Asset Management Plan for the Municipality of Strathroy-Caradoc

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Key Statistics

$743 million Replacement cost of asset portfolio (gravel roads excluded)	**$89,865** Replacement cost of infrastructure per household (2016)
1.77% Target average annual infrastructure reinvestment rate	**0.90%** Actual average annual infrastructure reinvestment rate
60% Percentage of assets in fair or better condition	**49%** Percentage of annual infrastructure funding needs currently being met
22% Portion of total infrastructure funding that comes from the Gas Tax	**32%** Annual cost savings for roads, storm water, water and wastewater mains through proactive lifecycle management
$6.5 million Annual capital infrastructure deficit	**15 & 20 Years** Recommended timeframe for eliminating annual infrastructure deficit for tax-funded and utility rate-funded assets respectively

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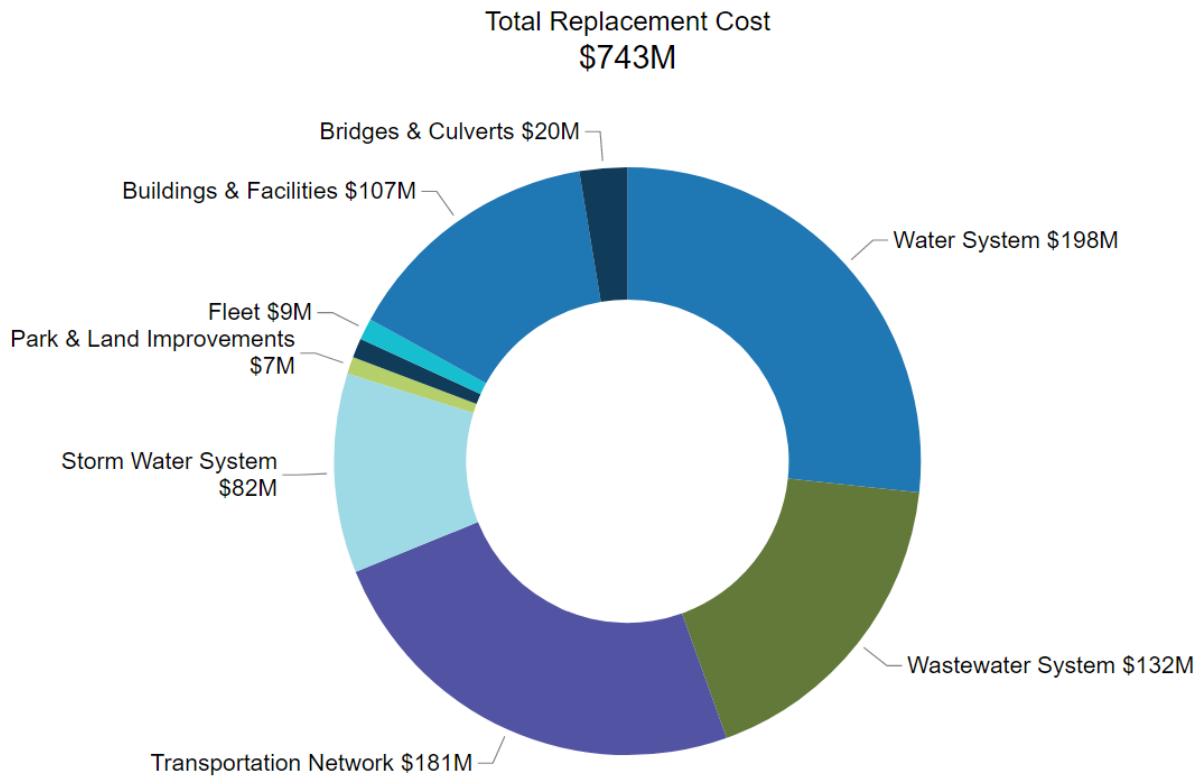
Executive Summary

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.

All municipalities in Ontario are required to complete an asset management plan (AMP) in accordance with Ontario Regulation 588/17 (O. Reg. 588/17). This AMP outlines the current state of asset management planning in the Municipality of Strathroy-Caradoc. It 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 Municipality can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP includes the following asset categories:

Asset Category	Source of Funding
Transportation Network	Tax Levy
Bridges & Culverts	
Buildings & Facilities	
Machinery & Equipment	
Fleet	
Park & Land Improvements	
Storm Water System	
Water System	User Rates
Wastewater System	



The overall replacement cost of the asset categories included in this AMP totals $743 million. 60% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 34% of assets. For the remaining 66% 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 has used a combination of proactive lifecycle strategies (roads, storm water, water, and wastewater 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 Municipality's average annual capital requirement totals $13.2 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $6.7 million towards capital projects per year. As a result, there is currently an annual funding gap of $6.5 million.

A financial strategy was developed to address the annual capital funding gap. The following table compares to total and average annual tax/rate change required to eliminate the Municipality's infrastructure deficit:

Funding Source	Years Until Full Funding	Total Tax/Rate Change	Average Annual Tax/Rate Change
Tax-Funded Assets	15 Years	34.0%	2.0%
Rate-Funded (Water)	20 Years	7.8%	0.4%

With the development of this AMP, Strathroy-Caradoc has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2022 and 2024. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2025.

This AMP represents a snapshot in time and is based on the best available processes, data, and information at the Municipality. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources. Several recommendations have been developed to guide the continuous refinement of the Municipality's asset management program. These include:

a) asset inventory data review and validation
b) the formalization of condition assessment strategies
c) the implementation of risk-based decision-making as part of asset management planning and budgeting
d) the continuous review, development and implementation of optimal lifecycle management strategies
e) the identification of proposed levels of service

The evaluation of the above items and further development of a data-driven, best-practice approach to asset management is recommended to ensure the Municipality is providing optimal value through its management of infrastructure and delivery of services.

1 Introduction and Context

Key Insights

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

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

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

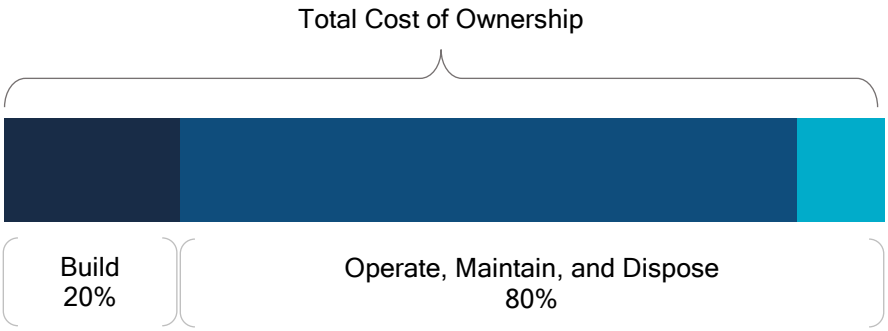
- An asset management plan is a living document that should be updated regularly to inform long-term planning.

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

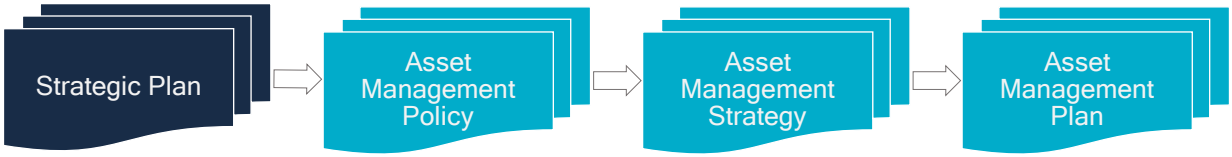
1.1 An Overview of Asset Management

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

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



These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The diagram below depicts an industry-standard approach and sequence to developing a practical asset management program.



The diagram, adopted from the Institute of Asset Management (IAM), illustrates the concept of 'line of sight', or alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

1.1.1 Asset Management Policy

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

Strathroy-Caradoc approved Policy (AMP-01) "Establish a Municipal Strategic Asset Management Policy" on May 22nd, 2018, in accordance with Ontario Regulation 588/17. It also opted to incorporate the policy into the Corporate Section of the Strathroy-Caradoc Policy Manual.

The purpose of the policy is to provide leadership in and commitment to the development and implementation of the Municipality's asset management program. It is intended to guide the consistent use of asset management across the organization, to facilitate logical and evidence-based decision-making for the management of municipal infrastructure assets and to support the delivery of sustainable community services now and in the future.

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

- The policy's statements dictate the use of asset management and data management practices to ensure all assets meet the expected levels and provide the desired levels of service in the most efficient and effective manner;
- The policy commits to, where appropriate, incorporating the asset management policy in the Municipality's other plans;
- There are formally defined roles and responsibilities of internal staff;
- The key principles include the use of a cost/benefit analysis in the management of risk; and
- The policy statements are well defined.

1.1.2 Asset Management Strategy

An asset management strategy outlines the business processes, organizational practices, and key initiatives with associated timelines and resources designed to create and sustain an asset management program. It is intended to covert the asset management policy from a set of formal, institutionalized, but philosophical commitments into specific actions.

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

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

1.1.3 Asset Management Plan

The asset management plan (AMP) presents the outcomes of the Municipality'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 focus of the AMP is not simply about identifying the money or resources that are required to meet lifecycle needs of infrastructure and maintain an adequate level of service. It should also identify the processes and strategies that are and can be implemented to improve decision-making outcomes.

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

Strathroy-Caradoc's last iteration of the AMP was completed in 2013. Since then, the asset inventory has undergone revisions to achieve asset data consolidation. This document is an AMP that uses the most recent inventory and has been prepared in compliance with O. Reg. 588/17.

1.2 Key Concepts in Asset Management

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

1.2.1 Lifecycle Management Strategies

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

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

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
Preventitive Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	$
General Maintenance	Activities that repair current defects or inhibit deterioration	Pothole Repairs	$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	$$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of the asset	Full Replacement	$$$
Replacement Upgrade	Asset end-of-life activities that involve the replacement of an asset to an upgraded asset	Full Replacement and Asset Upgrade	$$$$

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

1.2.2 Risk Management Strategies

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

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

This AMP includes a high-level evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. A risk matrix and a list of the five critical assets in each category are included in this AMP. These risk scores can be used to prioritize maintenance, rehabilitation and replacement strategies for critical assets.

