. Park assets are inspected on a weekly basis using the form provided by the insurance company. These inspectons are done internally and some input is usually provided by the county’s park committee.

### 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 30 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.



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 B.

### 3.10.5 Risk & Criticality

#### Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data.

- Assets that fall in the upper right quadrant require immediate action as they have high chances of failure and major consequences associated to their failure.
- Assets that fall in the lower right quadrant require monitoring and predictive analysis of failure as they have high chances of failure with minor to moderate consequences associated to their failure, which may be tolerable by the Township.
- Assets that fall in the upper left quadrant require proactive maintenance to keep their probability of failure low to moderate since they have moderate to high consequences associated to their failure.
- The assets that fall in the lower left quadrant have a low to moderate probability and low to moderate consequences of failure. Therefore, they require usual routine monitoring.

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



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 land improvements are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Department (Social)

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.

## 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



Trees and park assets are getting damaged due to recurring extreme weather events.

### Growth



The Town is expected to experience a 20% growth in population. Population and employment growth will increase the demand on municipal services, including parks. This can potentially cause capacity issues from a level of service perspective. As the population continues to grow, the Town must prioritize expanding its capacity to serve a larger population.

### Capital Funding Strategies



The funding strategies for the township's land improvement assets is very dependant on borrowing.

### 3.10.6 Levels of Service

The following tables identify the Township’s current level of service for the vehicles. These metrics include the performance measures that the Township has selected for this AMP.

#### Community Levels of Service

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

<b>Service Attribute</b>	<b>Qualitative Description</b>	<b>Current LOS (2021)</b>
Quality	Description of the current condition of land improvements and the plans that are in place to maintain or improve the provided level of service	The overall condition of the municipalities land improvements is fair.

#### Technical Levels of Service

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

<b>Service Attribute</b>	<b>Technical Metric</b>	<b>Current LOS (2021)</b>
Quality	% of land improvements in good or very good condition	5%
	% of land improvements in poor or very poor condition	18%
Performance	Annual capital reinvestment rate for land improvements	0.37%
	Average Risk Rating associated to land improvements	6.69 - Low

## 3.10.7 Recommendations

### Condition Assessment Strategies

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

### Risk Management Strategies

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

### Levels of Service

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

# 4

## Impacts of Growth

### Key Insights

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

# 4.1 Description of Growth Assumptions

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

## 4.1.1 County of Renfrew Official Plan (March 2020)

As a result of amalgamations many municipalities within the County do not have Local Official Plans that encompass their entire municipality. The County’s Official Plan has been designed to provide a consistent and detailed set of policies across Renfrew County that respond to local conditions. Greater Madawaska is amongst the municipalities that have indicated that they will utilize the County Official Plan as their detailed Official Plan.

The Township of Greater Madawaska intends to promote and accommodate recreation community development (recreational and residential) areas within the municipality while at the same time having regard for the natural environment and the financial and servicing needs of the municipality

The following table outlines the population and employment forecasts allocated to Greater Madawaska.

	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>2036</b>
Actual Population	2,485	2518 <sup>3</sup>	2,864 <sup>4</sup>	-	-	-
Project Population - Low	-	2560	2638	2718	2801	2886
Projected Population - High	-	2599	2718	2842	2973	3109

However, according to the 2021 Census, it appears that Greater Madawaska has exceeded its growth projection and has already reached the population it was originally projected to reach around 2031. This may be due to the recent migration trends from urban centres to rural communities due to remote working options and cheaper cost of living.

