Asset Management Plan

Township of Cramahe

2022

CRAMAHE
It's In Our Nature

This Asset Management Program was prepared by:

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

Key Statistics

Replacement cost of asset portfolio
$117.0 million

Replacement cost of infrastructure per household
$42.174 (2021)

Percentage of assets in fair or better condition
49%

Percentage of assets with assessed condition data
45%

Annual capital infrastructure deficit
$1.8 million

Recommended timeframe for eliminating annual infrastructure deficit
10 Years / 20 Years

Target reinvestment rate
2.75%

Actual reinvestment rate
1.19%

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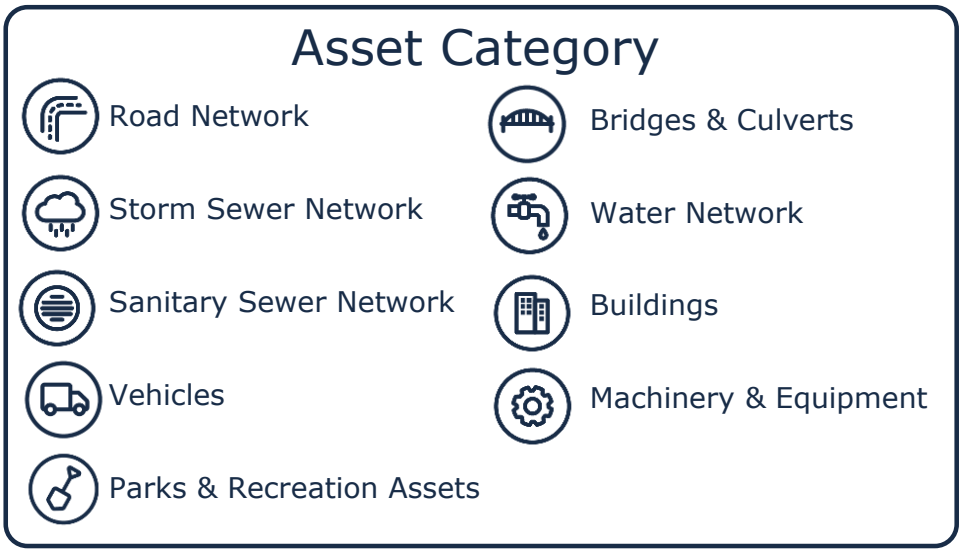
Executive Summary

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.

1.1 Scope

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

This AMP include the following asset categories:



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

1.2 Findings

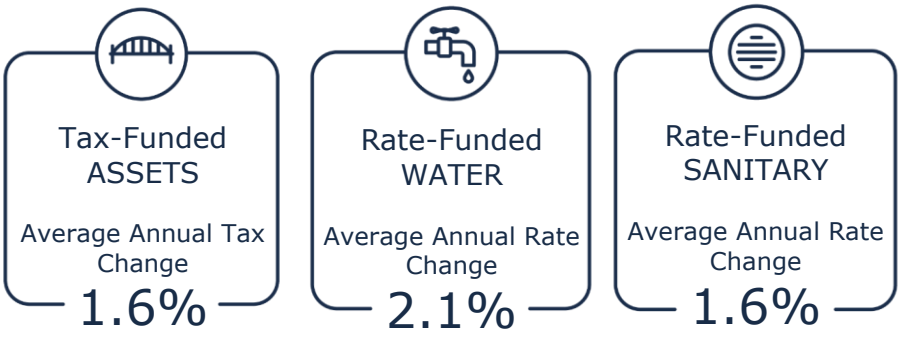
The overall replacement cost of the asset categories included in this AMP totals $116.9 million. 49% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 45% of assets. For the remaining 55% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.
The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads, surface treated roads, bridges and culverts, sanitary sewer mains) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Township's average annual capital requirement totals $3.2 million. It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the Township. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources.

Annual Deficit
Per Household

1.3 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 and 20-year plan for rate-funded asset:



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

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

1 Introduction & Context

Key Insights

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

1.1 Cramahe Community Profile

Census Characteristic	Township of Cramahe	Ontario
Population 2021	6,509	14,223,942
Population Change 2016-2021	2.4	5.8
Total Private Dwellings	2,772	5,929,250
Population Density (people/ square kilometers)	32.2	15.9
Land Area In Square Kilometers	202.22	892,411.76

The Township of Cramahe is located in Northumberland County of Central Ontario, part of the Greater Golden Horseshoe. The Township consists of largely rural area with the largest settlement area called Colborne. Cramahe was incorporated as a township in 1850 and Colborne became an important service centre for the region since 1840s. In 2001, the Township of Cramahe and the Village of Colborne was subject to a municipal amalgamation.

The close proximity to Cobourg, Peterborough, Oshawa, and Toronto allows residents to commute to larger cities for work. Colborne is a main service centre in the Township to provide goods and services for local residents. However, the predominant form of land use in the Township is residential and seasonal resort development along the lakeshore.

According to the Census data, the population of Township of Cramahe has increased from 5,713 in 2001 to 6,509 in 2021, which is equivalent to a 14% increase. As per the Official Plan, the population is projected to reach 6,990 and the employment forecast of 2,200 by 2031. The Township is planning to build 750 homes to fulfill the demands of the growing population. Cramahe will direct eighty-five percent growth to the Colborne Urban Area and the remaining to all rural areas of the Township.

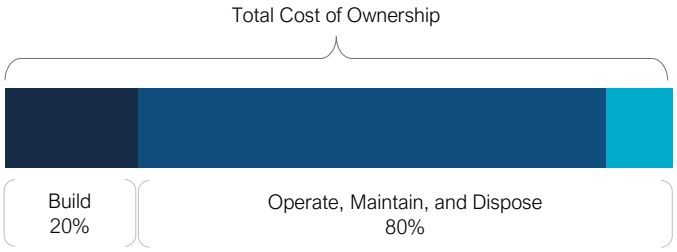
The Township focuses on intensification within the built boundary for growth and of the protection and conservation of environmental sensitive areas and natural heritage. Municipal staff have identified the road network as the primary infrastructure priority. Current design of the Township's transportation network is not capable to serve the heavy traffic coming from Ontario 401 Highway. Staff are aiming to expand the road network and improve the level of service through a series of rehabilitation and replacement projects.

Secondary infrastructure priorities focus on water and wastewater system which is restricted to Colborne at present. The Township aims to increase the capacity for drinking water storage and upgrade the sewer mains in certain area in the coming years. A long-term plan for the wastewater treatment plant expansion is proceeding because current wastewater treatment plant is reaching the capacity.
Risk-based project prioritization is essential for capital planning since major infrastructure projects are heavily reliant on the availability of grants. Staff hope to support continuous growth by investing in critical infrastructure and advancing their asset management program.

1.2 An Overview of Asset Management

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

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



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

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

1.2.1 Asset Management Policy

An asset management policy represents a statement of the commitment to the development and implementation of the Township of Cramahe's asset management program. It guides the organization-wide asset management activities, facilitate logical and evidence-based decision making for the management of municipal infrastructure assets and to support the delivery of sustainable community services.

The Township adopted the Asset Management Policy in accordance with Ontario Regulation 588/17 on July 2nd, 2019.

The approval of this policy is important to integrate the Township's strategic mission, vision and goals with its asset management program, and ensuring the critical municipal infrastructure assets and vital services are maintained and provided to the community in a reliable, sustainable manner. The essential services include transportation networks, stormwater management, facilities and parks and other infrastructure.

1.2.2 Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the Township plans to achieve asset management objectives through planned activities and decision-making criteria. The Township's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

1.2.3 Asset Management Plan

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

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

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

1.3 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.

1.3.1 Lifecycle Management Strategies

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

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

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

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

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

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

1.3.2 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.

1.3.3 Levels of Service

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

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

Community Levels of Service

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

Technical Levels of Service

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

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

Current and Proposed Levels of Service

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

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

1.4 Ontario Regulation 588/17

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

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

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

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

2024

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

2025

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

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

1.4.1 O. Reg. 588/17 Compliance Review

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

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

2 Scope and Methodology

Key Insights

- This asset management plan includes 9 asset categories and is divided between tax-funded and rate-funded categories
- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation
- Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life

2.1 Asset Categories Included in this AMP

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

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

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges & Culverts	
Storm Sewer Network	
Buildings & Facilities	
Parks & Recreation Assets	
Vehicles	
Machinery & Equipment	
Water Network	User Rates
Sanitary Sewer Network	

2.2 Deriving Replacement Costs

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

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

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the

absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the Township incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

2.3 Estimated Useful Life and Service Life Remaining

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

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

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

2.4 Reinvestment Rate

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

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

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

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

2.5 Deriving Asset Condition

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

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

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

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

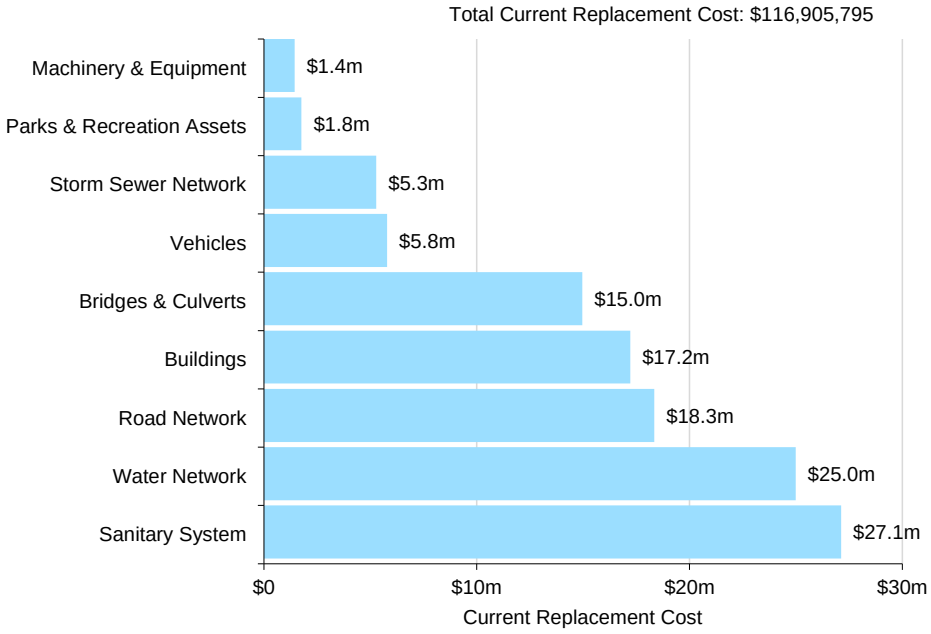
3 Portfolio Overview

Key Insights

- The total current replacement cost of the Township's asset portfolio is $117 million
- 49% of all assets are in fair or better condition
- 22% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements of approximately $3.2 million per year across all assets

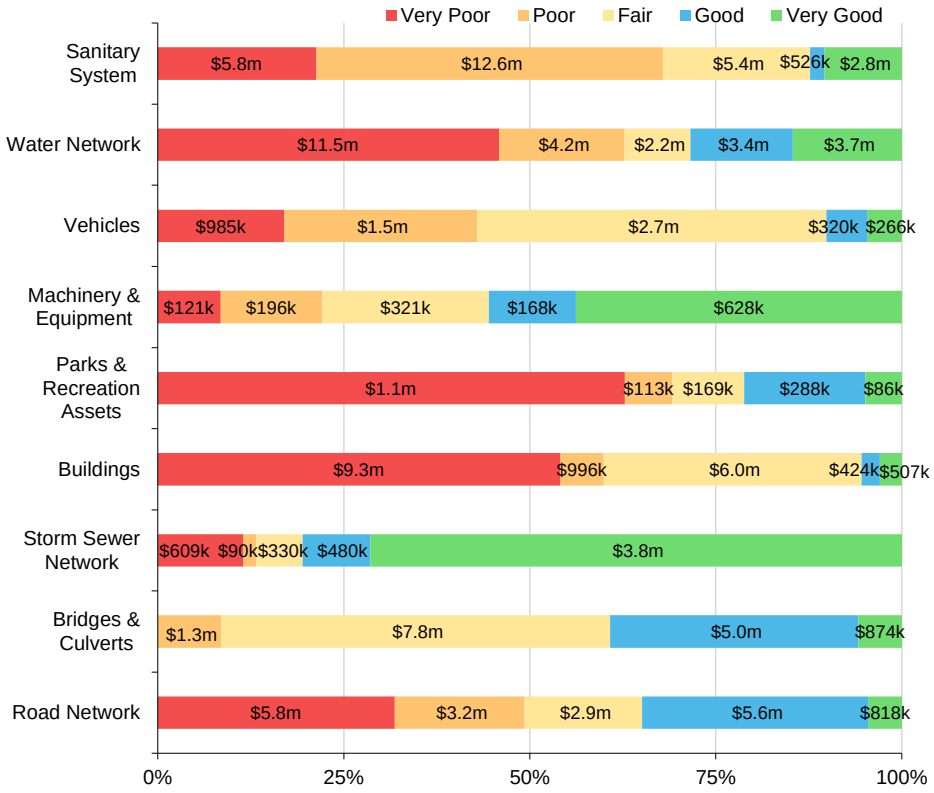
3.1 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total current replacement cost of $117 million based on inventory data from 2021. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.



3.2 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 49% of assets in Cramahe are in fair or better condition. This estimate relies on both age-based and field condition data.



Value and Percentage of Assets by Replacement Cost

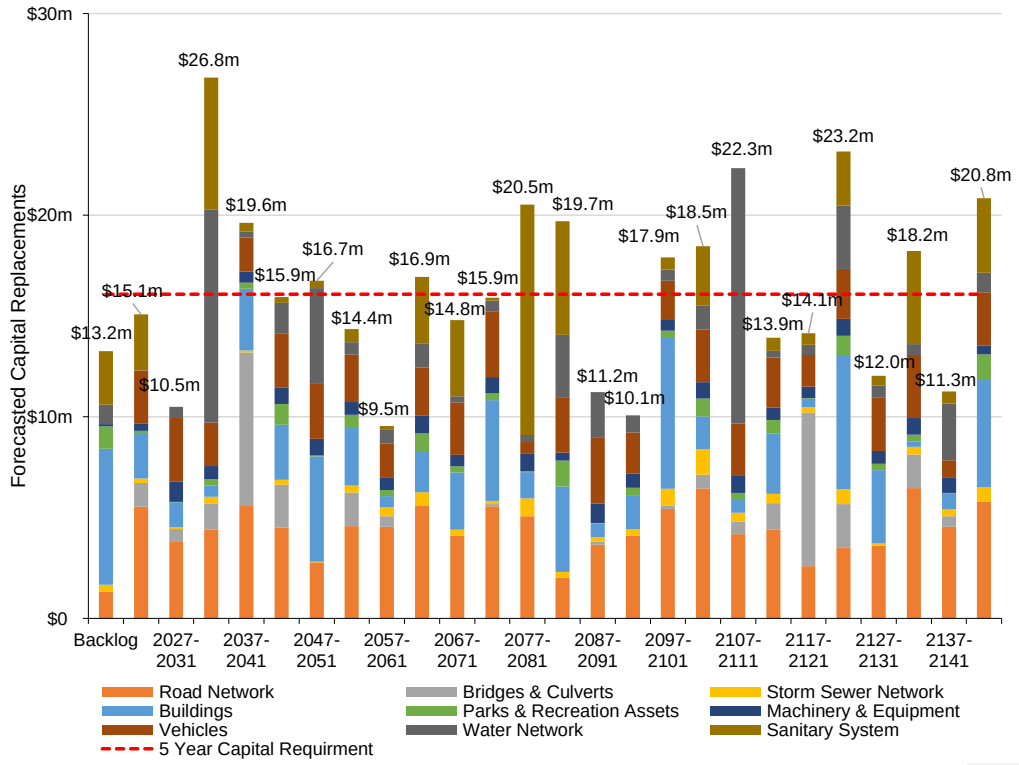
This AMP relies on assessed condition data for 45% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Road Network	Paved Roads	98%	2017 Road Needs Study
	Surface Treated Roads	87%	2017 Road Needs Study
	Gravel Roads	100%	2017 Road Needs Study
	Street Lights	87%	Staff Estimates
	Other Roadside Assets	0%	N/A
Bridges & Culverts	Bridges	95%	2017 OSIM Report
	Structural Culverts	100%	2017 OSIM Report
	Non-OSIM Culvert	0%	N/A
Storm Sewer Network	All	0%	N/A
Buildings & Facilities	All	0%	N/A
Machinery & Equipment	All	52%	Staff Estimates
Vehicles	All	94%	Staff Estimates
Park & Recreation Assets	All	0%	N/A
Water Network	All	0%	N/A
Sanitary Network	Sanitary Sewers	86%	Staff Estimates
	Other Sanitary Assets	0%	N/A

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, the Township can produce an accurate long-term capital forecast.
Current backlog for all the assets has reached $13.2 million where buildings and facilities is the largest contributor. The average annual capital requirement for all assets is $3.2 million.

The following graph identifies capital requirements from 2022 to 2146. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average capital requirements.



4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at $65 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 $2.4 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

4.1 Road Network

The Road Network is a critical component of the provision of safe and efficient transportation services. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including sidewalks and streetlights.

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

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

Replacement Cost	Condition	Financial Capacity	
$18.3 million	Poor (39.8%)	Annual Requirement:	$883,635

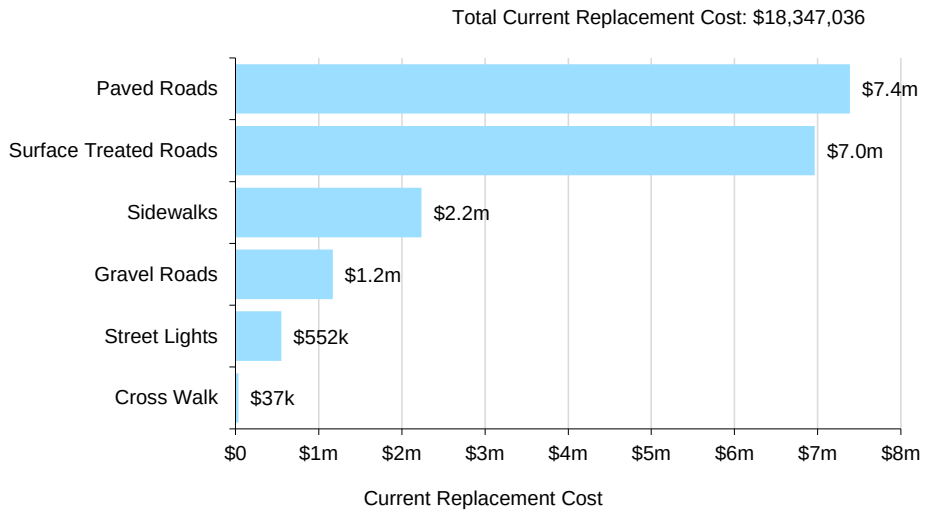
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Scope	The Road Network service is conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and is available under all most conditions.
Safe & Regulatory	The Road Network in poor condition with limited inspection for signage may result in increase probability of hazards and causing road closures.
Affordable	The Annual Capital Reinvestment Rate of the Road Network is 3.70%
Reliability	The Road Network is in poor condition which may result in unplanned service interruptions and road closures.