1.2.3 Levels of Service

A level of service (LOS) is a measure of what a municipality 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 Strathroy-Caradoc as worth measuring and evaluating. The Municipality measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Storm Water) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP. For non-core asset categories (Buildings & Facilities, Parks), Strathroy-Caradoc 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 Municipality's asset management strategies on the physical condition of assets or the quality/capacity of the services they provide.

For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Storm Water) 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 (Buildings & Facilities, Parks), Strathroy-Caradoc 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

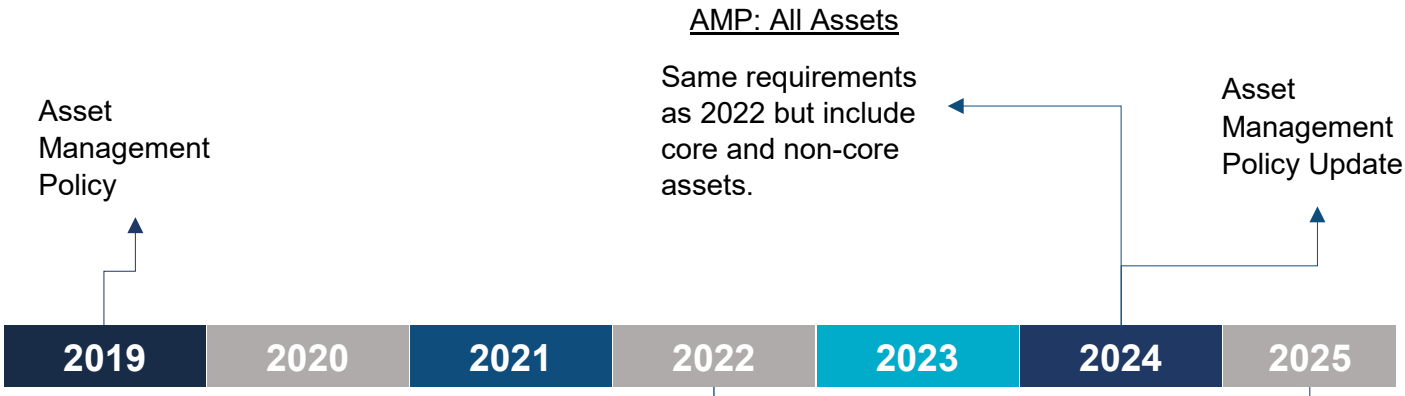
This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the Municipality plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the Municipality. 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 Municipality must identify a lifecycle management and financial strategy which allows these targets to be achieved.

1.3 Ontario Regulation 588/17

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

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



AMP: Core Assets

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

AMP: All Assets

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 strategy.

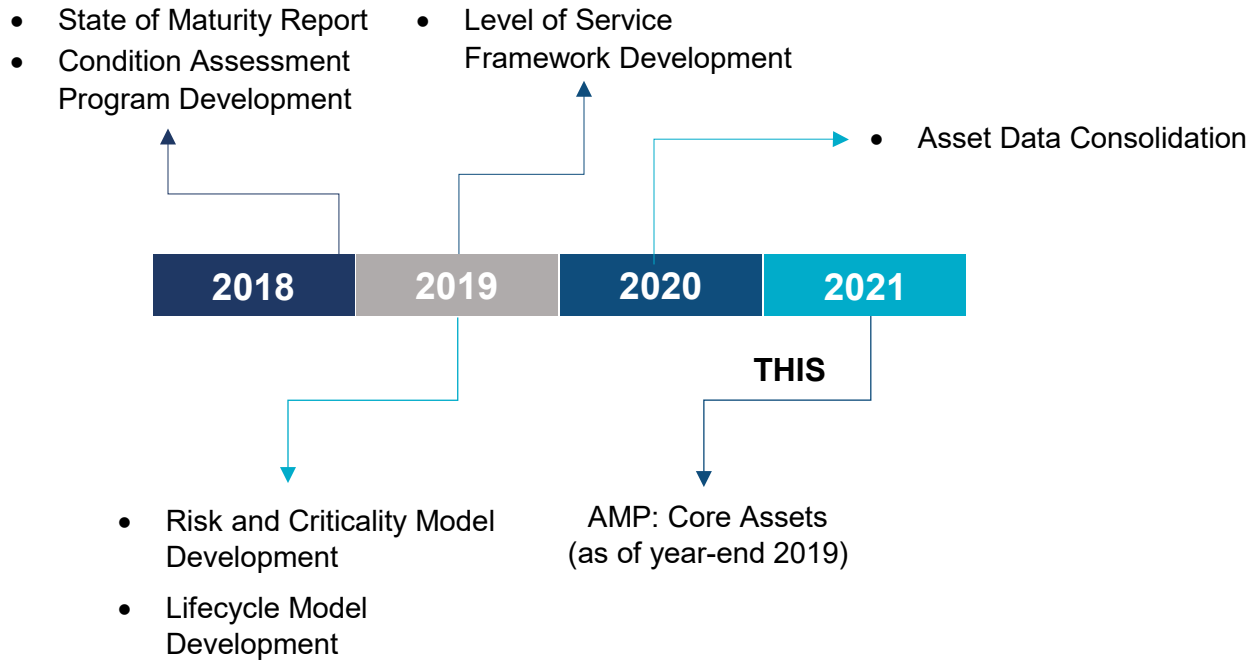
1.3.1 O. Reg. 588/17 Compliance Review

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

Requirement	O. Reg. Section	AMP Section Reference	Status
Summary of assets in each category	S.5(2), 3(i)	4.1.1 - 5.2.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	4.1.1 - 5.2.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	4.1.3 - 5.2.3	Complete
Condition of core assets in each category	S.5(2), 3(iv)	4.1.2 – 5.2.2	Complete
Description of Municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	4.1.2 – 5.2.2	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	4.1.6 - 5.2.6	Complete for Core Assets, Buildings and Facilities, Parks and Land Improvements
Current performance measures in each category	S.5(2), 2	4.1.6 - 5.2.6	TBD
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

1.4 Asset Management Roadmap

As part of PSD's Asset Management Roadmap, the Municipality of Strathroy-Caradoc committed to taking the necessary steps towards developing a systemic, sustainable and intelligently-structured asset management program. This process involved the collaboration of PSD's industry-leading asset management team with municipal staff over a multi-year engagement. The following summarizes key milestones/deliverables achieved throughout this project.



Asset Management Maturity Assessment (Completion Date: July 2018)

The State of Maturity Report provided an audit of the existing asset management capacity and competency. It outlined strategic recommendations to improve the Municipality's asset management program.

Condition Assessment Program Development (Completion Date: September 2018)
Municipal staff received training on the development of condition assessment strategies for municipal assets. This included condition assessment guidelines as well as data collection templates to ensure asset condition data is collected consistently and updated regularly.

Risk and Criticality Model Development (Completion Date: February 2019)
Risk models were developed to determine the relative criticality of assets based on their probability and consequence of failure. These models assist with the prioritization and ranking of infrastructure needs.

Lifecycle Model Development (Completion Date: July 2019)
The Municipality's lifecycle management strategies were reviewed and documented to determine current practices and identify opportunities for improvement and potential cost avoidance.

Level of Service Framework Development (Completion Date: August 2019)
A framework was developed to determine the current level of service provided to the community through municipal infrastructure.

Asset Data Review and Refinement (Completion Date: September 2020)
Asset data was consolidated from various datasets into the primary tangible capital asset inventory.

AMP & Financial Strategy (Completion Date: March 2021)
This document represents the culminating deliverable of the Asset Management Roadmap.

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 Municipality of Strathroy-Caradoc is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs—requires analysis of only core assets (roads, bridges & culverts, water, wastewater, and storm water).

The AMP summarizes the state of the infrastructure for the Municipality'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
Transportation Network	Tax Levy
Bridges & Culverts	
Buildings & Facilities	
Machinery & Equipment	
Fleet	
Park & Land Improvements	
Storm Water System	
Water System	User Rates
Wastewater System	

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 per 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.
- **Historical Cost Inflation**: Inflation of the asset cost recorded at the time it was initially acquired to today's value using an index (e.g., CPI or NRBCPI)

User-defined and Unit 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 Municipality 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 Municipality 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 Municipality can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, The Municipality can more accurately forecast when it will require replacement. The SLR is calculated as follows:

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

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

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

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

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 Municipality'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.

2.6 Asset Inventory Refinement

As part of the collaboration with PSD, the Municipality developed a refined asset inventory for the AMP, through the consolidation of asset data from additional data sources into the primary tangible capital asset inventory.

2.6.1 Data Sources

The asset inventory used in this AMP was refined with the consolidation of asset data from the following sources in the table below.

Asset Information Sources	Asset Category	Description of Asset Data
GIS Data	Transportation Network Bridges and Culverts Storm Water System Water System Wastewater System	spatial and attribute GIS data of asset types; originating from Strathroy-Caradoc's GIS datasets
Building Condition Assessments	Building & Facilities	2018 condition assessments for certain facilities by Walter Fedy
OSIM Report	Bridge & Culverts	2019 Bridge and Culvert Inspections report by BM Ross
CityWide AM Inventory	All	the primary tangible asset inventory for the Municipality; stored in CityWide™

3 Portfolio Overview

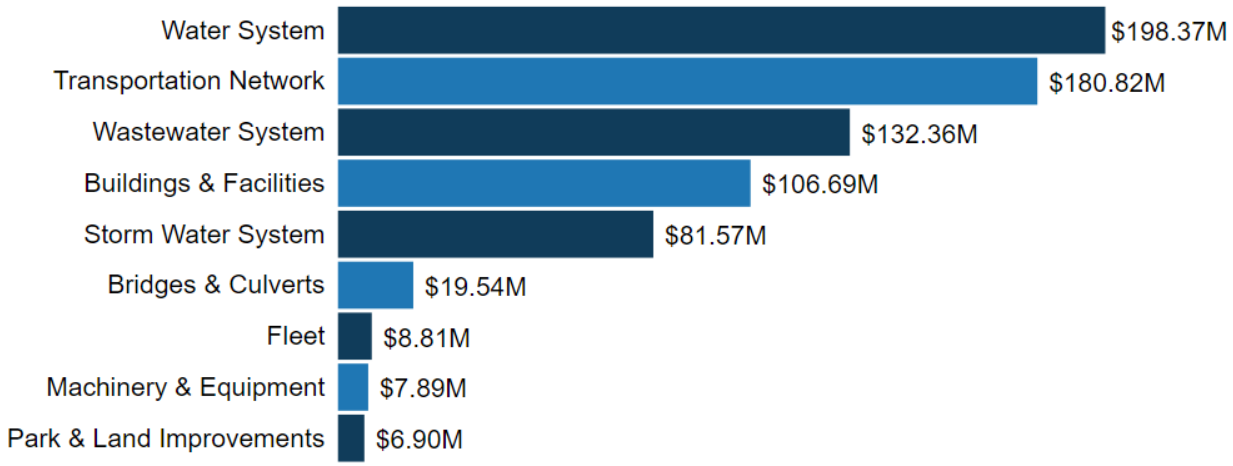
Key Insights

- The total replacement cost of the Municipality’s asset portfolio is $743 million.
- The Municipality’s target re-investment rate is 1.77%, and the actual re-investment rate is 0.90%, contributing to an expanding infrastructure deficit.
- 60% of all assets are in fair or better condition.
- 7% of assets are projected to require replacement in the next 10 years.
- Average annual capital requirements total $13.2 million per year across all asset categories.