<sup>3</sup> 2016 Census

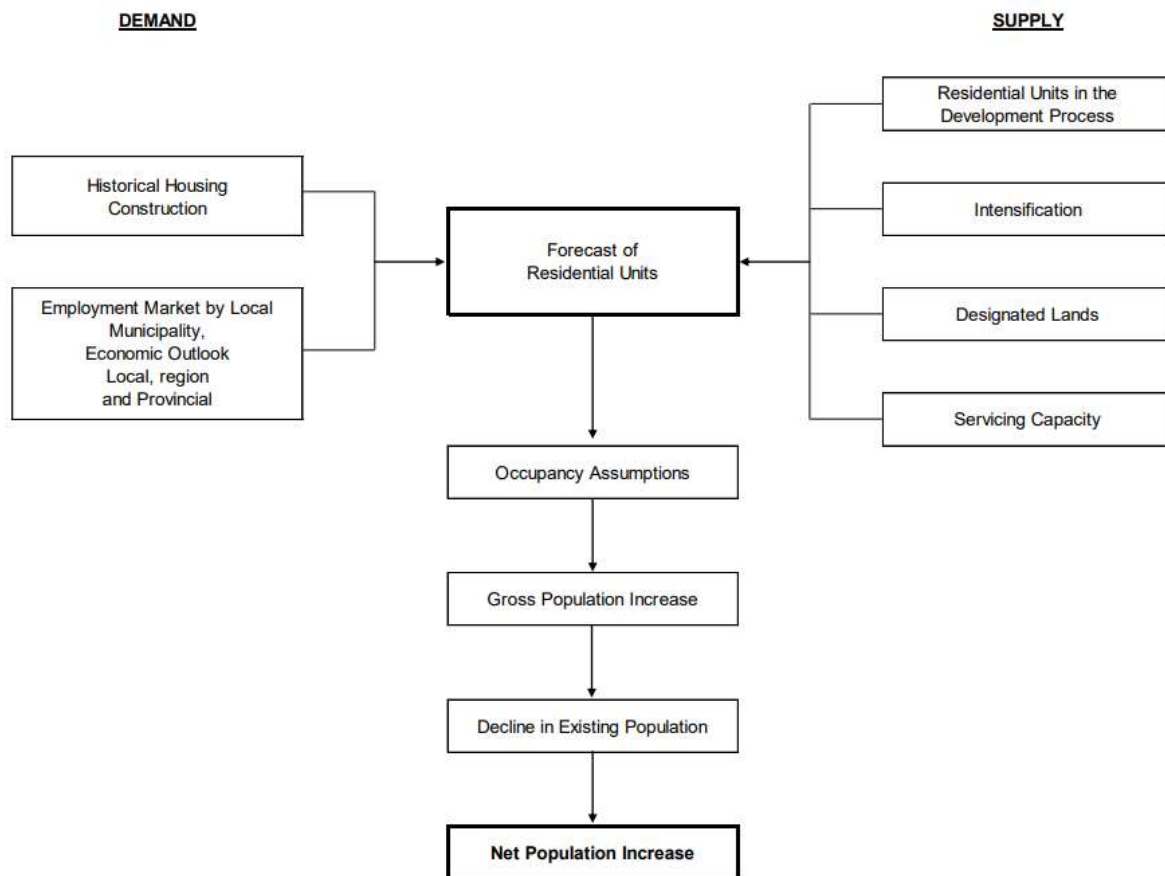
<sup>4</sup> 2021 Census



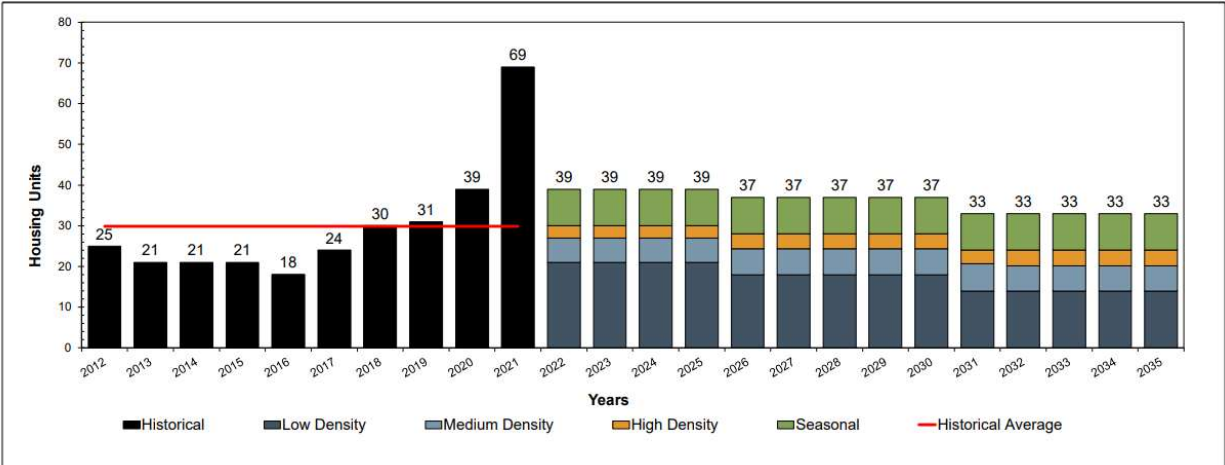
## 4.1.2 Development Charge Study (February 2022)

The development Charge Study identified that the permanent population in Greater Madawaska is anticipated to reach approximately 3,340 by early-2032 and 3,550 by mid-2036, resulting in an increase of approximately 590 and 810 persons, respectively. The Township’s seasonal population is forecast to increase to 4,020 persons in 2032, and 4,160 persons in 2036. The Township’s total population (permanent and seasonal population) is forecast to reach 7,360 by 2032, and 7,720 by 2036.