4.1.1 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	Primary Replacement Cost Method	Total Replacement Cost
Paved Roads	20,718 m	Cost per unit	$7,387,200
Surface Treated Roads	119,957 m	Inflated 2016 User-Defined Cost	$6,965,484
Street Lights	450	Inflated 2016 User-Defined Cost	$551,668
Sidewalks	2,174 m	Inflated 2016 User-Defined Cost	$2,236,230
Cross Walk	15 m	Inflated 2016 User-Defined Cost	$36,539
Gravel Roads	78,360 m	Cost per unit	$1,169,915[1]
			$18,347,036



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

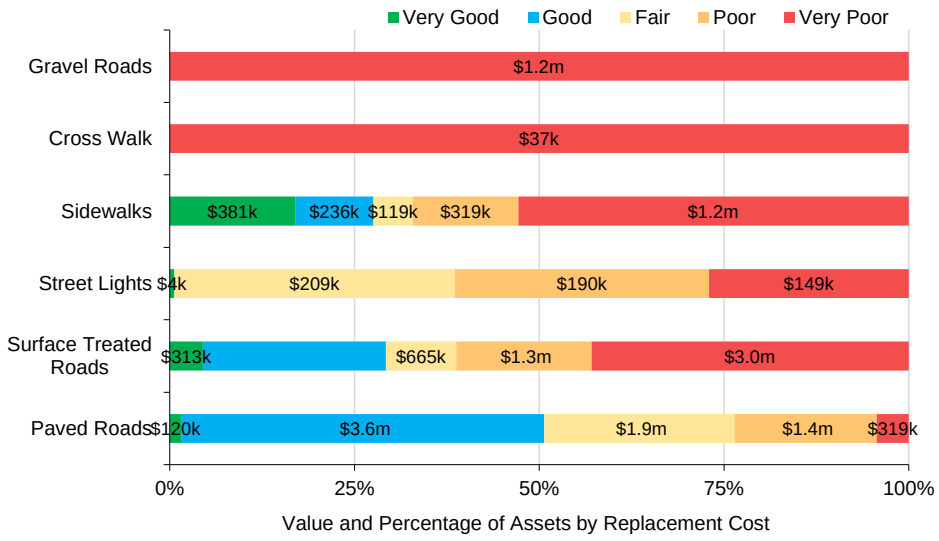
[1] This is only the capital portion of the replacement costs, and the additional operating expenses are not included here.

4.1.2 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. The average condition is not a good indicator for gravel roads because gravel roads are perpetually re-stoned every three years.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Paved Roads	51%	Fair	98% Assessed
Surface Treated Roads	37%	Poor	87% Assessed
Street Lights	35%	Poor	87% Assessed
Sidewalks	31%	Poor	Age-Based
Cross Walk	9%	Very Poor	Age-Based
Gravel Roads	0%	Very Poor[2]	100% Assessed
	40%	**Poor**	**82% Assessed**

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



[2] The assessed condition for gravel roads, which was based on a score prorated from the 2017 Road Needs Study, is not a good indicator because the study is outdated. Gravel roads are perpetually re-stoned every 3 years.

To ensure that the Township's 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 Road Network.

Current Approach to Condition Assessment

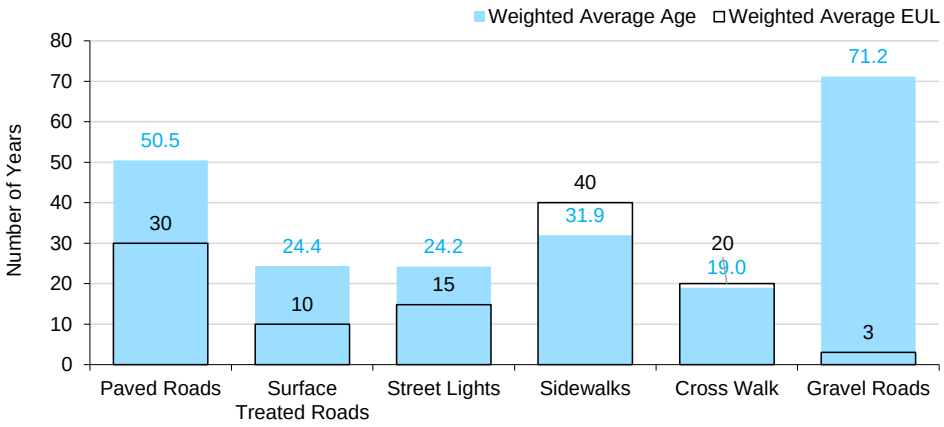
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Inspections are performed on an as needed basis, partially informed by complaints.
- Soil material testing is required in some areas where hazardous material is present.
- A Road Needs Study was completed by external contractors in 2017 that included a detailed assessment of the condition of each road segment
- The Road Needs Study is renewed every five years by external contractors

4.1.3 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Paved Roads	50.5	30
Surface Treated Roads	24.4	10
Street Lights	24.2	15
Sidewalks	31.9	40
Cross Walk	19.0	20
Gravel Roads	71.2[3]	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.

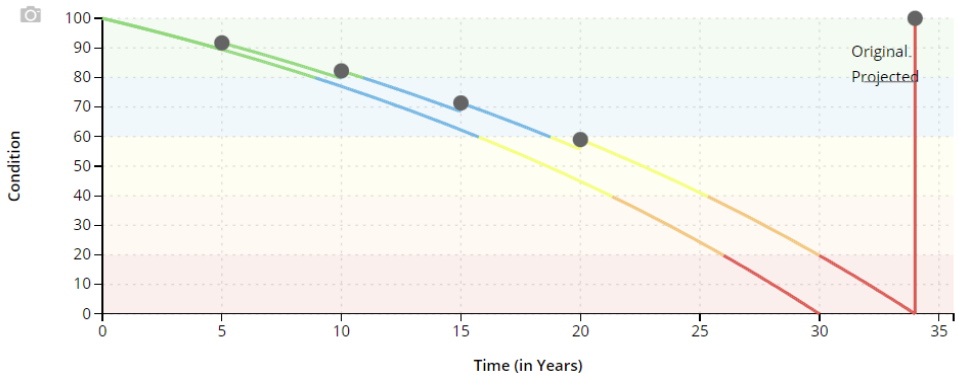
[3] The gravel roads are perpetually re-stoned every three years.

4.1.4 Lifecycle Management Strategy

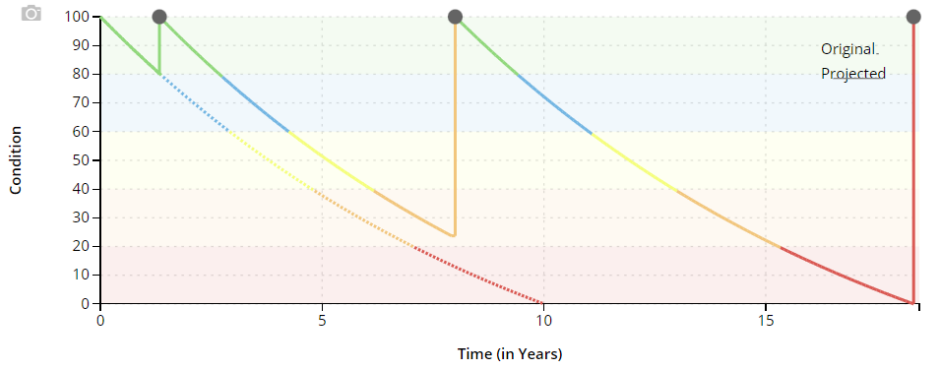
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

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

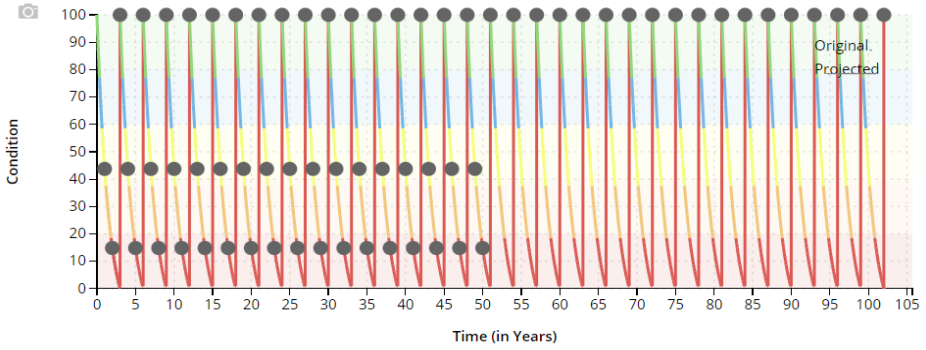
Paved Roads (HCB)		
Event Name	**Event Class**	**Event Trigger**
Crack Sealing	Preventative Maintenance	Repeated every 5 years 4 times
Full Reconstruction	Replacement	0% Condition



Surface Treated Roads		
Event Name	**Event Class**	**Event Trigger**
Cold Patch / Hot Mix Repairs	Preventative Maintenance	80% Condition
Single Lift Surface Treatment	Rehabilitation	7-8 years
Full Reconstruction	Replacement	0% Condition



Gravel Roads		
Event Name	**Event Class**	**Event Trigger**
Dust Suppressant	Maintenance	Repeat annually
Grading	Maintenance	Repeat annually
Gravelling – Adding Material	Rehabilitation	Repeat every 3 years[4]

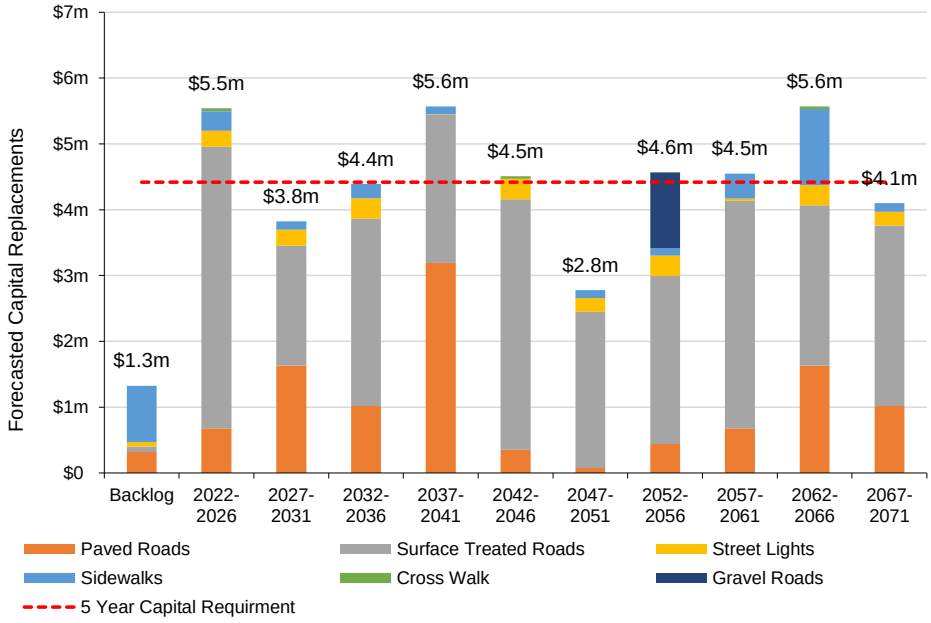


[4] The Unit Cost for re-stoning is $14.93/m. Due to the TCA thresholds set by the Township, gravelling costs are assumed to be operating and excluded from this plan. Future investigation should determine an appropriate portion of gravelling costs to be included as capital.

Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for Paved and Surface Treated roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the Road Network.

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2071. Current backlog for the Road Network is $1.3 million and the annual capital requirement is $883,634.71. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.1.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
	Average Annual Daily Traffic (Health and Safety)
	Speed Limit (Health and Safety)

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

Risks to Current Asset Management Strategies

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

Climate Change & Extreme Events

The trend of climate change-induced extreme precipitation events is projected to continue. Severe rainfall and drought, or increased temperature can impact service availability and usage. Flooding can tax the existing drainage system and damage roads. The Township maintains a large Road Network that could be impacted from more rapid freeze-thaw cycles, contributing to pavement deterioration. As a result, higher maintenance and rehabilitation requirements are expected to maintain the same level of service, to avoid complaints, liabilities, and larger capital spending. To improve asset resiliency, staff should identify the critical areas and improve drainage through enhanced lifecycle strategies.

Aging Infrastructure

Rapid expansion of the Road Network occurred in the 1950s, resulting in large cohorts of roads now exceeding 70 years of service life. A higher volume of traffic and heavy vehicles accelerate the deterioration of road surfaces. The large historical investments are now coming due for renewal and replacement, requiring either large expenditures or a decrease in service provision. The municipality will need to invest approximately $0.9 million, with the Roads network requiring the most capital. Finding a balance between meeting service demands and maintaining affordability will require the Township to employ strategic lifecycle management and prioritization of critical assets.

4.1.6 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the Road Network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement and sidewalk condition	The Township completed a Road Needs Study in November 2017 in coordination with D.M. Wills Associates Limited. Every road section received a surface condition rating (1-10). (1-5) Road surface exhibits moderate to significant deterioration and requires renewal or full replacement within 1-5 years (6-10) Road surface is in good condition or has been recently re-surfaced. Renewal or reconstruction is not required for 6-10+ years

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	1.00
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	1.24
	Average duration of planned road closures	6 days
	Number of planned road closures per year	1
Safe & Regulatory	Number of service requests related to road condition	39
	Percentage of signs inspected for reflectivity	0%
	Number of service requests related to sidewalk condition	2
Affordable	O&M costs for paved roads / lane-km (excluding winter control)	$1,747.66[5]
	O&M costs for surface treated roads / lane-km (excluding winter control)	$2,235.93
	O&M costs for unpaved roads / lane-km (excluding winter control)	$1618.17
	Winter control costs / lane-km	$431.06
Quality	Average pavement condition index for paved roads in the municipality	51%
	Average surface condition for surface treated roads in the municipality	37%
	Average surface condition for unpaved roads in the municipality	0.1%[6]

[5] Where the number of lanes was not specified, it was assumed that the road had two lanes.

[6] The average condition is not a good indicator for gravel roads because gravel roads are perpetually re-stoned every three years.

4.1.7 Recommendations

Asset Inventory

- Review cross walk and streetlight inventory to determine whether all municipal assets within these asset segments have been accounted for.
- The streetlights inventory includes several pooled assets that should be broken into discrete segments to allow for detailed planning and analysis.
- Continue to update the unit replacement costs which reflect current tender pricing.

Condition Assessment Strategies

- The last comprehensive assessment of the Road Network was completed in 2017. Consider completing an updated assessment of all roads within the next 1-2 years.
- Consider developing a condition score that utilizes the routine inspection records.

Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for paved roads, surface treated roads and gravel roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Establish a suitable annual costing for the re-gravelling of gravel roads.
- 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

Bridges and Culverts represent a critical portion of the transportation services provided to the community. The Department of Public Works is responsible for the maintenance 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.

The state of the infrastructure for the Bridges & Culverts is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$15.0 million	Fair (58%)	Annual Requirement:	$ 193,540

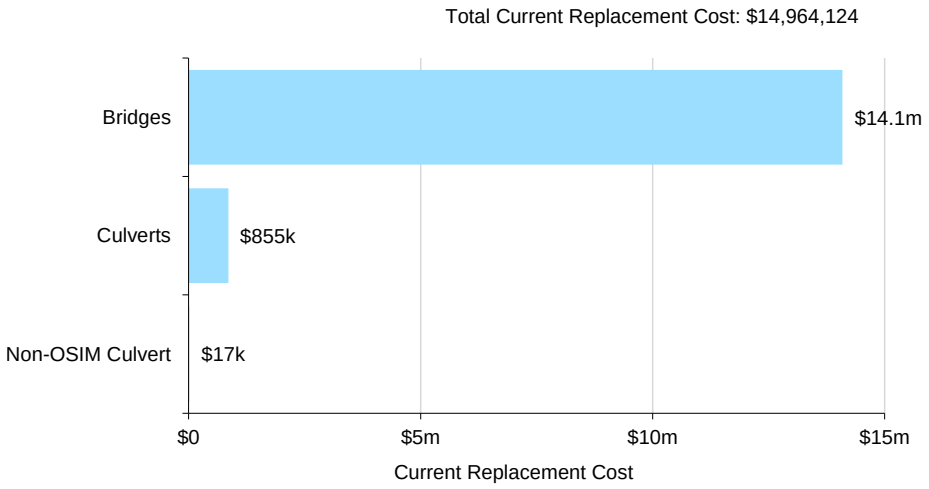
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Scope	Bridges and Culverts are conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and are available under most weather conditions. None of the bridges have dimensional or loading restrictions.
Safe & Regulatory	Limited inspection of bridges and structural culverts may result in unplanned structure closures or increase probability of hazards.
Affordable	The Annual Capital Reinvestment Rate of the Bridges and Culverts is 1.25%
Reliability	The Bridges and Culverts are in fair condition with minimal unplanned service interruptions and bridge closures.

4.2.1 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 and Culverts inventory.

Asset Segment	Quantity	Primary Replacement Cost Method	Total Replacement Cost
Bridges	19 (40)	CPI Tables	$14,092,403
Culverts	2 (4)	CPI Tables	$854,934
Non-OSIM Culvert	1	CPI Tables	$16,787
			$14,964,124



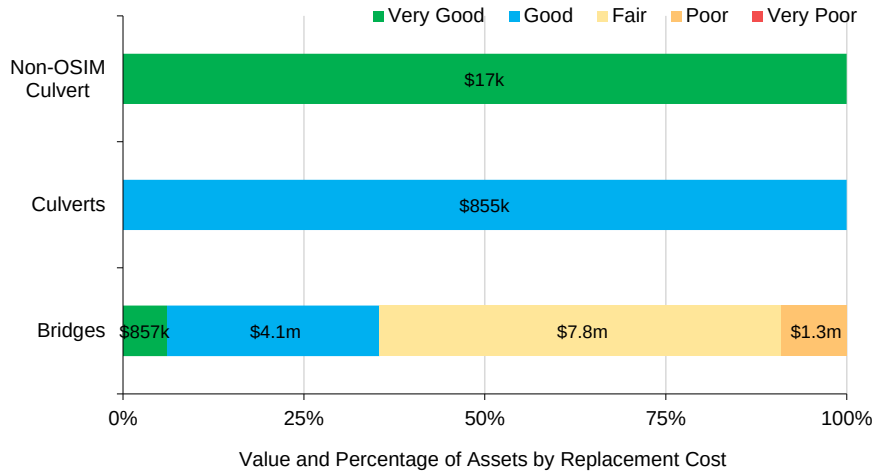
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.2.2 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	58%	Fair	95% Assessed[7]
Culverts	62%	Good	100% Assessed
Non-OSIM Culvert	99%	Very Good	Age-Based
	58%	**Fair**	**95% Assessed**

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



Value and Percentage of Assets by Replacement Cost

To ensure that the Township 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 and Culverts.

[7] The assessed condition of bridges and culverts are the weighted condition rating estimated based on the condition rating for each component in the OSIM report.

Current Approach to Condition Assessment

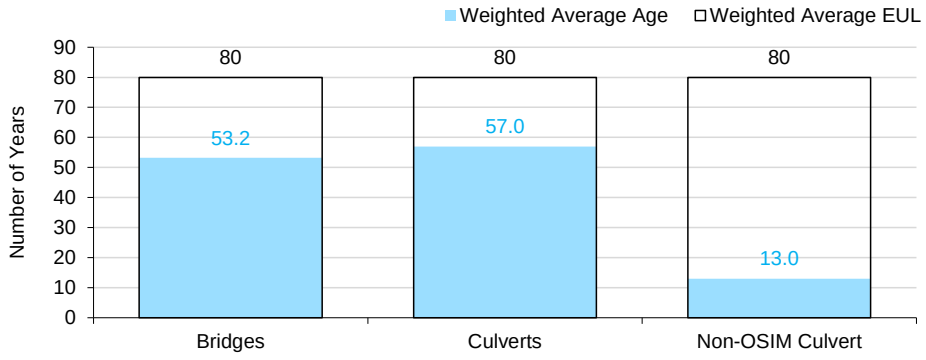
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

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

4.2.3 Estimated Useful Life & Average Age

The Estimated Useful Life for bridges and 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. The Profile Lifecycle Estimated Useful Life and weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Bridges	53.2	80
Culverts	57.0	80
Non-OSIM Culvert	13.0	80



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.