3.1 State of the Infrastructure

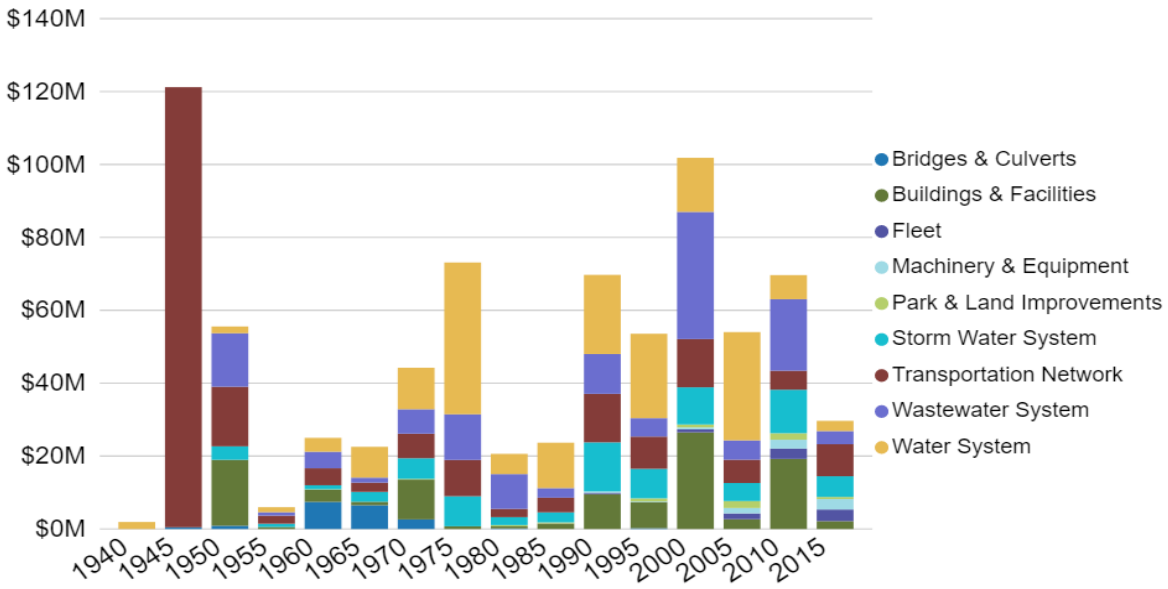
3.1.1 Total Replacement Cost of Asset Portfolio

The asset categories analysed in this AMP have a total replacement cost of $743 million based on inventory data from 2019. 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.



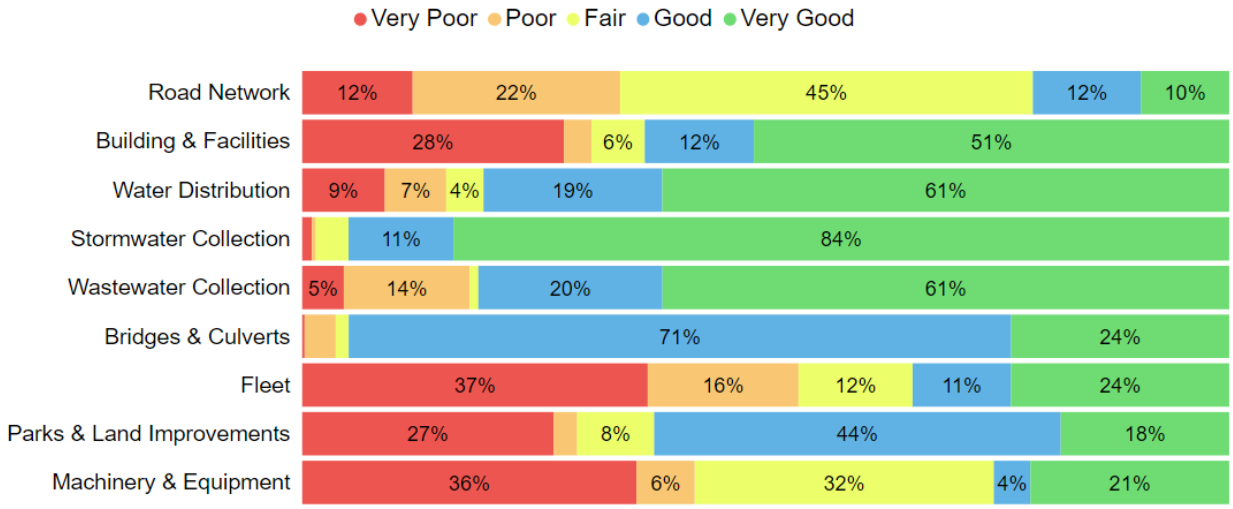
3.1.2 Installation Profile

The following graph illustrates the installation profile for the assets analysed in this AMP based on their in-service date and current replacement value.



3.1.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. The following graph
illustrates the projected condition of the asset categories.



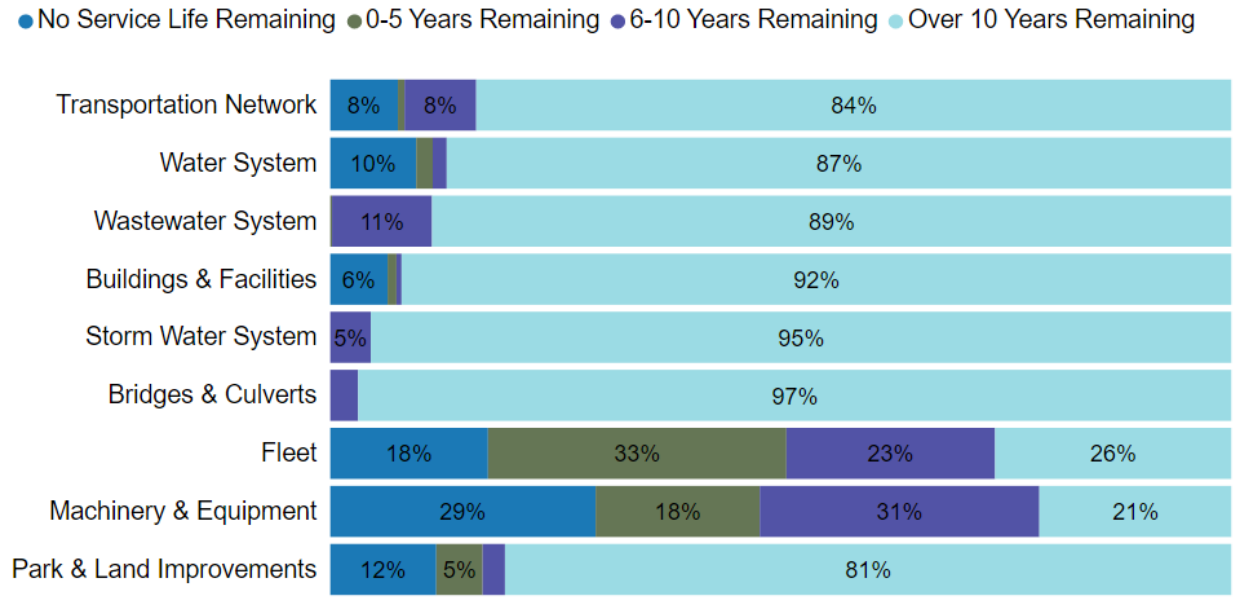
Collectively, 60% of assets in Strathroy-Caradoc are in fair or better condition. This estimate relies on both age-based and field condition data.

This AMP relies on assessed condition data for 34% 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 assessed condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Bridges & Culverts	Bridges	100%	2019 Bridge and Culvert Inspections report by BM Ross
	Culverts	100%	
Buildings & Facilities	Recreation & Cultural Services	75%	2018 condition assessments for certain facilities by Walter Fedy
Transportation Network	Sidewalks	98%	2015 Road Management Study by BM Ross
	Asphalt Roads	78%	
	Gravel Roads	99%	
	Tar & Chip Roads	98%	

3.1.4 Service Life Remaining

The graph below illustrates the service life remaining for each of the asset categories. The calculation of service life remaining is based on asset age, available assessed condition data and estimated useful life. Much like the calculation of asset condition, this value is replacement cost weighted.



Based on the a forementioned variables, around 7% of the Municipality's assets will require replacement within the next 10 years. Capital requirement costs over the next 10 years are identified in Appendix A.

The following provides a summary of the ranges in useful life, the average age and the average service life remaining of the asset categories within this AMP. The average age is determined

by the install year and estimated useful life, while the average service life remaining takes into account the condition of the asset into the calculation.

Category	Estimated Useful Life Range (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges & Culverts	50-75 Years	59.25	33.67
Buildings & Facilities	10-100 Years	17.58	26.5
Fleet	1-20 Years	7.58	3.25
Machinery & Equipment	5-50 Years	8.58	2.33
Park & Land Improvements	10-100 Years	22.33	20.67
Storm Water System	50-90 Years	26.33	48.58
Transportation Network	25-50 Years	43.92	14
Wastewater System	10-100 Years	32.25	42.5
Water System	10-90 Years	37.5	6.17
Total:		**32.00**	**28.75**

While capital planning horizons tend to be short (<10 Years), a sustainable lifecycle and financial strategy should consider the full lifecycle of all assets.