The methodology of the residential growth forecast analysis is summarized in graph below:



Furthermore, the graph below shows the annual housing forecast:



## 4.2 Impact of Growth on Lifecycle Activities

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

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Township’s AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Township will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

# 5

## Financial Strategy

### Key Insights

- The Township is committing approximately \$682,000 towards capital projects per year from sustainable revenue sources
- Given the annual capital requirement of \$2,168,000 there is currently a funding gap of \$1,486,000 annually
- For tax-funded assets, we recommend increasing tax revenues by 1.6% each year for the next 20 years to achieve a sustainable level of funding

# 5.1 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 Greater Madawaska to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

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

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

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

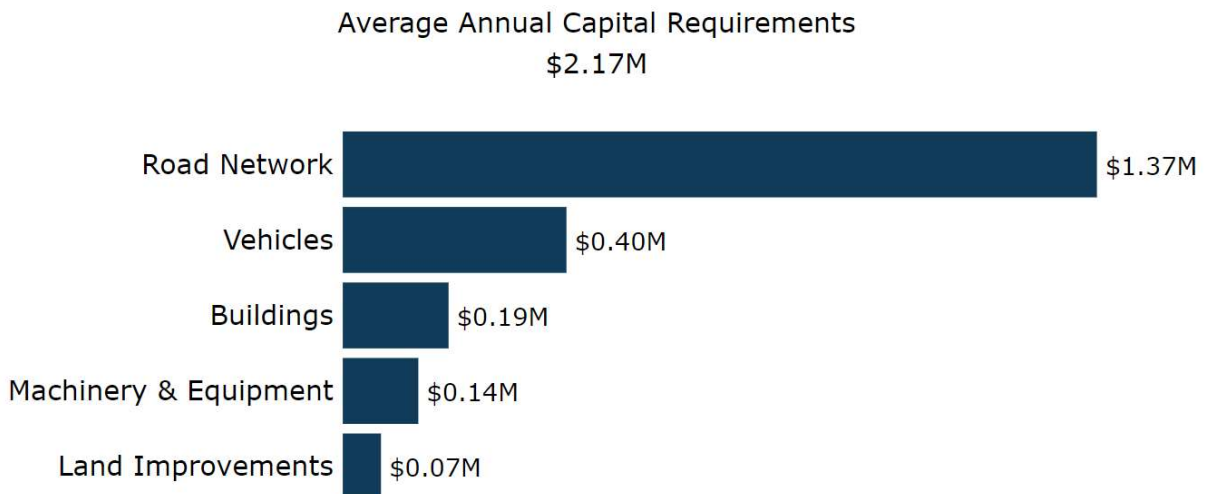
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Township's approach to the following:

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

## 5.1.1 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 \$2.2 million annually to address capital requirements for the assets included in this AMP.



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

However, for the Road Network, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Township’s roads and sanitary sewer mains respectively. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented. The following table compares two scenarios for the Road Network:

