Asset Management Plan

Township of Alfred & Plantagenet

2020

CANTON / TOWNSHIP
ALFRED ET PLANTAGENET

This Asset Management Program was prepared by:

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Key Statistics

Replacement cost of asset portfolio

$177.5 million

Replacement cost of infrastructure per household

$44,874 (2016)

Percentage of assets in fair or better condition

81%

Percentage of assets with assessed condition data

56%

Annual capital infrastructure deficit

$2.6 million

Recommended timeframe for eliminating annual infrastructure deficit

10 Years for Tax-Funded

20 Years for Water Rate-Funded

10 Years for Sewer Rate Funded

Target reinvestment rate

2.60%

Actual reinvestment rate

1.12%

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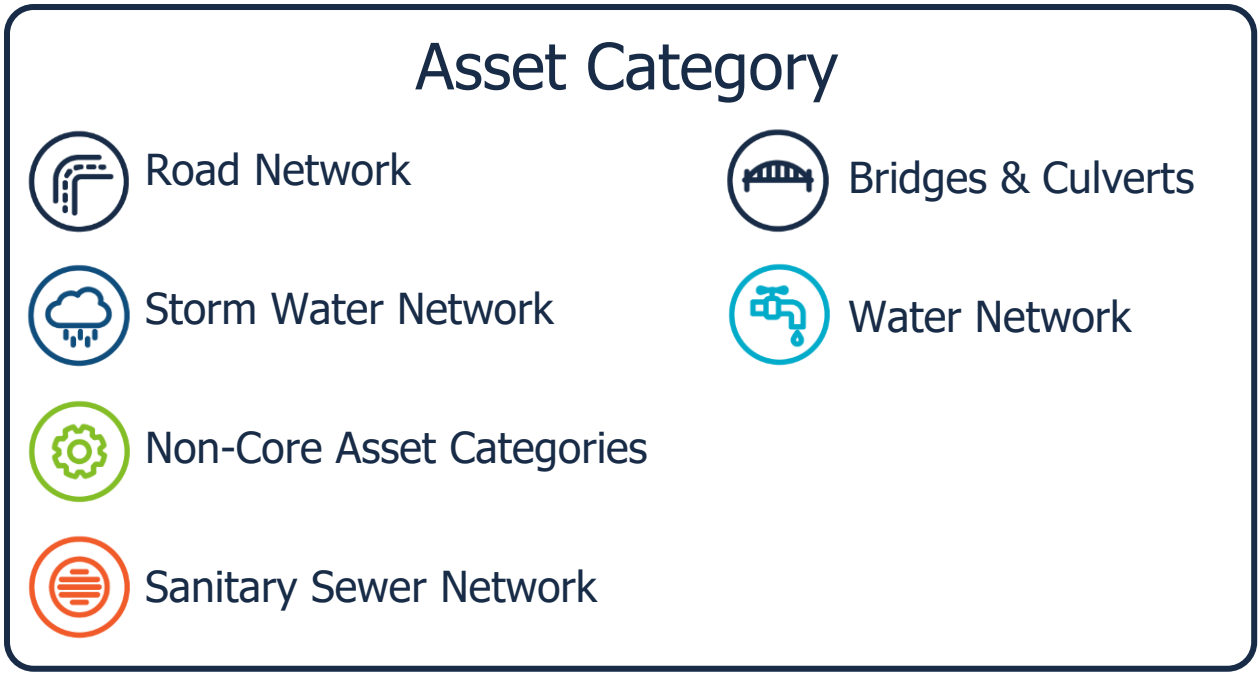
Executive Summary

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

Scope

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

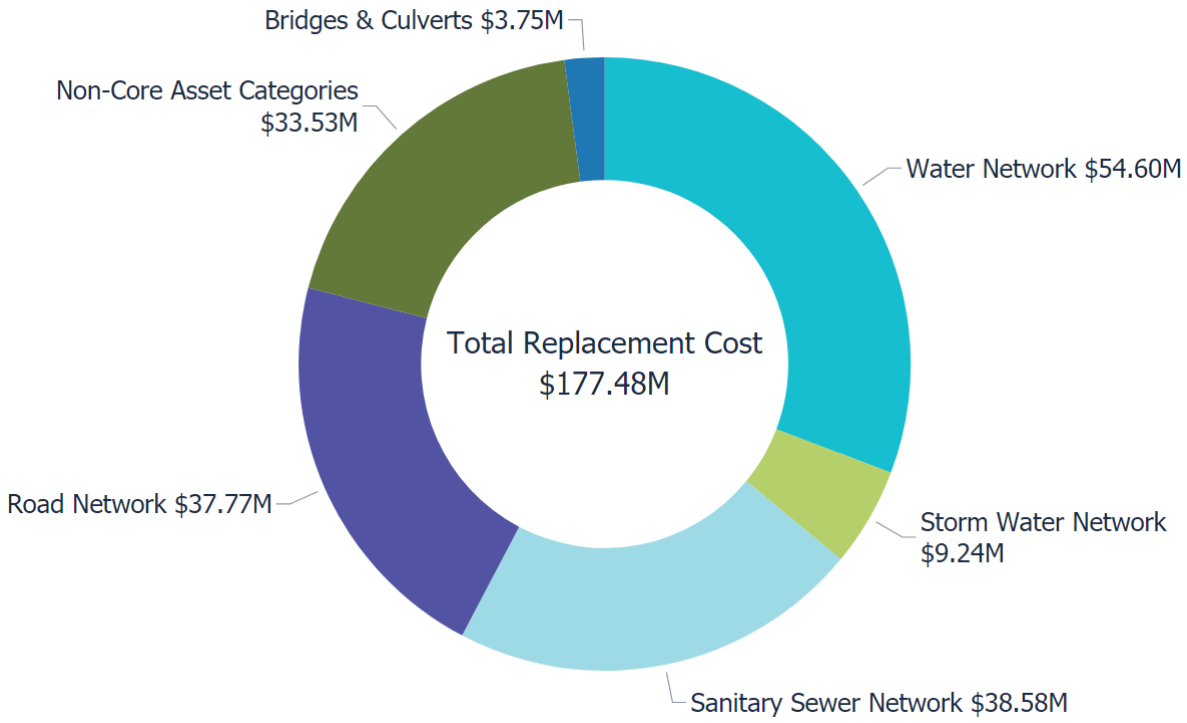
This AMP includes the following asset categories:



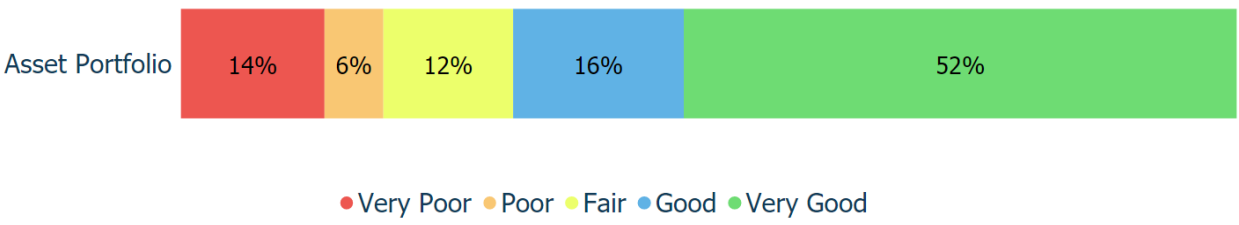
With the development of this Asset Management Plan the Township of Alfred & Plantagenet has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2022. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2024 and 2025.

Findings

The overall replacement cost of the asset categories includes in this AMP totals to $177.48 million. This is based on asset information in the portfolio as of the end of 2020.



About 81% of all assets analysed in this AMP are in fair or better condition.



Assessed condition data was available for 56% of all the assets. For the remaining 44% of assets in the inventory, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

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

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

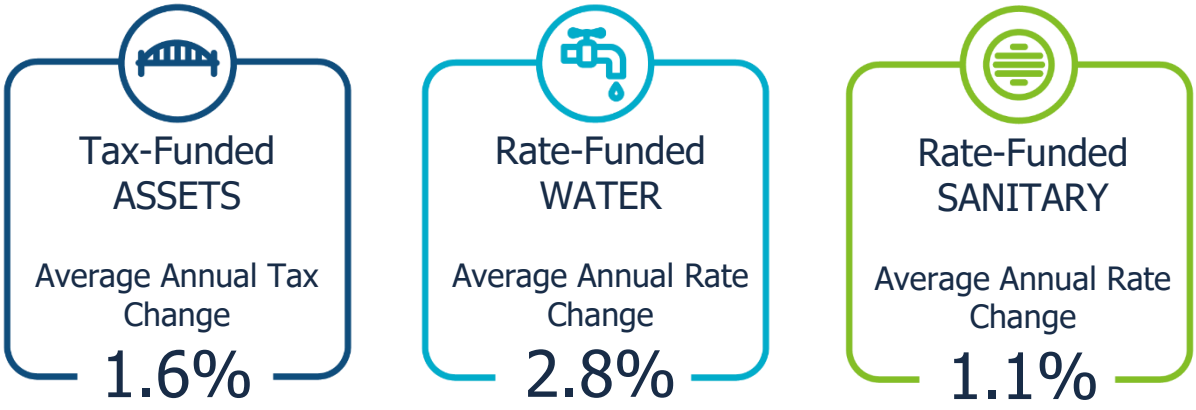
To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Township's average annual capital requirement totals $4.61 million. Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately $1.98 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $2.63 million.

Annual Capital Requirements Deficit Per Household

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

Recommendations

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



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

- Reviewing asset data to update and maintain a complete and accurate centralized asset inventory for the Township
- Developing a condition assessment strategy with a regular schedule
- Reviewing and updating lifecycle management strategies
- Developing and regularly reviewing short- and long-term plans to meet capital requirements
- Continuing to measure current levels of service and identify sustainable proposed levels of service

1 Introduction & Context

Key Insights

- The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio

- A municipal asset management program is a combination of several disciplines or business functions, including management, financial and economic analyses, engineering and operations and maintenance

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

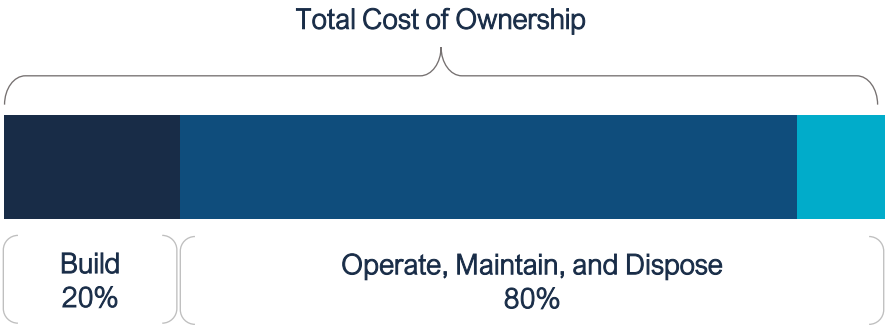
- An asset management plan is a dynamic document that should be updated regularly to inform long-term planning

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

1.1 An Overview of Asset Management

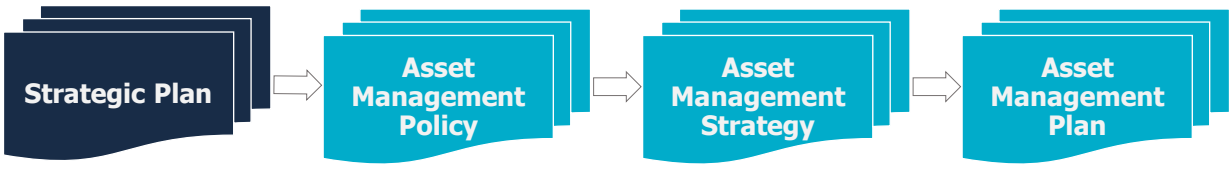
Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers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

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



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

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



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

1.1.1 Asset Management Policy

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

The Township adopted a "Strategic Asset Management Policy / Politique de gestion strategique des biens" on June 18th, 2019 in accordance with Ontario Regulation 588/17.

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

- The policy's purpose dictates the use of asset management practices to ensure all assets meet the agreed levels of service in the most efficient and effective manner;
- the policy commits to, where appropriate, incorporating asset management in the Township's other plans;
- there are formally defined roles and responsibilities of internal staff and stakeholders;
- the guiding principles include the use of a cost/benefit analysis in the management of risk; and
- the policy statements are well defined.

This AMP satisfies policy statement 1.2 where, "The Township's asset management plan will be in accordance with Ontario Regulation 588/17, (O. Reg. 588/17), Asset Management Planning for Municipal Infrastructure, under the *Infrastructure for Jobs and Prosperity Act, 2015*."

1.1.2 Asset Management Strategy

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

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

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

1.1.3 Asset Management Plan

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

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

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

The Township's last iteration of the AMP was completed in 2016. Since then, the asset inventory has undergone revisions and updates. This document is an AMP that uses the updated asset inventory and has been prepared in accordance with O. Reg. 588/17.

1.2 Key Concepts in Asset Management

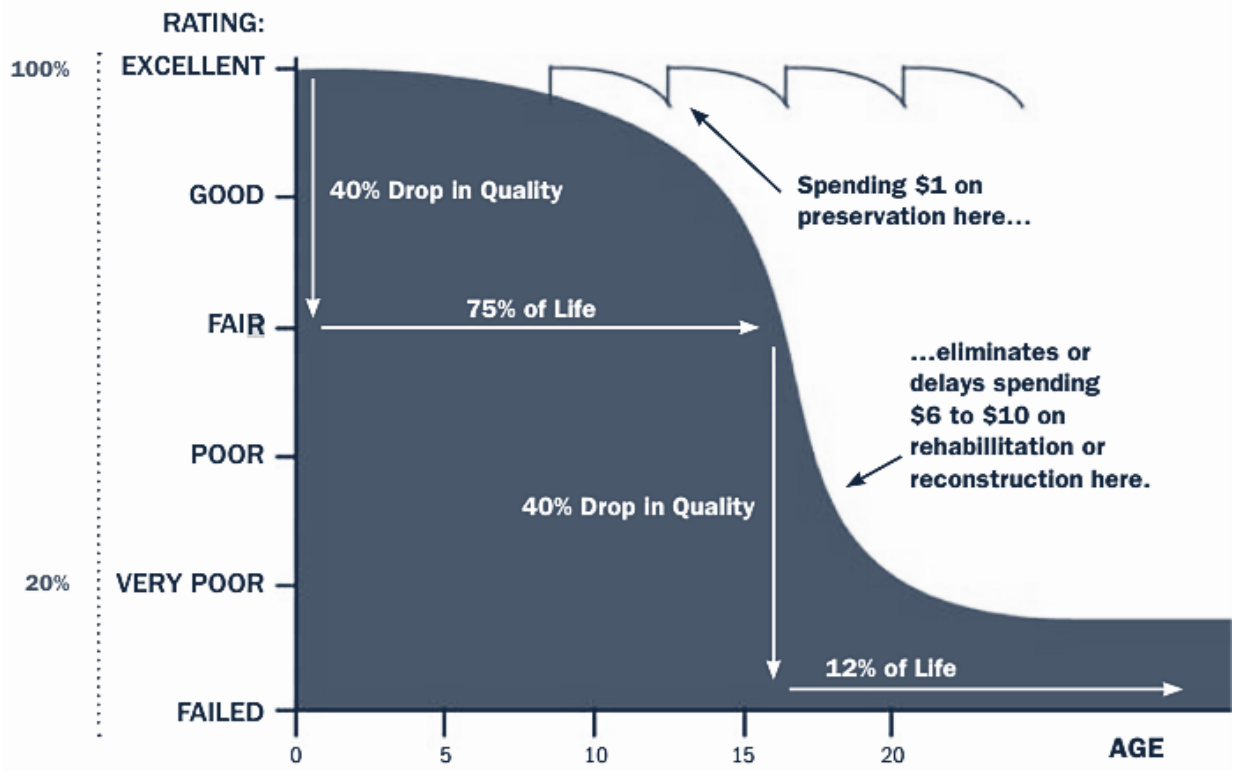
Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

1.2.1 Lifecycle Management Strategies

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

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. Since costs to rehabilitate tend to increase towards the end of life of an asset, proactive and timely intervention will lead to lower lifecycle costs.

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



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

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

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

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

1.2.2 Risk Management Strategies

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

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

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

1.2.3 Levels of Service

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

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

Community Levels of Service

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

For core asset categories (Roads, Bridges & Culverts, Water, Sanitary, 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 will define the qualitative descriptions that will be used to determine the community level of service by the July 2024 deadline.

Technical Levels of Service

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

For core asset categories (Roads, Bridges & Culverts, Water, 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 will define the technical metrics that will be used to determine the technical level of service by the July 2024 deadline.

Current and Proposed Levels of Service

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

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

1.3 Ontario Regulation 588/17

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

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

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

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

2024

Asset Management Plan for Core and Non-Core Assets

2025

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

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

1.3.1 O. Reg. 588/17 Compliance Review

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

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

2 Scope and Methodology

Key Insights

- This asset management plan includes 6 asset categories and is divided between tax-funded and rate-funded categories

- Asset data from various data sources was consolidated into the Township's tangible capital asset inventory to establish it as the primary asset inventory

- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation

- Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life

2.1 Asset categories included in this AMP

This asset management plan for the Township of Alfred & Plantagenet is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs—requires analysis of only core assets (Roads, Bridges & Culverts, Water, Sanitary, and Stormwater).

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

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges & Culverts	
Storm Water Network	
Non-Core Asset Categories[1]	
Water Network	User Rates
Sanitary Sewer Network	

[1] Non-Core Asset categories consist of the following asset categories: Buildings & Facilities, Machinery & Equipment, Fleet and Parks & Land Improvements.

2.2 The Asset Inventory

The asset information presented in this AMP has been developed from the asset inventory in CityWide Asset Manager™. This inventory serves as the Township's primary capital asset inventory and has been consolidated with additional asset data from the data sources listed below.

Asset Category	Asset Data Source
Bridges & Culverts	2019 Bridge & Culvert Inspections report (OSIMs)
Road Network	2016 and 2020 Road Needs Study (RNS)
Water Network	Staff input
Sanitary Sewer Network	

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

2.3 Deriving Replacement Costs

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

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

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

2.4 Estimated Useful Life and Service Life Remaining

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

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

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

2.5 Deriving Annual Capital Requirements

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

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

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

2.6 Reinvestment Rate

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

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

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

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

2.7 Deriving Asset Condition

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

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

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

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

3 Portfolio Overview

Key Insights

- The total replacement cost of the Township's asset portfolio is $177.5 million
- The Township's target re-investment rate is 2.60%, and the actual re-investment rate is 1.12%, contributing to an expanding infrastructure deficit
- 81% of all assets are in fair or better condition
- 17% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements total $4.61 million per year across the asset portfolio
- Annual capital funding by the Township totals $1.98 million across all assets

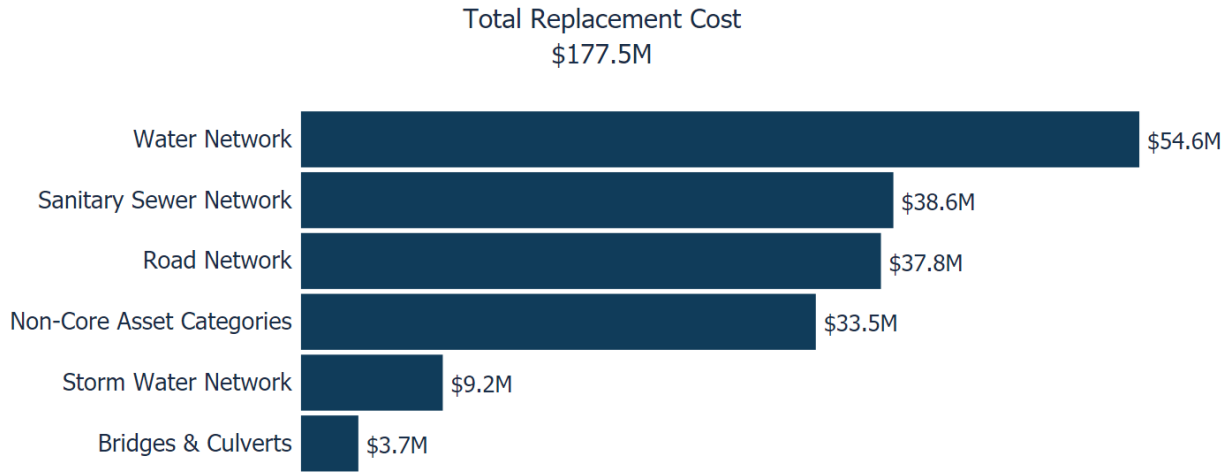
3.1 Asset Management Report Card

Asset Category	Replacement Cost (millions)	Asset Condition	Financial Capacity	
Road Network	$37.78	**Fair**	Annual Requirement:	$1,532,884
			Funding Available:	$1,071,000
			Annual Deficit:	**$461,884**
Bridges & Culverts	$3.75	**Fair**	Annual Requirement:	$82,946
			Funding Available:	$69,000
			Annual Deficit:	**$13,946**
Storm Water Network	$9.24	**Very Good**[2]	Annual Requirement:	$110,204
			Funding Available:	$0
			Annual Deficit:	**$110,204**
Non-Core Asset Categories	$33.53	**Good**	Annual Requirement:	$1,401,407
			Funding Available:	$512,000
			Annual Deficit:	**$889,407**
Water Network	$54.60	**Very Good**	Annual Requirement:	$910,098
			Funding Available:	$61,000
			Annual Deficit:	**$849,098**
Sanitary Sewer Network	$38.58	**Good**	Annual Requirement:	$576,509
			Funding Available:	$269,000
			Annual Deficit:	**$307,509**
Overall	$177.48	**Good**	Annual Requirement:	$4,614,047
			Funding Available:	$1,982,000
			Annual Deficit:	**$2,632,047**

[2] Staff have indicated that the current storm water network inventory is not complete and does not represent the overall network.