Short-term capital costs may be low for asset categories with long useful lives where infrastructure is relatively new. However, planning and saving for long-term capital costs is a key component of asset management planning.

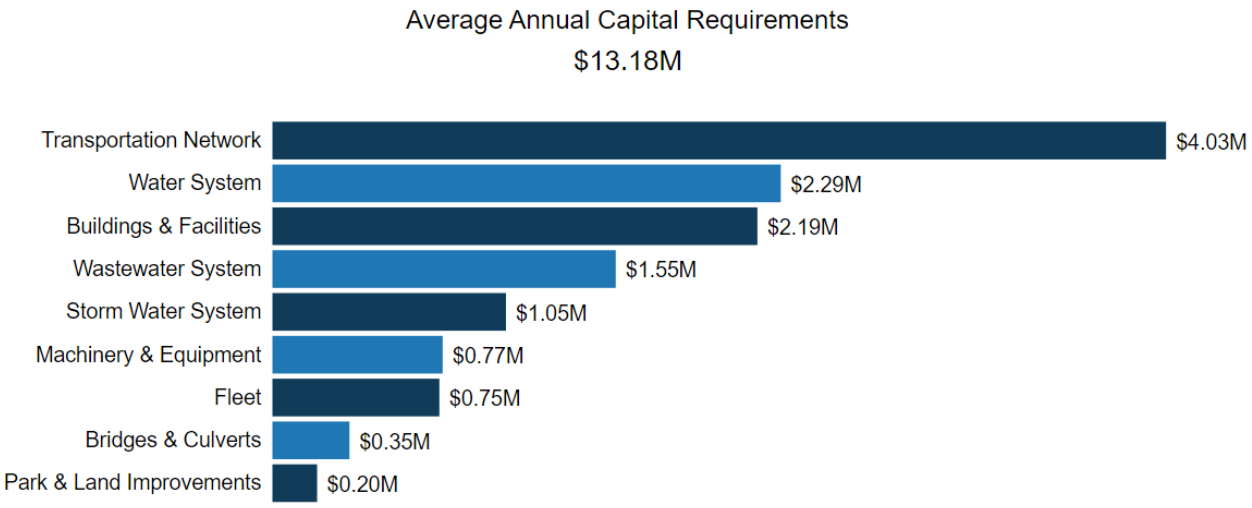
The calculation of an average annual capital requirement considers the estimated useful life and cost of infrastructure to identify the amount that the Municipality should be allocating to meet capital needs regardless of whether the project costs will be incurred in the short- or long-term.

3.2 Projected 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 Municipality can produce an accurate long-term capital forecast.

3.2.1 Average Annual Capital Requirements

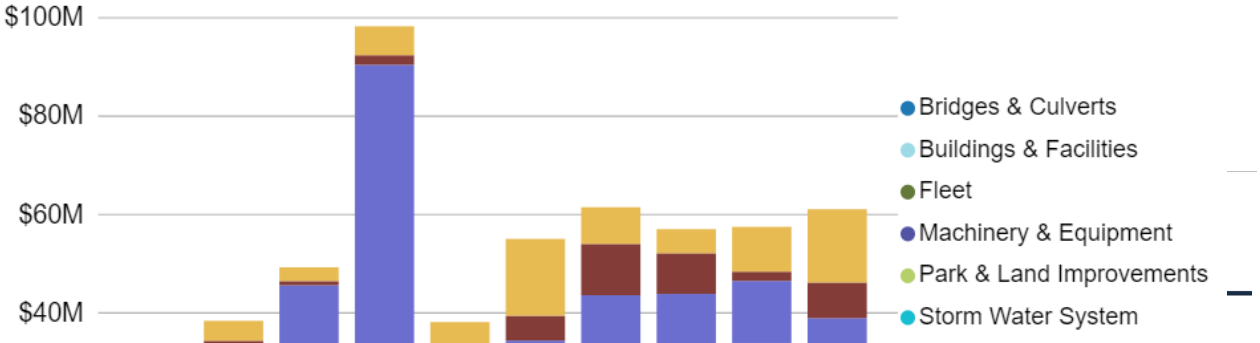
Annual capital requirements represent the amount that the Municipality should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability.



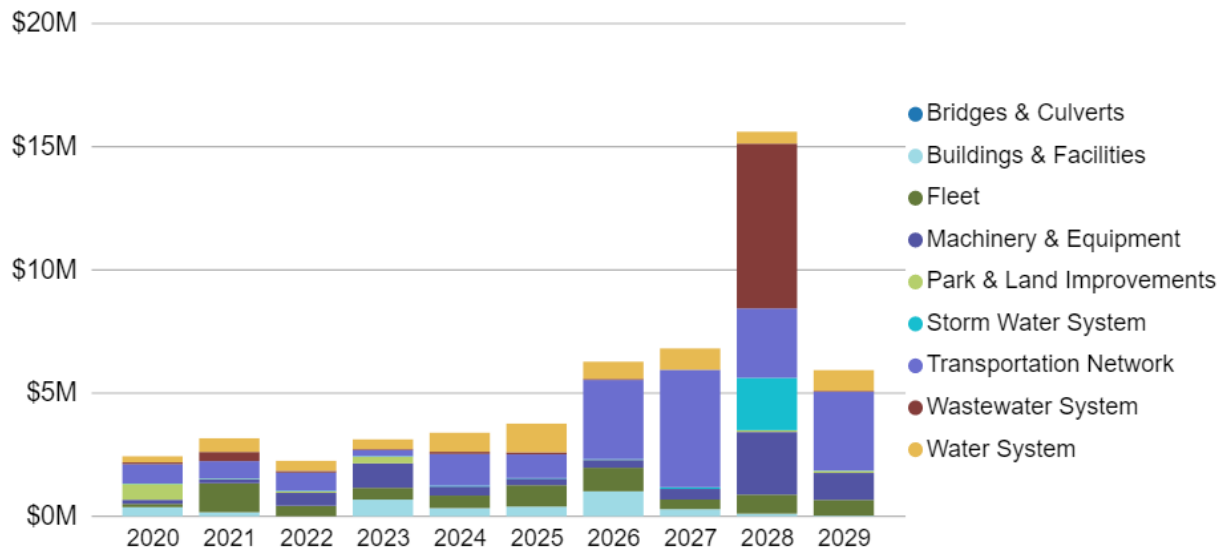
In total, the Municipality must allocate approximately $13.18 million annually to address capital requirements for the assets included in this AMP.

3.2.2 Projected Capital Requirements

The following graph identifies projected capital requirements over the next 50 years.



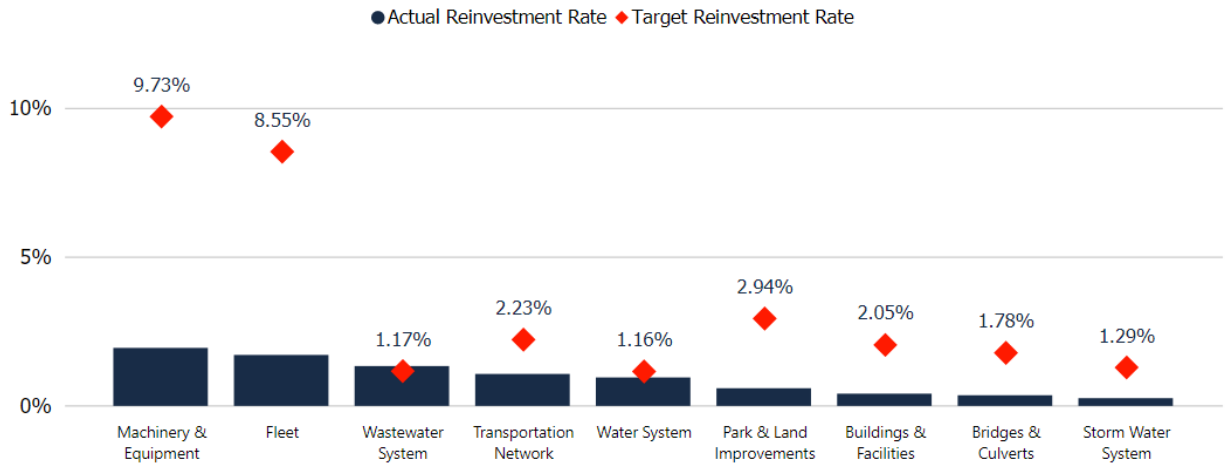
The following graph identifies projected capital requirements over the next 10 years.



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

3.3 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate.



To meet the long-term replacement needs, the Municipality should be allocating approximately $13.2 million annually, for a target reinvestment rate of 1.77%. Actual annual spending on infrastructure totals approximately $6.68 million, for an actual reinvestment rate of 0.9%.

4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at $412 million.
- 55% of assets are in fair or better condition.
- 8% of assets are projected to require replacement in the next 10 years.
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately $9.3 million.

4.1 Transportation Network

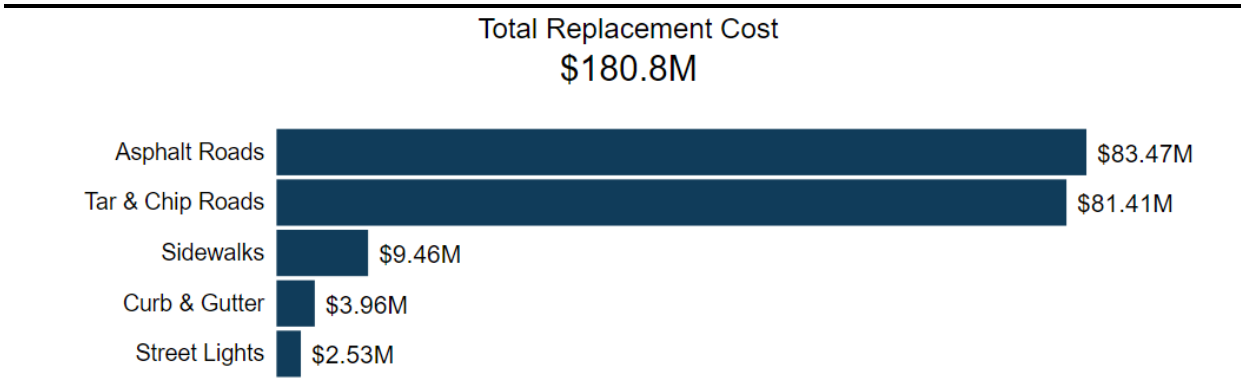
The Transportation Network is a critical component of the provision of safe and efficient transportation services and represents the highest value asset category in the Municipality's asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure such as sidewalks, curb and gutter, and streetlights.