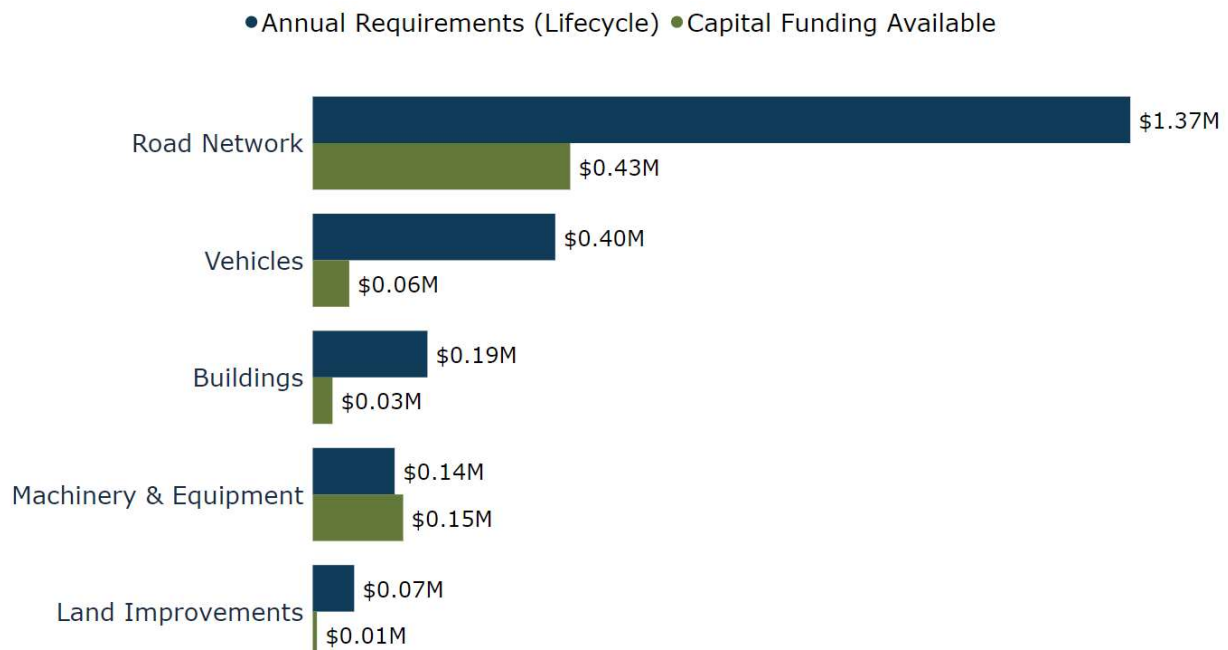
1. **Replacement Only Scenario:** Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario:** Based on the assumption that lifecycle activities are performed at strategic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

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	\$2,813,327	\$1,365,317	\$1,448,010

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of \$1,448,010 for the Road Network. This represents an overall reduction of the annual requirements by 51%. As the lifecycle strategy scenario represents the lowest cost option available to the Township, we have used these annual requirements in the development of the financial strategy.

## Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately \$682,000 towards capital projects per year. Given the annual capital requirement of \$2,168,000, there is currently a funding gap of \$1,486,000 annually.



## 5.2 Funding Objective

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

1. **Tax Funded Assets:** Buildings, Land Improvements, Machinery & Equipment, Road Network, Vehicles

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.

## 5.3 Financial Profile: Tax Funded Assets

### 5.3.1 Current Funding Position

The following tables show, by asset category, Greater Madawaska’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	Gas Tax	OCIF	OMPF	Total Available	
Buildings	\$191,000	0	0	0	\$33,000	\$33,000	\$224,000
Land Improvements	\$69,000	0	0	0	\$7,000	\$7,000	\$50,000
Machinery & Equipment	\$137,000	\$130,000	0	0	\$21,000	\$151,000	\$9,000
Road Network	\$1,365,000	\$85,000	\$76,000	\$141,000	\$128,000	\$430,000	\$924,341
Vehicles	\$405,000	0	0	0	\$61,000	\$61,000	\$409,000
	<b>\$2,167,000</b>	<b>\$215,000</b>	<b>\$76,000</b>	<b>\$141,000</b>	<b>\$250,000</b>	<b>\$682,000</b>	<b>\$1,486,000</b>

The average annual investment requirement for the above categories is \$2,167,000. Annual revenue currently allocated to these assets for capital purposes is \$682,000 leaving an annual deficit of \$1,486,000. Put differently, these infrastructure categories are currently funded at 31% of their long-term requirements.

### 5.3.2 Full Funding Requirements

In 2020, Township of Greater Madawaska has annual tax revenues of \$3,366,000. 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
Buildings	4.7%
Land Improvements	1.8%
Machinery & Equipment	-0.4%
Road Network	27.8%
Vehicles	10.2%
	<b>44.1%</b>



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

- a) Greater Madawaska’s debt payments for these asset categories will be decreasing by \$118,000 over the next 5 years and by \$229,000 over the next 10 years.