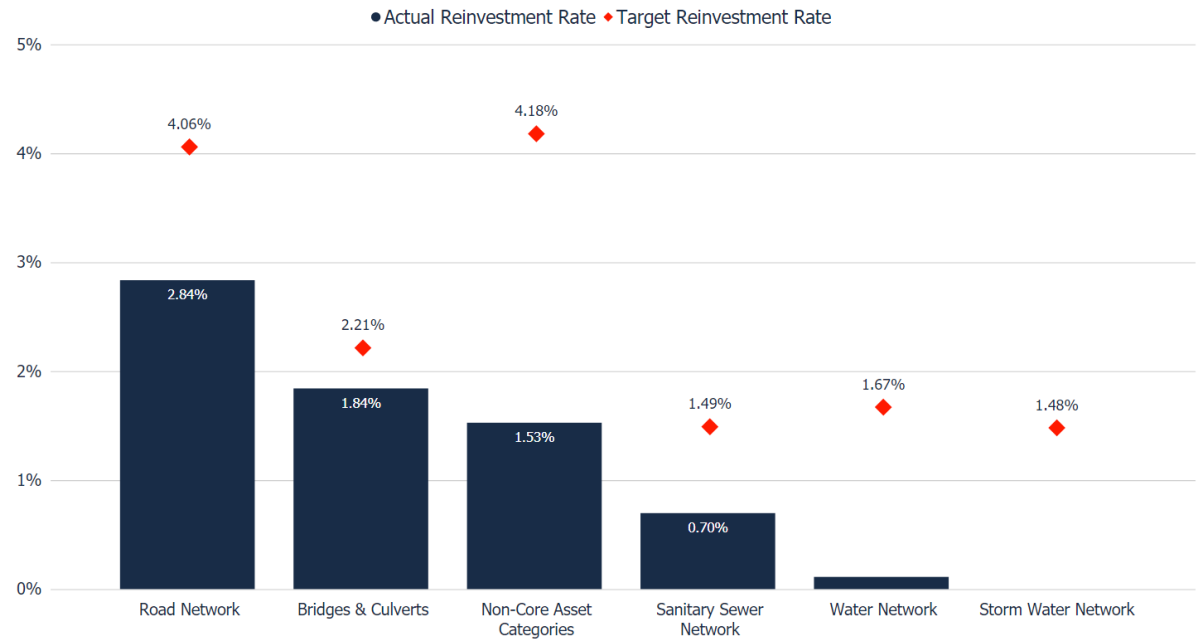
3.2 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of $177.5 million based on inventory data at the end of 2020. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.



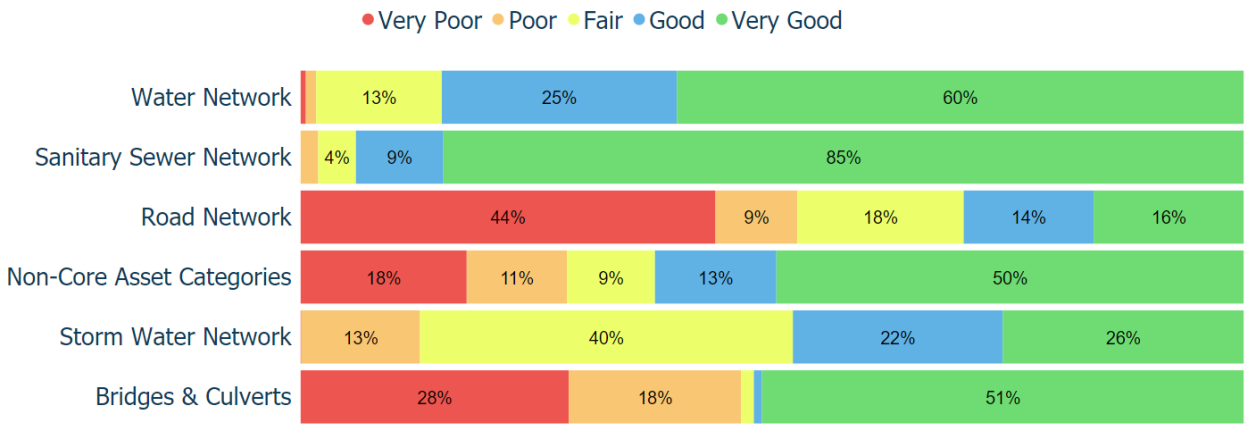
3.3 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing the target vs the actual reinvestment rate. To meet the long-term replacement needs, the Township should be allocating approximately $4.61 million annually, for a target reinvestment rate of 2.60%. Actual annual spending on infrastructure totals approximately $1.98 million, for an actual reinvestment rate of 1.12%.



3.4 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 81% of assets in Alfred & Plantagenet are in fair or better condition. This estimate relies on both age-based and field condition data. It is also important to acknowledge that for larger vertical assets such as facilities and park structures, having a componentized inventory rather than single asset will produce a more accurate condition and forecast.

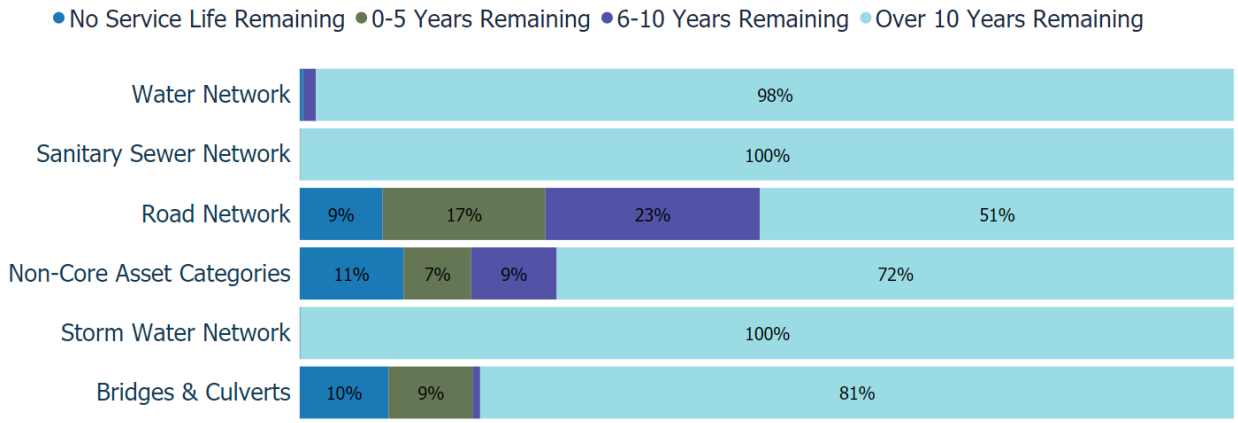


This AMP relies on assessed condition data for 56% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Road Network	Hot Mix Roads	85%	2016/2020 RNS
	DST Roads	95%	
	Gravel Roads	71%	
Bridges & Culverts	Bridges	100%	2019 OSIM Report
Non-Core Asset Categories	Buildings & Facilities	75%	2020 Staff Inspections
	Fleet	7%	
	Machinery & Equipment	0.2%	
	Parks & Land Improvements	17%	
Water Network	Water Facilities	100%	2020 OCWA Assessments
Sanitary Sewer Network	Sanitary Facilities	100%	

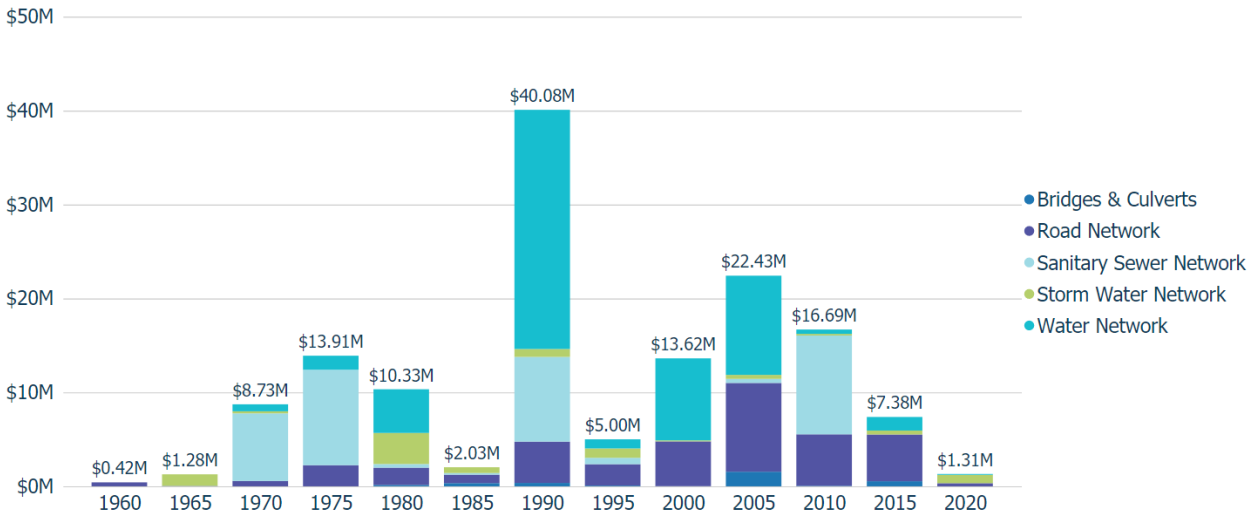
3.5 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 17% of the Township's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix B.



3.1 Historical Investment

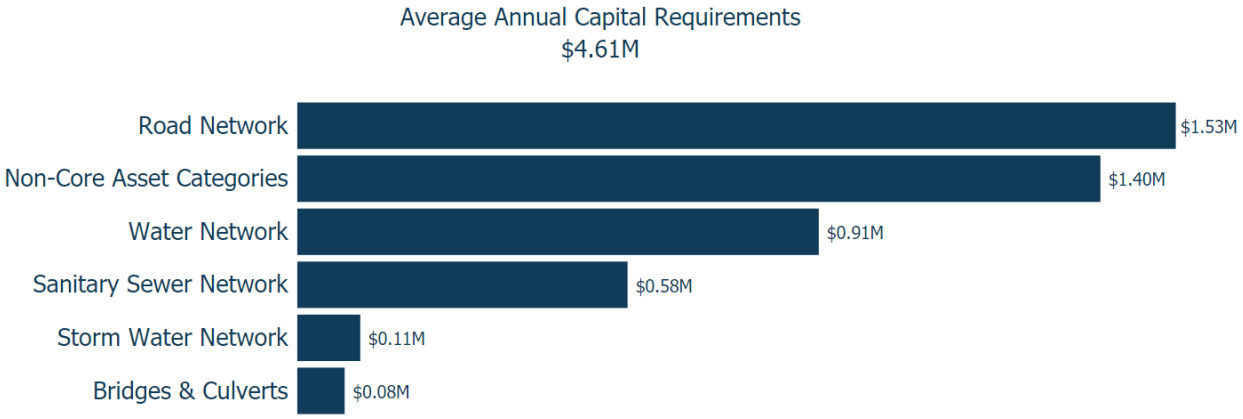
The graph below shows the level of investment the Township of Alfred Plantagenet has made in its asset portfolio since 1960. The data reflects only the Township's current or active inventory; assets that have been disposed or decommissioned over time are not included.



More than 20% of the Township's asset portfolio was placed into service in the 1990s. Although community infrastructure needs and expectations can evolve significantly over decades, understanding past investment patterns can be informative in planning for future needs.

3.2 Annual Capital Requirements

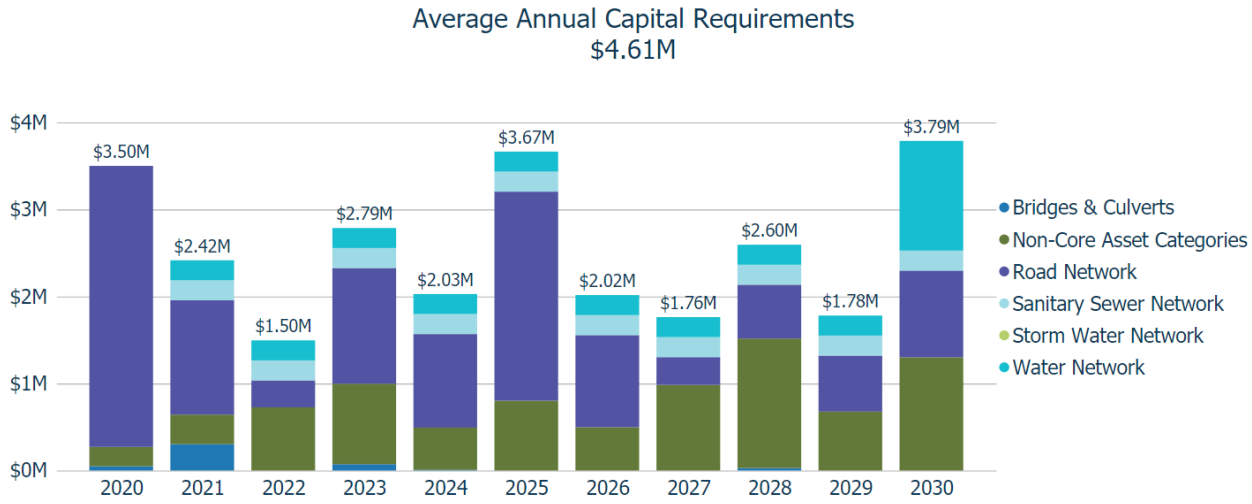
Based on the replacement cost of the assets, the estimated useful life, the cost and impact of lifecycle activities, the average annual capital requirements can be calculated for each category in the asset portfolio. This is the average annual amount required to maintain the current level of service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



3.3 Forecasted Capital Requirements

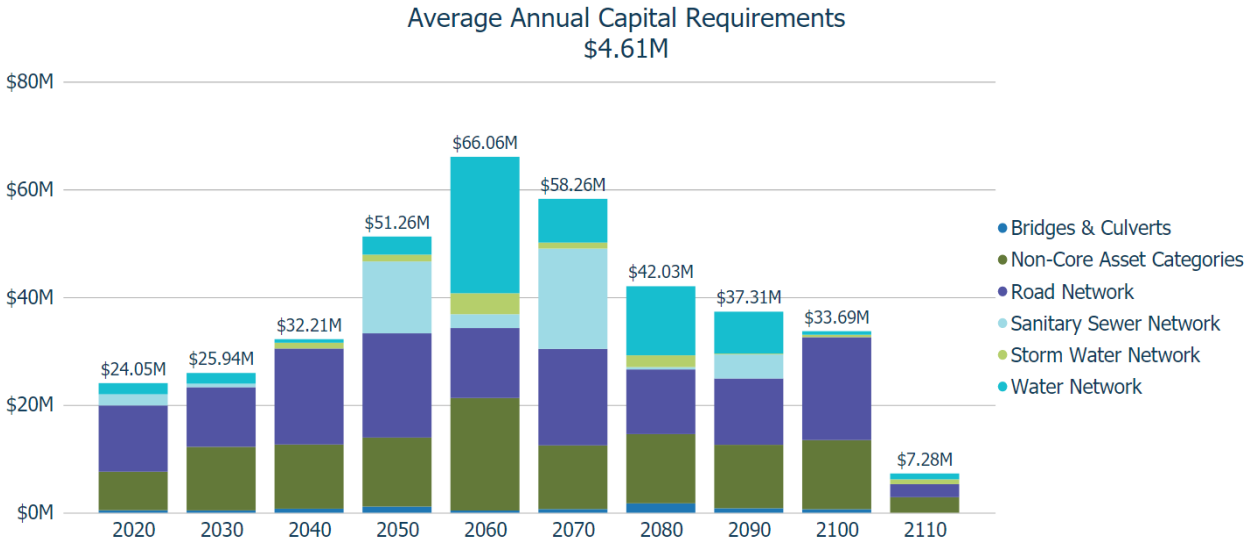
The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events and the refinement of the asset inventory, the Township can produce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

The graph below identifies the annual capital requirements over the next 10 years and is based on the Township's asset inventory as of 2020, not including assets that may be required due to growth.



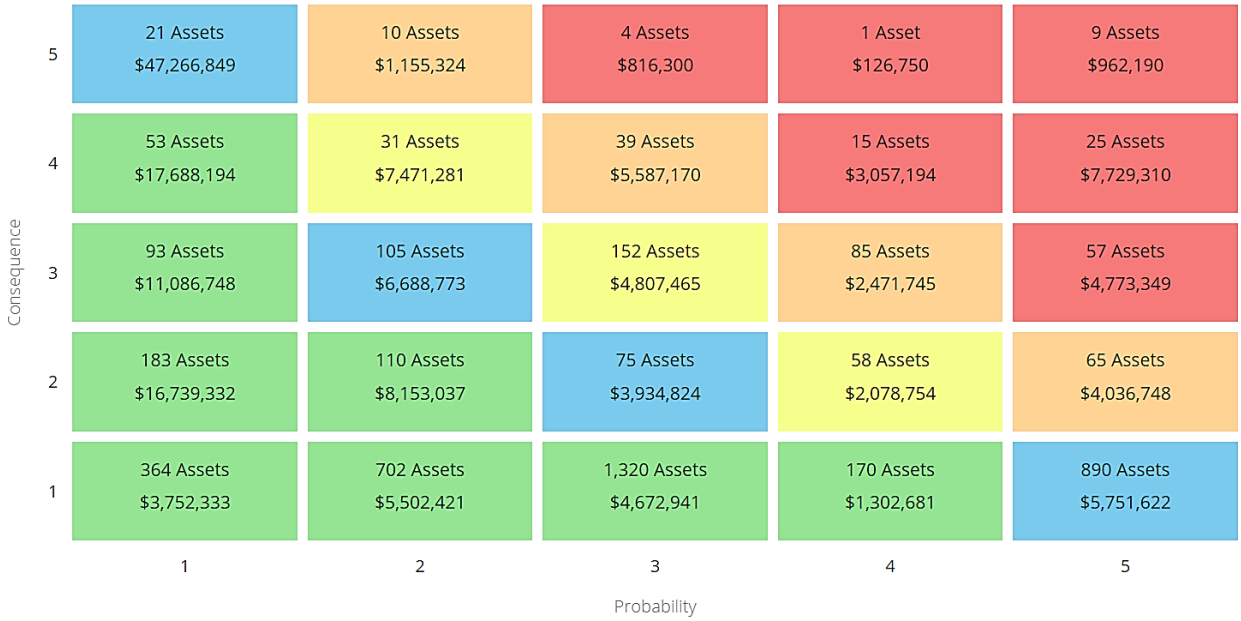
The specific projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

The following graph identifies the average annual capital requirements required over the next 90 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 10-year bins and are based on the Township's asset inventory as of 2020 and do not include assets that may be required for growth.



3.4 Risk & Criticality

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



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

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

4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at $84.3 million
- 61% of tax-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately $3.1 million
- Annual capital funding by the Township totals $1.7 million across all tax-funded assets
- To reach sustainability, tax revenues need to be increased by 1.6% annually for the next 10 years to eliminate annual deficits

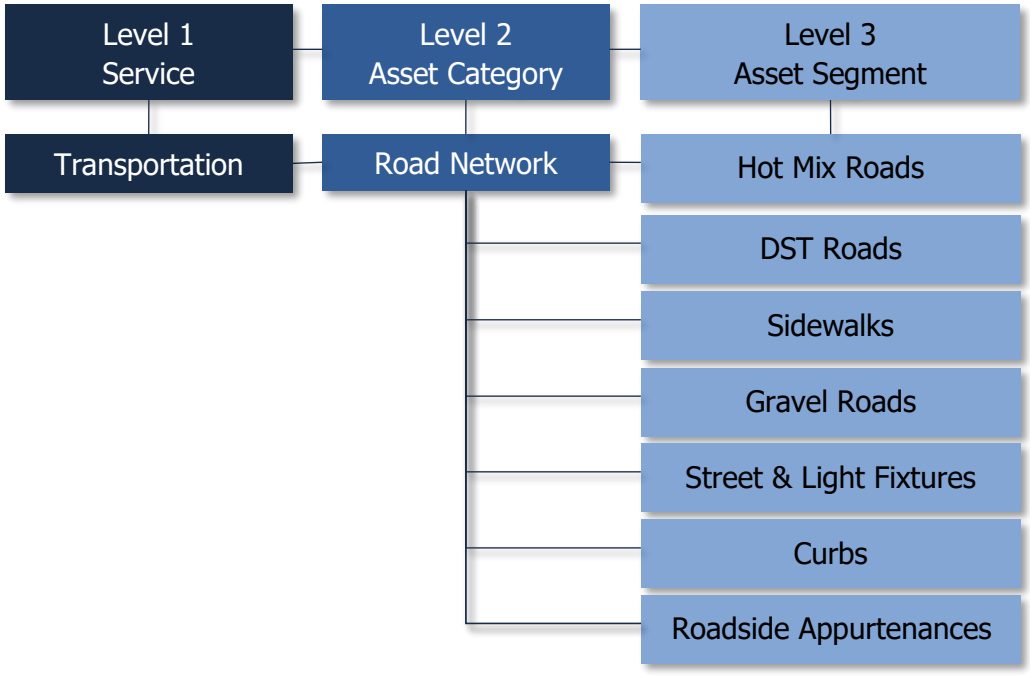
4.1 Road Network

The Township's Road Network inventory is managed in CityWide™, and comprises of 1,267 unique assets, including 275 kilometres of municipally owned and maintained roadways, around 16 kilometres of sidewalks, as well as roadway appurtenances such as streetlights, curbs, signs and guiderails.

The Public Works department is responsible for planning and managing the road network. The department is also responsible for winter snow clearing, ice control and snow removal operations.