4.2.4 Lifecycle Management Strategy

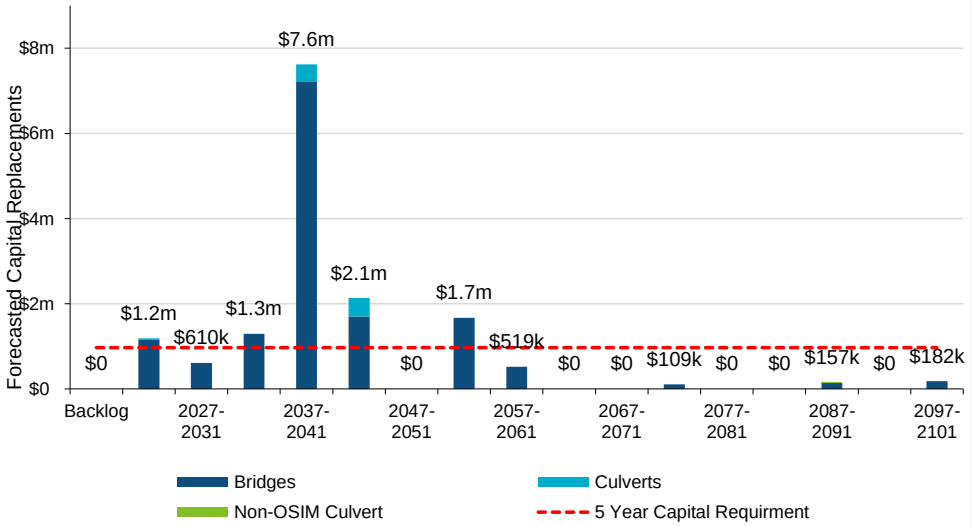
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	Annual bridge washing is conducted in the Spring. Other maintenance items include deck sealing, guardrail repair, and expansion joint maintenance as needed.
	Snow removal is a significant operating cost. Locations and timing are directed from the Minimum Maintenance Standards (MMS) criteria.
	All lifecycle activities are driven by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIM)
Inspection	The most recent inspection report was completed in 2017 by D.M. Wills Associates Limited.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2101 and the Annual Capital Requirement is $193,539.58. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.

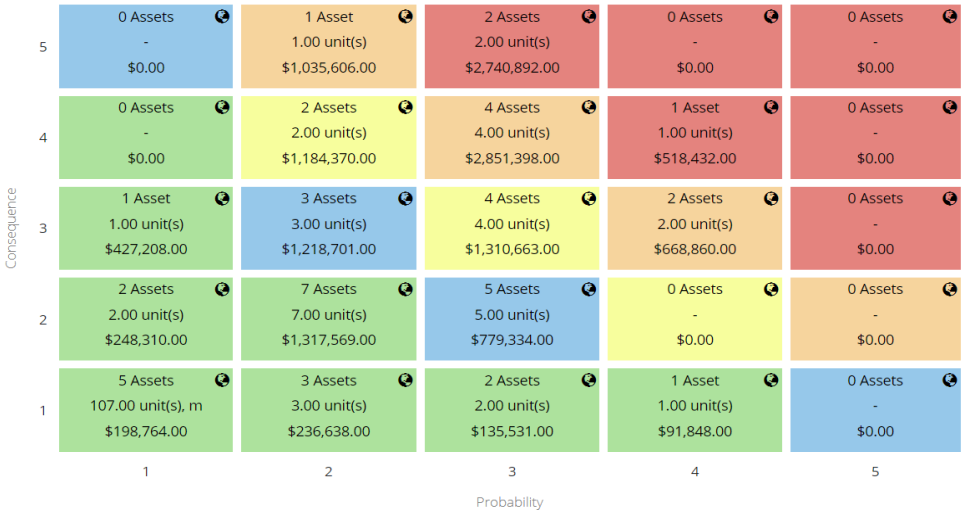


The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.2.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.



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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
	Average Annual Daily Traffic (Social)
	Special Route (Health and Safety)
	Speed Limit (Health and Safety)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-

specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

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

Climate Change & Extreme Events

Flooding and extreme weather causes damage to multiple components of the Township's bridges including the deck, superstructure, substructure, and approaches. The rising levels of freshwater and the increased frequency and intensity of precipitation events are likely to accelerate the deterioration of bridge components. The Township also should consider prioritizing infrastructure maintenance, rehabilitation, and replacement based on susceptibility to climate impacts.

Capital Funding Strategies

Major capital rehabilitation projects for Bridges and Culverts are entirely dependant on the availability of grant funding opportunities. The Township should continue to complete regular inspections according to the Ontario Structural Inspections Manual (OSIMs) and utilize the assessment recommendations for the development of lifecycle strategies and capital planning. The Township should also consider updating asset replacement costs and event costs on a cyclical basis to improve the effectiveness of capital planning.

4.2.6 Levels of Service

The following tables identify the Township's current level of service for Bridges and 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 and Culverts.

Service Attribute	Qualitative Description	Current LOS (2021)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the municipal transportation network. None of the Township's structures have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges	See Appendix B
	Description or images of the condition of culverts and how this would affect use of the 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 and Culverts.

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Percentage of bridges in the Township with loading or dimensional restrictions	0%
	Number of unplanned Structure closures	1
	Average duration of unplanned structure closures	365 days
Safe & Regulatory	Percentage of bridges and structural culverts inspected every two years	0%
Affordable	O&M costs for bridges & culverts per m^2	$9,969.33
	Annual capital reinvestment rate	1.25%
Quality	Average bridge condition index value for bridges in the Township	58%
	Average bridge condition index value for structural culverts in the Township	62%

4.2.7 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.
- Consider developing a condition score utilizing the inspection records.
- Continue to update the unit replacement costs which reflect current tender pricing.

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 only includes capital costs associated with the reconstruction of Bridges and Culverts. The Township should work towards identifying projected capital rehabilitation and renewal costs for Bridges and Culverts and integrating these costs into long-term planning.

Levels of Service

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

4.3 Storm Sewer Network

The Township is responsible for owning and maintaining a storm sewer network of a 6.2 km of storm sewer mains, catch basins and other supporting infrastructure.

Staff are working towards improving the accuracy and reliability of their storm sewer network inventory to assist with long-term asset management planning.

The state of the infrastructure for the Storm Sewer Network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$5,282,582	Good (76%)	Annual Requirement:	$83,531

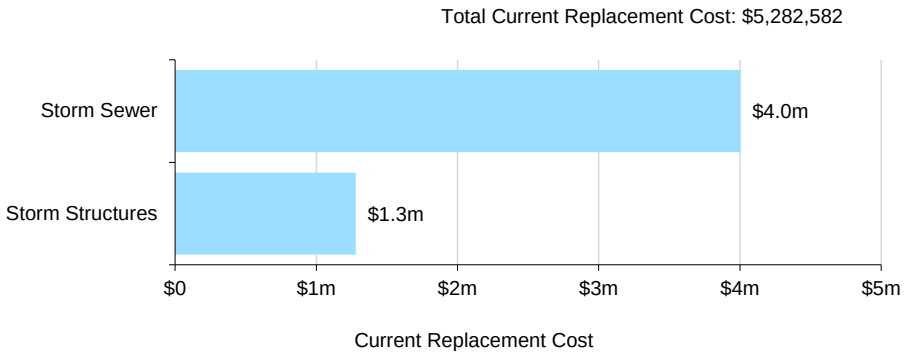
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Scope	Some areas of the Township are protected from flooding by the municipal Storm Sewer Network.
Safe & Regulatory	All of Storm Sewer Network within the municipality is resilient to a 5-year storm.
Affordable	The Annual capital reinvestment rate of the Storm Sewer Network is 0.17%.
Performance	The Storm Sewer Network is overall in good condition with average condition rates of 76%, and 87% of the assets are in fair or better condition.

4.3.1 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 Sewer Network inventory.

Asset Segment	Quantity	Primary Replacement Cost Method	Total Replacement Cost
Storm Sewer	6,172 m	Inflated 2016 User-Defined Cost	$4,002,862
Storm Structures	208	Inflated 2016 User-Defined Cost	$1,279,720
			$5,282,582



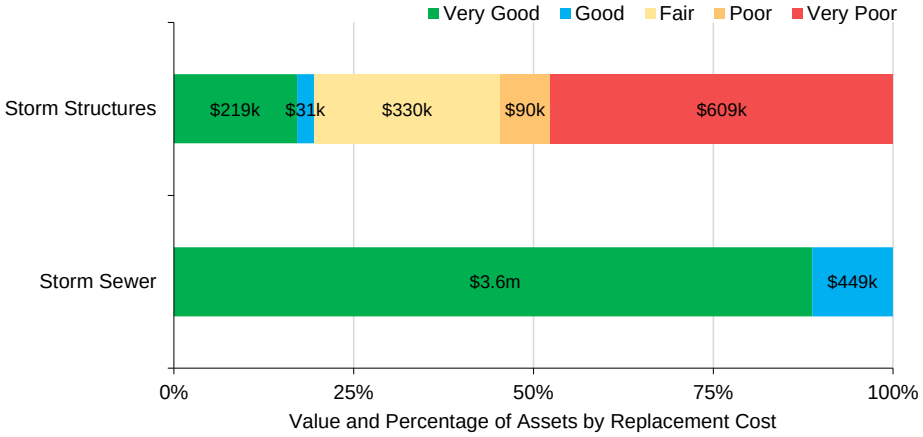
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.3.2 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
Storm Sewer	89%	Very Good	Age-based
Storm Structures	36%	Poor	Age-based
	76%	**Good**	**Age-based**

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



To ensure that the Township's Storm 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 Storm Sewer Network.

Current Approach to Condition Assessment

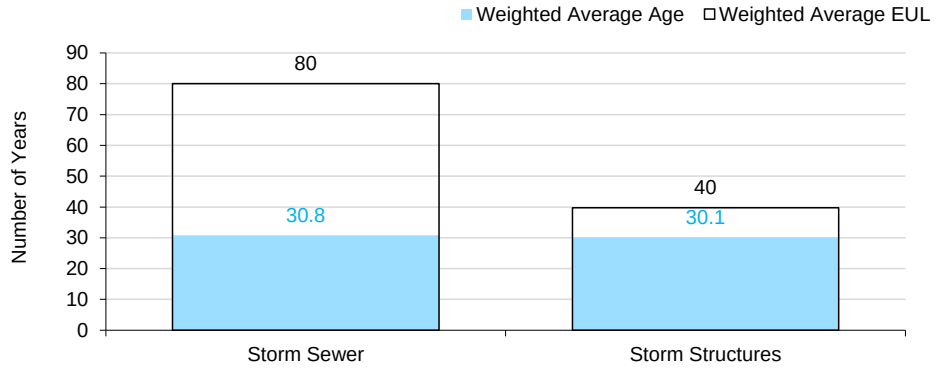
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- There are no formal condition assessment programs or CCTV Program in place for the Storm Sewer Network
- As the Township refines the available asset inventory for the Storm Sewer Network, a regular assessment cycle should be established

4.3.3 Estimated Useful Life & Average Age

The Estimated Useful Life for stormwater 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Storm Sewer	30.8	80
Storm Structures	30.1	40



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

4.3.4 Lifecycle Management Strategy

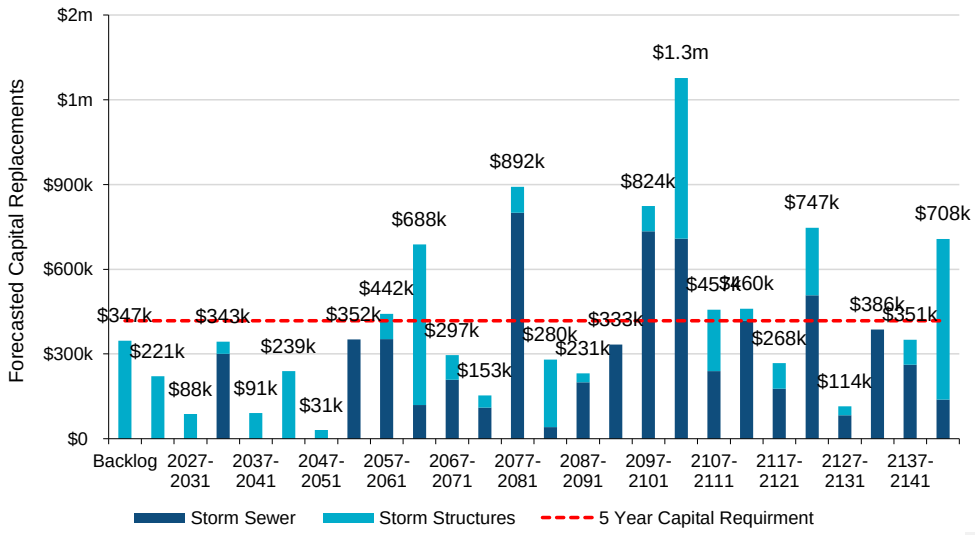
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Driveway culvert maintenance is performed as-needed, generally complaint based. Crushed culverts are replaced, and culverts with significant sedimentation are flushed.
	The road right-of-way is mowed on an annual basis.
	The engineered storm ponds are cleaned on a 10–15-year cycle. Sumps in catch basins are vacuumed out on an annual basis.
	Pipe flushing is performed as needed, removing winter sand buildup.
	Currently, no system-wide flushing or CCTV program in place.
Rehabilitation	Trenchless relining is not considered to be an effective strategy for storm pipes, considering they are smaller diameter than sanitary pipes.
Replacement	Replacements are failure driven, as this is considered more cost-effective than proactive replacements. Since the storm mains are generally lower risk than the road, water, or sanitary network, a reactive strategy is acceptable.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2146. Current backlog for the Storm Sewer Network is $347,462 which is mainly composed of catch basins and manholes. The average Annual Capital Requirement is $83,530.96. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.3.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
Pipe Material	Average Annual Daily Traffic (Social)

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

Risks to Current Asset Management Strategies

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

Lifecycle Management Strategies

The current lifecycle management strategy for Storm Sewer Network is considered reactive. There are no formal condition assessment programs in place for the Storm Sewer Network. This poses a risk of service disruption when assets failure occurs. An enhanced proactive strategy can be developed for critical assets to extend the service life of the assets, reduce the risk of service disruption, and reduce grant dependency.

Infrastructure Design & Extreme Weather Events

Past designs of the Storm Sewer Network are currently inadequate since the extreme weather impacts currently are much greater than at the time of design. The design of the Storm Sewer Network is not built to withstand the peak flows and may cause flooding and damage roads. Even though the township has not identified any immediate impacts on service delivery resulting from flooding, it poses a risk when extreme precipitation events is projected to continue. To improve asset resiliency, staff should identify the critical areas and incorporating a monitoring and maintenance program to support infrastructure resiliency and help mitigate the risk.

4.3.6 Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2021)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal Storm Sewer Network	A piped drainage system of approximately 6.2 kilometres is present in the Township, mainly located in Colborne. The Storm Sewer Network is consisting of sewer mains, manholes and catch basins. Storm sewer mains are managed in segments from road intersection to road intersection.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Number of service requests related to surface flooding	15
	Percentage of catch basins cleaned every annually	100%
Safe & Regulatory	Percentage of properties in municipality resilient to a 100-year storm	TBD[8]
	Percentage of the municipal stormwater management system resilient to a 5-year storm	100%
Affordable	O&M Cost / km of storm sewer mains	$2,197.89

[8] No assessment has been done to date.

	Annual capital reinvestment rate	0.17%
Sustainable	Percentage of the Storm Sewer Network that is in good or very good condition	81%
	Percentage of the Storm Sewer Network that is in poor or very poor condition	13%

4.3.7 Recommendations

Asset Inventory

- The storm structures inventory includes catch basins, manholes and inlets should be broken into discrete segments to allow for detailed planning and analysis.
- There is no location or identification system available for the storm pipes. As the network grows the Municipality should consider specifying identifiers for the start and end points of each linear asset.
- Continue to update the unit replacement costs which reflect current tender pricing.

Condition Assessment Strategies

- The development of a comprehensive inventory should be accompanied by a system-wide assessment of the condition of storm mains and storm laterals in the stormwater network through CCTV inspections.
- Consider determining a consistent condition rating criteria to assess the storm structures.

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

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

4.4 Buildings & Facilities

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

- Keeler Centre
- Art Gallery
- Public Library
- Municipal Offices
- Fire Halls
- Storage Buildings and Garage

The state of the Buildings and Facilities is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$17.2 million	Poor (28%)	Annual Requirement:	$ 552,734

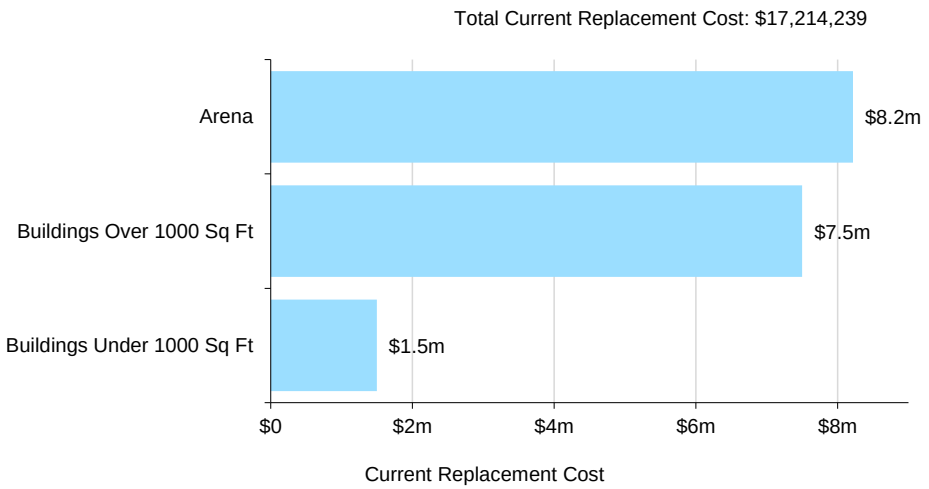
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Performance	The Buildings and Facilities are in poor condition without any reported safety issues, 40% of the Buildings and Facilities are in fair or better condition.
Accessible & Reliable	The Buildings and Facilities have some unplanned facility closures.
Safe & Regulatory	None of the user group complaints are related to unsafe condition.

4.4.1 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 and Facilities inventory.

Asset Segment	Quantity (components)	Primary Replacement Cost Method	Total Replacement Cost
Arena	1 (85)	Inflated 2016 User-Defined Cost	$8,216,127
Buildings Over 1000 Sq Ft	10 (43)	Inflated 2016 User-Defined Cost	$7,500,519
Buildings Under 1000 Sq Ft	7 (9)	Inflated 2016 User-Defined Cost	$1,497,593
			$17,214,239



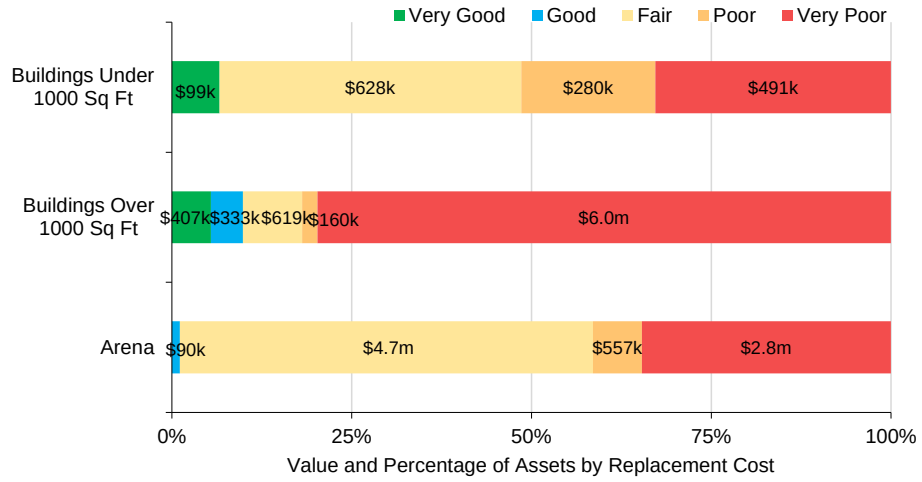
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.4.2 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
Arena	37%	Poor	Age-Based
Buildings Over 1000 Sq Ft	16%	Very Poor	Age-Based
Buildings Under 1000 Sq Ft	34%	Poor	Age-Based
	28%	**Poor**	**Age-Based**

The age-based condition may not be a precise indicator to represent the actual building condition. The Township should review and update the estimated useful life of the building components or conduct a building assessment to improve the accuracy.
The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



To ensure that the Township's Buildings and Facilities continues to provide an acceptable level of service, the Township should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance,

rehabilitation and replacement activities is required to increase the overall condition of the buildings and facilities.