Strathroy-Caradoc's transportation network is maintained by the Public Works division in the Engineering and Public Works department. The division is also responsible for patching and filling holes, cutting grass along roadside ditches, performing roadside tree maintenance, rebuilding roadways and winter maintenance.

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 road network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Asphalt Roads	105 km	Cost per Unit	$83,466,666
Tar & Chip Roads	140 km	CPI Inflation (Historical Cost)	$81,409,968
Gravel Roads	108 km	Not Planned for Replacement[1]	$44,384,720[2]
Curb & Gutter	89 km	CPI Inflation (Historical Cost)	$3,959,916
Sidewalks	82 km	CPI Inflation (Historical Cost)	$9,456,596
Streetlights	3,360	CPI Inflation (Historical Cost)	$2,525,625
			$225,203,492

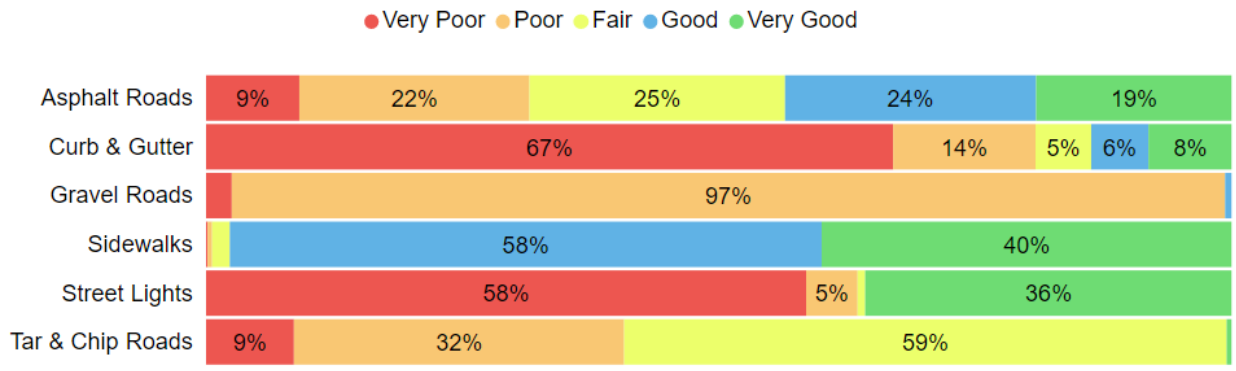


[1] Gravel roads do not undergo asset replacement and are either in a state of perpetual maintenance or upgraded to an asset with a different composition as they approach end of life. As such, gravel roads have been excluded from the calculation of the total replacement cost and annual capital requirements of the Transportation Network.
[2] An estimated replacement cost, based on historical cost inflation, was determined and assigned to each gravel road segment. This represents the estimated value of the gravel roads.

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.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Asphalt Roads	64%	Good	78% Assessed
Curb & Gutter	27%	Poor	Age-based
Gravel Roads	43%	Fair	99% Assessed
Sidewalks	85%	Very Good	98% Assessed
Streetlights	38%	Poor	Age-based
Tar & Chip Roads	53%	Fair	90% Assessed
	56%	**Fair**	



Current Approach to Condition Assessment

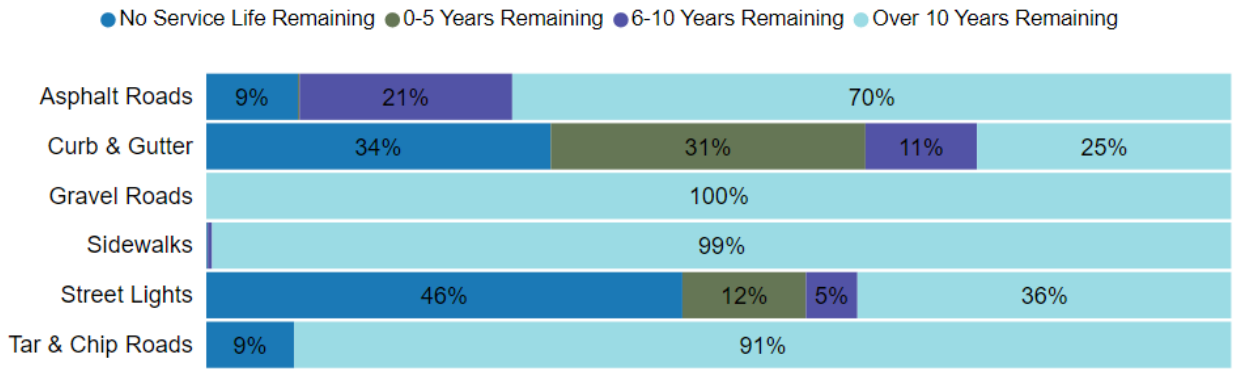
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Municipality's current approach:

- A Road Management Study was completed in 2015 by BM Ross that included a detailed assessment of the condition of each road and sidewalk segments.
- The Roads Management Study is reviewed every year and additional roads are assessed as needed.
- Transportation Network assets are inspected as per O. Reg. 239/02: Minimum Maintenance Standards for Municipal Highways.

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. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Asphalt Roads	25 Years	38.1	11.83
Curb & Gutter	30-50 Years	30.92	-0.67
Gravel Roads	20 Years	65.83	13.5
Sidewalks	30 Years	48.92	23
Street Lights	30 Years	34.75	-4.75
Tar & Chip Roads	25 Years	57.5	11.5
		43.92	**14**



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

4.1.4 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 2015 Road Management Study outlines recommended improvement suggestions and an expenditure forecast to guide Strathroy-Caradoc's operations. Currently the Municipality incorporates several of these strategies and although the study outlines detailed needs in the short term, a strategy to address the full lifecycle costs of roads has not yet been developed.

The table below outlines the Municipality's current lifecycle management strategy for Gravel roads.

Activity Type	Description of Current Strategy
Preventative Maintenance	Gravel roads are considered to be in a state of perpetual maintenance
	Lifecycle activities are funded through the Municipality's operating budget
	Maintenance events are applied on an identified and in some cases on a reactive need
Replacement	Gravel roads do not require conventional asset replacement events
	Roads are reviewed periodically as potential candidates for a surface composition upgrade

The table below outlines the Municipality's current lifecycle management strategy for HCB and LCB roads.

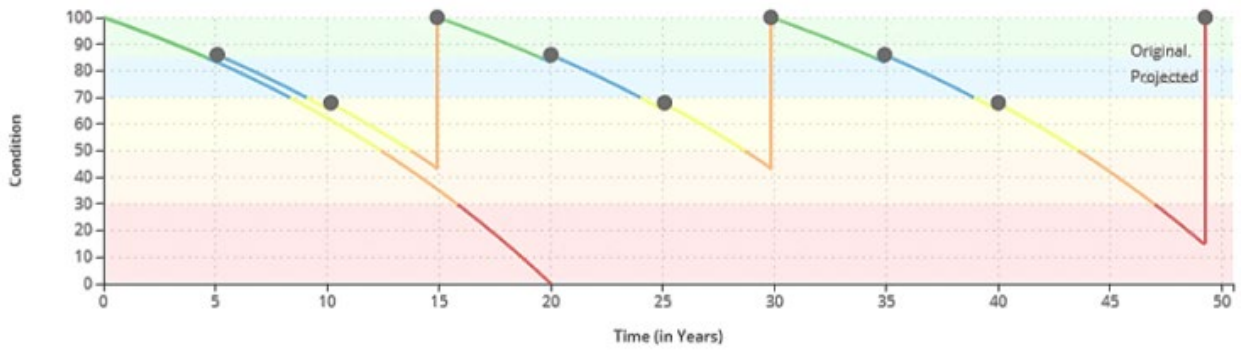
Activity Type	Description of Current Strategy
Maintenance	Scheduled maintenance that consists of Crack Sealing, Pothole Filling, and Spray Patching
	Reactive and unscheduled maintenance also occurs
Rehabilitation	Pavement Resurfacing – Microsurfacing, Single Lift, Double Lift
Replacement	Replacement is based on asset condition. Risk-based decision making is exercised to the best of staff's ability and references the 2015 Road Management Study
	Roads are fully reconstructed and are part of an informal lifecycle process

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of HCB, LCB and Gravel roads. These strategies have been developed with input from municipal staff and following industry best practices. 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.

The Municipality can apply 1 of 2 approaches for HCB roads:

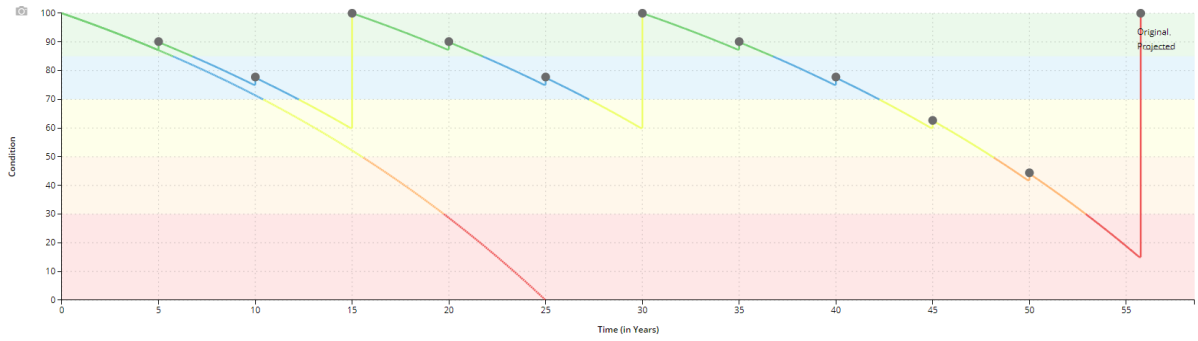
1) An assessed condition-based strategy will rely on scheduled road assessment values to trigger appropriate events. These will better dictate when lifecycle events should be applied to asphalt roads and it is the recommended approach moving forward.