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	\$1,486,000	\$1,486,000	\$1,486,000	\$1,486,000	\$1,486,000	\$1,486,000	\$1,486,000	\$1,486,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-\$118,000	-\$229,000	-\$229,000	-\$229,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Resulting Infrastructure Deficit:</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>
Tax Increase Required	44.1%	44.1%	44.1%	44.1%	40.6%	37.3%	37.3%	37.3%
<b>Annually:</b>	<b>7.6%</b>	<b>3.8%</b>	<b>2.5%</b>	<b>1.9%</b>	<b>7.1%</b>	<b>3.3%</b>	<b>2.2%</b>	<b>1.6%</b>

### 5.3.3 Financial Strategy Recommendations

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

- a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
- b) increasing tax revenues by 1.6% each year for the next 20 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) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
- e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
- f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable since this funding is a multi-year commitment<sup>5</sup>.
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 funding on an annual basis in 20 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 no pent-up investment demand.

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.

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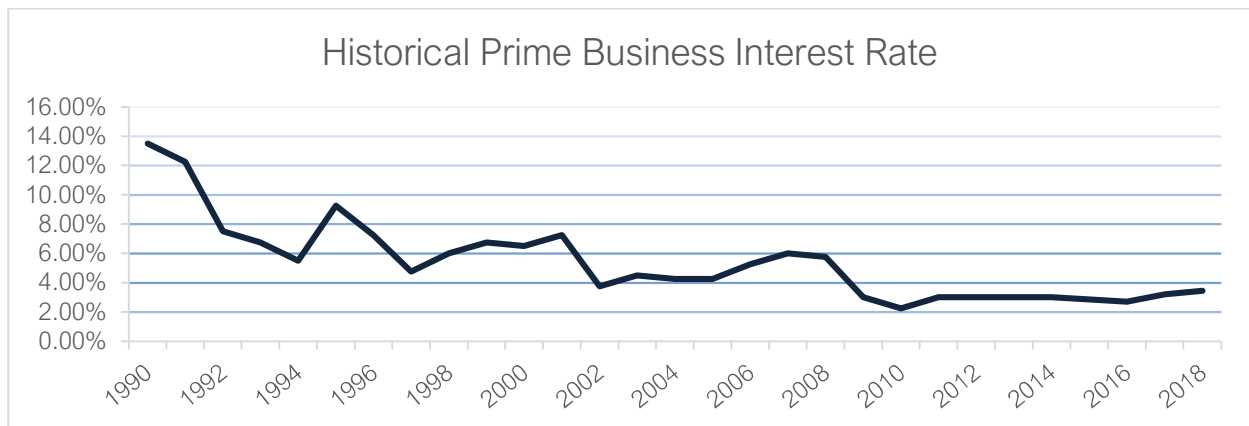
<sup>5</sup> The Township should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. Depending on the outcome of this review, there may be changes that impact its availability.

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



<sup>6</sup> 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 Greater Madawaska has historically used debt for investing in the asset categories as listed. There is currently \$1,216,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of \$229,000, well within its provincially prescribed maximum of \$678,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2017	2018	2019	2020	2021
Buildings	\$142,000	\$348,000	\$0	\$0	\$0	\$0
Land Improvements	\$0	\$0	\$0	\$0	\$0	\$0
Machinery & Equipment	\$0	\$52,000	\$0	\$0	\$0	\$0
Road Network	\$357,000	\$107,000	\$0	\$476,000	\$0	\$0
Vehicles	\$717,000	\$167,000	\$0	\$631,000	259,000	\$0
Total Tax Funded:	<b>\$1,216,000</b>	<b>\$674,000</b>	<b>\$0</b>	<b>\$1,107,000</b>	<b>\$259,000</b>	<b>\$0</b>

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2022	2023	2024	2025	2026	2027	2032
Buildings	\$39,000	\$39,000	\$37,000	\$36,000	\$0	\$0	\$0
Land Improvements	\$0	0	\$0	\$0	\$0	\$0	\$0
Machinery & Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Road Network	\$48,000	\$48,000	\$48,000	\$48,000	\$48,000	\$48,000	\$0
Vehicles	\$142,000	\$140,000	\$139,000	\$86,000	\$63,000	\$63,000	\$0
Total Tax Funded:	<b>\$229,000</b>	<b>\$227,000</b>	<b>\$224,000</b>	<b>\$170,000</b>	<b>\$111,000</b>	<b>\$111,000</b>	<b>\$0</b>

The revenue options outlined in this plan allow Greater Madawaska to fully fund its long-term infrastructure requirements without further use of debt.

## 5.5 Use of Reserves

### 5.5.1 Available Reserves

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

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

By asset category, the table below outlines the details of the reserves currently available to Greater Madawaska.