4.1.1 Asset Hierarchy and Segmentation

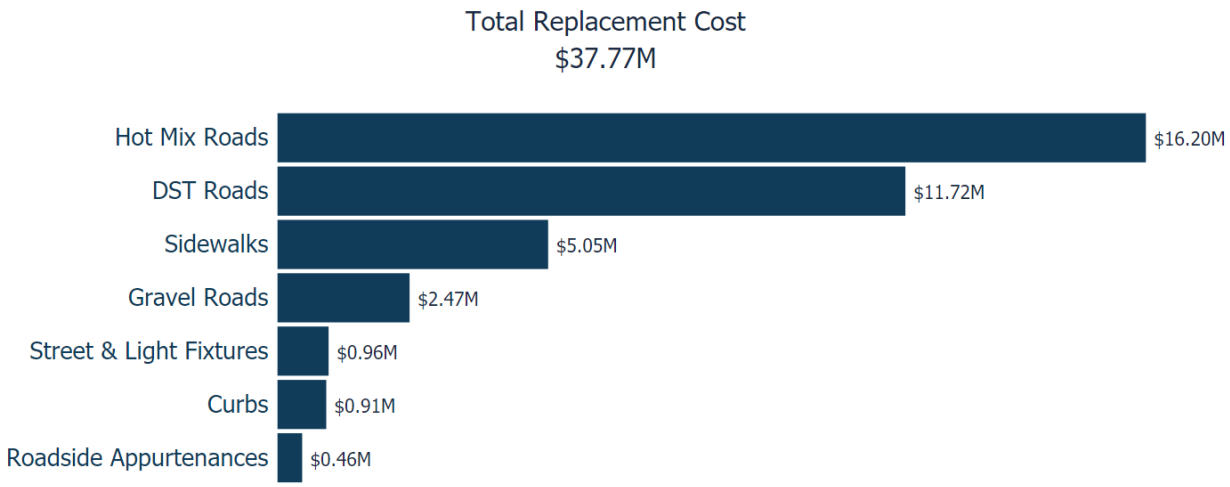
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



4.1.2 Asset Inventory & Replacement Cost

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

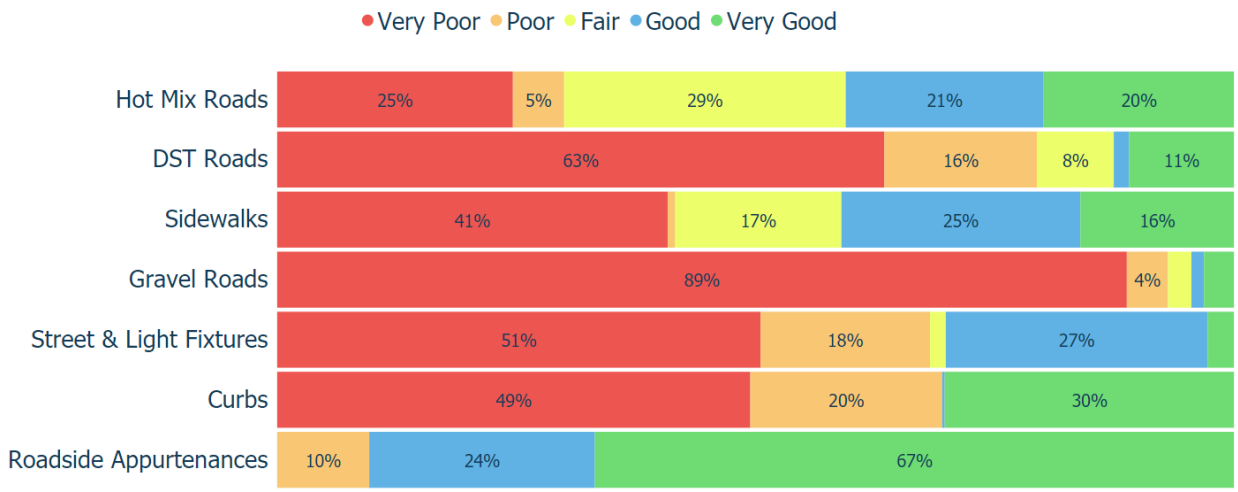
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Hot Mix Roads	108 km	Cost per Unit	$16,201,890
DST Roads	78 km	Cost per Unit	$11,716,228
Sidewalks	16 km	Cost per Unit	$5,052,474
Gravel Roads	89 km	Cost per Unit	$2,467,823
Street & Light Fixtures	805	Historical Cost Inflation	$957,210
Curbs	8 km	Historical Cost Inflation	$913,624
Roadside Appurtenances	13	Historical Cost Inflation	$464,180
			$37,773,428



4.1.3 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Hot Mix Roads	62%	Good	85% Assessed
DST Roads	37%	Poor	95% Assessed
Sidewalks	44%	Fair	Age-based
Gravel Roads	20%	Poor	71% Assessed
Street & Light Fixtures	28%	Poor	Age-based
Curbs	33%	Poor	Age-based
Roadside Appurtenances	86%	Very Good	Age-based
	48%	**Fair**	



Current Approach to Condition Assessment

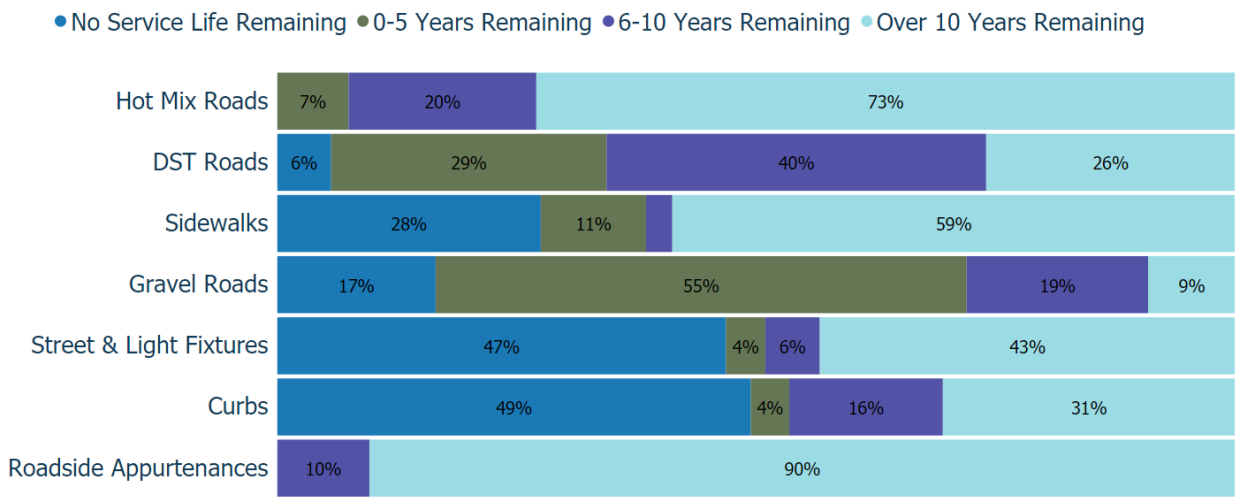
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- A Road Needs Study was completed in 2020 that included a detailed assessment of the condition of Hot Mix and DST roads
- Generally, an external assessment of roads through a Road Needs Study is conducted every 5 years
- An internal assessment of roads is completed on an annual basis
- Road patrols are conducted regularly but the frequency varies by season
- When reviewing assessment results, roads in poor condition are monitored closely
- Granular roads are also visually inspected during grading activities
- Road Network assets are inspected as per O. Reg. 239/02

4.1.4 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Hot Mix Roads	20 Years	18.7	15.5
DST Roads	7 Years	20.1	6.5
Sidewalks	30 - 50 Years	24.3	7.1
Gravel Roads	5 Years	28.6	3.6
Street & Light Fixtures	20 - 50 Years	15.7	7.4
Curbs	20 - 30 Years	27.9	-7.5
Roadside Appurtenances	15 - 30 Years	3.6	18.3
		18.2	**7.8**



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

4.1.5 Lifecycle Management Strategy

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

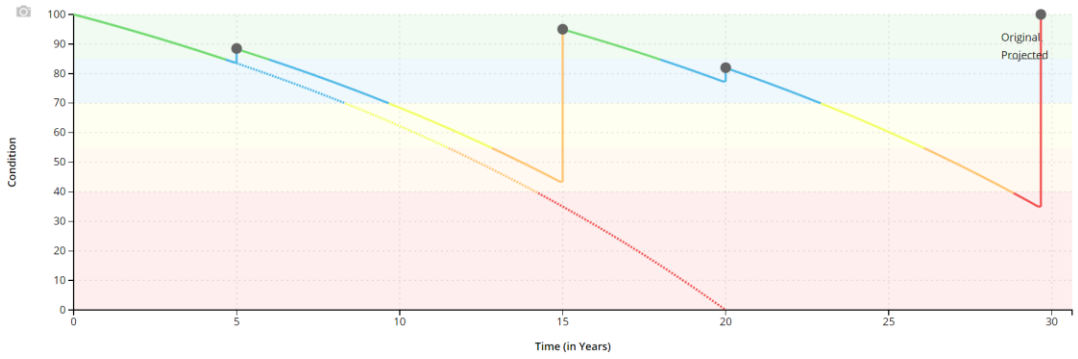
The following table outlines the Township's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Pothole repairs are completed annually based on deficiencies identified through regular road patrols and feedback from the public.
	Seasonal maintenance activities include asphalt patching, graveling, and tree cutting.
	Summer maintenance activities include sidewalk repairs, grading, re-gravelling, dust control, ditching, roadside mowing, tree trimming, brush cleanup, road sign installation/maintenance, and line painting.
	Winter maintenance activities include snow plowing, slating, and snow removal.
	A crack sealing program is in place for asphalt roads as needed to reduce erosion caused by poor drainage.
Rehabilitation	Rehabilitation activities include: pulverize & pave, asphalt overlay, and surface treatments.
Replacement	DST roads are replaced and upgraded to Hot Mix roads
	Road replacement prioritization is determined by consideration of growth, risk, condition, health and safety, and social impact.
	Road reconstruction projects (base & surface) are identified based on road condition, risk, and sub-surface asset requirements (water/sewer/storm)

The following lifecycle strategies have been developed to formalize the current approach to manage the lifecycle of Hot Mix and Double Surface Treated (DST) 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.

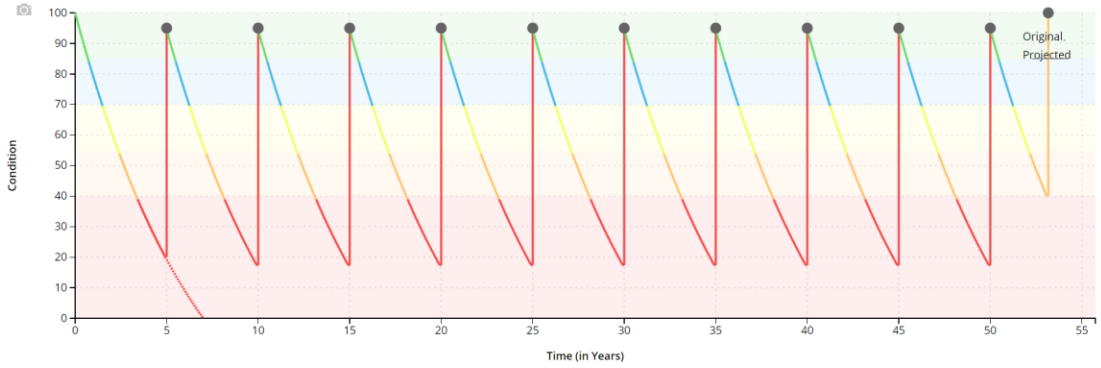
Hot Mix Roads

Event Name	Event Class	Event Trigger
Crack Sealing	Maintenance	Age: 5 Years
		Age: 20 Years
Pulverize & Pave	Rehabilitation	Age: 15 Years
Full Reconstruction	Replacement	Condition: 30 - 35



DST Roads

Event Name	Event Class	Event Trigger
Double Surface Treatment	Rehabilitation	Every 5 Years
Full Reconstruction and Asset Upgrade	Replacement	Condition: 20[3]

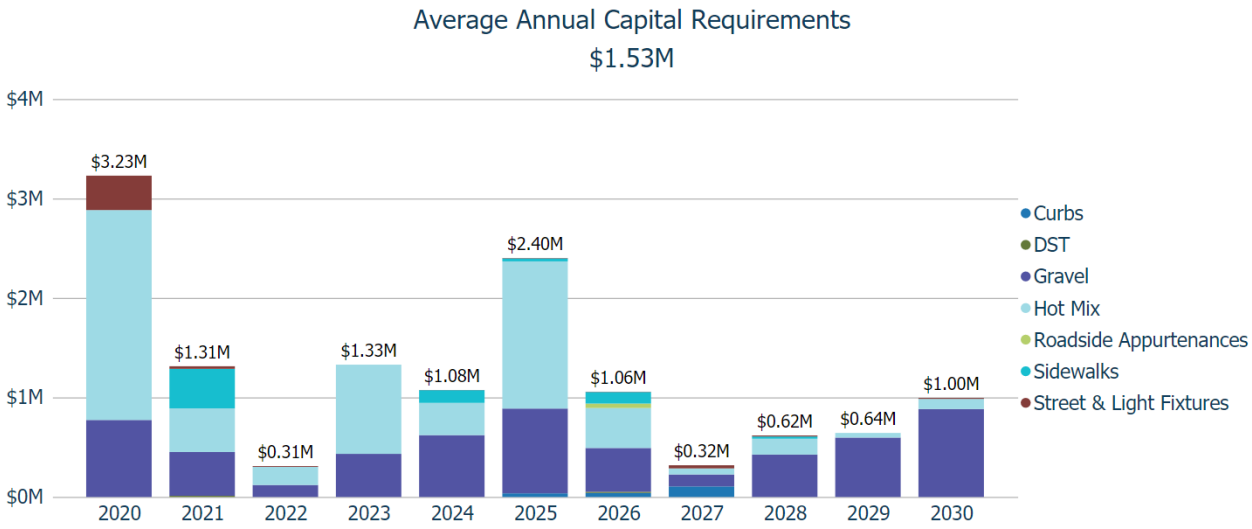


[3] The road type is considered to be in a state of perpetual maintenance, until the road asset is considered to be a suitable candidate for a road surface upgrade or the subsurface utilities infrastructure requires attention.

Forecasted Capital Requirements

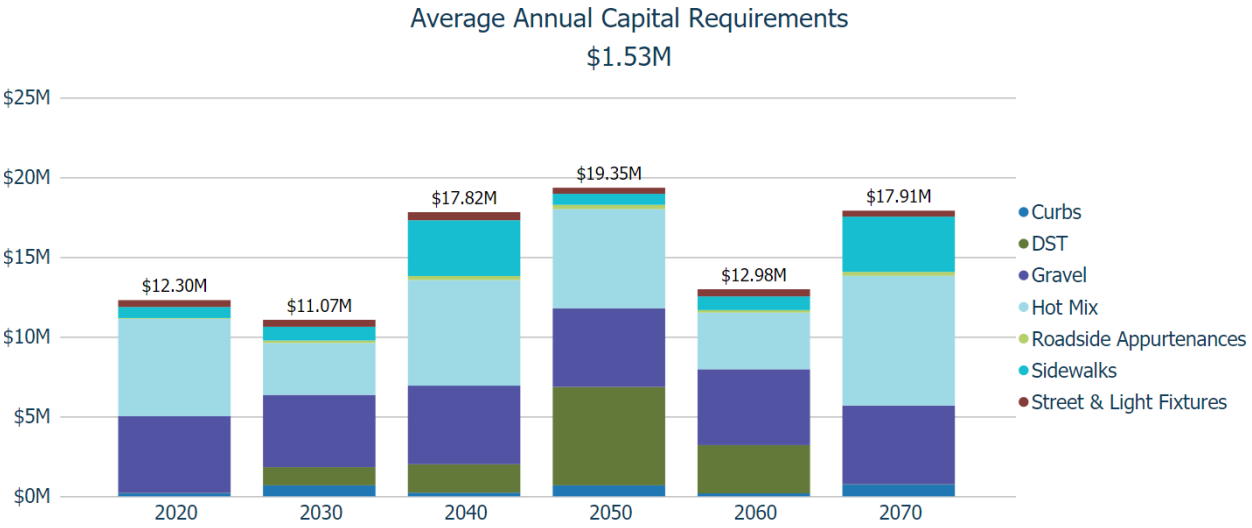
Based on the lifecycle strategies identified previously for Hot Mix and DST Roads, and assuming the end-of-life replacement of all other assets in this category, the following graphs forecasts short- and long-term capital requirements for the Road Network.

The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs to meet future capital needs. The graph below provides a 10-year forecast of the capital requirements for the Road Network, not including assets that will be required due to growth.



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

The graph below provides a 50-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement and does not include assets that may be required for growth.



4.1.6 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Risks to Current Asset Management Strategies

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

Climate Change & Extreme Weather Events

An increase in freeze/thaw cycles causes road pavement to heave and settle. This can cause the accelerated deterioration of road surface pavement which leads to an increased need for maintenance and rehabilitation. Flooding has been identified on two roads in the past due to the annual spring melt, which affects the surrounding ditches as well.

Legislative and Operations

The Ontario Ministry of Transportation (MTO) requires roads to be able to accommodate multiple forms of traffic. During the growing season from late Spring to Fall, tractors, farm equipment, and heavy trucks commonly use these roads, however, their size may impede traffic. Expectations must be managed.

Asset Data and Information

There is a lack of confidence in the available inventory data for some of the road appurtenance assets. Some of the asset data is pooled, missing in the inventory, and/or incomplete. This poses a risk when trying to manage assets and planning future work.

4.1.7 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the road network in the Township and its level of connectivity	An approximately 300 km road network spanning over 392 km² of area. Surface material ranging from earth, sand, gravel, double surface treatment to hot mix asphalt. The system mostly consists of local roads with an MMS class of 5 or 6. Arterial roads are mostly owned and operated by the United Counties of Prescott and Russell.
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.

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0 km/km^2
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.18 km/km^2
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	0.56 km/km^2
Quality	Average pavement condition index for paved roads in the Township	Hot Mix Roads: 63%
		DST Roads: 37%
	Average surface condition for unpaved roads in the Township (e.g., excellent, good, fair, poor)	20% - Poor
Performance	Capital reinvestment rate	0.76%
	Operating costs for unpaved (loose top) roads per kilometre	$7,213

4.1.8 Recommendations

Asset Inventory

- Review the road network inventory to determine whether all municipal assets within each of the asset segments have been accounted for.
- The roadside appurtenances inventory includes pooled assets that should be broken into individual assets to allow for detailed planning and analysis.
- Continue to consolidate critical asset information from other asset data sources into the Township's centralized asset inventory.

Lifecycle Management Strategies

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

Risk Management Strategies

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

Levels of Service

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

4.2 Bridges & Culverts

The Township's Bridges and Culverts inventory is managed in CityWide™ and comprises of 31 assets which represent the 27 structures that have a span of 3 meters or more and are therefore categorized as a bridge or a structural culvert asset.

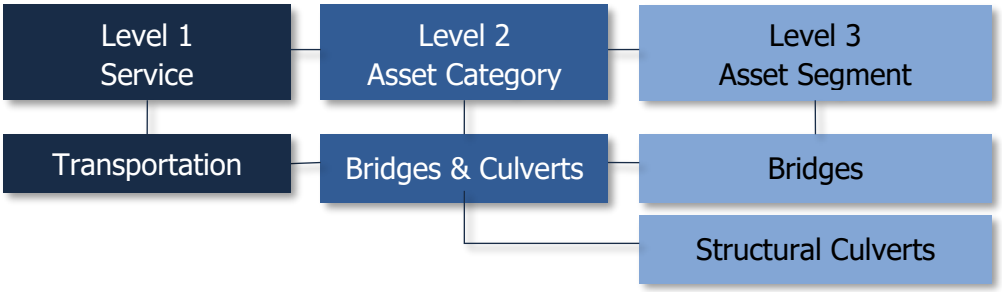
The Department of Public Works is responsible for the planning and managing of all bridges and structural culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

Based on the requirements outlined by the Ministry of Transportation, the most recent Bridge and Culvert inspection was conducted in 2019 and 2021 by LRL Associates Ltd.

As of the development of this AMP, one bridge structure has been closed while the other 4 remain operational. Staff have indicated that there is a significant backlog for Bridges & Culverts that has not been accounted for in the Township's asset inventory and this AMP.