HCB Roads Strategy 1: Condition-based		
Event Name	Event Class	Event Trigger
Crack Sealing – 1st, 3rd & 5th Treatments	Maintenance	Condition at 83%
Crack Sealing – 2nd, 4th & 6th Treatments	Maintenance	Condition at 65%
Surface Overlay – Single Lift	Rehabilitation	Condition at 43%
Mill & Pave – Double Lift	Rehabilitation	Condition at 43%
Crack Sealing – 7th Treatment	Maintenance	Condition at 42%
Full Reconstruction	Replacement	Condition at 0 - 30%

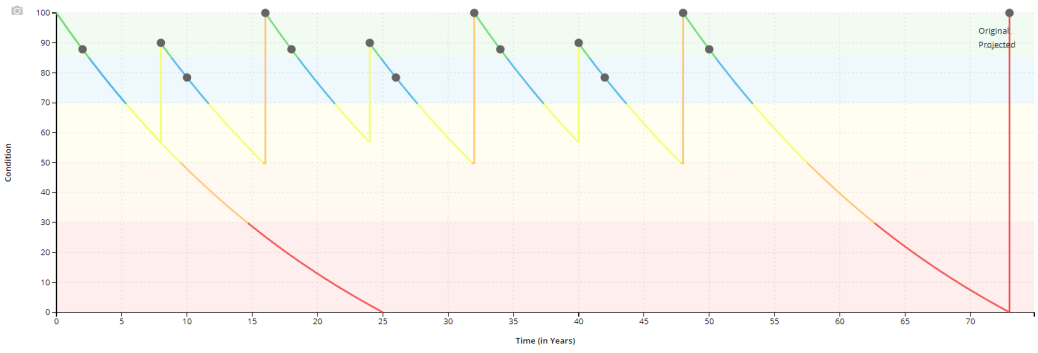


2) Although an age-based strategy is similar to the assessed condition strategy, this particular strategy will rely on age-based values. This strategy is limited – applying lifecycle events based on age does not accurately address the performance of the asset. This is a cursory approach to estimating the actual condition of an asset and not recommended.

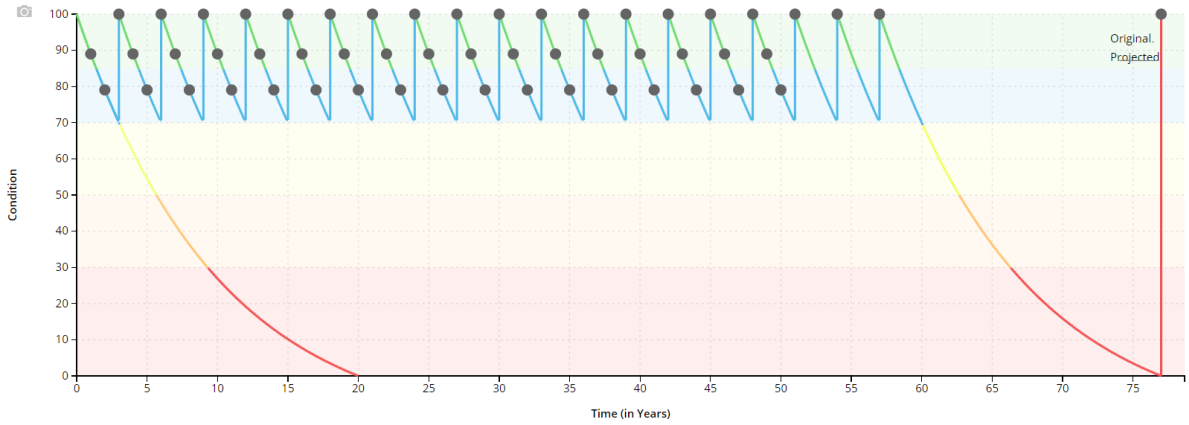
HCB Roads Strategy 2: Age-based		
Event Name	Event Class	Event Trigger
Crack Sealing	Maintenance	Year 5 & 10
Surface Overlay	Rehabilitation	Year 15
Crack Sealing	Maintenance	Year 20 & 25
Mill & Pave	Rehabilitation	Year 30
Crack Sealing	Maintenance	Year 35, 40 & 45
Full Reconstruction	Replacement	0-30% Condition



LCB Roads – Best Practice Strategy		
Event Name	Event Class	Event Trigger
Slurry Seal Treatments	Maintenance	Year 2, 10, 18, 26, 34, 42, & 50
Surface Treatment 1 – Single Lift	Rehabilitation	8 Years
Surface Treatment 2 – Double Lift	Rehabilitation	Repeats every 16 Years
Surface Treatment 3 – Single Lift	Rehabilitation	24 Years
Surface Treatment 4 – Single Lift	Rehabilitation	40 Years
Asset Composition Upgrade	Replacement	Condition at 0 - 30%



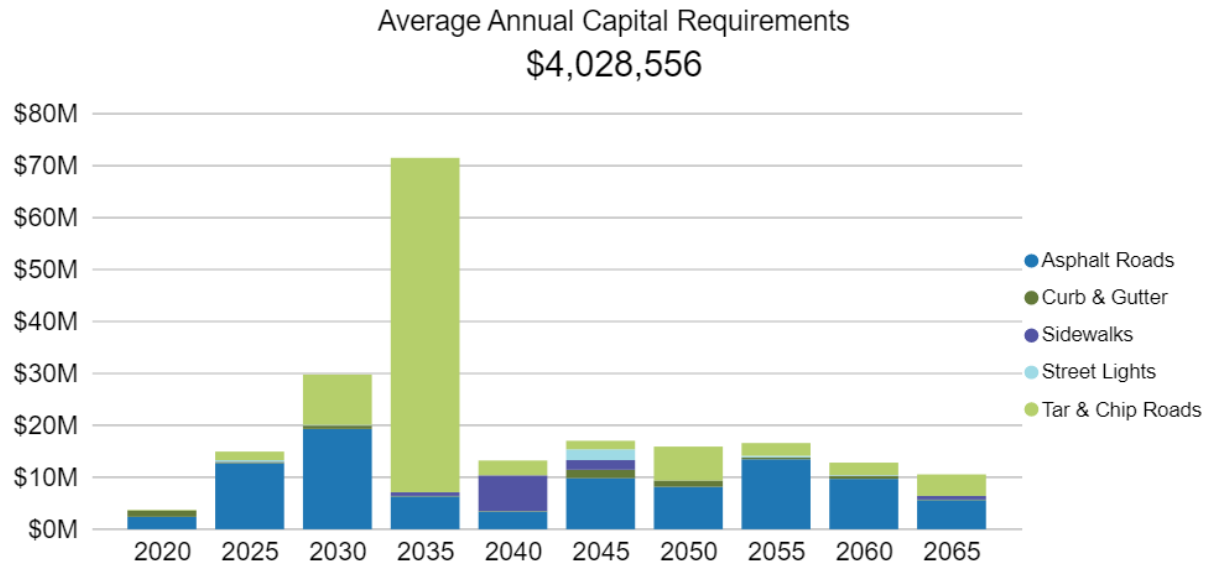
Gravel Roads – Best Practice Strategy		
Event Name	Event Class	Event Trigger
Dust Abatement – Dust Control	Preventative Maintenance	Annually
Grading – Reshaping	Preventative Maintenance	Annually
Ditching – 75mm	Maintenance	Repeats every 9 Years
Single Surface Treatment – 75 mm	Rehabilitation	Repeat every 3 Years
Asset Composition Upgrade	Replacement	Condition at 0 - 30%

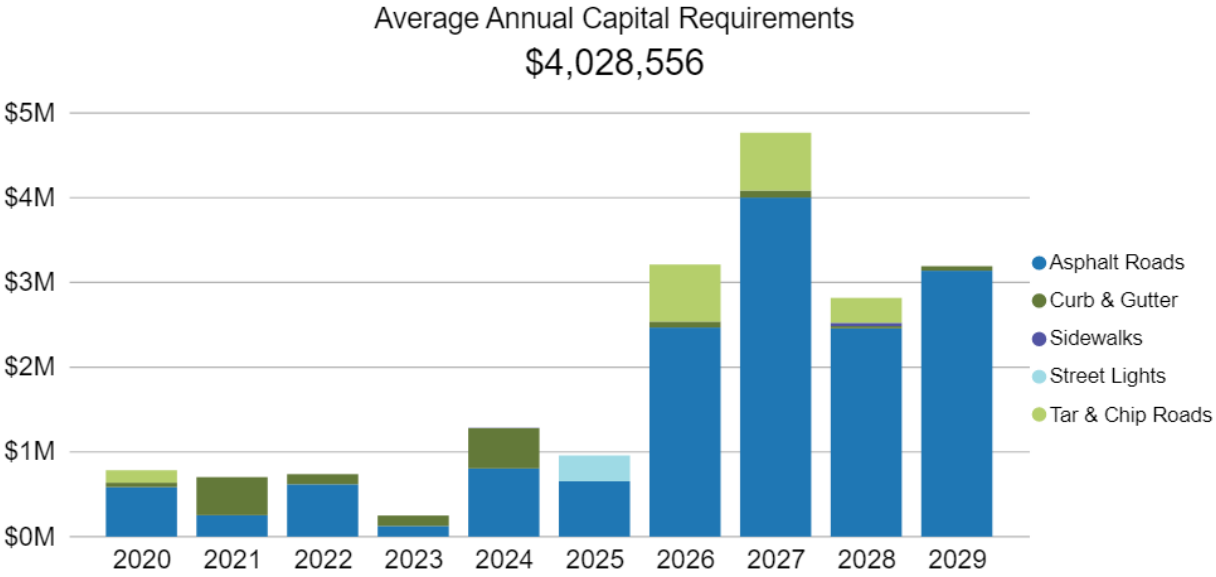


Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for HCB and LCB Roads, and assuming the end-of-life replacement of all other assets in this category, the following graphs forecasts capital requirements for the Road Network over the next 50-years and 10-years, respectively.