<b>Asset Category</b>	<b>Balance at December 31, 2020</b>
Buildings	\$213,000
Land Improvements	\$25,000
Machinery & Equipment	\$246,000
Road Network	\$600,000
Vehicles	\$146,000
<b>Total Tax Funded:</b>	<b>\$1,230,000</b>

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 take into account 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 Greater Madawaska'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.

## 5.5.2 Recommendation

In 2025, Ontario Regulation 588/17 will require Greater Madawaska 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.

# 6

## Appendices

### Key Insights

- Appendix A includes a one-page report card with an overview of key data from each asset category
- Appendix B identifies projected 10-year capital requirements for each asset category
- Appendix C includes several maps that have been used to visualize the current level of service
- Appendix D identifies the criteria used to calculate risk for each asset category
- Appendix E provides additional guidance on the development of a condition assessment program

# Appendix A: Infrastructure Report Card

Asset Category	Replacement Cost (millions)	Asset Condition	Financial Capacity	
Road Network	\$52.1	Fair (53%)	Annual Requirement:	\$1,365,000
			Funding Available:	\$430,000
			<b>Annual Deficit:</b>	<b>\$935,000</b>
Buildings	\$9.1	Good (62%)	Annual Requirement:	\$192,000
			Funding Available:	\$33,000
			<b>Annual Deficit:</b>	<b>\$156,000</b>
Vehicles	\$6.0	Fair (52%)	Annual Requirement:	\$405,000
			Funding Available:	\$61,000
			<b>Annual Deficit:</b>	<b>\$344,000</b>
Machinery & Equipment	\$2.6	Fair (54%)	Annual Requirement:	\$137,000
			Funding Available:	\$151,000
			<b>Annual Deficit:</b>	<b>-\$14,000</b>
Land Improvements	\$1.9	Fair (50%)	Annual Requirement:	\$69,000
			Funding Available:	\$7,000
			<b>Annual Deficit:</b>	<b>\$62,000</b>
<b>Overall</b>	\$71.7	Fair (52%)	Annual Requirement:	\$2,168,000
			Funding Available:	\$682,000
			<b>Annual Deficit:</b>	<b>\$1,486,000</b>



# Appendix B: 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.

<b>Road Network</b>											
<b>Asset Segment</b>	<b>Backlog</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
Culverts	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Paved Roads	\$158,325	\$249,575	\$4,346,249	\$769,065	\$288,683	\$566,436	\$219,457	\$184,986	\$1,271,796	\$537,899	\$974,268
	<b>\$158,325</b>	<b>\$249,575</b>	<b>\$4,346,249</b>	<b>\$769,065</b>	<b>\$288,683</b>	<b>\$566,436</b>	<b>\$219,457</b>	<b>\$184,986</b>	<b>\$1,271,796</b>	<b>\$537,899</b>	<b>\$974,268</b>

<b>Buildings</b>											
<b>Asset Segment</b>	<b>Backlog</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
Environmental Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Government Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Protective Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public Works Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Recreation & Cultural Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**Machinery & Equipment**

<b>Asset Segment</b>	<b>Backlog</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
Environmental Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Government Services	\$0	\$0	\$0	\$0	\$0	\$45,000	\$0	\$0	\$0	\$0	\$15,000
Protective Services	\$0	\$0	\$0	\$0	\$0	\$24,000	\$0	\$0	\$260,000	\$0	\$0
Public Works Services	\$0	\$0	\$0	\$0	\$0	\$0	\$75,000	\$14,000	\$0	\$117,500	\$0
Recreation & Cultural Services	\$0	\$0	\$0	\$0	\$0	\$100,000	\$0	\$0	\$30,000	\$0	\$0
	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$169,000</b>	<b>\$75,000</b>	<b>\$14,000</b>	<b>\$290,000</b>	<b>\$117,500</b>	<b>\$15,000</b>

**Vehicles**

<b>Asset Segment</b>	<b>Backlog</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
Environmental Services	\$0	\$0	\$0	\$0	\$0	\$0	\$265,000	\$0	\$0	\$0	\$0
Protective Services	\$0	\$0	\$300,000	\$0	\$0	\$0	\$0	\$0	\$38,000	\$1,288,000	\$0
Public Works Services	\$0	\$0	\$340,000	\$0	\$475,000	\$0	\$55,000	\$330,000	\$0	\$631,000	\$0
Recreation & Cultural Services	\$0	\$0	\$0	\$0	\$0	\$0	\$15,000	\$0	\$0	\$0	\$35,000
	<b>\$0</b>	<b>\$0</b>	<b>\$640,000</b>	<b>\$0</b>	<b>\$475,000</b>	<b>\$0</b>	<b>\$335,000</b>	<b>\$330,000</b>	<b>\$38,000</b>	<b>\$1,919,000</b>	<b>\$35,000</b>