4.2.1 Asset Hierarchy and Segmentation

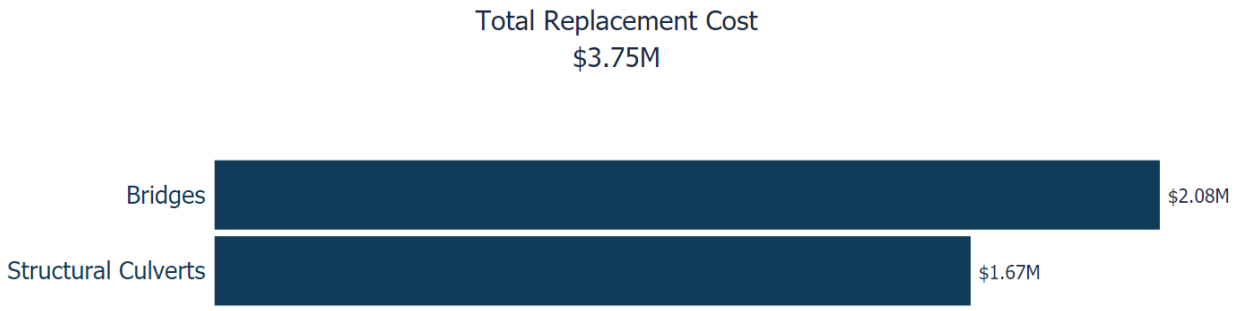
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



4.2.2 Asset Inventory & Replacement Cost

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

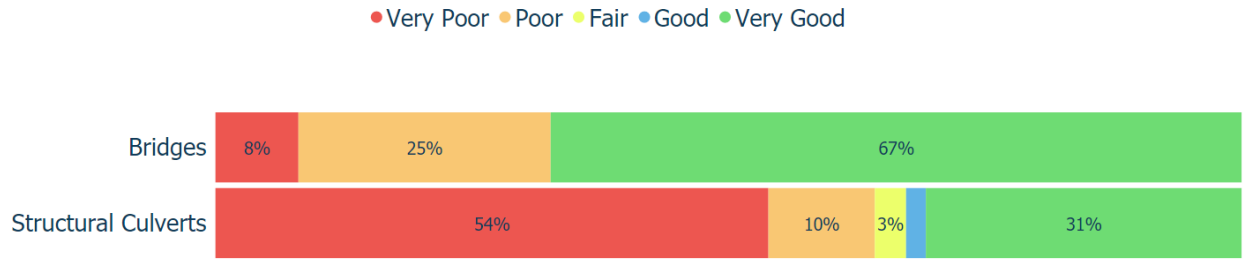
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	3	Historical Cost Inflation	$2,081,499
Structural Culverts	24	Historical Cost Inflation	$1,665,056
			$3,746,555



4.2.3 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Bridges	73%	Good	100% Assessed
Structural Culverts	42%	Fair	Age-based
	59%	**Fair**	



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

Current Approach to Condition Assessment

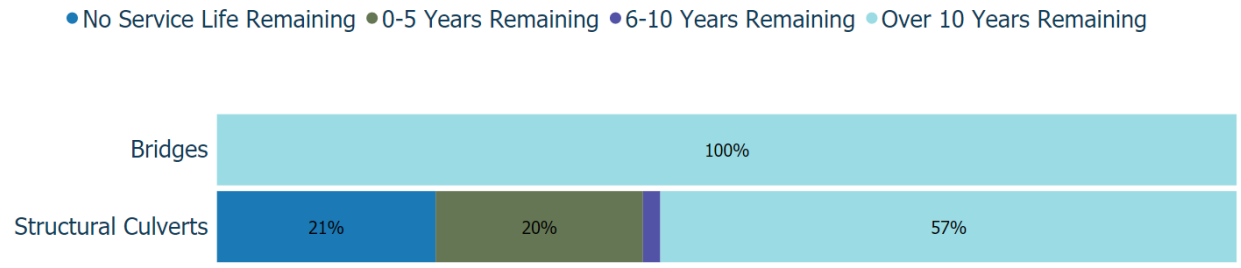
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Condition assessments of all bridges are completed every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM)
- The most recent Bridge and Culvert inspection reports were prepared in 2019 and 2021 by LRL Associates Ltd. The 2019 report was received in time to be incorporated into this AMP
- There have been no recent assessments assigned to structural culverts, as such Staff rely on several factors that include asset age, asset material and asset location to determine the projected condition

4.2.4 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges	30 - 100 Years	44.3	42.8
Structural Culverts	30 - 40 Years	21.3	11.7
		26.5	**18.7**



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

4.2.5 Lifecycle Management Strategy

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

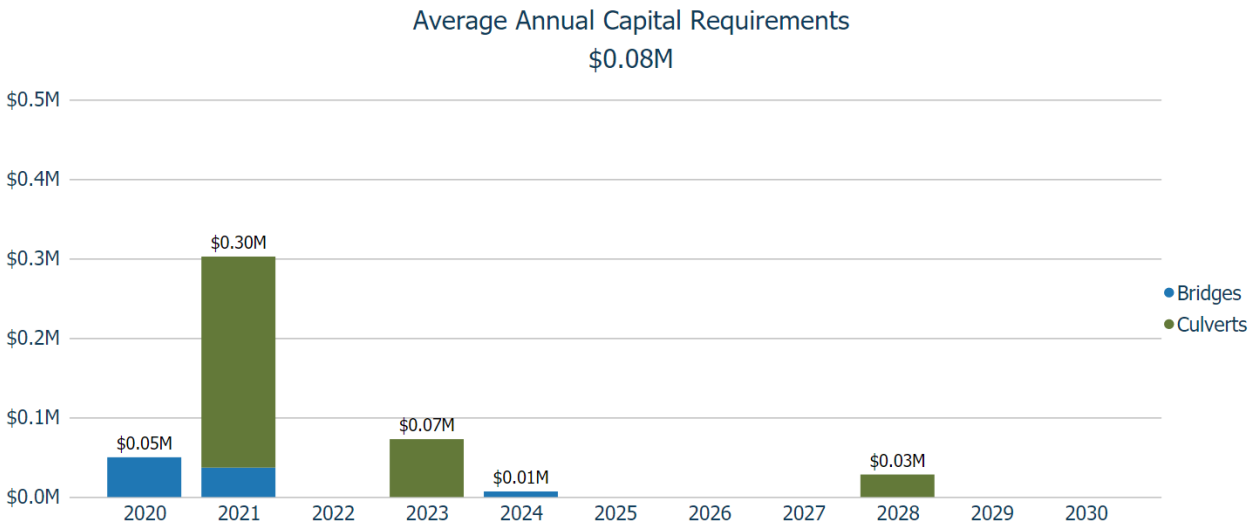
The following table outlines the Township's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance	Typical maintenance includes: • Obstruction removal • Cleaning/sweeping • Erosion control • Brush/tree removal
	Biennial OSIM inspection reports include a list of recommended maintenance activities that the Township considers and completes according to cost and urgency.
Rehabilitation / Replacement	Biennial OSIM inspection reports include a Capital Needs List identifying recommended rehabilitation and replacement activities with estimated costs.
Inspection	The most recent Bridge and Culvert inspection reports were prepared in 2019 and 2021 by LRL Associates Ltd.

Forecasted Capital Requirements

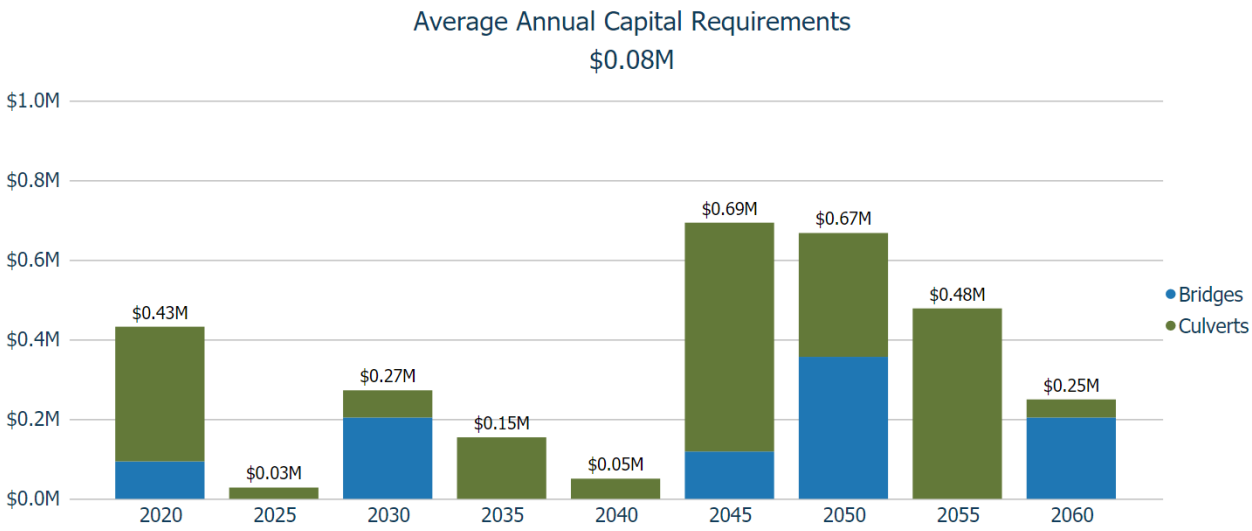
Based on the current asset inventory, the condition assessments from the 2019 inspection report, and assuming end-of-life replacement for all assets, the following graph forecasts short- and long-term capital requirements for the Bridges & Culverts category.

The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs to meet future capital needs. The graph below provides a 10-year forecast of the capital requirements for Bridges & Culverts, not including assets that may be required due to growth.



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

The graph below provides a 40-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement and does not include assets that may be required for growth.



4.2.6 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Risks to Current Asset Management Strategies

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

Legislative and Operations

New bridges are designed in accordance with MTO standards. However, older bridges were not designed with heavy traffic in mind. Given the current and expected usage in the future, they may need to be renovated. Bridges are expensive structures; thus, sufficient funding may also pose as an obstacle.

Climate Change & Extreme Weather Events

Extreme weather events have caused flooding of structures in the past, leading to unexpected closures. These events can reduce the accessibility of the structures and the levels of service generally expected. Repeated heat waves can also cause bridge material to expand, leading to a faster deterioration rate than originally expected.

Asset Data and Assessed Condition Data

There is a misalignment in the current inventory for Bridges & Culverts. Some of the asset data has not been included into the Township's central asset inventory. The current structural culvert inventory has not been consolidated with recent condition assessments. The misalignment in the inventory, coupled with the lack of assessed condition data in the inventory poses a risk for accurate planning and decision-making.

4.2.7 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	The traffic on bridges and structural culverts is generally light as these are local roads. However, some heavy vehicle traffic, such as agricultural and transport, is common.
Quality	Description or images of the condition of bridges & culverts and how this would affect use of the bridges & culverts	See Appendix B

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges in the Township with loading or dimensional restrictions	0%
Quality	Average bridge condition index value for bridges in the Township	73%[4]
	Average bridge condition index value for structural culverts in the Township	N/A
Performance	Capital re-investment rate	2.21%
	Average duration of unplanned bridge closure	TBD[5]

[4] Alfred-Plantagenet has 4 bridges, 1 is closed. This condition score excludes the closed bridge.
[5] This is a non-mandated metric that the Township is hoping to collect for a future iteration of the AMP

4.2.8 Recommendations

Data Review/Validation

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

Condition Assessment Strategies

- The structural culverts have not assessed through the OSIM inspections, develop or formalize a condition assessment strategy for structural culverts.

Risk Management Strategies

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

Lifecycle Management Strategies

- This AMP has calculated the reconstruction costs of bridge and structural culverts by inflating the historical cost. The Township should determine accurate reconstruction costs for bridges and structural culverts. These costs are often included in the OSIM inspections.
- Continue to incorporate the engineer recommended rehabilitative and renewal activities from the OSIM inspections and expand to include structural culvert assets.

Levels of Service

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

4.3 Storm Water Network

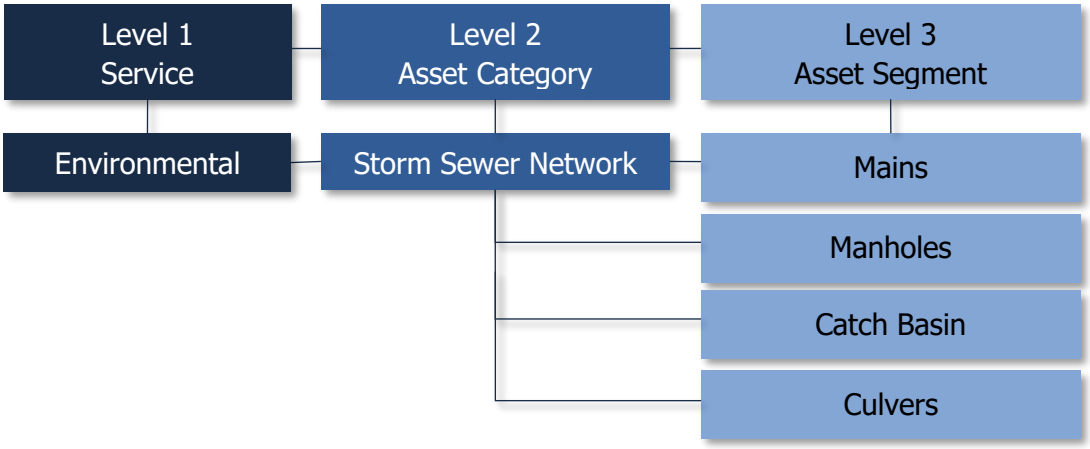
The Township's Storm Sewer inventory is managed in CityWide™, and comprises of 322 unique assets, including 99 manholes, 405 meters of culverts, 385 catch basins and around 15 kilometres of mains.

The Public Works department is responsible for planning and managing the Storm Water Network.

Storm Sewer Network infrastructure generals poses the greatest uncertainty for municipalities, including Alfred & Plantagenet. Staff have expressed a lack of confidence in the current inventory but are working towards improving the accuracy and reliability of the Storm Water inventory to assist with long-term asset management planning.

4.3.1 Asset Hierarchy and Segmentation

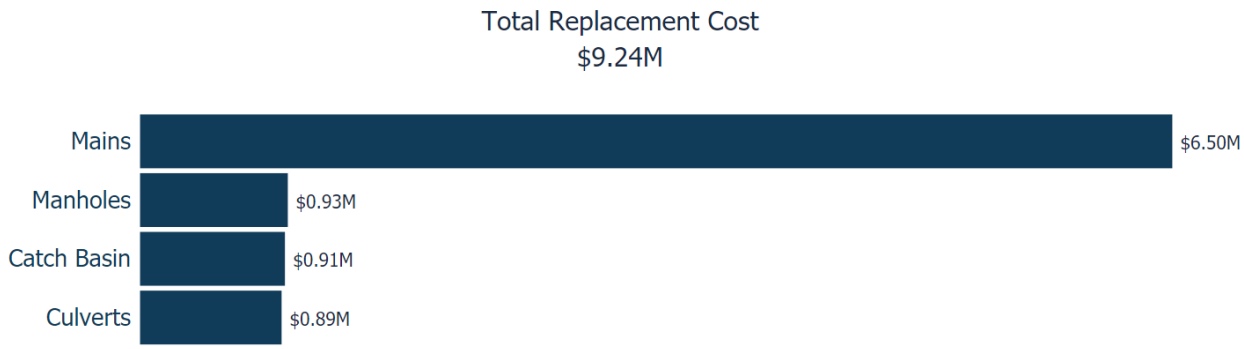
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



4.3.2 Asset Inventory & Replacement Cost

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

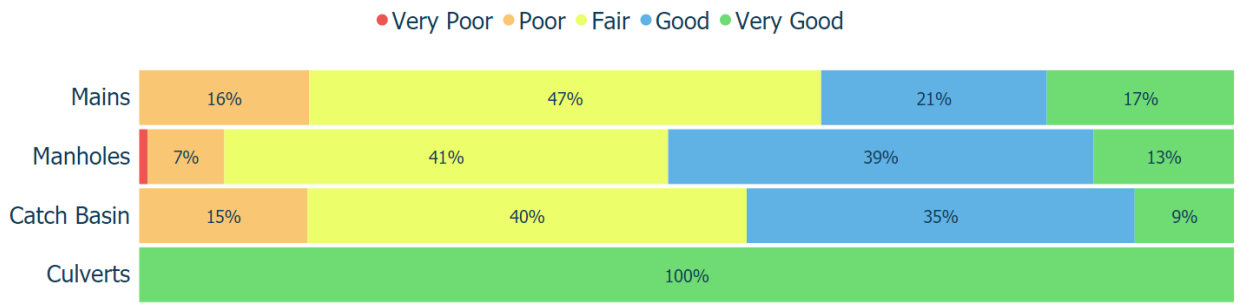
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Mains	14.7 km	Cost per Unit	$6,504,886
Manholes	99	Historical Cost Inflation	$932,124
Catch Basin	385	Historical Cost Inflation	$913,986
Culverts	405 m	Historical Cost Inflation	$892,919
			$9,243,915



4.3.3 Asset Condition

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

	Average Condition (%)	Average Condition Rating	Condition Source
Mains	57%	Fair	Age-based
Manholes	61%	Good	Age-based
Catch Basin	58%	Fair	Age-based
Culverts[6]	99%	Very Good	Age-based
	62%	**Good**	



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

Current Approach to Condition Assessment

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

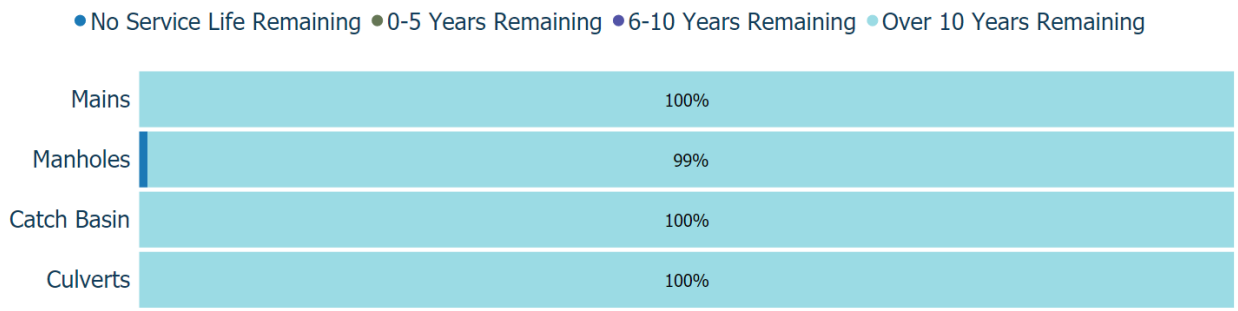
- There are no formal condition assessment programs in place for the Storm Water Network, however, when roads are expected to be paved, Closed-Circuit Television (CCTV) is completed for the section one year prior
- Manholes and catch basins are visually inspected by internal staff
- As the Township refines the available asset inventory for the Storm Water Network a regular assessment cycle may be established

[6] The current culvert inventory is not complete and only consists of culvert assets installed in 2020.

4.3.4 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Mains	50 - 90 Years	34.8	48.1
Manholes	40 - 90 Years	35.4	45.3
Catch Basin	80 - 90 Years	37.3	44.4
Culverts	30 Years	0.30	29.7
		33.4	**45.3**



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

It is also important to acknowledge the limitations of the current storm water inventory due to its incompleteness. Accuracy and reliability can be improved by ensuring all relevant asset data has been consolidated into the inventory.

4.3.5 Lifecycle Management Strategy

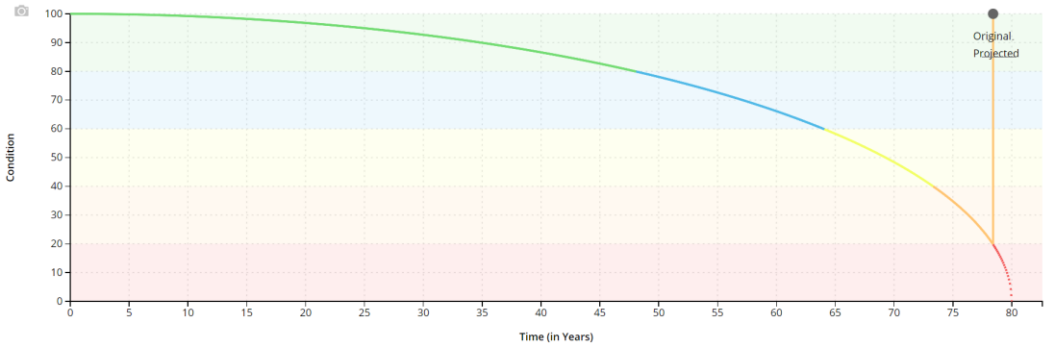
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Catch basins are cleaned annually and outlets are inspected regularly to ensure unobstructed flow
	Flushing activities are usually completed alongside CCTV inspections
	All other maintenance activities are completed on a reactive basis when operational issues are identified (e.g., blockages, backups), through complaints and service requests
Rehabilitation	Trenchless re-lining has the potential to reduce total lifecycle costs but would require a formal condition assessment program to determine viability
Replacement	Without the availability of up-to-date condition assessment information replacement activities are purely reactive in nature

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

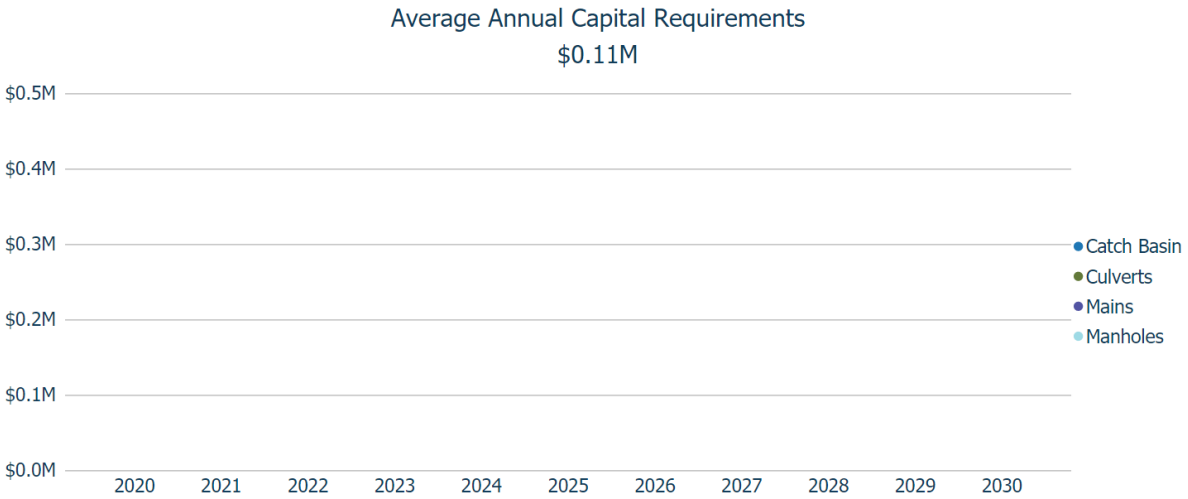
Storm Mains		
Event Name	**Event Class**	**Event Trigger**
Catch Basin Cleaing	Maintenance	Annually
CCTV Inspection	Preventative Maintenance	Reactive
Storm Sewer Flushing	Maintenance	Reactive
Full Reconstruction	Replacement	Condition: 20



Forecasted Capital Requirements

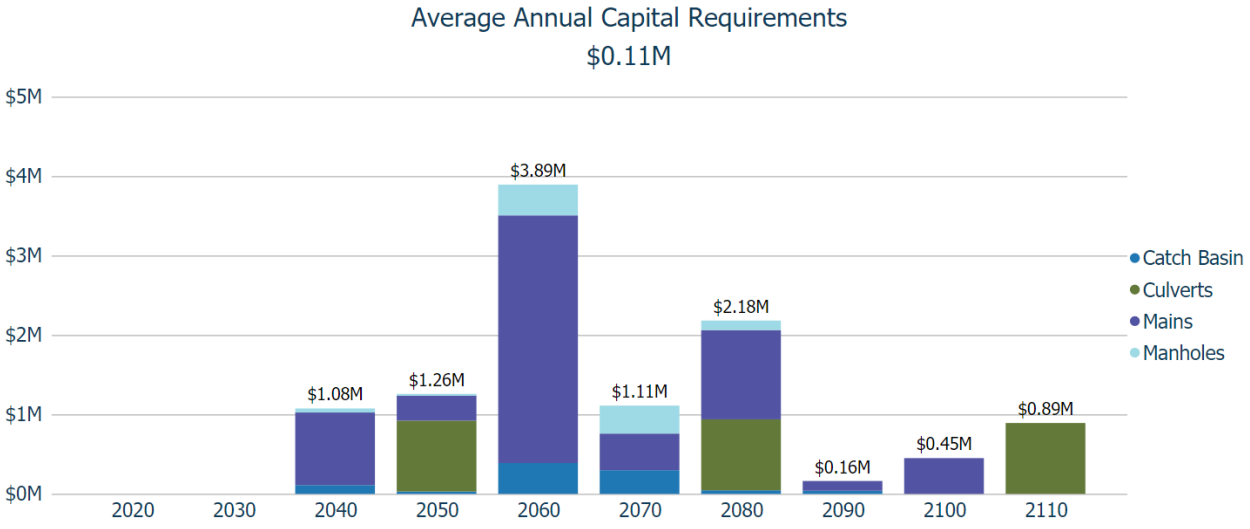
Based on the current storm sewer inventory and assuming end-of-life replacement for all assets, the following graph forecasts short- and long-term capital requirements for the Storm Water Network category.