Current Approach to Condition Assessment

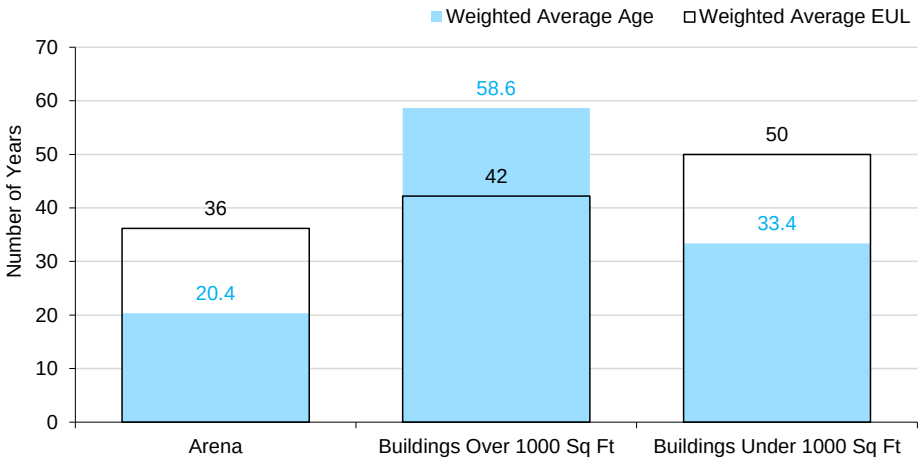
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Health and safety inspection by internal staff is completed monthly
- Municipal buildings are subject to internal inspections on an as-needed basis
- Currently, there are no formal condition structural assessment programs for building assets in place

4.4.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Buildings and Facilities 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Arena	20.4	36
Buildings Over 1000 Sq Ft	58.6	42
Buildings Under 1000 Sq Ft	33.4	50



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

4.4.4 Lifecycle Management Strategy

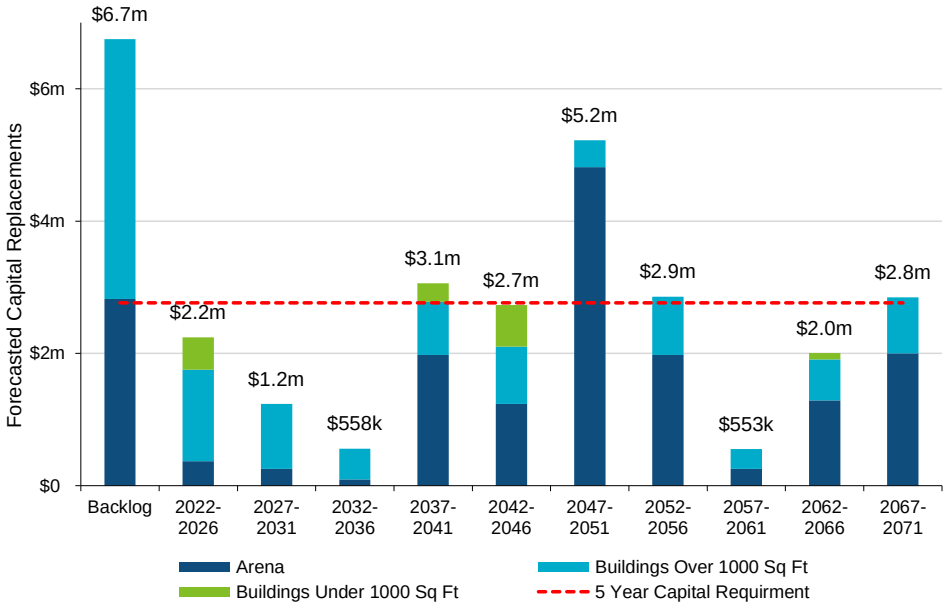
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following table outlines the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

Activity Type	Description of Current Strategy
Maintenance	Municipal buildings are subject to regular inspections for health & safety requirements
	Maintenance activities are undertaken as a result of internal inspections, prioritizing activities related to health and safety and regulatory compliance.
	Critical buildings (Fire Stations etc.) have a regular inspection, maintenance and rehabilitation schedule
Rehabilitation / Replacement	Currently no maintenance and rehabilitation schedule for municipal builidngs in place, the maintenance are dealt with on needed basis
	Refurbishments and replacements are projected out for the next 1–2 years. The Township is moving towards a 5–10 year proactive planning horizon.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2071. Current backlog for Buildings and Facilities is $6.7 million and the Annual Capital Requirement is $552,734.29. The backlog might be overstated when it is identified based on the age-based condition. It is recommended to conduct a building condition assessment to evaluate the actual building condition and the backlog.

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



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

4.4.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
	Function (Health and Safety)

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

Risks to Current Asset Management Strategies

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

Growth & Demographic Change

The population of the Township is projected to grow to 7,013 by 2034. The Township needs to prioritize expanding its capacity to serve a larger population. Residents that have moved from larger urban centres have a higher expectation on buildings and facilities. On the other hand, a significant portion of the population will be approaching retirement in the next decade. As residents are aging, there will be more demand for accessibility services, and health services in general. The Township is required to increase capital and operating costs for expanding services, enhance accessibility. Setting realistic levels of service targets and developing a comprehensive long-term capital plan with considerations for growth can be helpful to increase the capacity strategically.

Aging Infrastructure & Capital Funding Strategies

Many building assets in the Township are reaching the end of their estimated useful life. There is currently a backlog of approximately $13.2M for all assets, with Buildings & Facilities accounting for $6.7M. Several buildings require replacements of major components in the coming years. Major capital rehabilitation projects for buildings and facilities will be heavily reliant on the availability of grant funding opportunities. The Township should consider performing internal building structure inspections on a regular cycle and document all deficiencies. With the inspection data, a 5-to-10-year proactive facilities replacement /rehabilitation plan can be developed to reduce grant dependency and prevent deferral of capital works.

4.4.6 Levels of Service

The following table outlines the Township's current quantitative metrics that determine the technical level of service provided by the buildings and facilities.

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Number of unplanned facility closures	2
	Square Meter of indoor recreation facilities per 1,000 people	$663.54
Safe & Regulatory	Number of user group complaints	10
	Number of health and safety inspections per facility	92
	Number of service requests about unsafe conditions in facilities	0
Sustainable	O&M cost / Number of municipal facilities	$23,119.91
	Total equivalent kWh energy consumption / m^2 of all buildings and facilities	175.88
	Annual capital reinvestment rate	0.74%
	Percentage of facilities that are in good or very good condition	5%
	Percentage of facilities that are in poor or very poor condition	60%

4.4.7 Recommendations

Asset Inventory

- Several Buildings and Facilities have exceeded their estimated useful life. Review the estimated useful life values and ensure they reflect the true service life as utilized by staff.
- The estimated useful life values should be reviewed to ensure they match the true service life of each building.

Replacement Costs

- A number of replacement costs for Buildings and Facilities were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Continue to gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.

Condition Assessment Strategies

- The Township should implement and expand the scope of regular condition assessments for all Buildings and Facilities to better inform short- and long-term capital requirements.
- Review assets that have surpassed their estimated useful life to determine if immediate rehabilitation or 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

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

4.5 Vehicles

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

- Public Works vehicles for winter control activities and the maintenance of the Transportation Network
- Fire vehicles to provide emergency services
- Community Services vehicles to address service requests in the Community and maintain the Buildings and Facilities

The state of the Vehicles is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$5.8 million	Fair (41%)	Annual Requirement:	$ 468,947

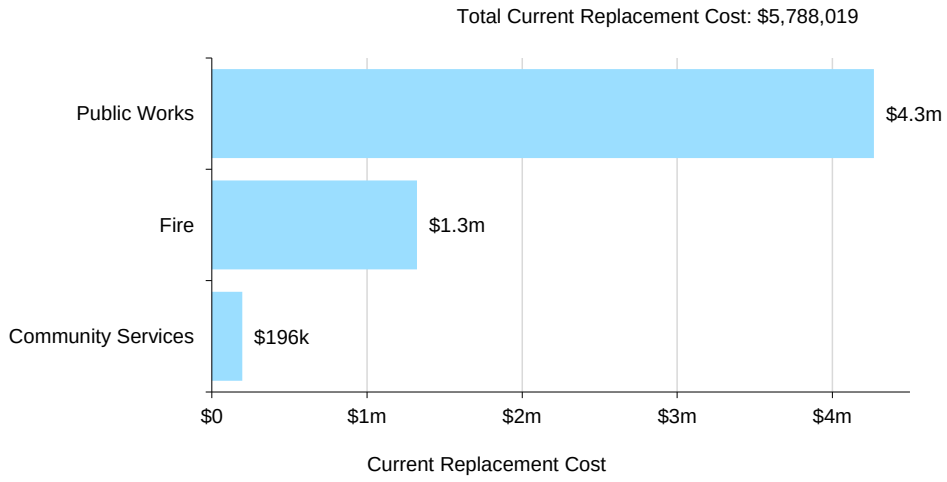
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Performance	The Vehicles owned by the Township are in overall fair condition with average condition rate of 41%, and 57% of the vehicles are in fair or better condition.
Accessible & Reliable	Most of the vehicles in service can perform its primary function.
Safe & Regulatory	All the vehicles have completed the regulated MTO maintenance inspections.
Affordable	The annual capital reinvestment rate for vehicles is 0.90%

4.5.1 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 Vehicles.

Asset Segment	Quantity	Primary Replacement Cost Method	Total Replacement Cost
Community Services	3	Inflated 2016 User-Defined Cost	$196,340
Fire	9	Inflated 2016 User-Defined Cost	$1,323,367
Public Works	24	Inflated 2016 User-Defined Cost	$4,268,312
			$5,788,019



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

4.5.2 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
Protection Services	44%	Fair	Age-Based
Recreation and Cultural Services	49%	Fair	Age-Based
Transportation Services	39%	Poor	Age-Based
	41%	**Fair**	**Age-Based**

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

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

Current Approach to Condition Assessment

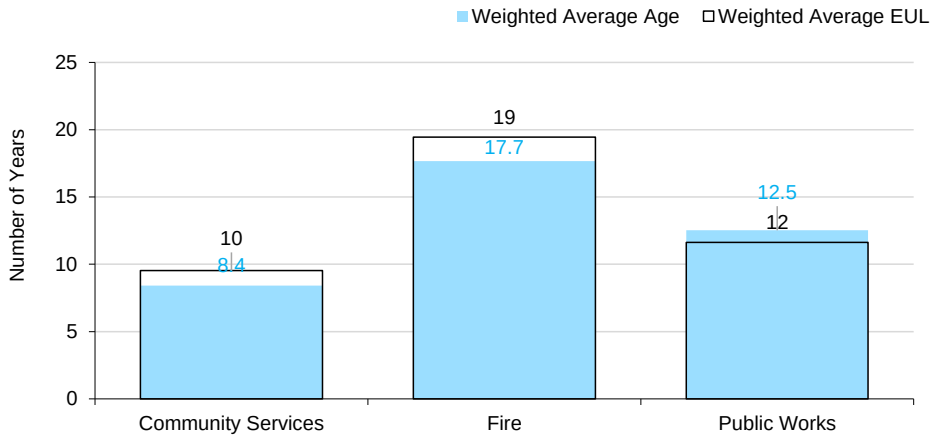
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Visual inspections on vehicles are completed and documented by in-house staff to ensure they are in state of adequate repair prior to operation.
- CVOR vehicles have detailed inspections on an annual basis.
- Non-CVOR vehicle inspections have less formality and are completed mainly for safety on a regular basis.
- Fire apparatus on trucks have annual pump testing from emergency vehicle technicians. Pump functionality is tested on weekly basis in house.

4.5.3 Estimated Useful Life & Average Age

The Estimated Useful Life for vehicles 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Protection Services	8.4	10
Recreation and Cultural Services	17.7	19
Transportation Services	12.5	12



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

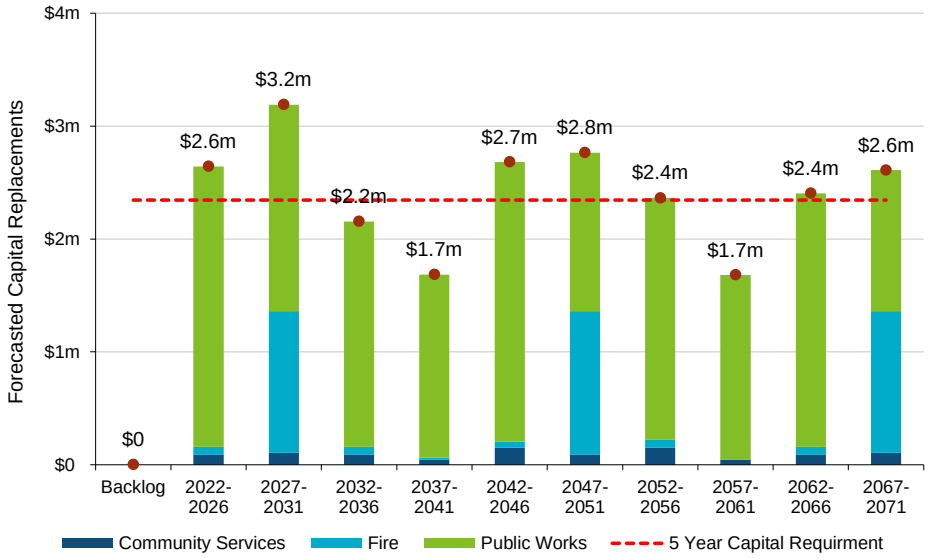
4.5.4 Lifecycle Management Strategy

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Currently, most maintenance and rehabilitation recommendations are completed by 3rd party mechanics.
	Oil changes are completed based on mileage driven
	License stickers, and registration if needed under CVOR, are competed on an annual basis
	Tire changes, fluid top up, minor component changes, such as wipers, are completed on an as needed basis. Certain specialty parts, such as electronics or sensors, have been cited to be scarce at times
Replacement	Fire department pumpers and tankers are replaced at the end of a 20-year lifecycle, fire support vehicles are replaced at the end of year 10
	Public Work vehicles are constrained by budget limitations, resulting in some trucks being replaced 12-16 years into lifecycle
	Generally, vehicles are operated past the industry standard recommendations for replacements

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2071 and the Annual Capital Requirement is $468,947.05. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.5.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
	Fleet Type (Economic)
	Services (Health and Safety)

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

Risks to Current Asset Management Strategies

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

Aging Infrastructure and Funding Strategies

Several vehicles within the Township are approaching or have exceeded their estimated useful life. As vehicles age, they will require exponentially increasing O&M costs to ensure compliance with MTO standards and to function adequately. As capital budgets become more constrained, more maintenance will be postponed, which will further amplify this risk. Replacement and major rehabilitation of the Vehicles are entirely dependant on the availability of reserve fund. Committing to a dedicated vehicle reserve contribution can be helpful to prevent deferral of critical vehicle replacement and reduce the risk of service disruption. The Township should consider updating asset replacement costs and event costs on a cyclical basis to improve the effectiveness of capital planning.

4.5.6 Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Average % of time a vehicle is in service and capable of performing its primary function	95%
	Percentage of vehicles with preventative maintenance overdue	0%
Safe & Regulatory	Percentage of regulated MTO maintenance inspections completed	100%
	Number of vehicles safety inspections completed per year per vehicle	1
Affordable	O&M cost per vehicle	$9,099.8
	Annual Capital Reinvestment Rate	0.90%
Sustainable	Percentage of vehicles that are in good or very good condition	10%
	Percentage of vehicles that are in poor or very poor condition	43%

4.5.7 Recommendations

Replacement Costs

- Several vehicles have exceeded their estimated useful life. Review the estimated useful life values and ensure they reflect the true service life as utilized by staff.
- Gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk vehicles. Consider developing the condition rating criteria and document the condition rating of the assets for rehabilitation or replacement projection.
- 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

- 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.

4.6 Parks & Recreation Assets

The Township owns a number of parks and recreation assets, including:

- Athletic Fields, Tennis Courts
- Parking Lots
- Playground
- Bike Paths and Walking Trails

The state of the Parks and Recreation assets are summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$1.8 million	Poor (23%)	Annual Requirement:	$ 93,811

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

Service Attribute	Level of Service Statement
Performance	The Parks and Recreation assets owned by the Township are in overall poor condition with average condition rate of 23%, and 69% of the Parks and Recreation assets are in poor or very poor condition.
Safe & Regulatory	The playground or park are inspected once a month however there are service requests about unsafe condition.
Affordable	The Annual Capital Reinvestment Rate for Parks and Recreation Assets is 2.44%.

4.6.1 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 Parks and Recreation assets.

Asset Segment	Quantity (components)	Primary Replacement Cost Method	Total Replacement Cost
Athletic Fields	3(18)	Inflated 2016 User-Defined Cost	$1,133,720
Bike Paths /Walking Trails	2	Inflated 2016 User-Defined Cost	$34,255
Parking Lots	7	Inflated 2016 User-Defined Cost	$231,123
Park Assets	1(87)	Inflated 2016 User-Defined Cost	$51,901
Playground Equipment	2	CPI Tables	$158,418
Retension Ponds	1	Inflated 2016 User-Defined Cost	$70,148
Tennis Courts	1(2)	Inflated 2016 User-Defined Cost	$83,791
			$1,763,356

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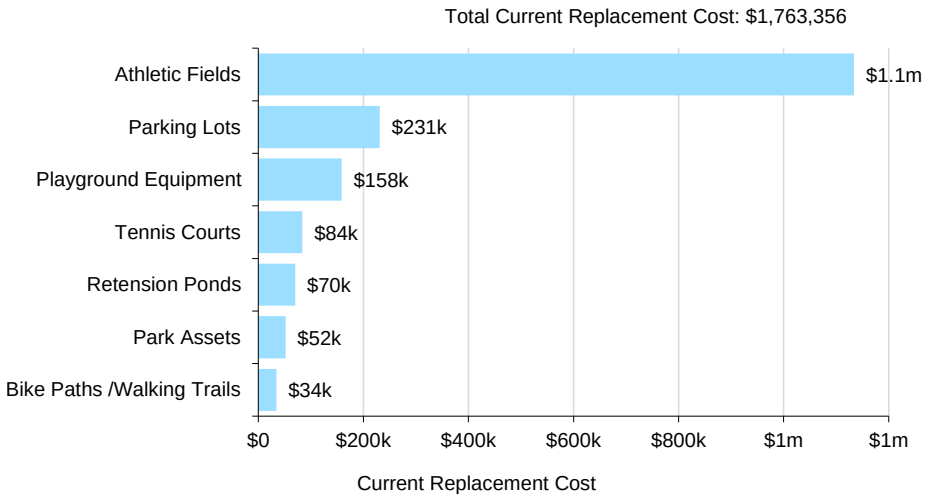


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

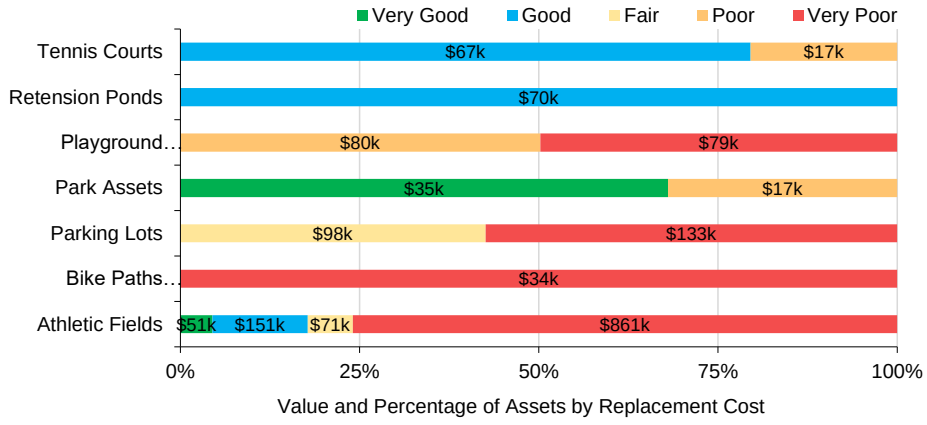
4.6.2 Asset Condition

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
Athletic Fields	17%	Very Poor	Age-Based
Bike Paths /Walking Trails	0%	Very Poor	Age-Based
Parking Lots	22%	Poor	Age-Based
Park Assets	72%	Good	Age-Based
Playground Equipment	13%	Very Poor	Age-Based
Retension Ponds	76%	Good	Age-Based
Tennis Courts	66%	Good	Age-Based
	23%	**Poor**	**Age-Based**

The age-based condition may not be an accurate indicator of the actual condition. The Township can review and update the estimated useful life of the Parks and Recreation assets to improve the accuracy of condition scores.