**Land Improvements**

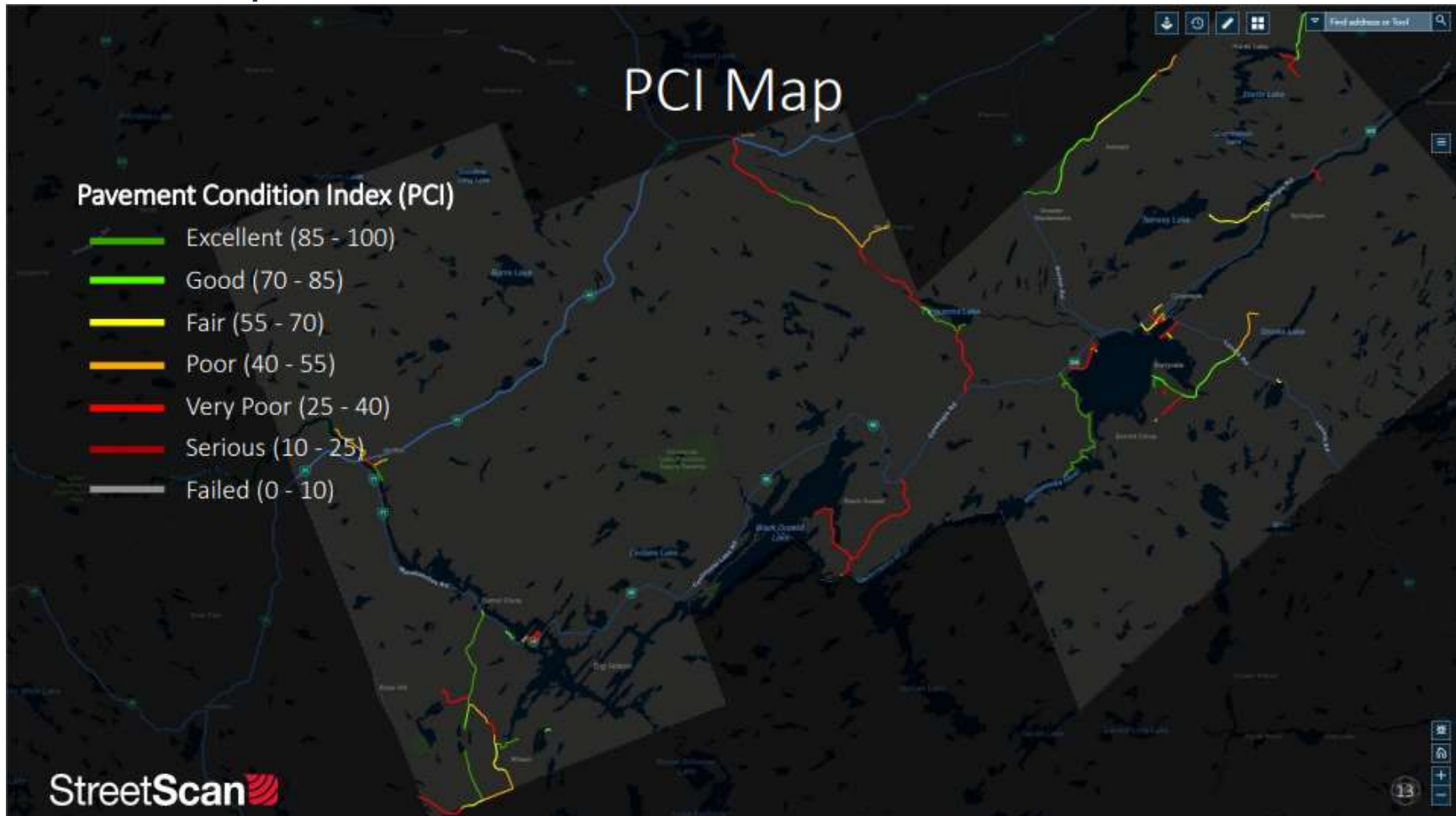
<b>Asset Segment</b>	<b>Backlog</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
Environmental Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Government Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$80,000
Protective Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public Works Services	\$0	\$0	\$0	\$0	\$0	\$15,000	\$0	\$0	\$0	\$50,000	\$0
Recreation & Cultural Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$95,000
	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$15,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$50,000</b>	<b>\$175,000</b>