The annual capital requirement represents the average amount per year that the Alfred & Plantagenet should allocate towards funding rehabilitation and replacement needs to meet future capital needs. The graph below provides a 10-year forecast of the capital requirements for the Storm Water Network, not including assets that may be required due to growth.



Based on the asset inventory for the Storm Water Network, there appears to be no forecasted requirements over the 10 years. Staff have indicated a low level of confidence and completeness in the current inventory for the Storm Water Network and are working towards gathering and refining asset data in order to generate accurate forecasting.

The graph below provides a 90-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement and does not include assets that may be required for growth.



4.3.6 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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 and Information

There is a lack of confidence in the available inventory data for the Storm Water Network. Much of the data within the villages is either missing, not available, and/or incomplete. Flows can be very unpredictable compared to water and sanitary systems. This poses a significant risk when trying to manage assets and planning future work.

Capital Funding Strategies

Partially owing to the lacking asset data, operations tend to be reactive rather than proactive for this category. Problems are generally only known when issues arise, and complaints are made. The capacity of the storm system is also unknown, especially in the context of handling extreme weather events. The required funding is uncertain given these circumstances, but funding studies to investigate these unknowns will likely be required.

4.3.7 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include map, of the user groups or areas of the Township that are protected from flooding, including the extent of protection provided by the municipal storm water network	Most of the municipal storm network precedes modern design guidelines and lacks data, these systems' capacities cannot be confirmed. Recent development such as site plans and subdivisions meet the authorities' guidelines requirements for flood protection and storm sewer sizing.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties in municipality designed to be resilient to a 100-year storm	7%
	% of the municipal stormwater management system designed to be resilient to a 5-year storm	<5%[7]
Performance	Capital reinvestment rate	1.19%
	O&M Cost / km of drainage system	4,536[8]

[7] The total extent of the storm network is still being accounted for. However, 3.7 km of the network is known to be resilient, accounting for less than 50% of the expected overall network.
[8] The total extent of the storm network is still being accounted for.

4.3.8 Recommendations

Asset Inventory

- The Township's Storm Water Network inventory remains at a basic level of maturity and staff do not have a high level of confidence in its accuracy or reliability. The development of a comprehensive inventory of the Storm Water Network should be priority.

Condition Assessment Strategies

- The development of a comprehensive inventory should be accompanied by a system-wide assessment of the condition of all assets in the Storm Water Network through CCTV inspections.

Risk Management Strategies

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

Lifecycle Management Strategies

- Develop and formalize lifecycle management strategies for the Storm Water Network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.

Levels of Service

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

4.4 Non-Core Assets

The Township's non-core asset inventory is managed in CityWide™ and comprises of 470 unique assets that have been grouped into the following sub-categories:

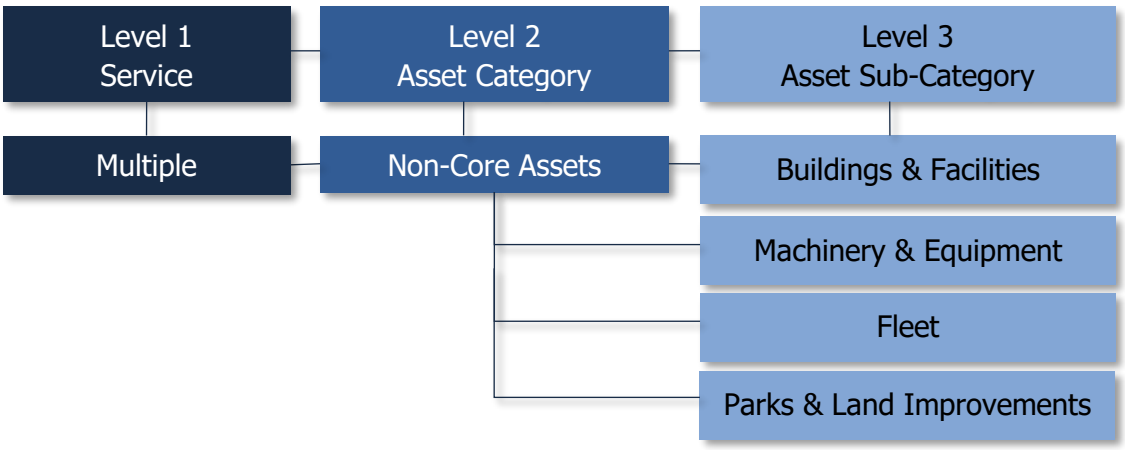
- Buildings & Facilities
- Fleet
- Machinery & Equipment
- Parks & Land Improvements

This AMP primarily focuses on core asset categories, as defined in O. Reg. 588/17. As such, only a high-level inventory overview, risk framework, and capital requirements of Non-Core assets have been included in this AMP. Additional information on Buildings & Facilities, Fleet, Machinery & Equipment, and Parks & Land Improvements assets will be documented for the July 1, 2024 deadline.

The current non-core asset inventory poses a significant limitation for accurate and long-term asset management planning due to a lack of componentization and missing asset information.

4.4.1 Asset Hierarchy and Segmentation

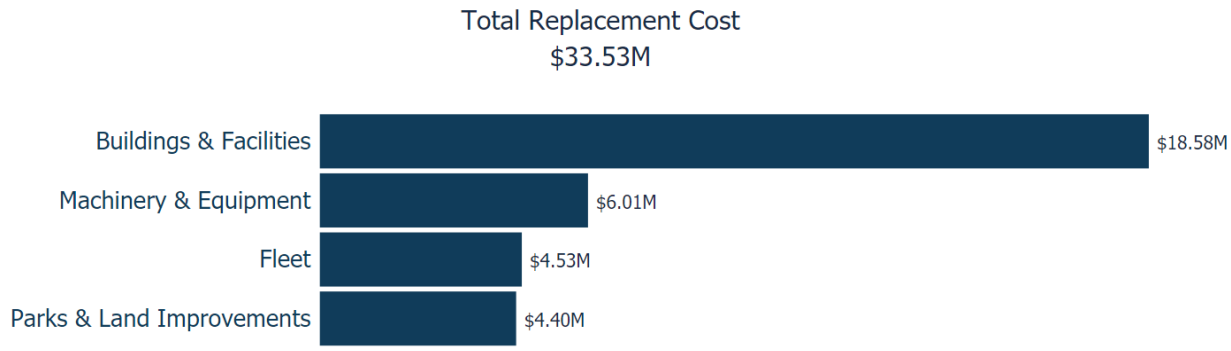
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



4.4.2 Asset Inventory & Replacement Cost

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

Asset Sub-Category	Number of Assets	Replacement Cost Method	Total Replacement Cost
Buildings & Facilities	45	Historical Cost Inflation	$18,582,554
Machinery & Equipment	308	Historical Cost Inflation	$4,530,782
Fleet	37	Historical Cost Inflation	$6,014,560
Parks & Land Improvements	80	Historical Cost Inflation	$4,403,872
			$33,531,768



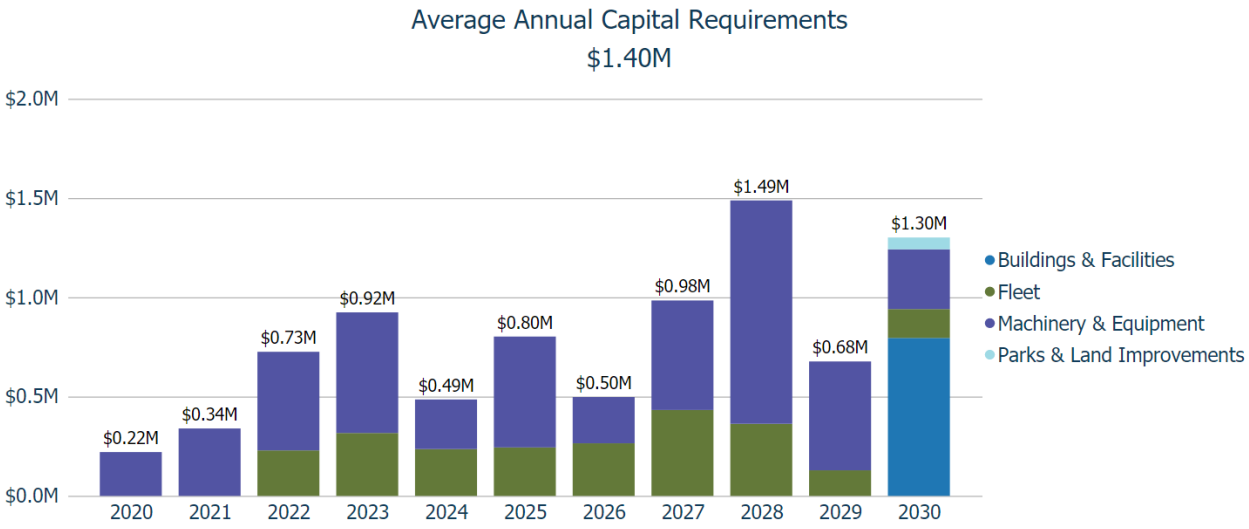
4.4.3 Forecasted Capital Requirements

Based on the current Non-Core Asset's inventory and assuming end-of-life replacement for all assets, the table below outlines the average annual requirements calculated for each non-core asset sub-category.

Asset Sub-Category	Annual Capital Requirements
Buildings & Facilities	$380,025
Machinery & Equipment	$546,051
Fleet	$316,045
Parks & Land Improvements	$159,286
	$1,401,407

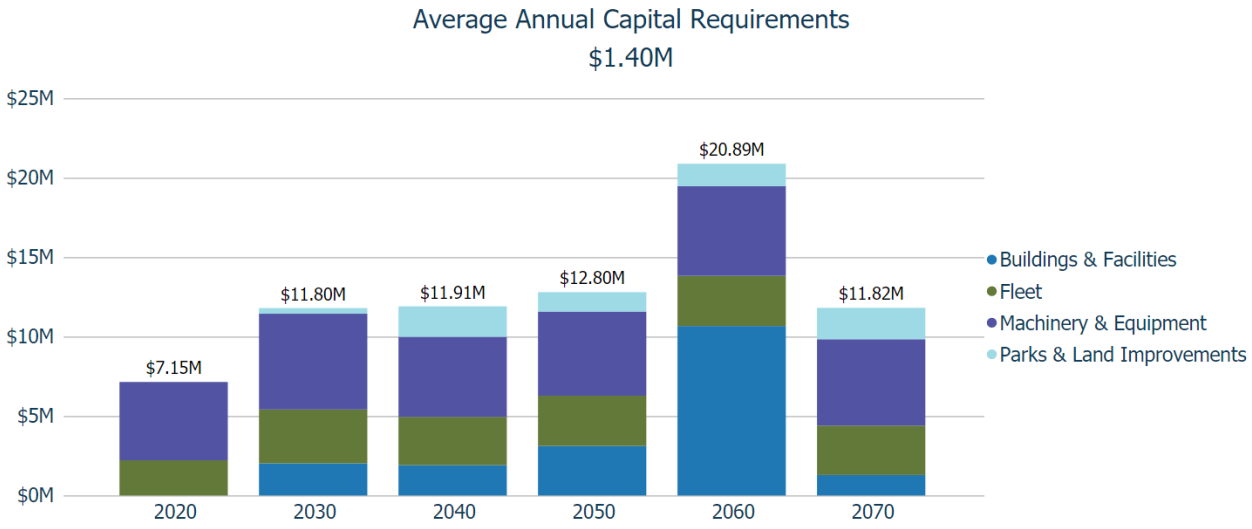
The following graphs forecast the capital requirements for Non-Core Assets. The average annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

The graph below provides a 10-year forecast of the capital requirements for Non-Core Assets, not including assets that may be required due to growth.



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

The graph below provides a 50-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement and does not include assets that may be required for growth.

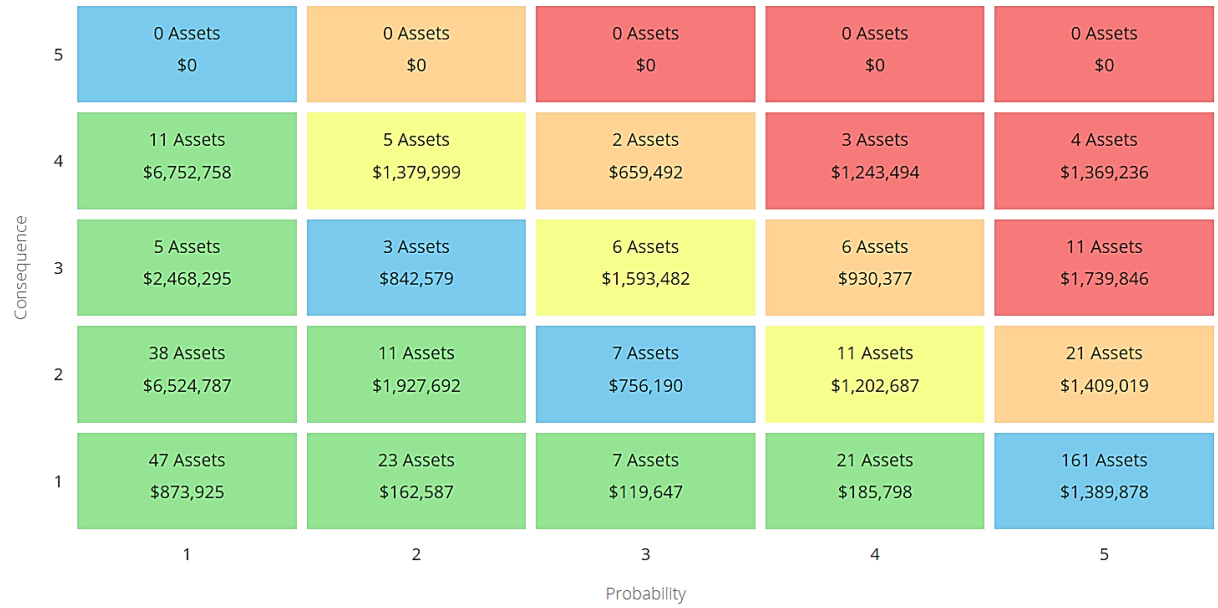


It is important to acknowledge the limitations of the non-core asset inventories due to their pooled and incomplete asset listing. Accuracy and reliability can be improved by collecting asset data, verifying and consolidating it into the current inventory.

4.4.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.



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 & Information

The current inventory for non-core assets is pooled and incomplete resulting in a basic level of data maturity. This is a limiting factor in allowing for accurate and reliable projections, and Staff have expressed a lack of confidence in the current inventory.

Organizational Knowledge & Capacity

Both short- and long-term planning requires the collection of infrastructure data to support asset management decision-making. Staff find it a continuous challenge to dedicate resource time towards data collection and consolidation.

4.4.5 Levels of Service

This asset category consists only of non-core asset categories. As such, the Township has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

4.4.6 Recommendations

Asset Inventory

- The asset inventories for buildings & facilities as well as parks & land improvements are incomplete and pooled. 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 to allow for component-based lifecycle planning.
- Staff have indicated that the current fleet, machinery & equipment inventories are incomplete and there are assets that have not been included. The Township should conduct an inventory review, collect and consolidate asset data to ensure all relevant assets are accounted for.

Condition Assessment Strategies

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

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

5 Analysis of Rate-funded Assets

Key Insights

- Rate-funded assets are valued at $93.2 million
- 98% of rate-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately $1.5 million
- Annual capital funding by the Township totals $0.3 million across all rate-funded assets
- To reach sustainability for the Water Network, water rates need to be increased by 2.8% annually for the next 20 years to eliminate annual deficits
- To reach sustainability for the Sanitary Sewer Network, sewer rates need to be increased by 1.1% annually for the next 10 years to eliminate annual deficits

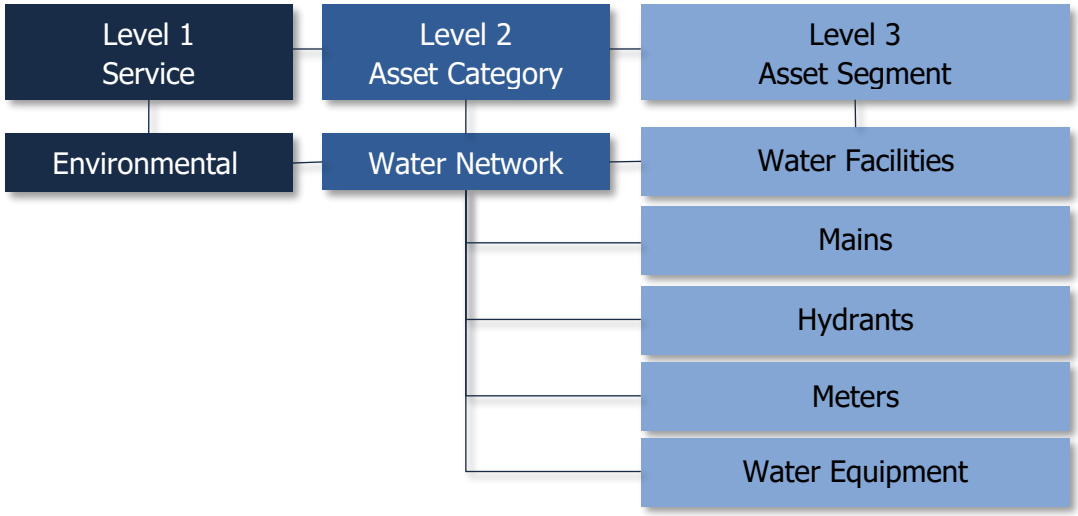
5.1 Water Network

The Township's Water Network inventory is managed in CityWide™, and comprises of 2,256 unique assets, including 53 kilometres of water mains, approximately 228 hydrants and 1,935 meters, as well as several water facilities like water towers and treatment plants. The inventory represents the 2 Drinking Water Systems that the Township owns.

The Ontario Clean Water Agency (OCWA) operates the Township's water network and the Township receives quarterly reports on system condition, capacity, operating and capital forecasts from OCWA and is in contact with them on a regular basis.

5.1.1 Asset Hierarchy and Segmentation

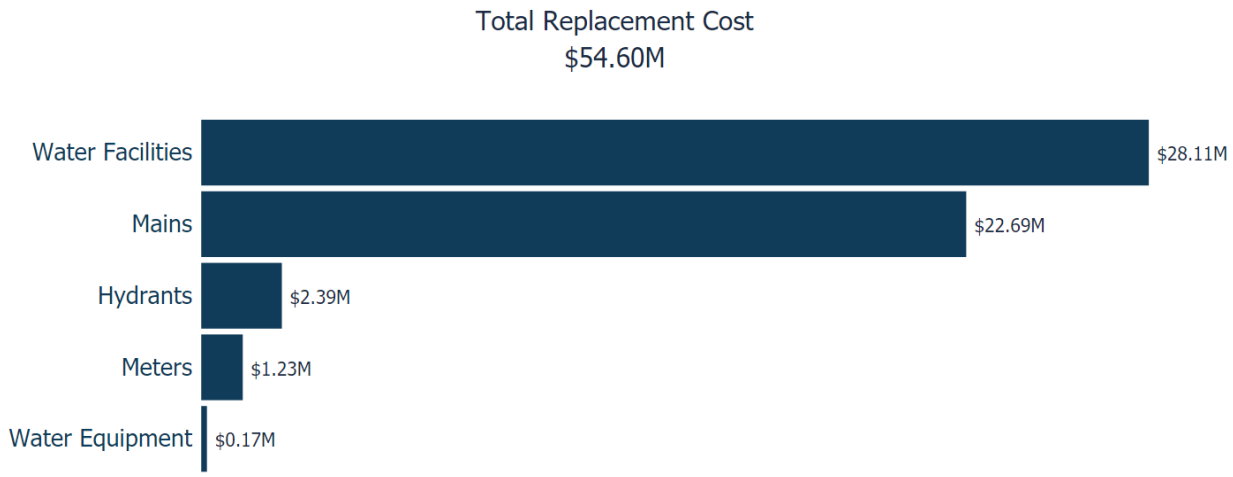
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



5.1.2 Asset Inventory & Replacement Cost

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

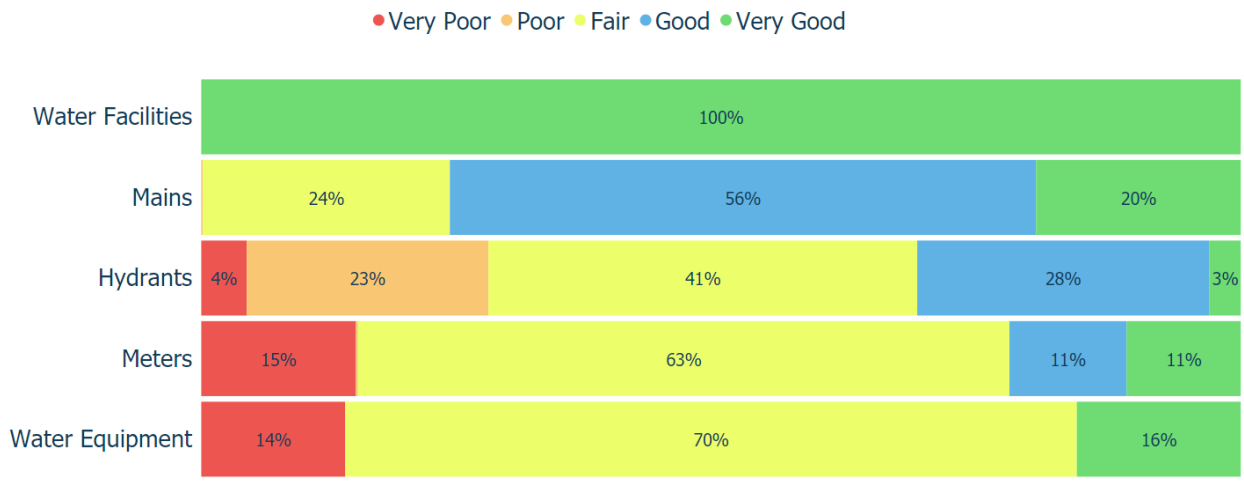
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Water Facilities	11	Historical Cost Inflation	$28,106,129
Mains	53 km	Cost per Unit	$22,690,740
Hydrants	228	Cost per Unit	$2,394,000
Meters	1,935	Cost per Unit	$1,234,530
Water Equipment	5	Historical Cost Inflation	$171,851
			$54,597,250