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



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

Current Approach to Condition Assessment

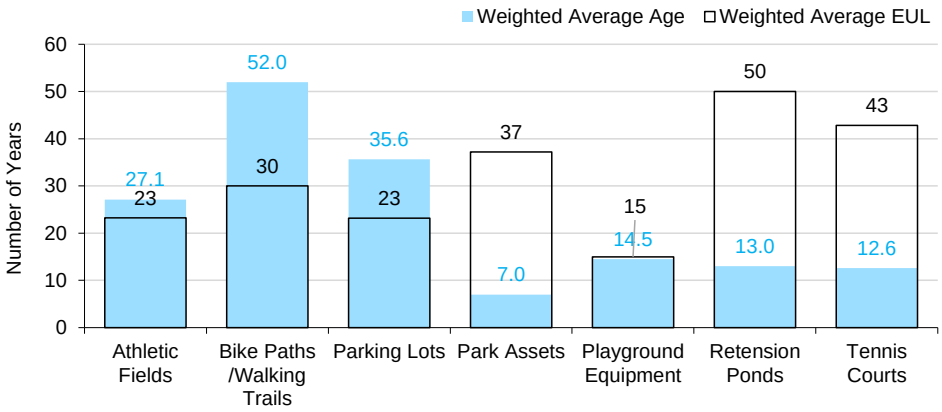
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Regular visual inspections of parks are completed by in-house staff on a weekly basis
- Play structures are inspected by in-house staff on a monthly basis for CSA compliance
- Sports fields are inspected monthly, or in response to user group planning

4.6.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Parks and Recreation 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Athletic Fields	27.1	23
Bike Paths /Walking Trails	52.0	30
Parking Lots	35.6	23
Park Assets	7.0	37
Playground Equipment	14.5	15
Retension Ponds	13.0	50
Tennis Courts	12.6	43



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.

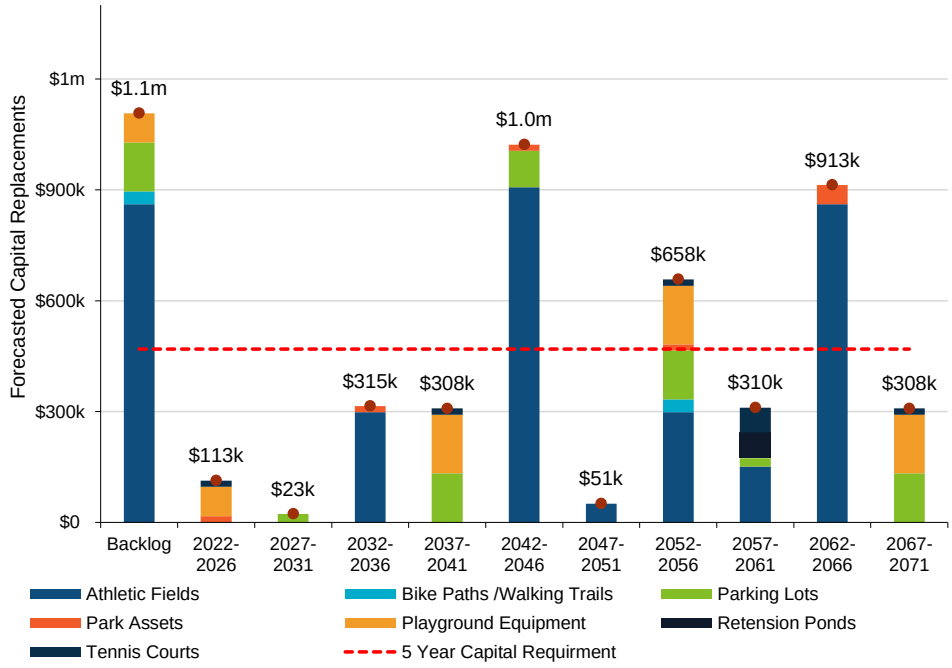
4.6.4 Lifecycle Management Strategy

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Parks are subjected to scheduled mowing and landscaping, prescribed by asset usage and season
	All trails are seasonal and do not require winter maintenance. In the past trail inspection and maintenance was undertaken by a volunteer group; going forward the Township will maintain trails
Replacement	Asset that falls in operating budget are replaced until it reaches its end-of-life

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2071. Current backlog for Parks and Recreation assets are $1.1 million and the average Annual Capital Requirement is $93,811.09. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.6.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
	Function (Health and Safety)

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

Risks to Current Asset Management Strategies

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

Growth & Community Expectations

The Census data indicates that the population of the Township has grown to 6509 in 2021 and it is projected to grow to 7,013 by 2034. The residents in the Township expect to have more Parks and Recreation assets, such as basketball courts, tennis courts and trails. The Township is required to increase capital and operating costs for expanding capacity and maintain current levels of service. Finding a balance between meeting service demands and maintaining affordability will require the Township to employ strategic lifecycle management and prioritization of critical assets.

4.6.6 Levels of Service

The following table outlines the Township's current quantitative metrics that determine the technical level of service provided by Parks and Recreation assets.

Service Attribute	Technical Metric	Current LOS (2021)
Safe & Regulatory	Number of service requests about unsafe conditions in parks	1
	Number of inspections per playground/park per month	1
Affordable	O&M cost per household	$7.31
	Annual Capital Reinvestment Rate	2.44%
Sustainable	Percentage of parks and recreation assets that are in good or very good condition	21%
	Percentage of parks and recreation assets that are in poor or very poor condition	69%

4.6.7 Recommendations

Replacement Costs

- Gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.
- The estimated useful life values should be reviewed to ensure they match the true service life of the Parks and Recreation assets.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment. Consider developing the condition rating criteria and document the condition rating of the assets for rehabilitation or replacement projection.
- 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

- 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.

4.7 Machinery & Equipment

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

- Water equipment to maintain water services
- Fire equipment to support the delivery of emergency services
- Public Work equipment to provide winter control activities and support transportation services
- Other equipment to support administration services and community services

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

The state of the Machinery & Equipment is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$1.4 million	Good (60%)	Annual Requirement:	$ 143,653

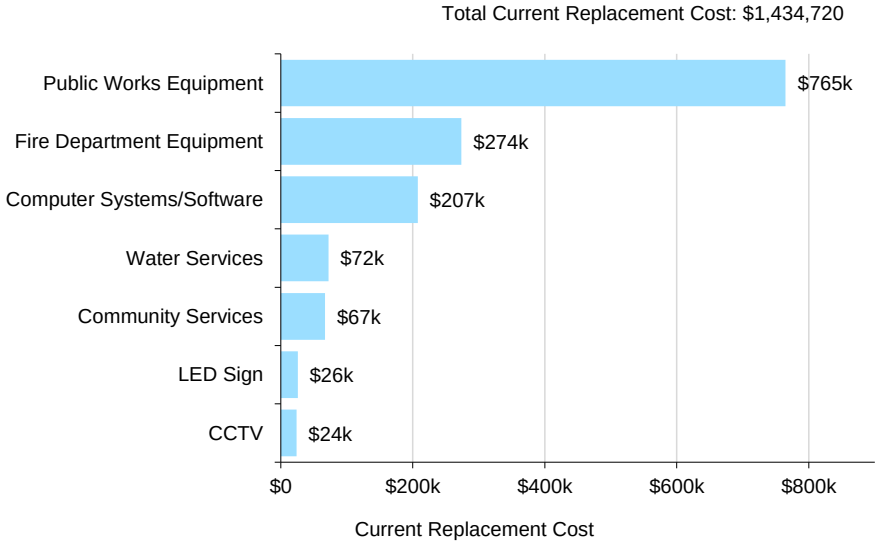
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Performance	The machinery and equipment owned by the Township are overall in good condition with average condition rate of 60%, and 55% of the Machinery & Equipment is in good or very good condition.
Safe & Regulatory	All Machinery & Equipment have completed the regulated maintenance and inspection activities.
Affordable	The Annual Capital Reinvestment Rate for Machinery and Equipment is 14.29%.

4.7.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Primary Replacement Cost Method	Total Replacement Cost
CCTV	1	CPI Tables	$23,961
Community Services	4	Inflated 2016 User-Defined Cost	$67,060
Computer Systems/Software	2	CPI Tables	$207,480
Fire Department Equipment	103	Inflated 2016 Unit Cost	$273,550
LED Sign	1	Inflated 2016 User-Defined Cost	$25,720
Public Works Equipment	33	Inflated 2016 User-Defined Cost	$764,778
Water Services	1	CPI Tables	$72,171
			$1,434,720



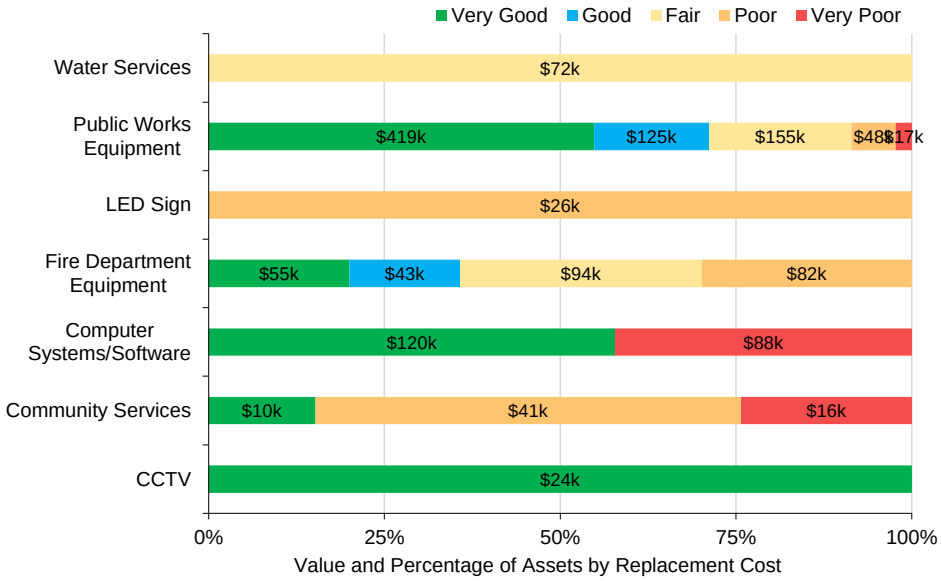
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

4.7.2 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
CCTV	82%	Very Good	Age-Based
Community Services	34%	Fair	85% Assessed
Computer Systems/Software	46%	Fair	Age-Based
Fire Department Equipment	57%	Fair	72% Assessed
LED Sign	31%	Poor	100% Assessed
Public Works Equipment	69%	Good	51% Assessed
Water Services	46%	Fair	100% Assessed
	60%	**Good**	**52% Assessed**

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



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

Current Approach to Condition Assessment

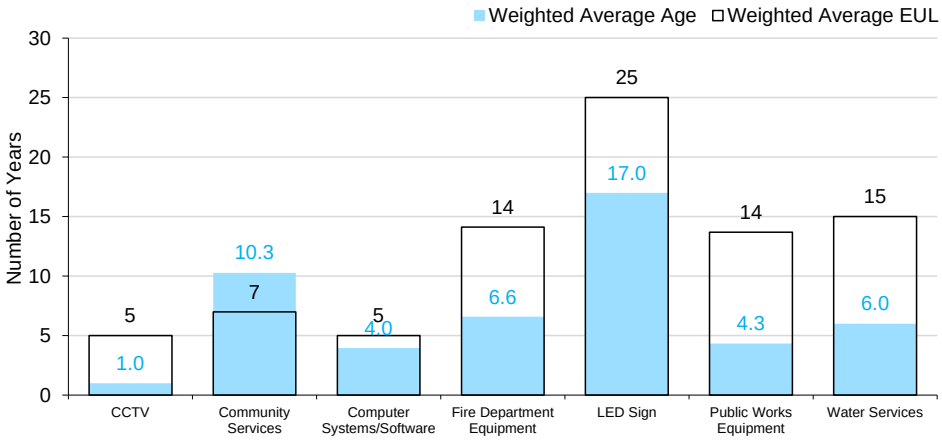
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Personal protective equipment (PPE) is sent to the manufacturer annually for testing. Repairs are made as needed based on the results.
- SCBAs are subject to annual bench testing to ensure functioning as per National Fire Protection Agency (NFPA) requirements.
- Gas detection equipment is bump tested after every use to recalibrate the sensors.
- Other fire equipment, such as the radios, Jaws of Life, firehose, and portable pumps, are subject to annual testing. Health and Safety standards govern the functionality of this equipment, and repairs are made to reduce risk of failure.
- Public Works equipment is generally inspected and maintained on a seasonal, or as-needed basis. Significant equipment, such as plow blades, are managed for functionality as per the Minimum Maintenance Standards (MMS). However, there is no formal condition assessment program in place.
- Parks equipment is inspected every Spring. Smaller equipment is inspected on a daily basis as they are used. However, the Zamboni is inspected twice annually, and sent to the manufacturer for an overhaul if required.

4.7.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Machinery & Equipment assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
CCTV	1.0	5
Community Services	10.3	7
Computer Systems/Software	4.0	5
Fire Department Equipment	6.6	14
LED Sign	17.0	25
Public Works Equipment	4.3	14
Water Services	6.0	15



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.

4.7.4 Lifecycle Management Strategy

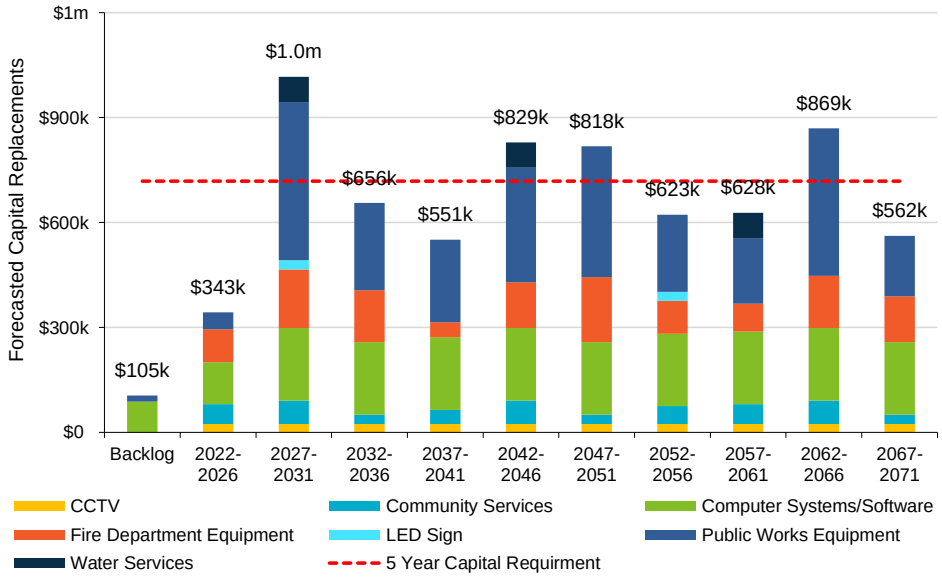
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance/ Rehabilitation	Maintenance program varies by department
	Annual inspections and cleaning for equipment are completed
	Fire Protection Services equipment is subject to a much more rigorous inspection and maintenance program compared to most other departments
	Machinery and Equipment is maintained according to per the Minimum Maintenance Standards (MMS), manufacturer recommended actions and supplemented by the expertise of municipal staff
Replacement	The replacement of Machinery and Equipment depends on its expected useful life, usage and deficiencies identified by operators that may impact their ability to complete required tasks.
	Fire equipment is replaced on schedules defined by the Health and Safety Act, and manufacturer recommendations, and the Levels of Service Bylaw. Specifically, Helmets and PPE are replaced on a 10-year schedule for compliance.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2071. Current backlog for Machinery & Equipment is $105 thousands and the Annual Capital Requirement is $143,652.95. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.7.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
	Services (Health and Safety)

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

Risks to Current Asset Management Strategies

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

Community Expectations

The Township is primarily a rural township, a significant portion of its population work in neighboring cities. Residents form larger urban centres may bring with them an expectation of higher level of service. Currently, the Township does not have the population density and user base to afford these expectations. An example is that requiring additional equipment and resources for road cleaning and building maintenance. Developing a comprehensive long-term capital plan with considerations for growth and proactive lifecycle strategy can be helpful to minimize dependency on grant funding and improve the efficiency.

Aging Infrastructure and Funding Strategies

As Machinery & Equipment age, they will require increasing O&M costs to function adequately. As capital budgets become more constrained, more maintenance will be postponed, which will further amplify this risk. Replacement and major rehabilitation of the Machinery & Equipment are entirely dependant on the availability of reserve fund. Commit to a dedicated equipment reserve contribution can avoid service disruption when the equipment fails. The Township should also consider updating asset replacement costs and event costs on a cyclical basis to improve the effectiveness of capital planning.

4.7.6 Levels of Service

The following table outlines the Township's current qualitative descriptions that determine the community levels of service provided by the Machinery & Equipment.

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Percentage of equipment with preventative maintenance overdue	0%
Safe & Regulatory	Number of workplace injuries due to equipment failures	0
	Percentage of safety equipment used beyond its recommended life	0%
	Percentage of Ministry/Safety regulated maintenance and inspection activities completed	100%
Affordable	Annual Capital Reinvestment Rate	14.29%
Sustainable	Percentage of Machinery and Equipment assets that are in good or very good condition	55%
	Percentage of Machinery and Equipment assets that are in poor or very poor condition	22%

4.7.7 Recommendations

Replacement Costs

- A number of replacement costs for Machinery and Equipment were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Continue to gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.

Condition Assessment Strategies

- The Township should implement the existing condition rating criteria and expand the scope of condition assessments for all the Machinery and Equipment to better inform short- and long-term capital requirements.
- 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

- 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 Analysis of Rate-funded Assets

Key Insights

- Rate-funded assets are valued at $52.1 million
- 35% 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 $795,895
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

5.1 Water Network

The Colborne Water Supply and Distribution System is maintained and operated by Aquatech Canadian Water Services Inc.

The Water Network in the Township include the following:

- Water Treatment Plant
- Watermains
- Water Towers, Wells
- Hydrants, water meters and other Appurtenances

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

Replacement Cost	Condition	Financial Capacity	
$25.0 million	Fair (40%)	Annual Requirement:	$ 387,667

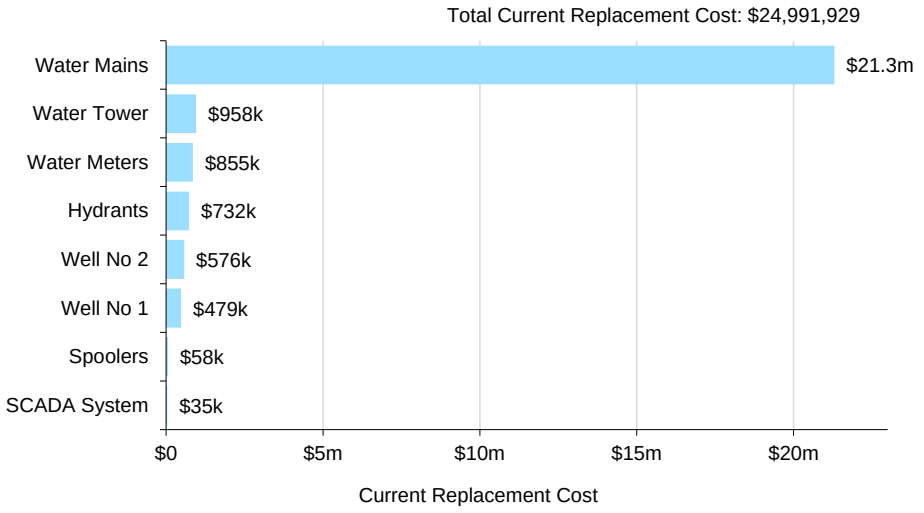
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Scope	Current municipal water is accessible to some areas of the Township, mainly located in Colborne. The Water Network includes water mains, water tower, wells and hydrants.
Reliability	The Water Network is in fair condition with minimal reports of low water quality and pressure. There are no unplanned service interruptions due to boil water advisories.