**All Assets**

<b>Asset Segment</b>	<b>Backlog</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
Road Network	\$158,325	\$249,575	\$4,346,249	\$769,065	\$288,683	\$566,436	\$219,457	\$184,986	\$1,271,796	\$537,899	\$974,268
Buildings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$80,000
Machinery & Equipment	\$0	\$0	\$0	\$0	\$0	\$169,000	\$75,000	\$14,000	\$290,000	\$117,500	\$15,000
Vehicles	\$0	\$0	\$640,000	\$0	\$475,000	\$0	\$335,000	\$330,000	\$38,000	\$1,919,000	\$35,000
Land Improvements	\$0	\$0	\$0	\$0	\$0	\$15,000	\$0	\$0	\$0	\$50,000	\$175,000
	<b>\$158,325</b>	<b>\$249,575</b>	<b>\$4,986,249</b>	<b>\$769,065</b>	<b>\$763,683</b>	<b>\$750,436</b>	<b>\$629,457</b>	<b>\$528,986</b>	<b>\$1,599,796</b>	<b>\$2,624,399</b>	<b>\$1,279,268</b>

# Appendix C: Level of Service Maps

## Road Network Map



### Image of Road in Excellent Condition



### Images of Road in Very Poor Condition



# Appendix D: Risk Rating Criteria

## Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Network Buildings Vehicles Machinery & Equipment Land Improvements	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
			Ductile Iron	4
			Asbestos Cement	3
			Copper	3
			Riveted Steel	3
			HDPE	2
			PVC	2

## Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network	Economic (80%)	Replacement Cost (100%)	\$0-25,000	1
			\$25,001-100,000	2
			\$100,001-500,000	3
			\$500,001-\$1,000,000	4
			\$1,000,001 - \$4,000,000	5
	Social (20%)	Road Class (20%)	6	1
			5	2
			3-4	3
			2	4
			1	5
Buildings	Economic (80%)	Replacement Cost (100%)	\$0-\$10,000	1
			\$10,001-\$40,000	2
			\$40,001-\$100,000	3
			\$100,001-\$500,000	4
			\$500,001-1,000,000	5
	Social (20%)	Department (100%)	Environmental Services	2
			Government Services	2
			Recreation and Cultural Services	2
			Public Works Services	4
			Protective Services	5



<b>Asset Category</b>	<b>Risk Classification</b>	<b>Risk Criteria</b>	<b>Value/Range</b>	<b>Consequence of Failure Score</b>
Vehicles	Economic (80%)	Replacement Cost (100%)	\$0-\$5,000	1
			\$5,001-\$10,000	2
			\$10,001-\$20,000	3
			\$20,001-\$40,000	4
			\$40,001-650,000	5
	Social (20%)	Department (100%)	Environmental Services	2
			Government Services	2
			Recreation and Cultural Services	2
			Public Works Services	4
			Protective Services	5
Machinery & Equipment	Economic (80%)	Replacement Cost (100%)	\$0-\$10,000	1
			\$10,001-\$30,000	2
			\$30,001-\$70,000	3
			\$70,001-\$150,000	4
			\$150,001-350,000	5
	Social (20%)	Department (100%)	Environmental Services	2
			Government Services	2
			Recreation and Cultural Services	2
			Public Works Services	4
			Protective Services	5

<b>Asset Category</b>	<b>Risk Classification</b>	<b>Risk Criteria</b>	<b>Value/Range</b>	<b>Consequence of Failure Score</b>
Land Improvements	Economic (80%)	Replacement Cost (100%)	\$0-\$10,000	1
			\$10,001-\$20,000	2
			\$20,001-\$50,000	3
			\$50,001-\$100,000	4
			\$100,001-450,000	5
	Social (20%)	Department (100%)	Environmental Services	2
			Government Services	2
			Recreation and Cultural Services	2
			Public Works Services	4
			Protective Services	5

# Appendix E: Condition Assessment Guidelines

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

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

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

## Role of Asset Condition Data

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

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

## Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of

condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project. There are many options available to the Township to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

## Developing a Condition Assessment Schedule

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

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