5.1.3 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Water Facilities	89%	Very Good	95% Assessed
Mains	68%	Good	Age-based
Hydrants	54%	Fair	Age-based
Meters	44%	Fair	Age-based
Water Equipment	51%	Fair	Age-based
	78%	**Good**	



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

Current Approach to Condition Assessment

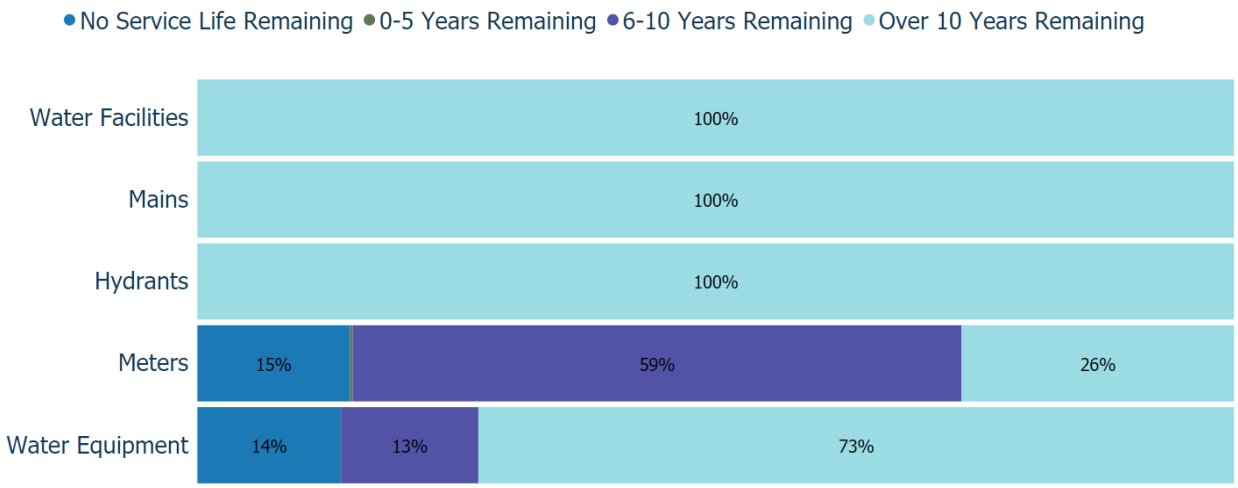
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- OCWA provides the Township with multi-year forecasts
- Inspections as required under O. Reg. 170/3 are conducted
- Staff primarily rely on the age and material of water mains to determine the projected condition of water mains

5.1.4 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Water Facilities	15 - 90 Years	19.9	47.7
Mains	80 - 90 Years	32.5	55.1
Hydrants	60 Years	27.8	32.2
Meters	20 Years	12.6	7.3
Water Equipment	5 - 25 Years	6.5	11.5
		16.1	**14.7**



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

It is also important to acknowledge the limitations of the current water inventory due to its incompleteness. Accuracy and reliability can be improved by ensuring all relevant asset data has been consolidated into the inventory.

5.1.5 Lifecycle Management Strategy

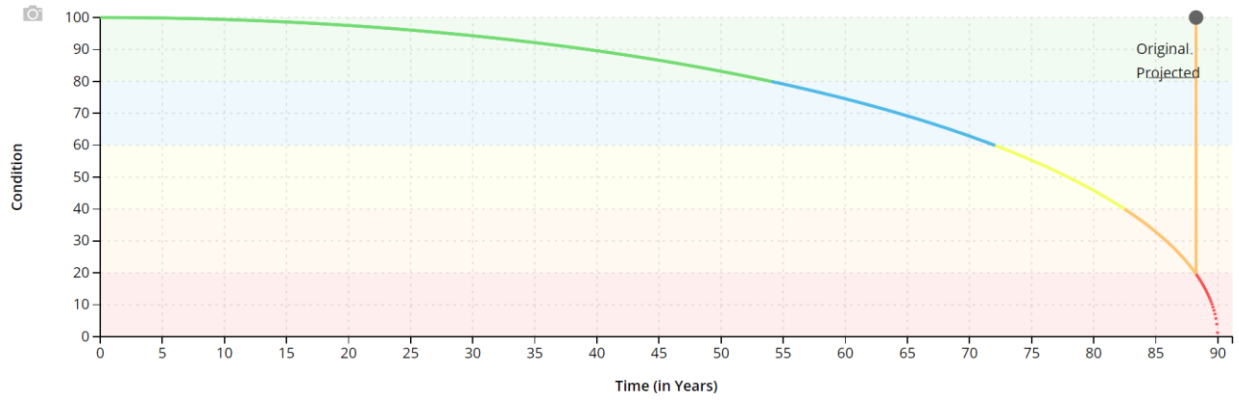
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Water main breaks are managed and remediated when they occur. Staff may assist OCWA on site
	Valves undergo annual maintenance as part of preventative maintenance
	Periodic pressure testing to identify deficiencies and potential leaks
	Mains are flushed twice per year on the entire network
Rehabilitation/ Replacement	Multi-year forecasts provided by OCWA and further reviewed by Staff
	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life
	Other replacement activities are identified based on an analysis of the main break rate, asset functionality and design capacity as well as any issues identified during regular maintenance activities
	When mains are replaced, PVC pipe material is used
	Similar to other sub-surface infrastructure, Staff attempt to coordinate water reconstruction projects with road reconstruction project to produce cost efficiencies

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

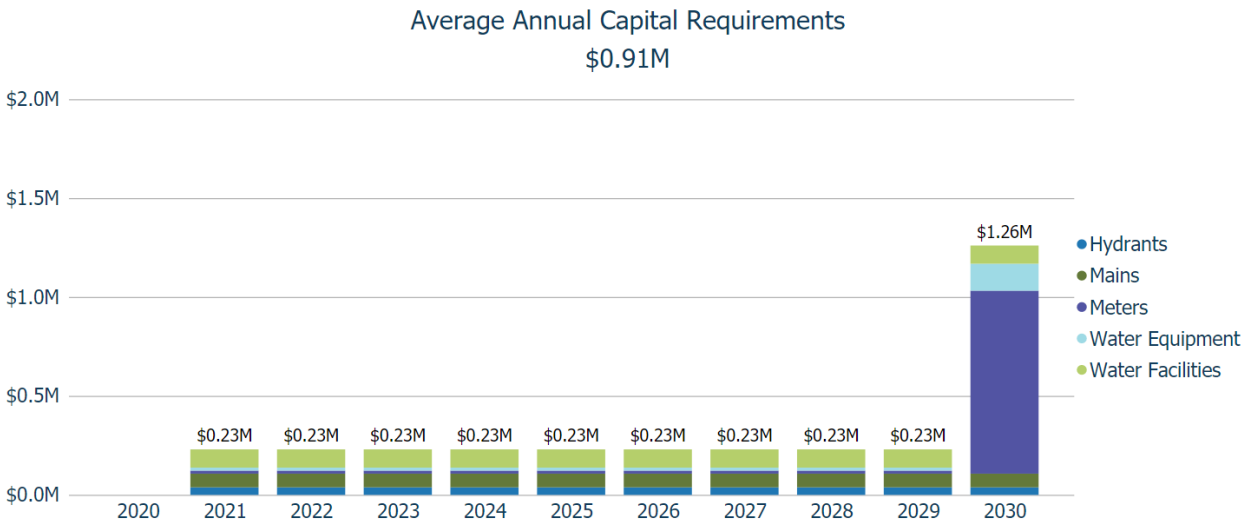
Water Mains		
Event Name	**Event Class**	**Event Trigger**
Valve Maintenance	Maintenance	Annually
Water Main Flushing	Maintenance	Twice per year
Full Reconstruction	Replacement	Condition: 20



Forecasted Capital Requirements

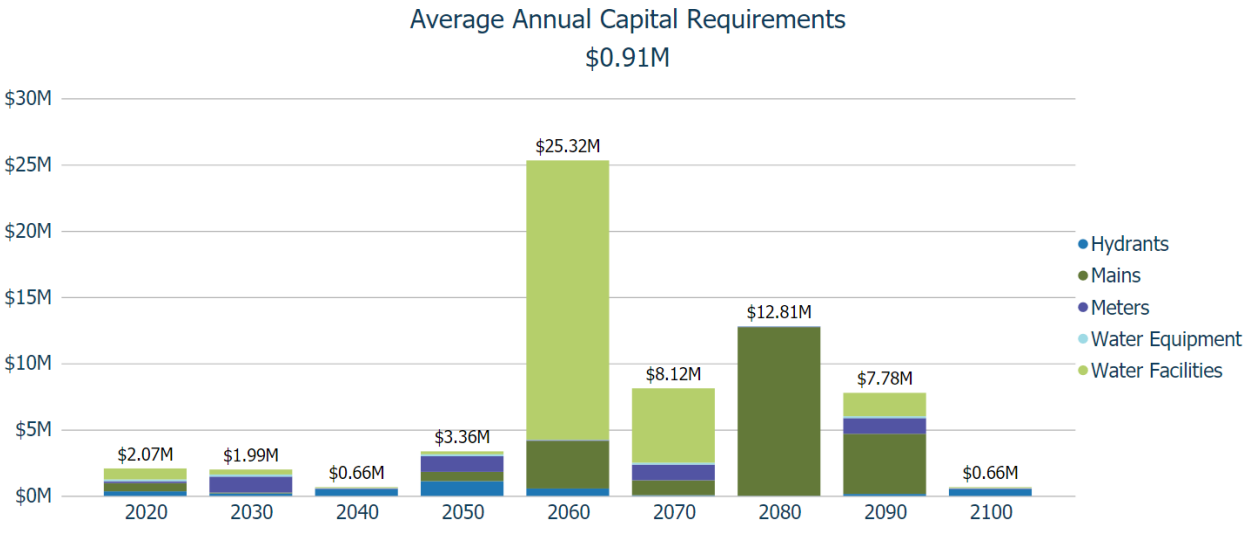
Based on the specifically allocated capital costs provided by Staff and assuming end-of-life replacement for all assets, the following graph forecasts short- and long-term capital requirements for the Water Network category.

The annual capital requirement represents the average amount per year that the Alfred & Plantagenet should allocate towards funding rehabilitation and replacement needs to meet future capital needs. The graph below provides a 10-year forecast of the capital requirements for the Water Network, not including assets that may be required due to growth.



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

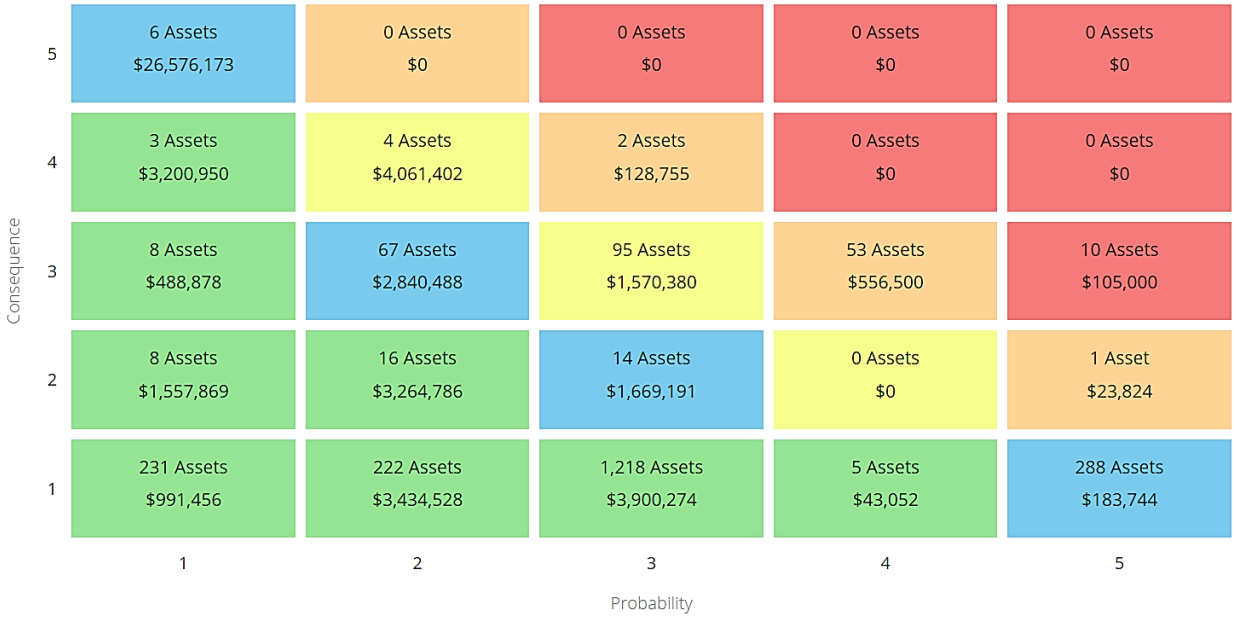
The graph below provides an 80-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement and does not include assets that may be required for growth.



5.1.6 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.



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 and Information

There is a misalignment in the current inventory data for critical Water Network assets, particularly Water Network facilities. Some of the asset data has not been consolidated into the Township's central asset inventory. This poses a significant risk and will lead to discrepancies when trying to manage assets and plan future work.

Assessed Condition Data

Water Network assets such as mains are difficult to visually inspect, in contrast to storm and sanitary mains which can have CCTV inspections. Water main condition assessments generally rely on age-based estimates of current condition and pipe material to try and predict when mains need to be replaced.

Operations and Capital Funding

The current funding has allowed the Township to repair breaks that may occur e.g., water main breaks. However, current levels of funding have generally only allowed for reactive maintenance rather than taking a proactive approach. Additional funding can assist with being more proactive and complete planned work in a timelier manner.

Expectations on Water Services

With the population growth that the Township has already experienced and will likely experience in the future, especially amid rising housing prices in metropolitan areas, the Township continues to be a destination of choice. New residents may shift expectations of water services, ranging from water quality to adequate flow pressures. Managing expectations will be important.

5.1.7 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	Two distinct water systems; Wendover and Lefaivre/Alfred/Plantagenet/St-Isidore. Water in Wendover is sourced from the Ottawa River, pumped and treated at the Township owned treatment plant, stored in an above ground storage tank and distributed within the Village limits via water mains. The Lefaivre system is sourced from the Ottawa River, treated in Lefaivre and pumped to Alfred and Plantagenet. There is an above ground water tank in Alfred. A booster station is located in Plantagenet to feed St-Isidore which is part of a neighbouring Municipality. Water is distributed within the Villages via watermain.
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	Both systems have hydrants and fire fighting capabilities. Some system ends have been extended with smaller size pipes which do not provide fire fighting capacities.
Reliability	Description of boil water advisories and service interruptions	No instances of boil water advisories have been mentioned in the annual reports dating back to 2016. On occasion, water service interruptions may occur due to unexpected main breaks, maintenance activities, or water infrastructure replacement. Staff make every effort to keep service interruptions to a minimum.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal water system	47%
	% of properties where fire flow is available	36%
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0.005
Performance	Capital re-investment rate	1.67%

5.1.8 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data into the central asset inventory to ensure all relevant assets are included and that asset data is current and complete
- Review and revise replacement costs and critical asset attribute data on a regular basis.

Condition Assessment Strategies

- Consider proactive, periodic monitoring of high value and high-risk water assets
- Identify condition assessment strategies for high value and high-risk water network assets and expand this to a comprehensive condition assessment program for all water assets so that, where achievable, Staff can use assessed condition data

Lifecycle Management Strategies

- Consider proactive rehabilitative strategies such as relining to extend the service life of water mains at a lower total cost of ownership
- Evaluate the efficacy of the Township's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Risk Management Strategies

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

Levels of Service

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

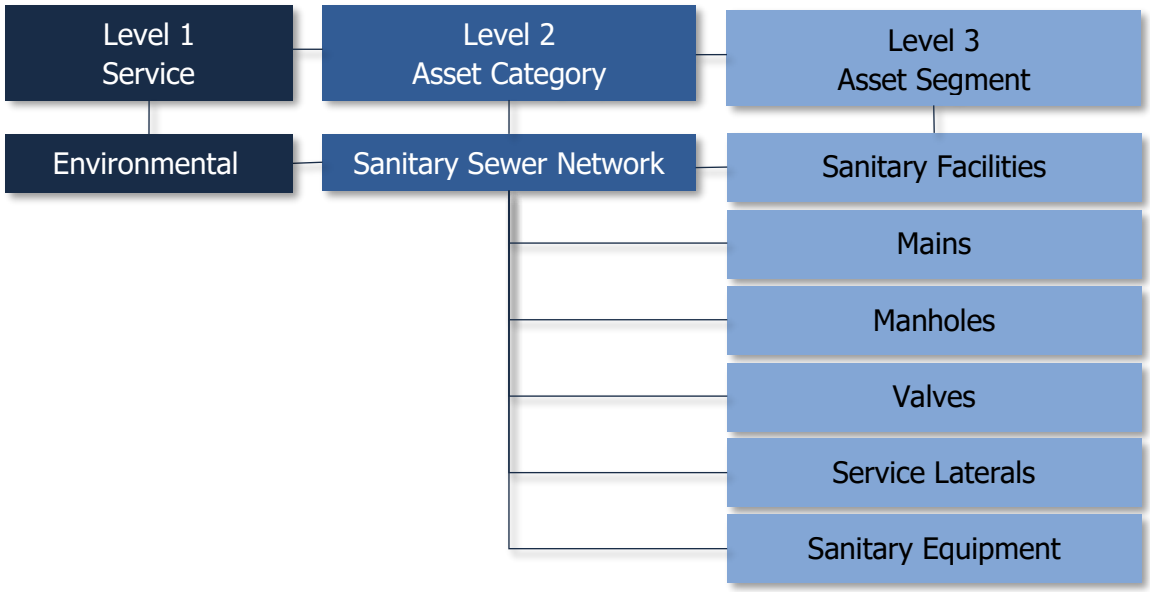
5.2 Sanitary Sewer Network

The Township's Sanitary Sewer Network inventory is managed in CityWide™, and comprises of 407 unique assets, including 42 kilometres of sanitary mains, approximately 268 manholes, supporting infrastructure such as service laterals and valves as well as several sanitary facilities like pumping stations, treatment plants and lagoons. It represents the 3 sewer systems that the Township owns.

The Ontario Clean Water Agency (OCWA) operates the Township's sanitary network and the Township receives quarterly reports on system condition, capacity, operating and capital forecasts from OCWA and is in contact with them on a regular basis.

5.2.1 Asset Hierarchy and Segmentation

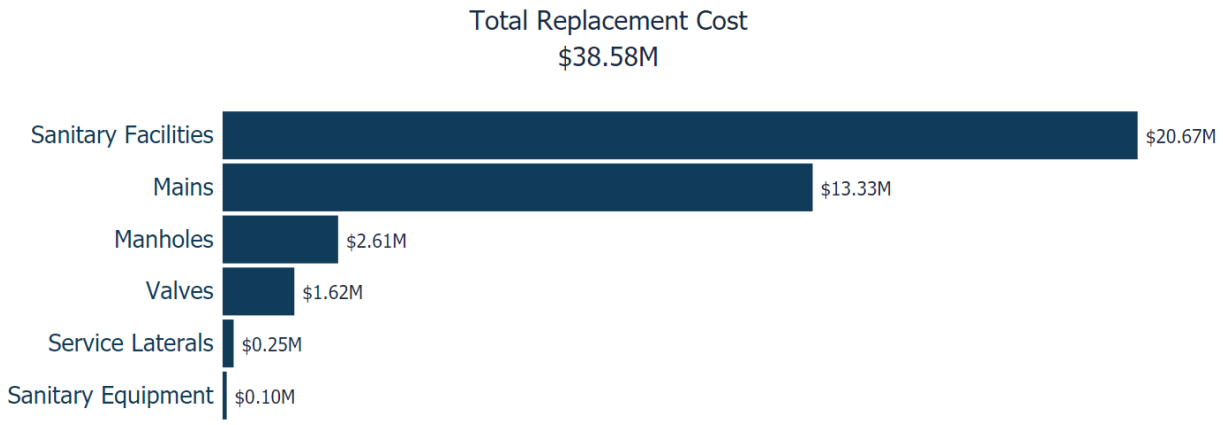
Asset hierarchy explains the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Assets were structured to support meaningful, efficient reporting and analysis.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



5.2.2 Asset Inventory & Replacement Cost

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

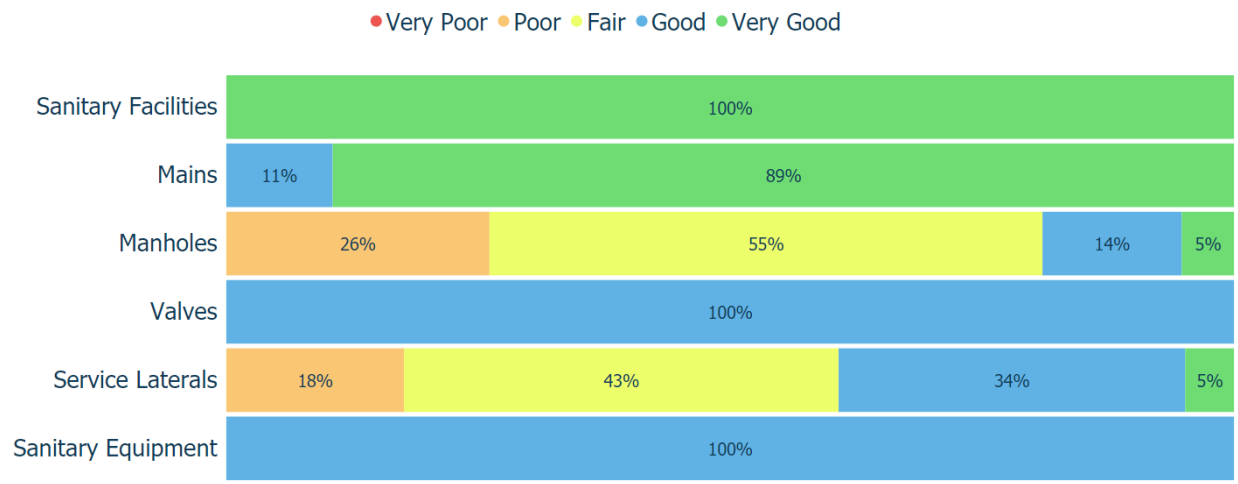
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Sanitary Facilities	12	Historical Cost Inflation	$20,667,004
Mains	42 km	Cost per Unit	$13,329,289
Manholes	268	Cost per Unit	$2,613,000
Valves	50	Historical Cost Inflation	$1,624,127
Service Laterals	1,002	Historical Cost Inflation	$252,793
Sanitary Equipment	1	Historical Cost Inflation	$96,368
			$38,582,581