5.1.1 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
Hydrants	125	CPI Tables	$732,480
SCADA System	1	Inflated 2016 User-Defined Cost	$34,601
Water Mains	25,844 m	Inflated 2016 User-Defined Cost	$21,299,188
Water Meters	1,022	CPI Tables	$855,125
Water Tower	2	Inflated 2016 User-Defined Cost	$957,845
Well No 1	3	Inflated 2016 User-Defined Cost	$478,646
Well No 2	2	CPI Tables	$576,376
Spoolers	1	Inflated 2016 User-Defined Cost	$57,668
			$24,991,929



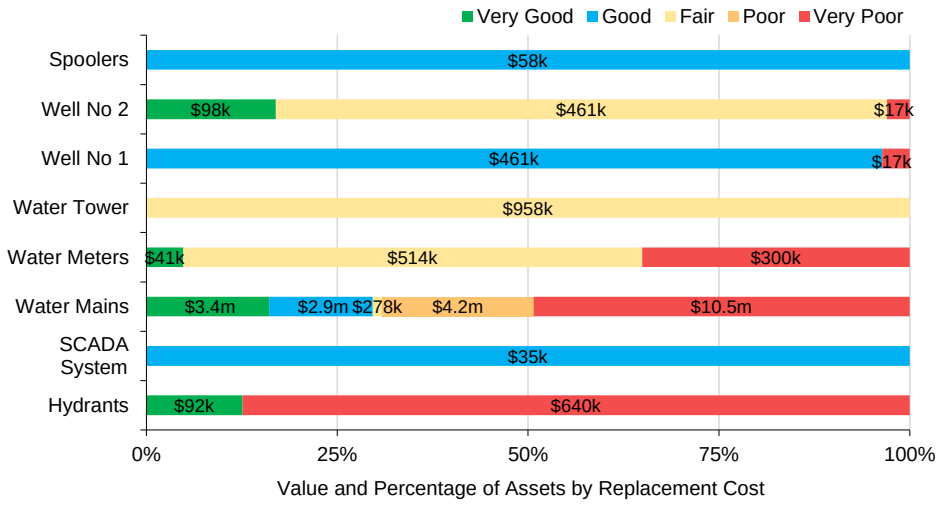
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

5.1.2 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
Hydrants	12%	Very Poor	Age-Based
SCADA System	70%	Good	Age-Based
Water Mains	74%	Good	Age-Based
Water Meters	40%	Poor	Age-Based
Water Tower	29%	Poor	Age-Based
Well No 1[9]	59%	Fair	Age-Based
Well No 2	71%	Good	Age-Based
Spoolers	53%	Fair	Age-Based
	40%	**Fair**	**Age-Based**

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



[9] Well No.1 was in service and it is planned to be disposed in 2022.

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

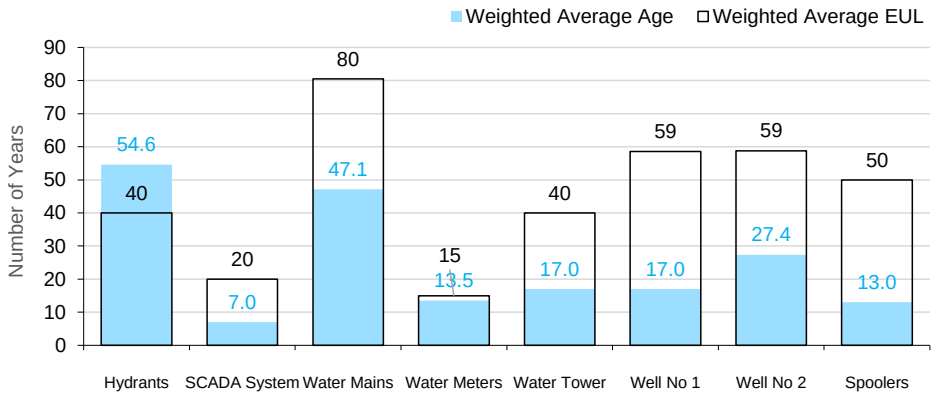
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- Currently, there are no formal condition assessment programs for water assets in place
- Staff primarily rely on the historical break records, pipe diameter, age and material types to determine the projected condition of water mains

5.1.3 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Hydrants	54.6	40
SCADA System	7.0	20
Water Mains	47.1	80
Water Meters	13.5	15
Water Tower	17.0	40
Well No 1	17.0	59
Well No 2	27.4	59
Spoolers	13.0	50



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

5.1.4 Lifecycle Management Strategy

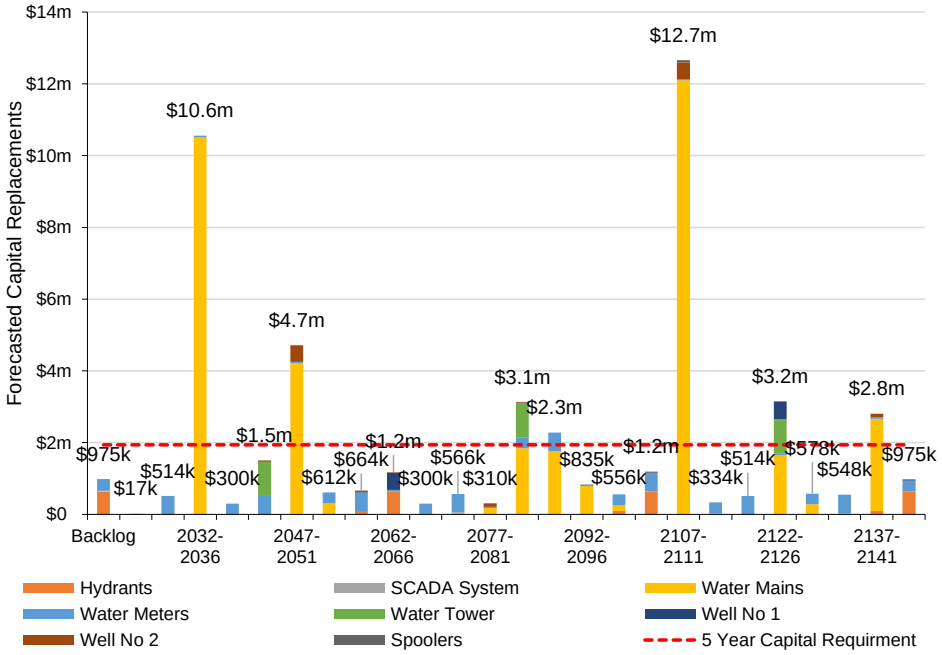
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Main flushing and valve turning is completed on the network on an annual basis.
	Maintenance on water meters and hydrants is undertaken annually in batches.
Rehabilitation	A water relining program is not considered, as the network is relatively small and relining costs are significant.
Replacement	In the absence of mid-lifecycle rehabilitative events, full replacement for most mains is completed once it reaches its end-of-life.
	The prioritized list of watermains is scheduled to align with work on the storm, sanitary, and roads networks.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2146 and the Annual Capital Requirement is $387,666.89. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

5.1.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
Pipe Material	Road Surface Type (Economic)

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

Risks to Current Asset Management Strategies

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

Lifecycle Management Strategies

The current lifecycle management strategy for the Water Network is considered reactive. Replacement of watermain is dependent on break records, water quality, age and material type. This poses a risk of service disruption when assets failure occurs. The Township can consider assessing the suitability of corrosion protection for metallic mains, such as cathodic protection systems, zinc galvanization, and plastic coating to extend service life of the assets. The Township can also consider leak detection technologies to reduce costs related to water loss and excavation to find the leak locations.

Growth & Infrastructure Design

The population of the Township is projected to grow to 7,013 by 2034. Past designs of the Water Network have been inadequate for the population growth because some water pipes are undersized. The Township needs to prioritize expanding its capacity to serve a larger population. Developing a comprehensive long-term capital plan with considerations for growth can be helpful to increase the capacity strategically.

5.1.6 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 the Water Network.

Service Attribute	Qualitative Description	Current LOS (2021)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Appendix B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix B
Reliability	Description of boil water advisories and service interruptions	No water quality issue that requires to issue the boil water advisory.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Percentage of properties connected to the municipal water system	36%
	Percentage of watermains flushed annually	94%
	Number of water pressure complaints per capita	0
	Number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system	0
	Percentage of properties where fire flow is available	81.86%
Safe & Regulatory	Number 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
	Number of water quality customer complaints per capita related to the water system	0
Affordable	O&M cost for Water Network / pipe km length	$36,187.39
	Annual capital reinvestment rate	0.17%
Sustainable	Percentage of the Water Network that is in good or very good condition	28%
	Percentage of the Water Network that is in poor or very poor condition	63%

5.1.7 Recommendations

Asset Inventory

- The water meters and hydrant inventory include a number of pooled assets that should be broken into discrete segments to allow for asset-specific lifecycle planning and costing.

Replacement Costs

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

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk Water Network assets. Consider developing the condition rating criteria and document the condition rating of the assets for rehabilitation or replacement projection.
- 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

- 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 Sanitary Sewer Network is owned, maintained and operated by the Township. The network includes the following:

- Sewer mains
- Sanitary Laterals
- Sanitary Treatment Plant

The state of the infrastructure for the Sanitary Sewer Network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$27,119,790	Poor (36%)	Annual Requirement:	$ 408,228

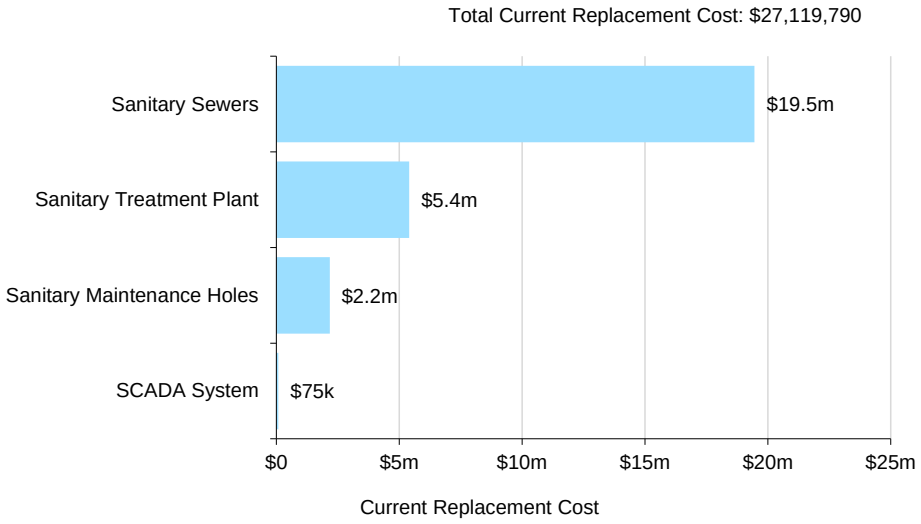
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning:

Service Attribute	Level of Service Statement
Scope	The Sanitary Sewer Network is accessible to some area of the Township, mainly located in Colborne.
Reliability	The Sanitary Sewer Network is in poor condition with minimal unplanned service interruptions due to backups and effluent violations.

5.2.1 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 (components)	Replacement Cost Method	Total Replacement Cost
Sanitary Maintenance Holes	204	CPI Tables	$2,174,288
Sanitary Sewers	17,835 m	Inflated 2016 User-Defined Cost	$19,458,304
Sanitary Treatment Plant	1(10)	Inflated 2016 User-Defined Cost	$5,411,970
SCADA System	1	CPI Tables	$75,228
			$27,119,790



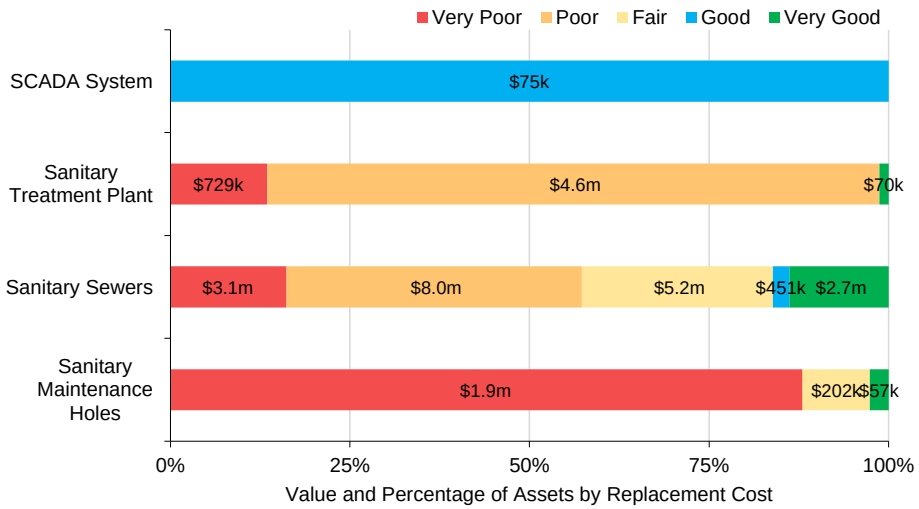
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

5.2.2 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 Maintenance Holes	8%	Very Poor	Age-Based
Sanitary Sewers	44%	Fair	86% Assessed
Sanitary Treatment Plant	20%	Poor	Age-Based
SCADA System	80%	Good	Age-Based
	36%	**Poor**	**61% Assessed**

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



To ensure that the Township's sanitary 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 network.

Current Approach to Condition Assessment

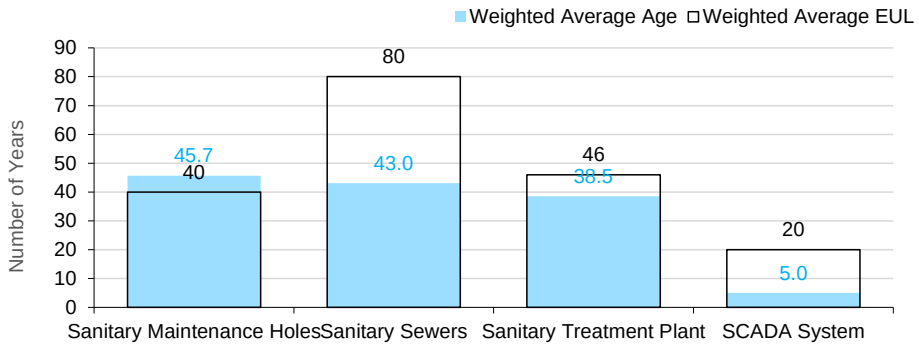
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Township's current approach:

- CCTV inspections are completed for sanitary mains by in-house staff on a project basis
- The wastewater treatment plant is inspected daily to compliant with the Ministry of Environment standards

5.2.3 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. The Profile Lifecycle Estimated Useful Life and Weighted Average Age take the varying data in the segment into account and calculated by determining the weights by the replacement cost. The figure below represents the Estimated Useful Life and the Average Age for each segment, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Weighted Average Age (Years)	Profile Lifecycle Estimated Useful Life (Years)
Sanitary Maintenance Holes	45.7	40
Sanitary Sewers	43.0	80
Sanitary Treatment Plant	38.5	45
SCADA System	5.0	20



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

5.2.4 Lifecycle Management Strategy

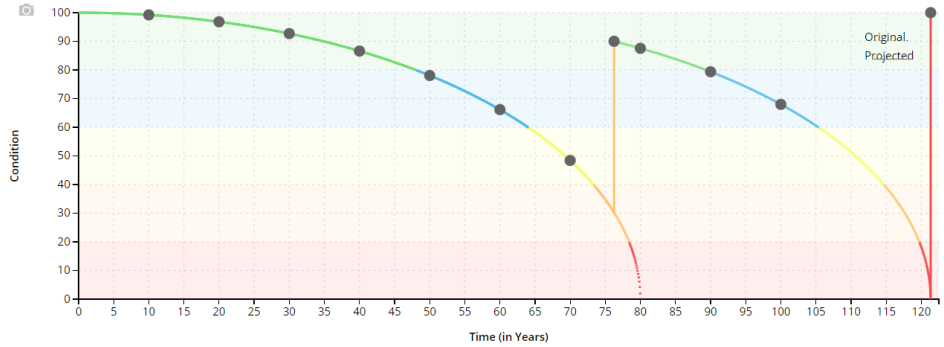
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation / Replacement	Rodding, boring, and flushing is performed on an as-needed basis, generally complaint driven
	CCTV inspections and flushing are incorporated within the inflow and infiltration (I&I) program, to identify areas with significant stormwater intrusion. Reducing overall I&I will reduce demands on the wastewater conveyance and treatment system, ensuring capacity is more readily available
	Sewer mains are generally replaced as part of the I&I program, or in coordination with road reconstruction
	A structural relining program is being considered for specific locations where road reconstruction is not an option.
	For purpose of this AMP, the relining program is applied to all the sanitary sewer mains and assumed the entire network is flushed and completed a CCTV inspection every 10 years.

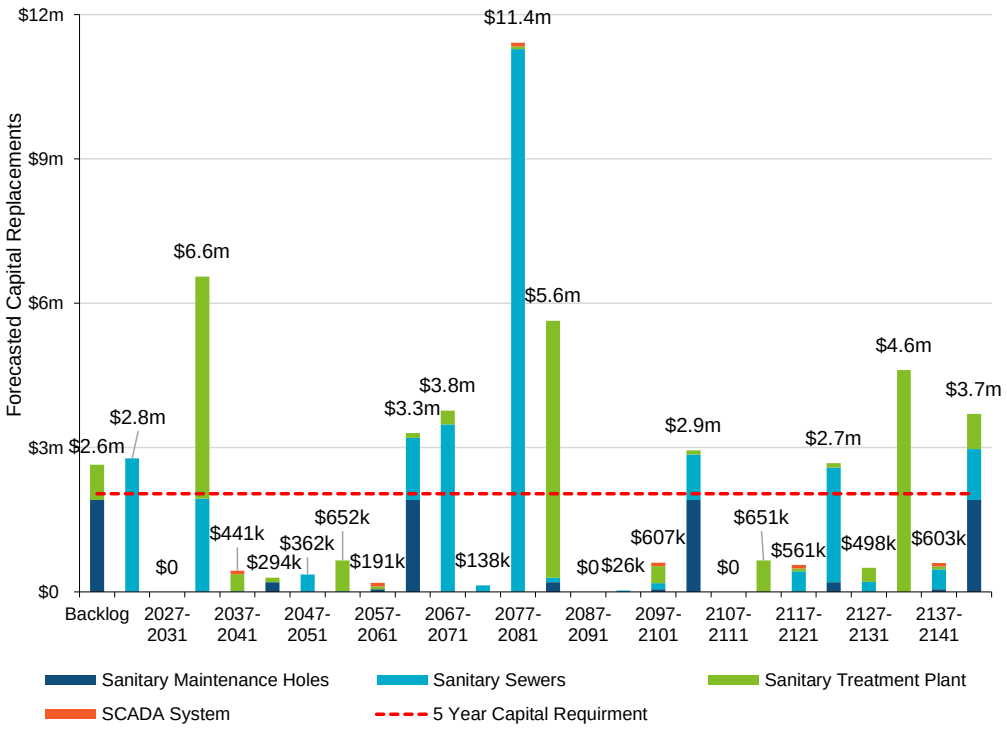
The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of Sanitary Sewer mains. Instead of allowing the mains to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Sanitary Sewer Mains		
Event Name	**Event Class**	**Event Trigger**
O&M Activities (flushing and CCTV inspection)	Maintenance	Repeated every 10 years
Trenchless Relining	Rehabilitation	30% Condition
Full Reconstruction	Replacement	0% Condition



Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements from 2022 to 2146 and the Annual Capital Requirement is $408,227.70. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

5.2.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2021 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

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

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

Probability of Failure (POF)	Consequence of Failure (COF)
Pipe Material	Replacement Cost (Economic)
Condition	Average Annual Daily Traffic (Social)

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

Risks to Current Asset Management Strategies

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

Growth

The population of the Township is projected to grow to 7,013 by 2034. The Township needs to prioritize expanding its capacity to serve a larger population. Currently, the Township focuses on solving the inflow and infiltration issues to save capacity and reduce costs for water treatment. However, the rapid development requires the Township to increase capital and operating costs to maintain current levels of service and improve efficiency of the sanitary network. Developing a comprehensive long-term capital plan with considerations for growth can be helpful to increase the capacity strategically.

Capital Funding Strategies

A concern for the Township's aging assets, it requires the Township to maintain the assets more frequently to ensure the assets are meeting safety requirements. Current lifecycle strategies for sanitary assets are relatively reactive. The Township should consider developing an annual capital funding strategy to reduce dependency on grant funding and prevent deferral the capital works. The Township should also consider updating asset replacement costs and event costs on a cyclical basis to improve the effectiveness of capital planning.