The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

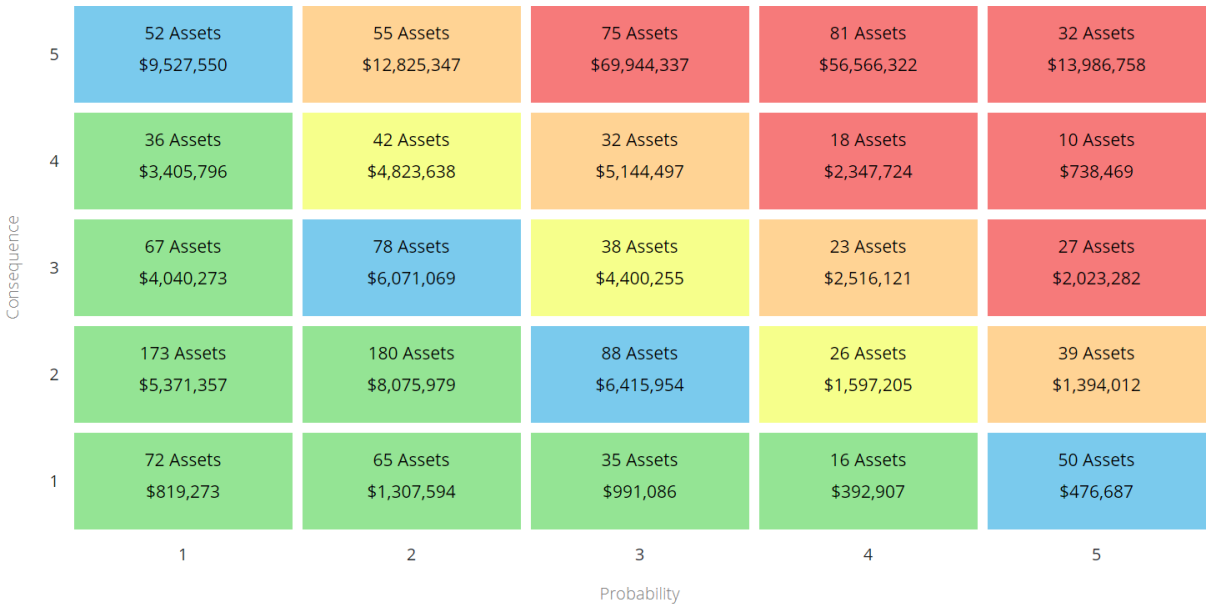




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.1.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.1.6 Levels of Service

The following tables identify Strathroy-Caradoc's current level of service for the Transportation 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 Municipality 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.

<table>
<tr><th>Service Attribute</th><th>Qualitative Description</th><th>Current LOS (2019)</th></tr>
<tr><td>Scope</td><td>Description, which may include maps, of the road network in the Municipality and its level of connectivity</td><td>TBD [See Appendix B for Maps]</td></tr>
<tr><td>Quality</td><td>Description or images that illustrate the different levels of road class pavement condition</td><td>The Municipality completed a Road Management Study in 2015 in coordination with B.M. Ross and Associates. Each road segment received a pavement condition score (0 – 100).
<table>
<tr><th>PCI Score</th><th>Description</th></tr>
<tr><td>0 – 20</td><td>Pavement is in poor to very poor condition with extensive severe cracking, alligatoring and dishing. Rideability is poor and the surface is very rough and uneven.</td></tr>
<tr><td>20 – 30</td><td>Pavement is in poor condition with moderate alligatoring and extensive severe cracking and dishing. Rideability is poor and the surface is very rough and uneven.</td></tr>
<tr><td>30 – 40</td><td>Pavement is in poor to fair condition with frequent moderate alligatoring and extensive moderate cracking and dishing. Rideability is poor to fair and surface is moderately rough and uneven.</td></tr>
<tr><td>40 – 50</td><td>Pavement is in poor to fair condition with frequent moderate cracking and dishing, and intermittent moderate alligatoring. Rideability is poor to fair and surface is moderately rough and uneven.</td></tr>
<tr><td>50 – 65</td><td>Pavement is in fair condition with intermittent moderate and frequent slight cracking, and with intermittent slight or moderate alligatoring and dishing. Rideability is fair and surface is slightly rough and uneven.</td></tr>
<tr><td>65 – 75</td><td>Pavement is in fairly good condition with slight or very slight dishing and a few areas of slight alligatoring. Rideability is fairly good with intermittent rough and uneven sections.</td></tr>
</table></td></tr>
</table>

75 – 90	Pavement is in good condition with frequent very slight or slight cracking. Rideability is good with intermittent rough and uneven sections.
90 - 100	Pavement is in excellent condition with few cracks. Rideability is excellent with few areas of slight distortion.

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 (2019)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	TBD (km/km^2)
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	TBD (km/km^2)
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	TBD (km/km^2)
Quality	Average pavement condition index for paved roads in the municipality	HCB: 65%
		LCB: 54%
	Average surface condition for unpaved roads in the municipality (e.g., excellent, good, fair, poor)	Fair
Performance	Annual capital reinvestment rate	1.07%

4.1.7 Recommendations

Asset Inventory

- Review the road asset inventory to align it with GIS data for an accurate record of road segments.
- Refine the streetlight asset inventory to disaggregate pooled assets and ensure alignment of asset records with GIS data and/or other data sources.
- Review and revise replacement costs and critical attribute data on a regular basis.

Condition Assessment Strategies

- The last comprehensive assessment of the road network was completed in 2015. Consider completing an updated assessment of all roads within the next 1-2 years.
- Formalize the condition assessment program developed as part of the Roadmap project and expand to other road network assets.

Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for HCB, LCB and Gravel roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of Strathroy-Caradoc'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 Strathroy-Caradoc 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 & Culverts represent a critical portion of the transportation network, facilitating a roadway and/or walkway over a physical obstacle. Strathroy-Caradoc has 39 structures that have a span of 3 meters or more and are therefore categorized as a bridge or a culvert asset.

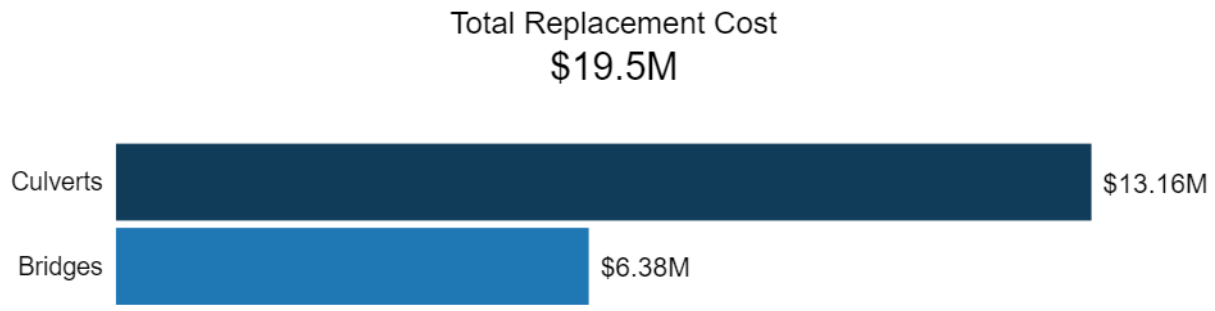
The Engineering and Public Works Department is responsible for the maintenance of all bridges and culverts located across municipal roads, with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

Based on the requirements outlined by the Ministry of Transportation, the most recent Bridge and Culvert inspection report was prepared by BM Ross and completed in 2019.

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 Municipality's Bridges & Culverts inventory.

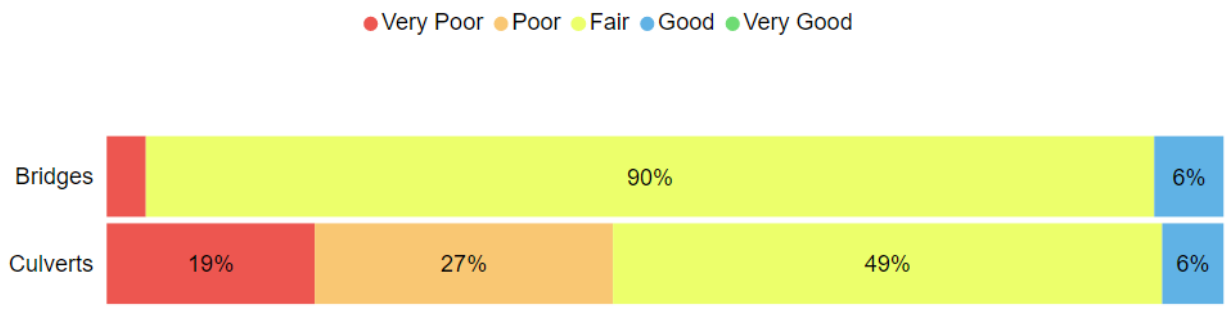
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	9	User-Defined (BM Ross – OSIM Report)	$6,379,600
Culverts	30	User-Defined (BM Ross – OSIM Report)	$13,158,800
			$19,721,451



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	72%	Good	100% Assessed
Culverts	62%	Good	100% Assessed
	66%	**Good**	



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

Current Approach to Condition Assessment

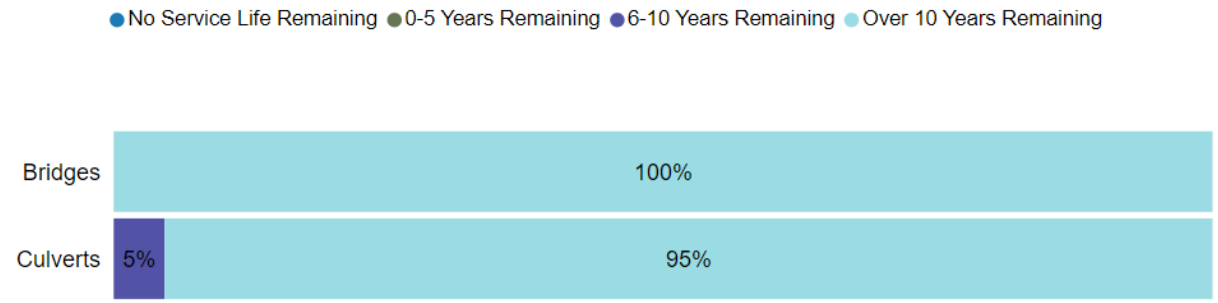
Accurate and reliable condition data allows staff to confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges	75 Years	58.75	51.17
Culverts	50 Years	59.50	28.17
		59.25	**33.67**



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.