5.2.3 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Sanitary Facilities	91%	Very Good	100% Assessed
Mains	84%	Very Good	Age-based
Manholes	47%	Fair	Age-based
Valves	62%	Good	Age-based
Service Laterals	51%	Fair	Age-based
Sanitary Equipment	88%	Very Good	Age-based
	84%	**Good**	



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

Current Approach to Condition Assessment

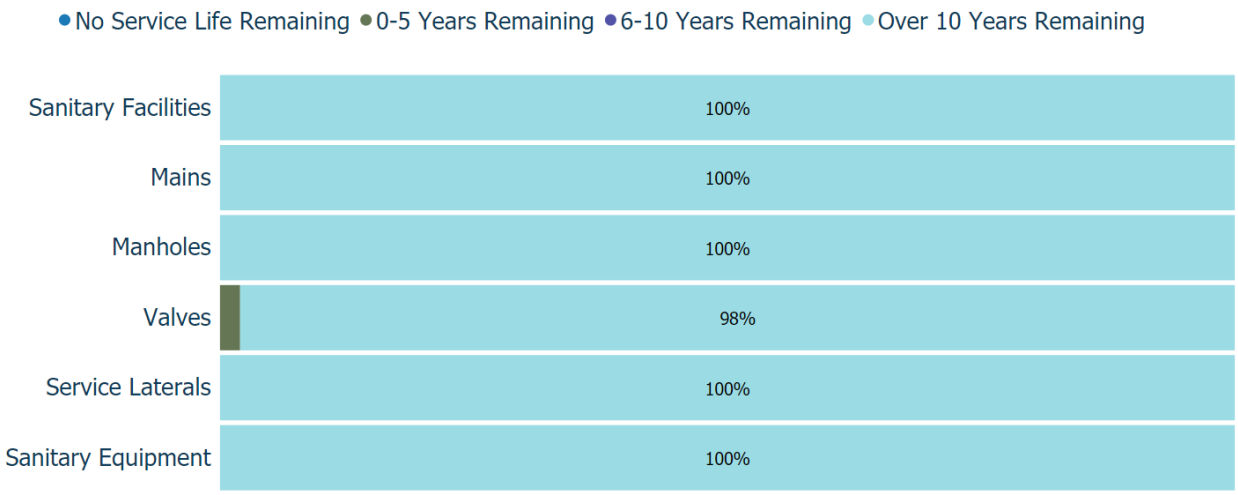
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- There are no formal condition assessments in place for the Sanitary Sewer Network, but Staff rely on multi-year forecasts from OCWA and information on assets that are in need of repair
- CCTV inspections are conducted on as-needed or in coordination with road construction
- Staff rely on a variety of metrics including age, pipe material and diameter, location, and available CCTV assessments to determine the projection condition of linear assets
- Other sanitary assets are inspected by staff on a regular basis

5.2.4 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Sanitary Facilities	20 - 75 Years	34.6	51.3
Mains	80 - 90 Years	41.7	41.3
Manholes	80 Years	44.1	35.9
Valves	80 Years	30.5	47.6
Service Laterals	80 Years	41.8	38.2
Sanitary Equipment	25 Years	7.4	17.6
		41.3	**39.7**



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

It is also important to acknowledge the limitations of the current sanitary sewer inventory due to its incompleteness. Accuracy and reliability can be improved by ensuring all relevant asset data has been consolidated into the inventory.

5.2.5 Lifecycle Management Strategy

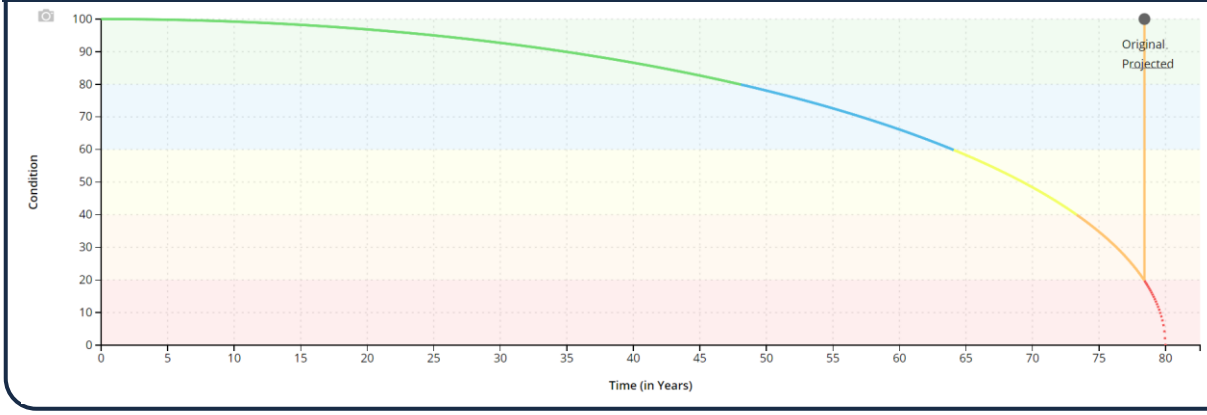
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	CCTV inspections are conducted as necessary
	Annual maintenance of mains that consists of main flushing, rodding and inspections
	Annual maintenance of manholes that consists of manhole inspection, lining and grouting
Rehabilitation/ Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life
	Multi-year forecasts provided by OCWA and further reviewed by Staff
	Project prioritization is based on CCTV inspections, asset age, material, environmental risks, health and safety risks, and social impact. Additional considerations include asset functionality and design capacity.
	When mains are replaced, PVC pipe material is used
	Similar to other sub-surface infrastructure, Staff coordinate sanitary reconstruction projects with road construction projects to produce cost efficiencies

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

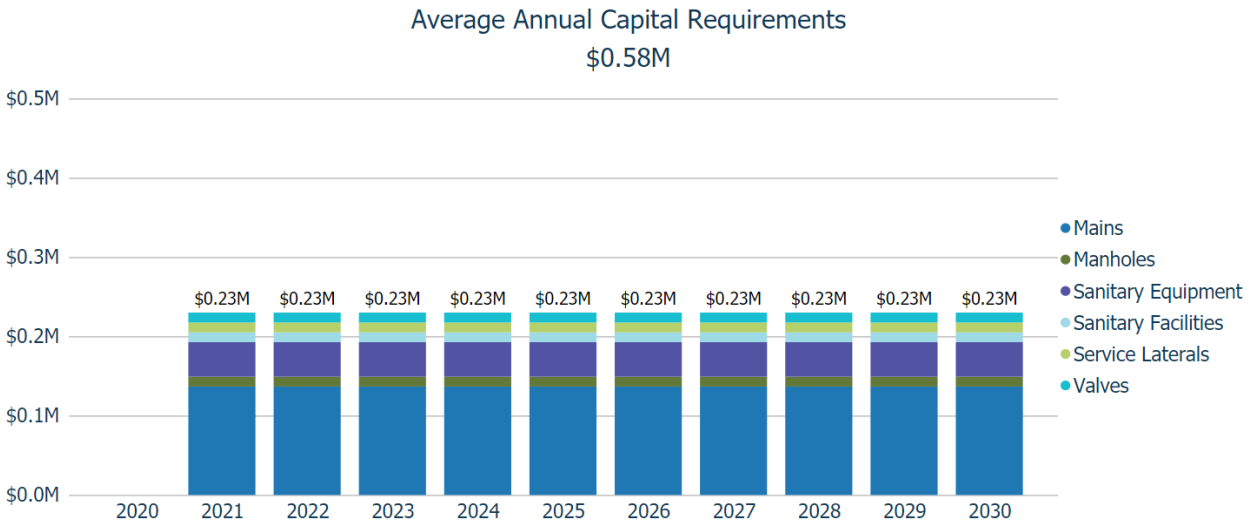
Sanitary Mains		
Event Name	**Event Class**	**Event Trigger**
CCTV Inspection	Preventative Maintenance	As Needed
Main Flushing, Rodding & Inspections	Maintenance	Annually
Manhole Inspection, Lining & Grouting	Maintenance	Annually
Full Reconstruction	Replacement	Condition: 20



Forecasted Capital Requirements

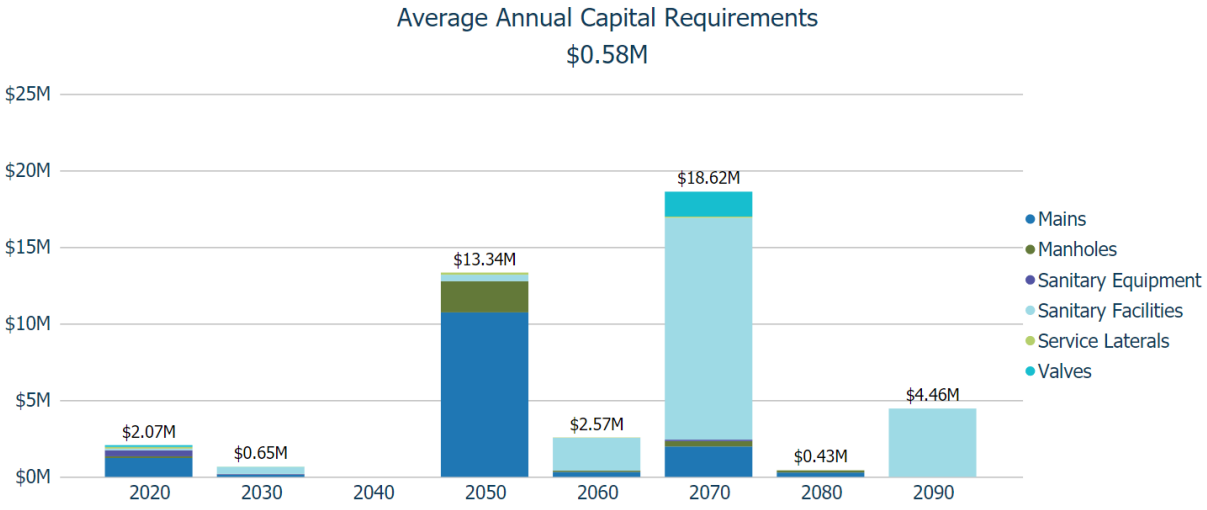
Based on the specifically allocated capital costs provided by Staff and assuming end-of-life replacement for all assets, the following graph forecasts short- and long-term capital requirements for the Sanitary Sewer Network.

The annual capital requirement represents the average amount per year that the Alfred & Plantagenet should allocate towards funding rehabilitation and replacement needs to meet future capital needs. The graph below provides a 10-year forecast of the capital requirements for the Sanitary Sewer Network, not including assets that may be required due to growth.



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

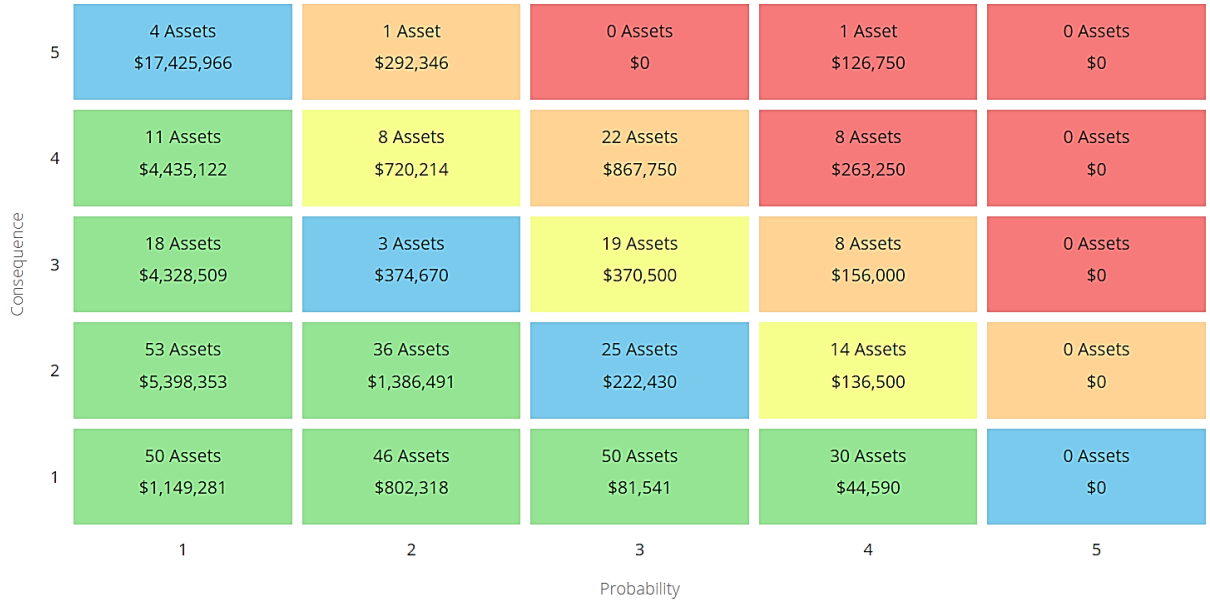
The graph below provides a 75-year forecast. This projection is used as it ensures that every asset has gone through one full iteration of replacement and does not include assets that may be required for growth.



5.2.6 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.



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 and Information

There is a misalignment in the current inventory data for critical Sanitary Sewer Network assets, particularly the sanitary sewer facilities. Some of the asset data has not been consolidated into the Township's central asset inventory and some assets are pooled. This poses a significant risk and will lead to discrepancies when trying to manage assets and planning future work.

Asset Data and Information

Inflow and Infiltration (I/I) poses a problem for the Township. Without addressing the problem, sanitary treatment capacity will be lessened, and rates may need to be increased. Identifying where the issue originates from and addressing its underlying cause(s) will require a significant amount of work.

Legislative and Operations

Waterbodies within Alfred-Plantagenet and downstream of the Township have different standards for treated wastewater. The difference in rules, targets, and governing authorities affect the design and operation of sanitary systems. Navigating this poses a challenge and adds constraints to decision-making.

5.2.7 Levels of Service

The following tables identify the Township's current level of service for Sanitary Sewer 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 Sanitary Sewer Network.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	The Township has three distinct municipal wastewater systems: Wendover, Plantagenet and Alfred. Wendover's system includes three STEP systems, gravity pipes and one pumping station. Flow is treated at the mechanical treatment facility and is discharged into the Ottawa River. The Plantagenet system consists of gravity pipes, two pumping stations and one single cell lagoon which treats runoff before discharging into the South Nation River. The Alfred system consists of gravity pipes, one pumping station and one lagoon which treats runoff before discharging into a nearby ditch.

Service Attribute	Qualitative Description	Current LOS (2020)
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	Overflows are present at pumping stations and treatment facilities
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	No spills in the last year for all three systems.
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	No backups or overflows recorded in recent years. There are some combined flows due to foundation drain connections and infiltration on all three systems. The full extent is unknown.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	Major facilities such as pumping stations and treatment facilities are equipped with emergency overflows.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	All three treatment facilities generally meet all effluent requirements.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal wastewater system	61%
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	14%
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0.004
Performance	Capital re-investment rate	1.49%

5.2.8 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data into the central asset inventory to ensure all relevant assets are included and that asset data is current and complete
- Review and revise replacement costs and critical asset attribute data on a regular basis.

Condition Assessment Strategies

- Consider proactive, periodic monitoring of high value and high-risk sanitary assets
- Identify condition assessment strategies for high value and high-risk sanitary assets and expand this to a comprehensive condition assessment program for all sanitary assets so that, where achievable, Staff can use assessed condition data.

Risk Management Strategies

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

Lifecycle Management Strategies

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

Levels of Service

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

6 Impacts of Growth

Key Insights

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

- Moderate population and employment growth is expected at Alfred & Plantagenet

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

6.1 Description of Growth Assumptions

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

6.1.1 United Counties of Prescott and Russell Official Plan (November 2018)

The United Counties of Prescott and Russell is the easternmost county in Ontario, located between the City of Ottawa on the west and the Province of Quebec on the east. The County comprises eight local municipalities including: The City of Clarence-Rockland, the Town of Hawkesbury, the Village of Casselman, the Township of Alfred and Plantagenet, the Township of Champlain, the Township of East Hawkesbury, the Nation Municipality, and the Township of Russell.

The goal of the Official Plan is to provide guidance and direction to growth and development, redevelopment, and/or conservation activities in the United Counties. Council adopted a 5 year review on August 2015 and the document was consolidated in November 2018. The Official Plan spans a twenty-year period until 2035.

The following table outlines the population, employment, and household forecasts allocated to Alfred-Plantagenet.

Year	2011	2031	2035
Population	9,541	11,546	11,940
Employment	2,668	2,990	3,101
Households	3,730	4,533	4,626

Much of the County's population, employment, and housing growth forecasts are based on December 2012 document by Hemson Consulting titled, "Growth Forecast and Land Needs Analysis – United Counties of Prescott and Russell."

Population is expected to increase throughout the County. An estimate of growth was derived and downscaled to local municipalities based on historic building permits from Statistics Canada, adjusted for expected shifts in the pattern of growth arising form migration patterns. Migration from the City of Ottawa is expected to be a key driver of population growth in the County. The City of Ottawa's growth may further increase development pressure in the surrounding regional market area, particularly in western portions of the County. The local housing forecast reflect

the anticipation that Ottawa commuter-based development pressure continues in the coming years.

The Official Plan suggests a housing growth distribution of 85-15 between urban/community and rural for the western portion of the county, including Wendover. In other parts of the county, a 70-30 urban/community and rural split is established. Following this distribution approach maximizes the development on available infrastructure while the intensification allows future infrastructure expansion to be completed in a more cost-effective manner.

6.2 Impact of Growth on Lifecycle Activities

By July 1, 2025 the Township's asset management plan must include a discussion of how the assumptions regarding future changes in population and economic activity informed the preparation of the lifecycle management and financial strategy.
Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Township's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Township will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

7 Financial Strategy

Key Insights

- The Township is committing approximately $1.98 million towards capital projects per year from sustainable revenue sources

- Given the annual capital requirement of $4.61 million, there is currently a funding gap of $2.63 million annually

- For Tax-Funded assets, we recommend increasing tax revenues by 1.6% each year for the next 10 years to achieve a sustainable level of funding

- For the Water Network, we recommend increasing rate revenues by 2.8% annually for the next 20 years to achieve a sustainable level of funding

- For the Sanitary Sewer Network, we recommend increasing rate revenues by 1.1% annually for the next 10 years to achieve a sustainable level of funding

7.1 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 the Township of Alfred & Plantagenet to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

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

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

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

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

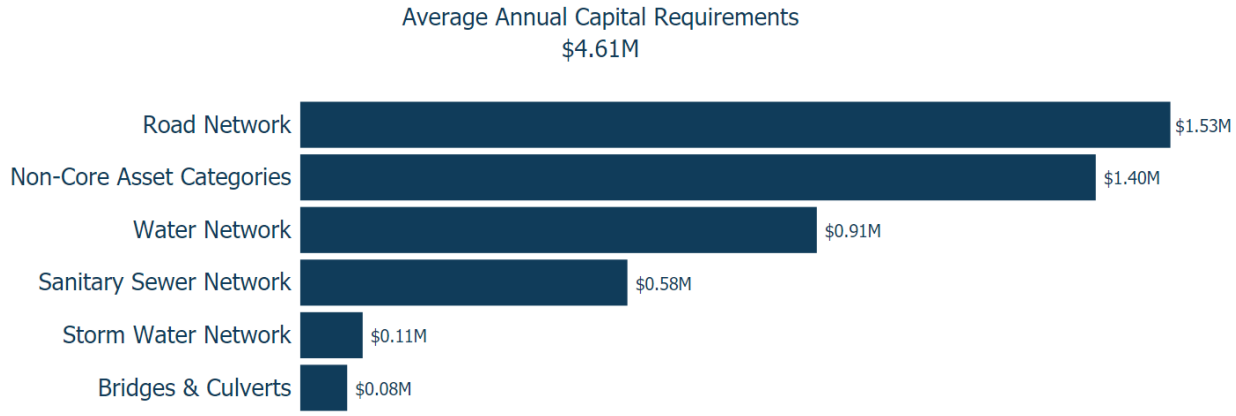
1. In order to reduce financial requirements, consideration has been given to revising service levels downward.

2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not, the use of debt should be considered.
    b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the Township should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the Township must allocate approximately $4.61 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. This also includes lifecycle activities found on the 2019 OSIM Report as well as specific capital costs allotted to Water and Sanitary Sewer Network that have been factored into the calculation.