5.2.6 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 (2021)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal Sanitary Sewer Network	See Appendix B
Reliability	Description of how combined sewers in the municipal Sanitary Sewer Network are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	No combined sewer is used in the Township.
	Description of the frequency and volume of overflows in combined sewers in the municipal Sanitary Sewer Network that occur in habitable areas or beaches	No combined sewer is used in the Township.
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Inflow and infiltration issues are identified in the current sanitary system of the Township, the water can infiltrate through cracks in the joints and through manholes.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid stormwater infiltration	The newly installed sewer pipes are designed to be watertight to minimize infiltration.

Service Attribute	Qualitative Description	Current LOS (2021)
	Description of the effluent that is discharged from sewage treatment plants in the municipal Sanitary Sewer Network	Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants. The Municipality follows ECA criteria.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2021)
Accessible & Reliable	Percentage of properties connected to the municipal Sanitary Sewer Network	31%
	Number of sanitary sewer main backups	0
Safe & Regulatory	Number of connection-days per year due to sanitary main backups compared to the total number of properties connected to the municipal Sanitary Sewer Network	0
	Number of connection-days per year due to sanitary service backups compared to the total number of properties connected to the municipal Sanitary Sewer Network	0
	Number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal Sanitary Sewer Network	0
Affordable	O&M Cost for Sanitary Sewer Network / km pipe length	$19,404.46
	Annual capital reinvestment rate	0.17%

Performance	Percentage of the Sanitary Sewer Network that is in good or very good condition	13%
	Percentage of the Sanitary Sewer Network that is in poor or very poor condition	67%

5.2.7 Recommendations

Replacement Costs

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

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water network assets. Consider developing the condition rating criteria and document the condition rating of the assets for rehabilitation or replacement projection.
- Consider flow monitoring to identify areas prone to inflow and infiltration.
- 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.

Lifecycle Management Strategies

- 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
- The costs of growth should be considered in long-term funding strategies that are designed to maintain the current levels 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 Cramahe Official Plan (December 2014)

The Township of Cramahe's Official Plan is intended to provide a framework for the future growth, set out the policies to guide the development and use of land with consideration of social, economic and environmental factors. The document planning horizon spans 20 years, covering it to the year 2023.

The Township of Cramahe and the Village of Colborne were subject to a municipal amalgamation in 2001. The original Official Plan for the Township of Cramahe was prepared and originally approved in 1998. The original Official Plan for the former Village of Colborne was approved by the Ministry in 1993 and completed a general official plan review and update in October 2000. The current official plan is updated based on the comprehensive background information that was prepared for the former official plans.

The official plan reflects the priority of promoting commercial and industrial growth in designated areas, and policies pertaining to these land uses have been updated. The Township focuses on directing development to the Colborne urban area and existing hamlet areas of Castleton, Salem Corners and Dundonald. The Official Plan does not encourage expansion of communal sewage and water servicing within the hamlet settlement areas. While intensification, redevelopment and renewal are encouraged, all development within the Township shall have regard for the character and quality of established neighbourhoods. According to the Plan, the population is projected to reach 6,990 by 2031. The following table outlines population, private dwellings and employment changes to the Township between 2011-2021 from Statistics Canada, for which the Township will be required to provide services.

Year	Population	Private Dwellings	Employment
2021	6,509	2,772	N/A
2016	6,355	2,603	2,985
2011	6,073	2,380	3,090

6.1.2 Other Related Documents

As part of the Greater Golden Horseshoe, the Township of Cramahe is subject to the policy outlined in the Growth Plan document. The Growth Plan for the Greater Golden Horseshoe (the "Growth Plan") and its Amendment 1 was approved by the Lieutenant Governor in Council to take effect on August 28, 2020. The Plan emphasis on optimizing the use of existing infrastructure and services public service facilities before expanding the urban area. The Growth Plan establishes the population and employment forecasts for the County of Northumberland in the year 2031. The population is projected to grow to 96,000 and employment is projected to grow to 33,000. As per the County's Official Plan, the population of the Township of Cramahe is projected to grow to 6,990 by 2031.

Under the Plan, the Province and the County of Northumberland has determined the population and employment projections, density and intensification targets based on the Northumberland Growth Management Strategy. The Township shall direct 85% growth to the Colborne Urban Area through intensification and the remaining (15%) to the rural areas.

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.

The Strategic Plan for Cramahe has indicated the visions as maintaining sustainable infrastructure, thriving business community, providing fiscally responsible practices, supporting balanced and sustainable growth as well as providing gathering places and ensuring effective communications.

The Township will ensure the sewage treatment, waste disposal services, water supply services, stormwater management, transport pathways, utilities and emergency services are planned and developed to provide for the growth targets outlined in the Official Plan. 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 $1,391,000 towards capital projects per year from sustainable revenue sources

- Given the annual capital requirement of $3,218,000, there is currently a funding gap of $1,827,000 annually

- For tax-funded assets, we recommend reallocating the debt cost reductions of $107 thousand and increasing tax revenues by 1.6% each year for the next 10 years to achieve a sustainable level of funding

- For rate-funded assets, we recommend reallocating the debt cost reductions of $124 thousand, increasing rate revenues 1.6% for sanitary services and by increasing rate revenues 2.1% for water services annually for the next 20years 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 Cramahe to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

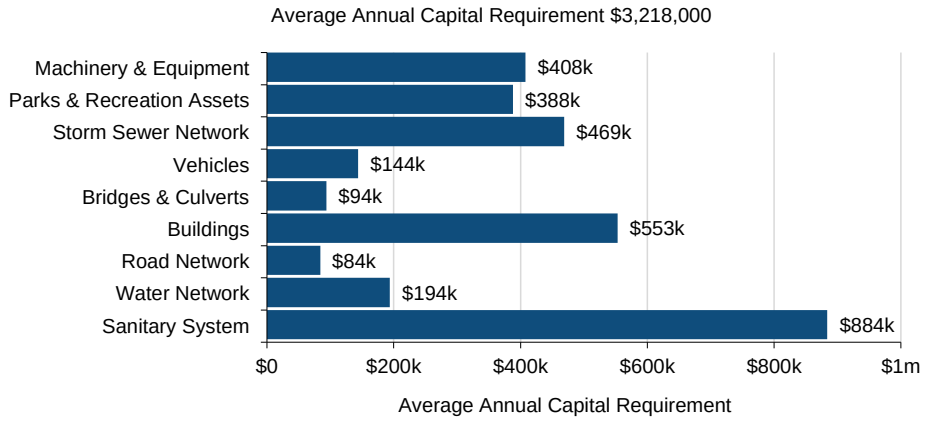
This report develops such a financial plan by presenting several scenarios for consideration and culminating with final recommendations. As outlined below, the scenarios presented model different combinations of the following components:

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

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 $3.2 million annually to address capital requirements for the assets included in this AMP.



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

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

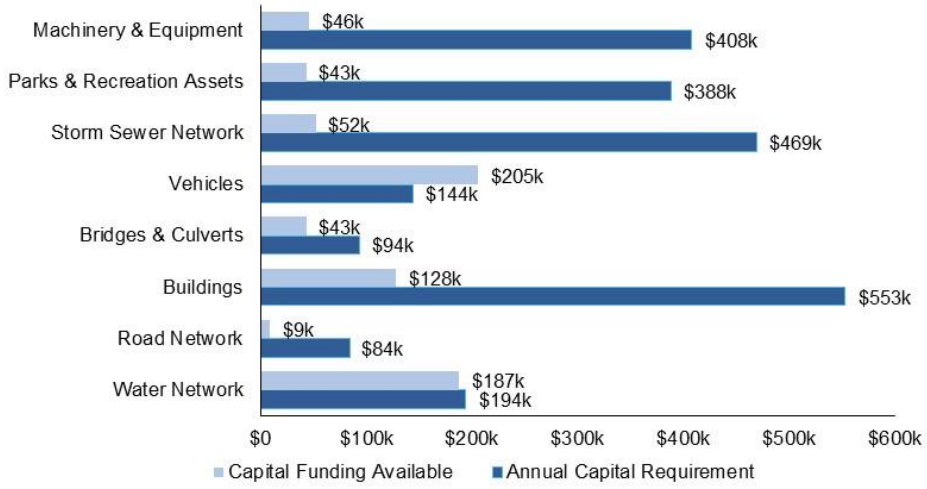
Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	$3,069,000	$2,425,000	$644,000
Bridges and Culverts	$187,052	$193,540	($6,488)
Sanitary Sewer Network	$613,000	$599,000	$14,000

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of $644,000 for the Road Network and $14,000 for the Sanitary Sewer Network, as well as and $6,488 cost increase for Bridges and Culverts. This represents an overall reduction of the annual requirements for Road

Network and Sanitary Sewer Network by 21% and 2.3% and increase of 3.5% for Bridges and Culverts respectively. As the lifecycle strategy scenario represents the lowest cost option available to the Township, we have used these annual requirements in the development of the financial strategy.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately $1,391,000 towards capital projects per year. Given the annual capital requirement of $3,218,000, there is currently a funding gap of $1,827,000 annually.



7.2 Funding Objective

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

1. **Tax Funded Assets:** Road Network, Bridges & Culverts, Storm Sewer Network, Buildings & Facilities, Machinery & Equipment, Vehicles, Parks & Recreation Assets
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, Cramahe's average annual asset capital expenditure (CapEx) requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Avg. Annual Requirement	Annual Funding Available					Annual Deficit
		Taxes	Gas Tax	OCIF	Taxes to Reserves	Total Available	
Road Network	884,000[10]	436,000	99,000	93,000	50,000	678,000	206,000
Bridges & Culverts	194,000	140,000	22,000		25,000	187,000	7,000
Buildings & Facilities	553,000	36,000	62,000		30,000	128,000	425,000
Machinery & Equipment	144,000	39,000	16,000		150,000	205,000	(61,000)
Vehicles	469,000		52,000			52,000	417,000
Parks and Recreation	94,000		11,000		32,000	43,000	51,000
Storm Sewer Network	84,000		9,000			9,000	75,000
	2,422,000	651,000	271,000	93,000	287,000	1,302,000	1,120,000

The average annual CapEx requirement for the above categories is $2.422 million. Annual revenue currently allocated to these assets for capital purposes is $1.302 million leaving an annual deficit of $1.120 million. Put differently, these infrastructure categories are currently funded at 53.8% of their long-term requirements.

[10] These costs do not include graveling, as discussed in Section 4.1.4. If gravelling costs were included fully as capital, then the average annual requirements of gravel roads would increase to $439,907.

7.3.2 Full Funding Requirements

In 2022, Township of Cramahe has annual budgeted tax revenues of $6.523 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	3.2%
Bridges & Culverts	0.1%
Buildings & Facilities	6.5%
Equipment and Machinery	-0.9%
Vehicles	6.4%
Parks and Recreation	0.8%
Storm Sewer Network	1.1%
	17.2%

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

a) Cramahe's debt payments for these asset categories will be decreasing, and although not shown in the table, debt payment decreases will be $107 thousand over the next 20 years.

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

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,120,000	1,120,000	1,120,000	1,120,000	1,120,000	1,120,000	1,120,000	1,120,000
Change in Debt Costs	N/A	N/A	N/A	N/A				(107,000)
Change in OCIF Grants	N/A	N/A	N/A	N/A				
Resulting Infrastructure Deficit:	**1,120,000**	**1,120,000**	**1,120,000**	**1,120,000**	**1,120,000**	**1,120,000**	**1,120,000**	**1,013,000**
Tax Increase Required	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	15.5%
Annually:	**3.3%**	**1.6%**	**1.1%**	**0.8%**	**3.3%**	**1.6%**	**1.1%**	**0.8%**

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 of $107 thousand to the infrastructure deficit as outlined above.
b) increasing tax revenues 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 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:

- As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable, since this funding is a multi-year commitment[11].
- 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 $1.3 million for the Road Network, $347 thousand for the Storm Sewer Network, $6.7 million for Buildings & Facilities, $105 thousand for Machinery & Equipment, and $1.1 million for Parks & Recreation.

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.

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

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Ops	Gas Tax	Total Available	
Water Network	388,000	670,000	(670,000)	43,000	43,000	345,000
Sanitary Sewer Network	408,000	645,000	(645,000)	46,000	46,000	362,000
	796,000	1,315,000	(1,315,000)	89,000	89,000	707,000

The average annual CapEx requirement for the above categories is $796 thousand. Annual revenue currently allocated to these assets for capital purposes is $89 thousand leaving an annual deficit of $707 thousand. Put differently, these infrastructure categories are currently funded at 11.2% of their long-term requirements.

7.4.2 Full Funding Requirements

In 2022, Cramahe had annual budgeted water revenues of $670 thousand and sanitary revenues of $645 thousand. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Rate Change Required for Full Funding
Water Network	51.5%
Sanitary Sewer Network	56.1%

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							
	No reallocation of decrease in debt payment				Reallocation of decrease in debt payments			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	345,000	345,000	345,000	345,000	345,000	345,000	345,000	345,000
Decrease in debt payments	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Resulting Infrastructure Deficit:	**345,000**	**345,000**	**345,000**	**345,000**	**345,000**	**345,000**	**345,000**	**345,000**
Tax Increase Required	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%
Annually:	**8.7%**	**4.3%**	**2.9%**	**2.1%**	**8.7%**	**4.3%**	**2.9%**	**2.1%**

	Sanitary Sewer Network							
	No reallocation of decrease in debt payment				Reallocation of decrease in debt payments			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	362,000	362,000	362,000	362,000	362,000	362,000	362,000	362,000
Decrease in debt payments	n/a	n/a	n/a	n/a	(124,000)	(124,000)	(124,000)	(124,000)
Resulting Infrastructure Deficit:	**362,000**	**362,000**	**362,000**	**362,000**	**238,000**	**238,000**	**238,000**	**238,000**
Tax Increase Required	56.1%	56.1%	56.1%	56.1%	36.9%	36.9%	36.9%	36.9%
Annually:	**9.4%**	**4.6%**	**3.1%**	**2.3%**	**6.5%**	**3.2%**	**2.2%**	**1.6%**

7.4.3 Financial Strategy Recommendations

Considering all of the above information, we recommend the 20-year option that includes debt cost reallocations. This involves full CapEx funding being achieved over 20 years by:

a) when realized, reallocating the debt cost reductions of $124 thousand for the Sanitary Sewer Network to the applicable infrastructure deficit.
b) increasing rate revenues by 2.1% for water services and 1.6% for sanitary services each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax revenue as outlined previously.
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 option achieves full CapEx funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $975 thousand for the Water Network and $2.6 million for the Sanitary Network.

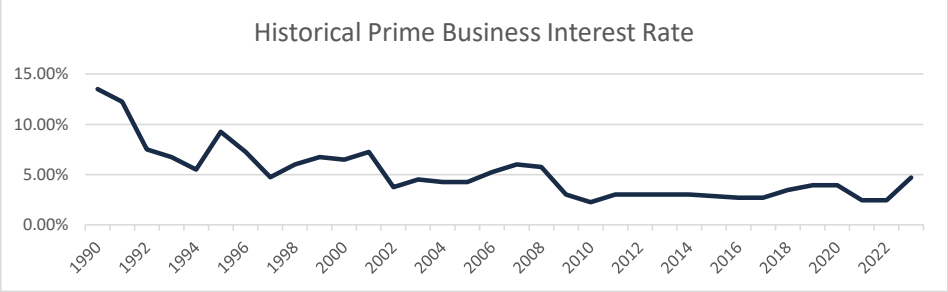
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

7.5 Use of Debt

Debt can be strategically utilized as a funding source with in the long-term financial plan. The benefits of leveraging debt for infrastructure planning include:

a) the ability to stabilize tax & user rates when dealing with variable and sometimes uncontrollable factors
a) equitable distribution of the cost/benefits of infrastructure over its useful life
b) a secure source of funding
c) flexibility in cash flow management

Debt management policies and procedures with limitations and monitoring practices should be considered when reviewing debt as a funding option. In efforts to mitigate increasing commodity prices and inflation, interest rates have been rising. Sustainable funding models that include debt need to incorporate the current realized risk of rising interest rates. The following graph shows the historical changes to the lending rates:



A change in 15-year rates from 5% to 7% would change the premium from 45% to 65%. Such a change would have a significant impact on a financial plan.

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1 million project financed at 3.0%[12] over 15 years would result in a 26% premium or $260 thousand 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.

[12] Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

Table: Premiums Paid

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%

The following tables outline how Cramahe has historically used debt for investing in the asset categories as listed. There is currently $3.545 million of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $338 thousand, well within its provincially prescribed maximum of $1.965 million.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2017	2018	2019	2020	2021
Road Network	1,545,000			1,720,000		
Bridges & Culverts						
Buildings & Facilities	1,767,000	1,968,000				
Equipment and Machinery						
Vehicles						
Parks and Recreation						
Storm Sewer Network						
Total Tax Funded:	**3,312,000**			**1,720,000**		
Water Network						
Sanitary Sewer Network	233,000	742,000				
Total Rate Funded:	**233,000**	**742,000**				

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2022	2023	2024	2025	2026	2027	2032
Road Network	107,000	107,000	107,000	107,000	107,000	107,000	107,000
Bridges & Culverts							
Buildings & Facilities	107,000	107,000	107,000	107,000	107,000	107,000	107,000
Equipment and Machinery							
Vehicles							
Parks and Recreation							
Storm Sewer Network							
Total Tax Funded:	**214,000**	**214,000**	**214,000**	**214,000**	**214,000**	**214,000**	**214,000**
Water Network							
Sanitary Sewer Network	124,000	124,000					
Total Rate Funded:	**124,000**	**124,000**					

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

7.6 Use of Reserves

7.6.1 Available Reserves

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

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

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

Asset Category	Balance at December 31, 2021
Road Network	1,743,000
Bridges & Culverts	620,000
Buildings & Facilities	79,000
Equipment and Machinery	544,000
Vehicles	0
Parks and Recreation	115,000
Storm Sewer Network	0
Total Tax Funded:	3,101,000
Water Network	0
Sanitary Sewer Network	0
Total Rate Funded:	0

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

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

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Cramahe'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 Cramahe 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 maps that have been used to visualize the current level of service
- Appendix C identifies the criteria used to calculate risk for each asset category
- Appendix D provides additional guidance on the development of a condition assessment

8.1 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	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Paved Roads	$319k	$0	$0	$0	$0	$680k	$0	$743k	$0	$0	$885k
Surface Treated Roads	$83k	$1.0m	$42k	$1.9m	$0	$1.3m	$394k	$177k	$639k	$616k	$0
Street Lights	$66k	$0	$83k	$0	$161k	$0	$0	$0	$0	$4k	$238k
Sidewalks	$858k	$0	$0	$118k	$155k	$24k	$0	$26k	$0	$0	$101k
Cross Walk	$0	$0	$37k	$0	$0	$0	$0	$0	$0	$0	$0
Gravel Roads	$0	$3k	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$1.3m	**$1.0m**	**$161k**	**$2.0m**	**$316k**	**$2.0m**	**$394k**	**$947k**	**$639k**	**$619k**	**$1.2m**

Bridges & Culverts

Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Bridges	$0	$76k	$116k	$486k	$389k	$81k	$0	$610k	$0	$0	$0
Culverts	$0	$38k	$0	$0	$0	$0	$0	$0	$0	$0	$0
Non-OSIM Culvert	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$115k**	**$116k**	**$486k**	**$389k**	**$81k**	**$0**	**$610k**	**$0**	**$0**	**$0**

Storm Sewer Network											
Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Storm Sewer	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Structures	$347k	$0	$0	$127k	$54k	$40k	$0	$0	$40k	$0	$47k
	$347k	**$0**	**$0**	**$127k**	**$54k**	**$40k**	**$0**	**$0**	**$40k**	**$0**	**$47k**

Buildings & Facilities											
Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Arena	$2.8m	$23k	$0	$0	$0	$345k	$0	$0	$23k	$0	$230k
Buildings Over 1000 Square Feet	$3.9m	$0	$237k	$1.0m	$0	$145k	$0	$58k	$0	$817k	$106k
Buildings Under 1000 Square Feet	$0	$0	$0	$0	$0	$491k	$0	$0	$0	$0	$0
	$7.3m	**$23k**	**$237k**	**$1.0m**	**$0**	**$981k**	**$0**	**$58k**	**$23k**	**$817k**	**$336k**

Vehicles

Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Community Services	$0	$0	$0	$45k	$0	$45k	$0	$106k	$0	$0	$0
Fire	$0	$0	$0	$17k	$53k	$0	$0	$0	$0	$0	$1.3m
Public Works	$0	$270k	$715k	$168k	$1.2m	$115k	$550k	$710k	$260k	$266k	$45k
	$0	**$270k**	**$715k**	**$230k**	**$1.3m**	**$160k**	**$550k**	**$816k**	**$260k**	**$266k**	**$1.3m**

Machinery & Equipment

Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
CCTV	$0	$0	$0	$0	$0	$24k	$0	$0	$0	$0	$24k
Community Services	$0	$16k	$0	$41k	$0	$0	$0	$10k	$16k	$0	$41k
Computer Systems/Software	$88k	$0	$0	$0	$0	$120k	$88k	$0	$0	$0	$120k
Fire Department Equipment	$0	$0	$0	$0	$94k	$0	$31k	$36k	$0	$43k	$58k
LED Sign	$0	$0	$0	$0	$0	$0	$0	$0	$26k	$0	$0
Public Works Equipment	$17k	$0	$0	$18k	$31k	$0	$155k	$0	$0	$0	$298k
Water Services	$0	$0	$0	$0	$0	$0	$0	$72k	$0	$0	$0
	$105k	**$16k**	**$0**	**$58k**	**$125k**	**$144k**	**$273k**	**$119k**	**$42k**	**$43k**	**$540k**

Parks & Recreation Assets											
Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Athletic Fields	$861k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Bike Paths /Walking Trails	$34k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Parking Lots	$133k	$0	$0	$0	$0	$0	$0	$23k	$0	$0	$0
Park Assets	$0	$0	$0	$0	$17k	$0	$0	$0	$0	$0	$0
Playground Equipment	$79k	$0	$0	$0	$80k	$0	$0	$0	$0	$0	$0
Retension Ponds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tennis Courts	$0	$0	$0	$0	$0	$17k	$0	$0	$0	$0	$0
	$1.1m	**$0**	**$0**	**$0**	**$96k**	**$17k**	**$0**	**$23k**	**$0**	**$0**	**$0**

Water Network

Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Hydrants	$640k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SCADA System	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Mains	$17k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Meters	$300k	$0	$0	$0	$0	$0	$0	$514k	$0	$0	$0
Water Tower	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Well No 1	$0	$0	$0	$0	$17k	$0	$0	$0	$0	$0	$0
Well No 2	$17k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Spoolers	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$975k	**$0**	**$0**	**$0**	**$17k**	**$0**	**$0**	**$514k**	**$0**	**$0**	**$0**

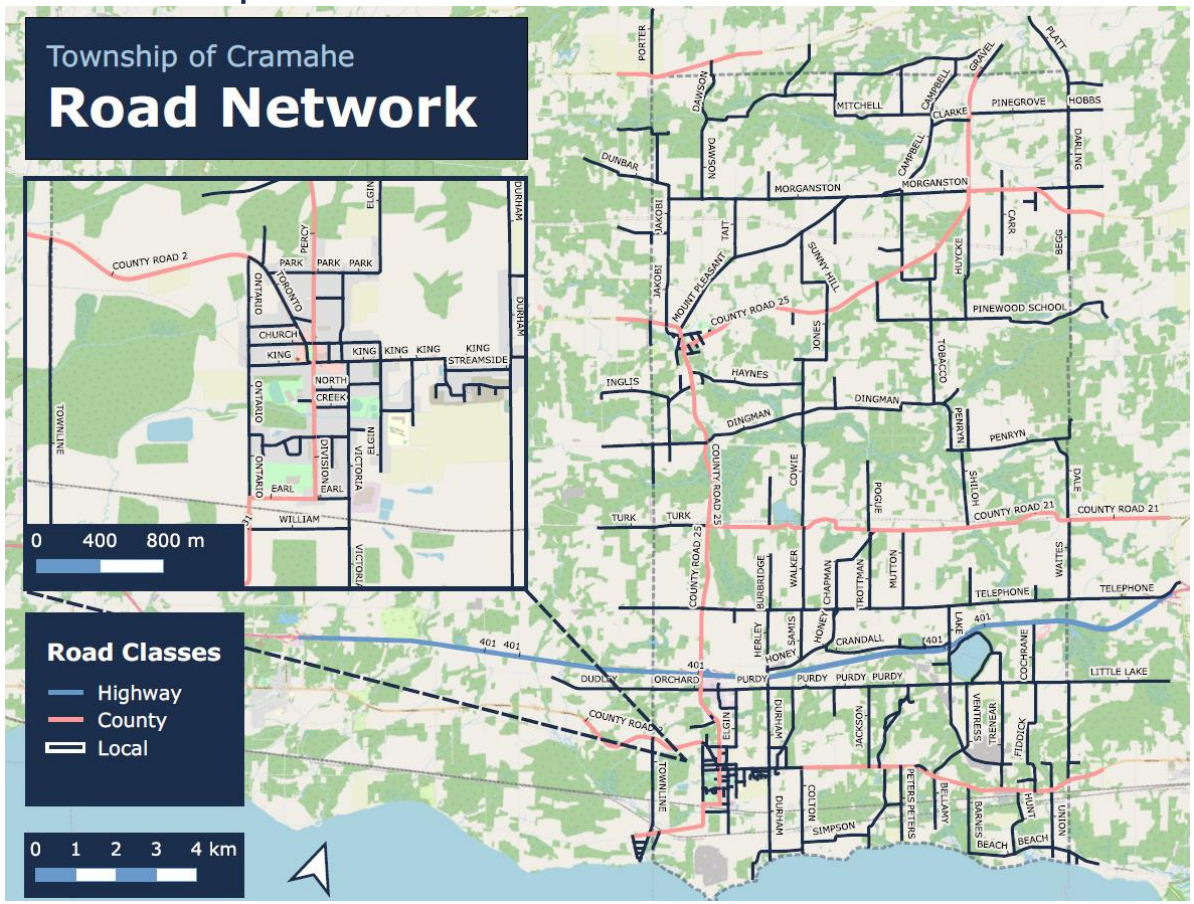
Sanitary Sewer Network

Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Sanitary Maintenance Holes	$1.9m	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Sewers	$0	$2.8m	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Treatment Plant	$729k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SCADA System	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$2.6m	**$2.8m**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

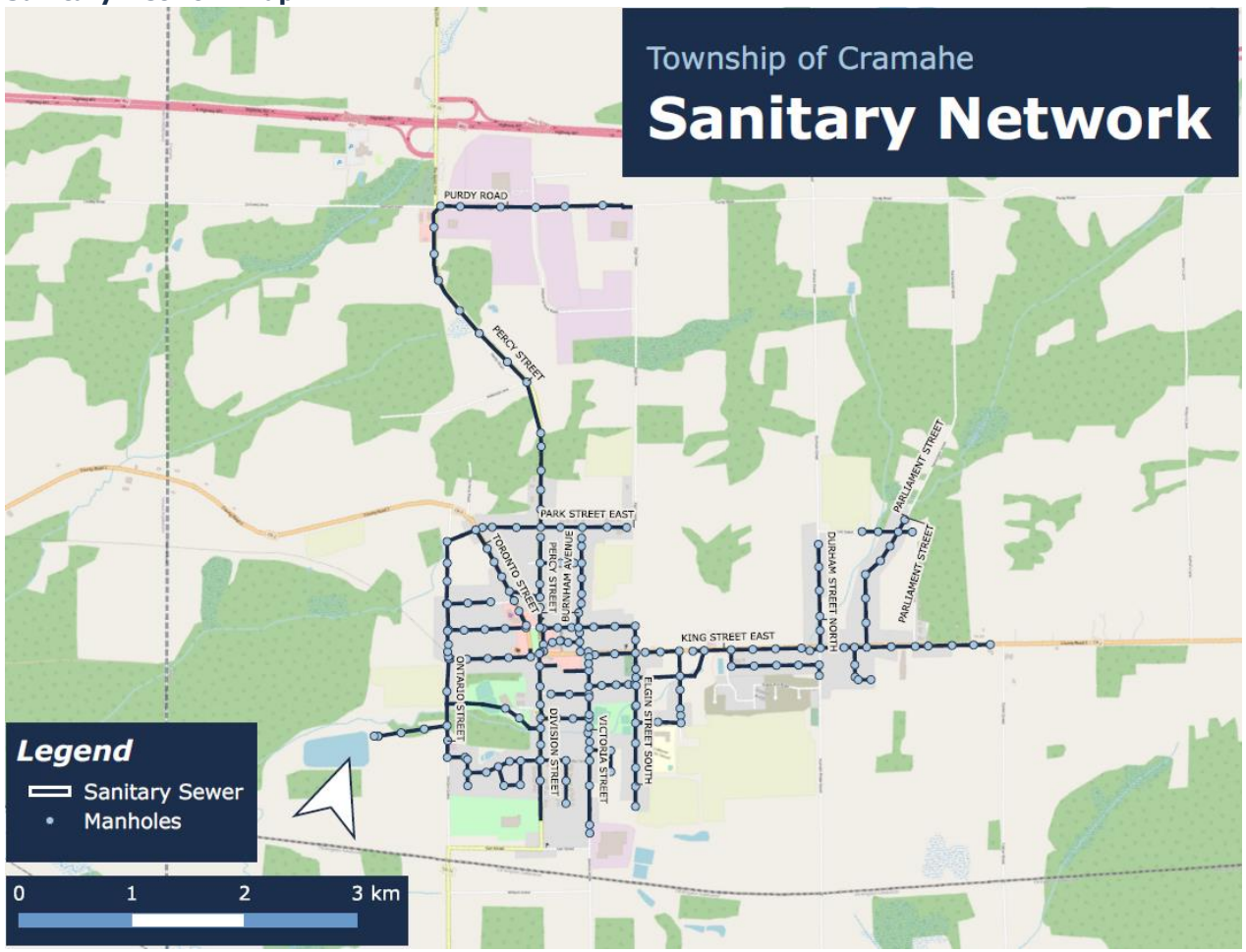
All Asset Categories											
Asset Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Road Network	$1.3m	$1.0m	$161k	$2.0m	$316k	$2.0m	$394k	$947k	$639k	$619k	$1.2m
Bridges & Culverts	$0	$115k	$116k	$486k	$389k	$81k	$0	$610k	$0	$0	$0
Storm Sewer Network	$347k	$0	$0	$127k	$54k	$40k	$0	$0	$40k	$0	$47k
Buildings & Facilities	$6.7m	$23k	$237k	$1.0m	$0	$981k	$0	$58k	$23k	$817k	$336k
Parks & Recreation Assets	$1.1m	$0	$0	$0	$96k	$17k	$0	$23k	$0	$0	$0
Machinery & Equipment	$105k	$16k	$0	$58k	$125k	$144k	$273k	$119k	$42k	$43k	$540k
Vehicles	$0	$270k	$715k	$230k	$1.3m	$160k	$550k	$816k	$260k	$266k	$1.3m
Water Network	$975k	$0	$0	$0	$17k	$0	$0	$514k	$0	$0	$0
Sanitary Sewer Network	$2.6m	$2.8m	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$13.2m	**$4.2m**	**$1.2m**	**$3.9m**	**$2.3m**	**$3.4m**	**$1.2m**	**$3.1m**	**$1.0m**	**$1.7m**	**$3.4m**

8.2 Appendix B: Level of Service Maps

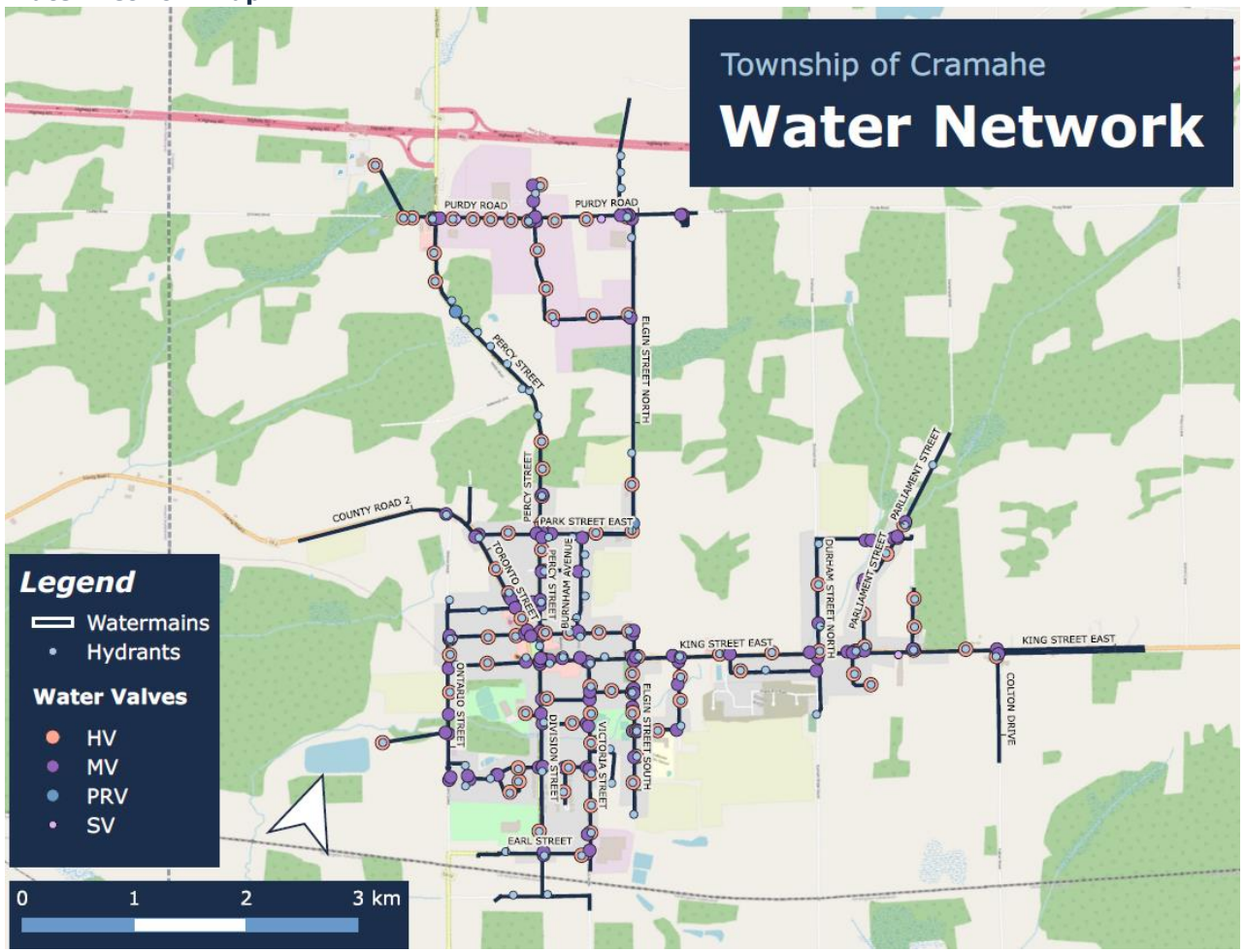
Road Network Map



Sanitary Network Map



Water Network Map



Images of Bridge in Fair Condition
Elgin Street Bridge
Inspected: June 21st, 2017

Photo 1: West Elevation (Outlet)

Photo 2: Wearing Surface (Looking North)

Photo 3: Exterior Steel Girder Supporting Walkway

Photo 4: Barrel – North wall

Photo 5: Soffit at Inlet

Photo 6: Approach (Looking North)

Images of Bridge in Good Condition
Cowie Road Bridge
Inspected: June 21st, 2017

Photo 1: South Barrel (Looking West)

Photo 2: Elevation (Looking West)

Photo 3: Soffit – North Barrel (Looking East)

Photo 4: Barrel Wall (North Barrel)

Photo 5: Outlet - South Barrel (Southeast Quadrant)

Photo 6: Exposed Deck (Looking East)

Images of Culvert in Good Condition
Shiloh Road Culvert
Inspected: June 21st, 2017

Photo 1: Elevation (Looking East)

Photo 2: Wearing Surface (Looking South)

Photo 3: Culvert End (Looking West)

Photo 4: Culvert End (Looking East)

Photo 5: Barrel - Upstream (Looking East)

Photo 6: Approach (Looking North)

8.3 Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Network Bridges & Culverts Buildings & Facilities Machinery & Equipment Parks & Recreation Vehicles Water Network (all other assets) Storm Sewer Network (all other assets) Sanitary Sewer Network (all other assets)	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Sanitary Sewer Network (Sewer Mains)	Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	20%	PVC	1
			HDPE	1
			Polyurethane	1
			Steel	2
			Asbestos	3
			Cast Iron	3
			Concrete	3
			Ductile Iron	3
Storm Sewer Network	Condition	80%	80-100	1
			60-79	2

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
(Storm Mains)			40-59	3
			20-39	4
			0-19	5
	Pipe Material	20%	PVC	1
			HDPE	1
			Polyurethane	1
			Steel	2
			Ductile Iron	3
			Asbestos	3
			Cast Iron	3
			Concrete	3
Water Network (Watermains)	Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	20%	PVC	1
			HDPE	1
			Steel	2
			Asbestos	3
			Cast Iron	3
			Concrete	3
			Ductile Iron	3

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Paved Roads / Surface Treated Roads / Gravel Roads)	Economic (80%)	Replacement Cost (100%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
	Health and Safety (20%)	AADT (70%)	0-199	1
			200-399	2
			400-999	3
			1000-1999	4
			2000+	5
		Speed Limit (30%)	<50 km	1
			50 km	2
			60 km	3
			>80 km	5
Bridges & Culverts	Economic (70%)	Replacement Cost (100%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
	Social (10%)	AADT (100%)	0-49	1
			50-199	2
	Health and Safety (20%)	Speed Limit	50 km	2
			60 km	3
			80 km	4
		Special Route (50%)	Non-School Route	1
			School Route	4

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Buildings & Facilities Water Network (all other assets) Storm Sewer Network (all other assets) Sanitary Sewer Network (all other assets)	Economic (100%)	Replacement Cost (70%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
		Services Types (30%)	Planning and Development Services	2
			General Government	3
			Receration and Cultural Services	3
			Transportation Services	4
			Environmental Services	5
			Health Services	5
			Sewer Services	5
			Water Services	5
			Protection Services	5
Machinery & Equipment	Economic (70%)	Replacement Cost (70%)	0-$50,000	1
			$50,000-$100,000	2
			$100,000-$250,000	3
			$250,000-$500,000	4
			$500,000+	5
	Health and Safety (30%)	Services Type (30%)	Planning and Development Services	2
			General Government	3
			Receration and Cultural Services	3
			Transportation	4
			Environmental Services	5
			Health Services	5
			Protection Services	5
			Sewer Services	5
			Water Services	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Sanitary Sewer Network (Sanitary Sewer Mains)	Economic (80%)	Replacement Costs (100%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
	Social (20%)	AADT (100%)	0-199	1
			200-399	2
			400-999	3
			1000-1999	4
			2000+	5
Vehicles	Economic (70%)	Replacement Cost (80%)	0-$50,000	1
			$50,000-$100,000	2
			$100,000-$250,000	3
			$250,000-$500,000	4
			$500,000+	5
		Vehicles Type (20%)	Ligth Duty Vehicle	2
			Medium Duty Vehicle	3
			Heavy Duty Vehicle	4
	Health and Safety (30%)	Services Type (100%)	Community Services	2
			Public Works	3
			Fire Services	5
Water Network (Water Mains)	Economic (70%)	Replacement Cost (70%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
		Road Surface Type (30%)	Gravel Roads	1
			Surface Treated Roads	3
			Hot Mix Roads	4

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Storm Sewer Network (Storm Mains)	Economic (80%)	Replacement Cost (100%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
	Social (20%)	AADT (100%)	0-199	1
			200-399	2
			400-999	3
			1000-1999	4
			2000+	5
Parks and Recreation Assets	Economic (70%)	Replacement Cost (100%)	0-$100,000	1
			$100,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1000,000	4
			$1000,000+	5
	Health and Safety (30%)	Type (100%)	Parking Lots	1
			Community Services	2
			Athletic Fields	3
			Parks Assets	3
			Playground Equipment	4
			Rentension Ponds	5

8.4 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