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

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

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	$3,256,093	$1,532,884	$1,723,208

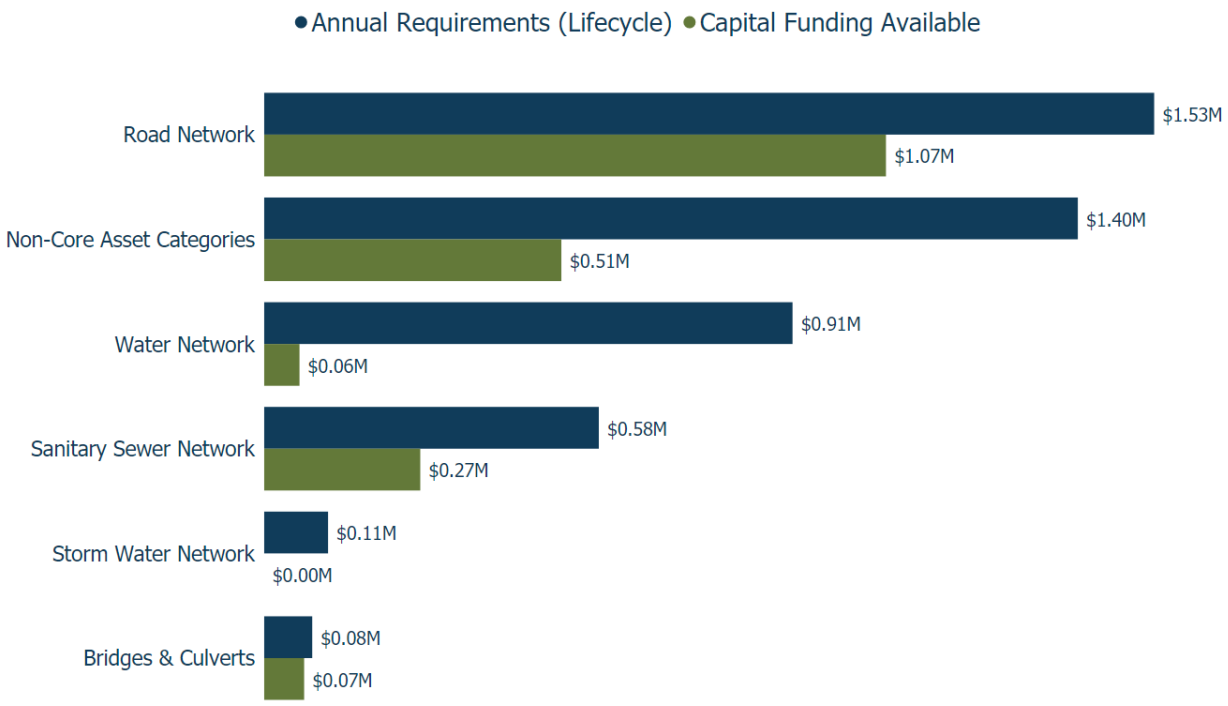
The impact of the current lifecycle strategy for roads leads to a potential annual cost avoidance of $1.7 million for the Road Network. This represents an overall reduction of the annual requirements for the category by 53%.

As the lifecycle strategy scenario represents the actual activities the Township undertakes and also because it is 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 $1,982,000 towards capital projects per year from sustainable revenue sources.

Given the annual capital requirement of $4,614,047, there is currently a funding gap of $2,632,047 annually.



7.2 Funding Objective

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

1. **Tax Funded Assets:** Road Network, Bridges & Culverts, Storm Water Network, Non-Core Asset Categories
2. **Rate-Funded Assets:** Water Network, Sanitary Sewer Network

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

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

7.3 Financial Profile: Tax Funded Assets

7.3.1 Current Funding Position

The following tables show, by asset category, Alfred & Plantagenet'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	UCPR	Total Available	
Road Network	$1,533,000	$110,000	$307,000	$403,000	$251,000	$1,071,000	$462,000
Bridges & Culverts	$83,000	$69,000	$0	$0	$0	$69,000	$14,000
Storm Water Network	$110,000	$0	$0	$0	$0	$0	$110,000
Non-Core Asset Categories	$1,401,000	$512,000	$0	$0	$0	$512,000	$889,000
	$3,127,000	$691,000	$307,000	$403,000	$251,000	**$1,652,000**	**$1,475,000**

The average annual investment requirement for the above categories is $3.13 million. Annual revenue currently allocated to these assets for capital purposes is $1.65 million leaving an annual deficit of $1.48 million.

Put differently, these infrastructure categories are currently funded at 53% of their long-term requirements.

7.3.2 Full Funding Requirements

In 2021, the Township of Alfred & Plantagenet has budgeted annual tax revenues of $7.6 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Road Network	6.0%
Bridges & Culverts	0.2%
Storm Water Network	1.4%
Non-Core Asset Categories	11.6%
	19.2%

The following change in revenue over the next number of years should also be considered in the financial strategy:

a) Alfred & Plantagenet's debt payments for these asset categories will be decreasing by $215k over the next 5 years and by $274k over the next 10 years. Although not shown in the table, debt payment decreases will be $326k and $401k over the next 15 and 20 years, respectively.

Our recommendations include capturing the above change and allocating it 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	$1,475,000	$1,475,000	$1,475,000	$1,475,000	$1,475,000	$1,475,000	$1,475,000	$1,475,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-$215,000	-$274,000	-$326,000	-$401,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit:	**$1,475,000**	**$1,475,000**	**$1,475,000**	**$1,475,000**	**$1,260,000**	**$1,201,000**	**$1,149,000**	**$1,074,000**
Tax Increase Required	19.3%	19.3%	19.3%	19.3%	16.5%	15.7%	15.0%	14.0%
Annually	**3.9%**	**1.9%**	**1.3%**	**1.0%**	**3.3%**	**1.6%**	**1.0%**	**0.7%**

7.3.3 Financial Strategy Recommendations

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

a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
b) increasing tax revenue by 1.6% each year for the next 10 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax and OCIF revenue as outlined previously.
d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included any applicable OCIF formula-based funding since this funding is a multi-year commitment9.
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full CapEx funding on an annual basis in 10 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $2,681,000 for the Road Network, $357,000 for Bridges & Culverts, $3,382,000 for the Non-Core Asset Categories, and $7,000 for the Storm Water Network.

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

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

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

The following tables show, by asset category, Alfred & Plantagenet's average annual CapEx requirements, current funding positions[10], and funding increases required to achieve full funding on assets funded by rates.

Asset Category	Avg. Annual Requirement	Annual Funding Available			Annual Deficit
		Rates	To Operations	Total Available	
Water Network	$910,000	$1,489,000	-$1,428,000	$61,000	$849,000
Sanitary Sewer Network	$577,000	$1,090,000	-821,000	$269,000	$308,000
	$1,487,000	$2,579,000	-$2,249,000	**$330,000**	**$1,157,000**

The average annual CapEx requirement for the above categories is $1,487,000. Annual revenue currently allocated to these assets for capital purposes is $330,000 leaving an annual deficit of $1,157,000.

Put differently, these infrastructure categories are currently funded at 22% of their long-term requirements.

7.4.2 Full Funding Requirements

In 2020, Alfred & Plantagenet had budgeted annual Water rate revenues of $1.509 million and annual Sanitary Sewer revenues of $1.095 million. In the following tables, we have analyzed the various scenarios of long-term funding options up to 20 years.

Asset Category	Tax Change Required for Full Funding
Water Network	57.0%
Sanitary Sewer Network	28.3%

[10] The annual rate funding excludes other taxes and government transfer revenues applied to utilities.

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

	Water Network				Sanitary Sewer Network			
	5 Years	**10 Years**	**15 Years**	**20 Years**	**5 Years**	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	$849,000	$849,000	$849,000	$849,000	$308,000	$308,000	$308,000	$308,000
Rate Increase Required	57.0%	57.0%	57.0%	57.0%	28.3%	28.3%	28.3%	28.3%
Annually:	**11.4%**	**5.7%**	**3.8%**	**2.9%**	**5.7%**	**2.8%**	**1.9%**	**1.4%**

	Water Network				Sanitary Sewer Network			
	5 Years	**10 Years**	**15 Years**	**20 Years**	**5 Years**	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	$849,000	$849,000	$849,000	$849,000	$308,000	$308,000	$308,000	$308,000
Less: Decrease in debt payments	$0	$0	$0	-$18,000	-$127,000	-$190,000	-$190,000	-$190,000
Rate Increase Required	57.0%	57.0%	57.0%	55.8%	16.6%	10.8%	10.8%	10.8%
Annually:	**11.4%**	**5.7%**	**3.8%**	**2.8%**	**3.3%**	**1.1%**	**0.7%**	**0.5%**

7.4.3 Financial Strategy Recommendations

Considering the above information, we recommend the 20-year option for the Water Network, and the 10-year option for the Sanitary Sewer Network. This involves full CapEx funding being achieved over 20 years by:

a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
b) increasing rate revenues by 2.8% for the Water Network each year for the next 20 years and 1.1% for the Wastewater Network each year for the next 10 years
c) These rate revenue increases are solely for the purpose of phasing in full funding to the respective asset categories covered in this AMP.
d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

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

Although this strategy achieves full CapEx funding for rate-funded assets over 20 years, the recommendation does require prioritizing capital projects to fit the annual funding available. Current data shows a pent-up investment demand of $206,000 for the Water Network.

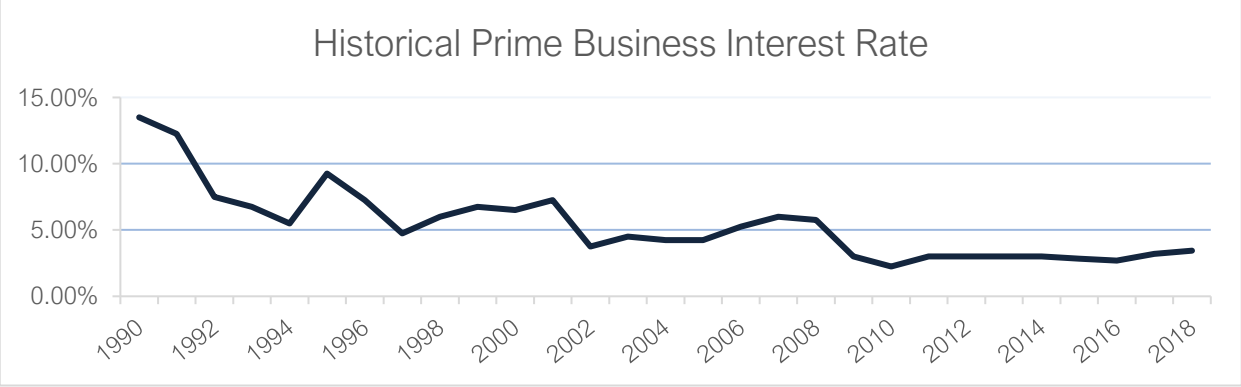
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

7.5 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[11] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

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

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



[11] 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 Alfred & Plantagenet has historically used debt for investing in the asset categories as listed. There is currently $6,083,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $609,000, well within its provincially prescribed maximum of $2,475,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2016	2017	2018	2019	2020
Bridges & Culverts	$0	$0	$0	$0	$0	$0
Non-Core Asset Categories	$2,730,000	$0	$0	$868,000	$427,000	$645,000
Road Network	$0	$0	$87,000	$0	$0	$0
Storm Water Network	$0	$0	$0	$0	$0	$0
Total Tax Funded:	**$2,730,000**	**$0**	**$87,000**	**$868,000**	**427,000**	**$645,000**
Water Network	$229,000	$0	$0	257,000	$0	$0
Sanitary Sewer Network	$3,124,000	$0	$0	$0	$0	$0
Total Rate Funded:	**$3,353,000**	**$0**	**$0**	**$257,000**	**$0**	**$0**

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2021	2022	2023	2024	2025	2026	2031
Bridges & Culverts	$0	$0	$0	$0	$0	$0	$0
Non-Core Asset Categories	$401,000	$401,000	$401,000	$367,000	$276,000	$186,000	$127,000
Road Network	$0	$0	$0	$0	$0	$0	$0
Storm Water Network	$0	$0	$0	$0	$0	$0	$0
Total Tax Funded:	**$401,000**	**$401,000**	**$401,000**	**$367,000**	**$276,000**	**$186,000**	**$127,000**
Water Network	$18,000	$18,000	$18,000	$18,000	$18,000	$18,000	$18,000
Sanitary Sewer Network	$190,000	$190,000	$190,000	$190,000	$190,000	$63,000	$0
Total Rate Funded:	**$208,000**	**$208,000**	**$208,000**	**$208,000**	**$208,000**	**$81,000**	**$18,000**

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

7.6 Use of Reserves

7.6.1 Available Reserves

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

a) the ability to stabilize tax rates when dealing with variable and 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 reserves currently available to the Township.

Asset Category	Balance on December 31, 2020
Road Network	$207,000
Bridges & Culverts	$207,000
Storm Water Network	$207,000
Non-Core Asset Categories	$1,623,000
Total Tax Funded:	**$2,244,000**
Water Network	$2,281,000
Sanitary Sewer Network	$3,058,000
Total Rate Funded:	**$5,339,000**

There is considerable debate in the municipal sector as to the appropriate level of reserves that a Municipality 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 the Township's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

7.6.2 Recommendation

In 2025, Ontario Regulation 588/17 will require the Township 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.

8 Appendices

Key Insights

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

Appendix A: 10-Year Capital Requirements

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

Road Network

Asset Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Curbs	$0	$0	$0	$0	$0	$36,656	$40,409	$106,037	$0	$0	$0
DST Roads	$0	$11,830	$0	$0	$0	$0	$11,830	$0	$0	$0	$0
Gravel Roads	$1,451,617	$440,232	$120,275	$433,477	$621,631	$852,207	$440,232	$120,275	$426,443	$597,075	$883,797
Hot Mix Roads	$2,140,350	$439,035	$181,800	$896,550	$324,450	$1,479,750	$402,000	$61,050	$159,300	$46,650	$102,300
Roadside Appurtenances	$0	$0	$0	$0	$0	$0	$44,760	$0	$0	$0	$0
Sidewalks	$138,600	$397,200	$0	$0	$128,100	$30,000	$116,160	$0	$22,200	$0	$0
Street & Light Fixtures	$363,327	$25,642	$7,873	$0	$1,594	$4,121	$2,879	$31,344	$10,356	$0	$9,898
	$4,093,894	**$1,313,939**	**$309,948**	**$1,330,027**	**$1,075,775**	**$2,402,734**	**$1,058,270**	**$318,706**	**$618,299**	**$643,725**	**$995,995**

Bridges & Culverts

Asset Segment	Backlog	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Bridges	$50,000	$37,000	$0	$0	$7,000	$0	$0	$0	$0	$0	$0
Structural Culverts	$342,784	$265,585	$0	$72,826	$0	$0	$0	$0	$28,328	$0	$0
	$392,784	**$302,585**	**$0**	**$72,826**	**$7,000**	**$0**	**$0**	**$0**	**$28,328**	**$0**	**$0**

Storm Water Network											
Asset Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Catch Basin	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Manholes	$7,252	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$7,252	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Non-Core Asset Categories											
Asset Sub-Category	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Buildings & Facilities	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$795,821
Fleet	$32,297	$0	$229,256	$316,947	$235,804	$244,210	$265,100	$432,843	$363,295	$128,933	$145,400
Machinery & Equipment	$531,685	$339,730	$496,697	$607,642	$249,967	$558,497	$233,017	$551,662	$1,125,251	$548,317	$300,875
Parks & Land Improvements	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$59,606
	$563,982	**$339,730**	**$725,953**	**$924,589**	**$485,771**	**$802,707**	**$498,117**	**$984,505**	**$1,488,546**	**$677,250**	**$1,301,702**

Water Network											
Asset Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Hydrants	$0	$38,334	$38,334	$38,334	$38,334	$38,334	$38,334	$38,334	$38,334	$38,334	$38,334
Mains	$0	$69,000	$69,000	$69,000	$69,000	$69,000	$69,000	$69,000	$69,000	$69,000	$69,000
Meters	$0	$15,326	$15,326	$15,326	$15,326	$15,326	$15,326	$15,326	$15,326	$15,326	$925,114
Water Equipment	$0	$15,333	$15,333	$15,333	$15,333	$15,333	$15,333	$15,333	$15,333	$15,333	$136,216
Water Facilities	$0	$92,000	$92,000	$92,000	$92,000	$92,000	$92,000	$92,000	$92,000	$92,000	$92,000
	$0	**$229,993**	**$229,993**	**$229,993**	**$229,993**	**$229,993**	**$229,993**	**$229,993**	**$229,993**	**$229,993**	**$1,260,664**

Sanitary Sewer Network											
Asset Segment	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Mains	$0	$136,757	$136,757	$136,757	$136,757	$136,757	$136,757	$136,757	$136,757	$136,757	$136,757
Manholes	$0	$12,433	$12,433	$12,433	$12,433	$12,433	$12,433	$12,433	$12,433	$12,433	$12,433
Sanitary Equipment	$0	$43,514	$43,514	$43,514	$43,514	$43,514	$43,514	$43,514	$43,514	$43,514	$43,514
Sanitary Facilities	$0	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432
Service Laterals	$0	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432
Valves	$0	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432	$12,432
	$0	**$230,000**	**$230,000**	**$230,000**	**$230,000**	**$230,000**	**$230,000**	**$230,000**	**$230,000**	**$230,000**	**$230,000**

Asset Portfolio											
Asset Category	**Backlog**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Road Network	$4,093,894	$1,313,939	$309,948	$1,330,027	$1,075,775	$2,402,734	$1,058,270	$318,706	$618,299	$643,725	$995,995
Bridges & Culverts	$392,784	$302,585	$0	$72,826	$7,000	$0	$0	$0	$28,328	$0	$0
Storm Water Network	$7,525	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Non-Core Asset Categories	$3,733,231	$312,099	$725,953	$573,102	$456,874	$775,672	$406,680	$1,211,938	$470,165	$897,646	$2,371,110
Water Network	$0	$229,993	$229,993	$229,993	$229,993	$229,993	$229,993	$229,993	$229,993	$229,993	$1,260,664
Sanitary Sewer Network	$0	$230,000	$230,000	$230,000	$230,000	$230,000	$230,000	$230,000	$230,000	$230,000	$230,000
	$5,058,185	**$2,416,248**	**$1,495,895**	**$2,787,436**	**$2,028,539**	**$3,665,435**	**$2,016,381**	**$1,763,205**	**$2,595,166**	**$1,780,969**	**$3,788,362**

Appendix B: Level of Service Images

Roads – Images of Different Road Type Conditions[12]

Hot Mix Roads	 Asset ID: 4847 Montford Street Condition:20	 Asset ID: 4646 Concession 2 Condition:50	 Asset ID: 5257 Boundary Road Condition:100
Double Surface Treated (DST) Roads	 Asset ID: 4640 Concession 1 Condition:10	 Asset ID: 5333 Concession 10 Condition:50	 Asset ID: 4694 Concession 4 Condition:90
Gravel Roads	 Asset ID: 5038 Boundary Road Condition:10	 Asset ID: 5044 Concession 1 Condition:60	 Asset ID: 5050 Concession 2 Condition:80
Earth Roads	 Asset ID: 5031 Blue Corner Road Condition:20		

[12] Condition Scores are out of 100. A higher value indicates a better condition

Bridges – Images of Alfred-Plantagenet Bridge Conditions

Structure 001 – Poor
Azatica Creek on Concession 5

Alignment of North Guard, Looking West

North Side, Underside and West Abutment

Structure 002 – Very Good
Conc 4 lot 20 Azotica Creek

North Side, Looking East

Southwest End of Guard

Structure 101 – Very Poor
Conc 1 & 2, lot 37 on Conc 2

South Side, Looking East

Northeast abutment, looking East

Structure 102 – Very Poor (Closed)
Conc 1 & 2, lot 37 on Conc 2

West Side, from above

West Side, from below

Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Network (Roads)	Condition	100%	85-100	1
			70-84	2
			55-69	3
			40-54	4
			0-39	5
Road Network (Other Assets) Storm Water Network (Other Assets) Non-Core Assets Water Network (Other Assets) Sanitary Sewer Network (Other Assets)	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Bridges & Culverts	Condition	70%	85-100	1
			70-84	2
			55-69	3
			40-54	4
			0-39	5
	Service Life Remaining (%)	20%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	AADT	10%	0-49	1
			50-199	2
			200-399	3
			400-999	4
			999+	5

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Storm Water Network (Mains)	Condition	70%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	30%	PVC	1
			Ultra-Ribbed	1
			Big 'O'	1
			Concrete	3
			CSP	3
			Red Clay	5
Sanitary Sewer Network (Mains)	Condition	70%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	30%	PVC	2
			Ductile Iron	3
			Asbestos Cement	4
Water Network (Mains)	Condition	70%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	30%	PVC	2
			Transite	4
			Asbestos Cement	4

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Roads)	Economic (80%)	Replacement Cost (100%)	$0-$50,000	1
			$50,000-$100,000	2
			$100,000-$250,000	3
			$250,000-$400,000	4
			$400,000+	5
	Operational (20%)	Number of Lanes (20%)	1	2
			2	4
		AADT (80%)	0-49	1
			50-199	2
			200-399	3
			400-999	4
			999+	5
Road Network (Other Assets) Storm Water Network (Other Assets) Non-Core Assets Water Network (Other Assets) Sanitary Sewer Network (Other Assets)	Economic (80%)	Replacement Cost (100%)	$0-$50,000	1
			$50,000-$100,000	2
			$100,000-$250,000	3
			$250,000-$400,000	4
			$400,000+	5
Bridges & Culverts	Economic (70%)	Replacement Cost (100%)	$0-$150,000	1
			$150,000-$300,000	2
			$300,000-$450,000	3
			$450,000-$600,000	4
			$600,000+	5
	Social (30%)	Detour Distance (50%)	0-2	1
			2-5	2
			5-8	3
			8-10	4
			10+	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Storm Water Network (Storm Mains)	Economic (70%)	Replacement Cost (100%)	$0-$10,000	1
			$10,000-$25,000	2
			$25,000-$50,000	3
			$50,000-$100,000	4
			$100,000+	5
	Operational (30%)	Diameter (100%)	0-150mm	1
			151-300mm	2
			301-500mm	3
			501-750mm	4
			751mm+	5
Sanitary Sewer Network (Sanitary Mains)	Economic (70%)	Replacement Cost (100%)	$0-50,000	1
			$50,000-150,000	2
			$150,000-250,000	3
			$250,000-400,000	4
			$400,000+	5
	Operational (30%)	Pipe Diameter (100%)	0-50mm	1
			51-150mm	2
			151-250mm	3
			251-450mm	4
			451mm+	5
Water Network (Water Mains)	Economic (70%)	Replacement Cost (100%)	$0-100,000	1
			$100,000-500,000	2
			$500,000-1,000,000	3
			$1,000,000-2,500,000	4
			$2,500,000+	5
	Operational (30%)	Pipe Diameter (100%)	0-50mm	1
			51-150mm	2
			151-250mm	3
			251-400mm	4
			401mm+	5

Appendix D: Condition Assessment Guidelines

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

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

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

Role of Asset Condition Data

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

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

Guidelines for Condition Assessment

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

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

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

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

Developing a Condition Assessment Schedule

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

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