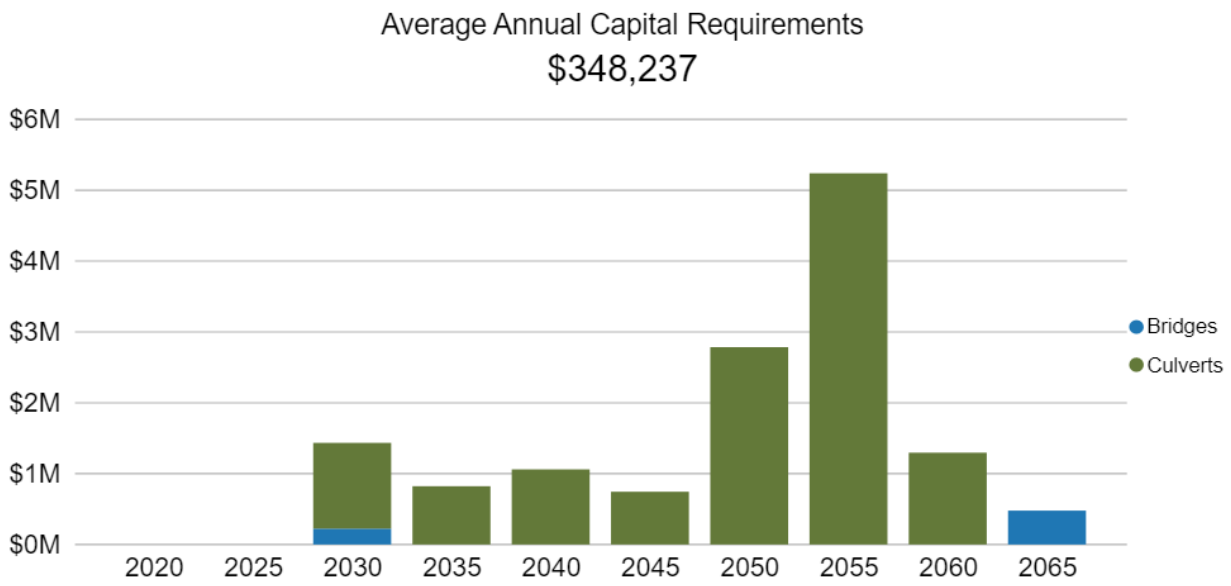
The following table outlines the Municipality's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	All lifecycle activities are driven by the results of mandated structural inspections competed as per the Ontario Structure Inspection Manual (OSIM).
Inspection	An inspection report was completed in 2019 by BM Ross.

Forecasted Capital Requirements

The following graphs forecasts capital requirements for bridge and culvert assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average

amount per year that Strathroy-Caradoc should allocate towards funding rehabilitation and replacement needs to meet future capital needs.



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

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 2019 inventory data.

The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.2.6 Levels of Service

The following tables identify the Municipality's current level of service for Bridges & Culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	TBD
Quality	Description or images of the condition of bridges & culverts and how this would affect use of the bridges & culverts	TBD

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of bridges in the Municipality with loading or dimensional restrictions	TBD
Quality	Average bridge condition index value for bridges in the Municipality	72%
	Average bridge condition index value for structural culverts in the Municipality	62%
Performance	Annual capital reinvestment rate	0.36%

4.2.7 Recommendations

Asset Inventory/Data Refinement

- 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 2-3 years.

Risk Management Strategies

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

Lifecycle Management Strategies

- This AMP includes capital costs associated with the reconstruction of bridges and culverts, as well as projected rehabilitation and renewal costs from the 2018 OSIM report. Strathroy-Caradoc should continue to 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 Municipality believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.3 Buildings & Facilities

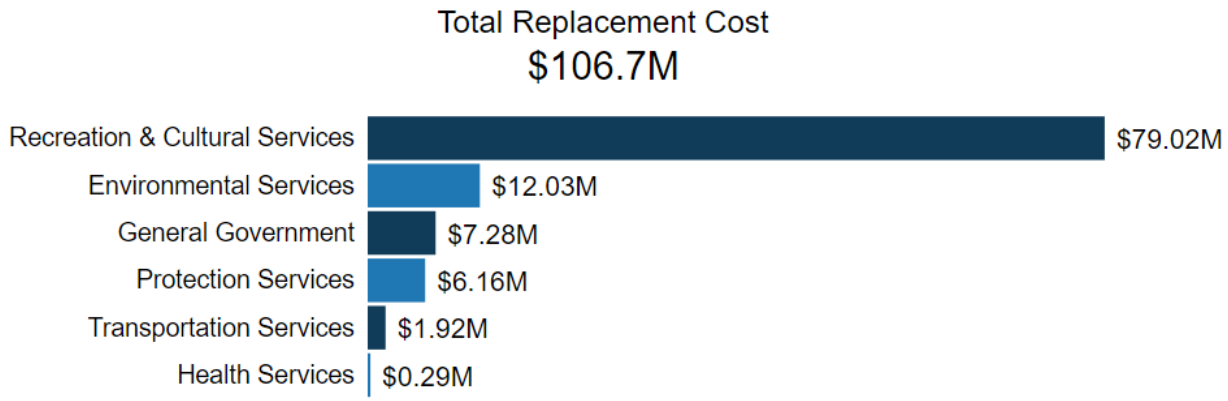
The Municipality of Strathroy-Caradoc owns and maintains several facilities and recreation centres that provide key services to the community. These facilities include:

- municipal offices
- operations centre
- public libraries and schools
- cemeteries
- fire halls and associated offices and facilities
- public works garages, equipment depot and storage sheds
- arenas and community centres

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 Buildings & Facilities inventory.

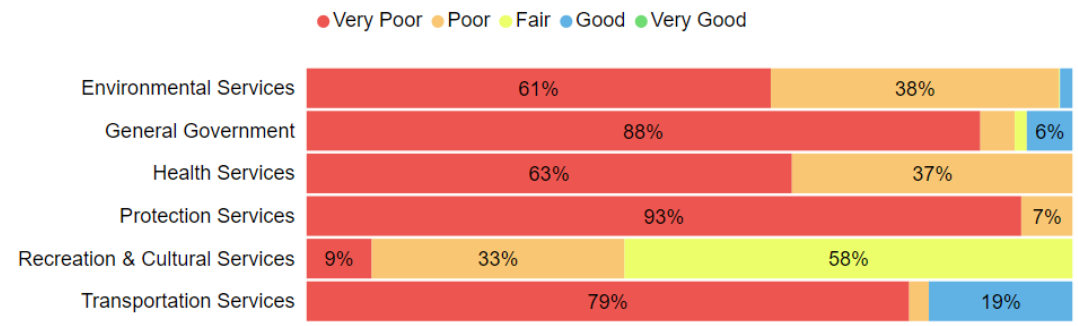
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Environmental Services	38	CPI Inflation (Historical Cost)	$12,027,213
General Government	377	CPI Inflation (Historical Cost)	$7,280,966
Health Services	6	CPI Inflation (Historical Cost)	$289,541
Protection Services	20	CPI Inflation (Historical Cost)	$6,158,939
Recreation & Cultural Services	78	CPI Inflation (Historical Cost)	$79,016,443
Transportation Services	14	CPI Inflation (Historical Cost)	$1,915,347
			$106,688,449



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.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Environmental Services	59%	Fair	Age-based
General Government	36%	Poor	Age-based
Health Services	51%	Fair	Age-based
Protection Services	61%	Good	Age-based
Recreation & Cultural Services	84%	Very Good	75% Assessed
Transportation Services	59%	Fair	Age-based
	76%	**Good**	



To ensure that the Buildings & Facilities continue to provide an acceptable level of service, Strathroy-Caradoc 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 & Facilities.

Current Approach to Condition Assessment

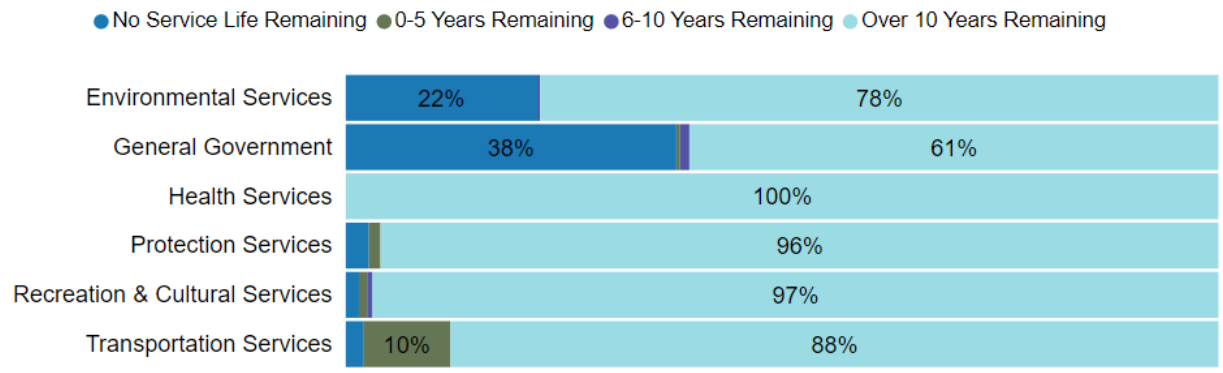
Accurate and reliable condition data allows staff to confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Formal workplace inspections conducted every year through the Municipality's health and safety program.
- High-level assessments by internal staff are performed annually to determine an estimated condition of facilities and facility components.
- A building condition assessment was conducted for several recreation facilities by Walter Fedy in 2018.

4.3.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Buildings & 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. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Environmental Services	15-75 Years	11.58	36.75
General Government	10-60 Years	16.17	19.08
Health Services	15-100 Years	18.33	45.83
Protection Services	10-60 Years	22.42	23.42
Recreation & Cultural Services	10-75 Years	18.92	21.58
Transportation Services	30-60 Years	23.83	24.33
		17.58	**26.50**



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.

4.3.4 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.

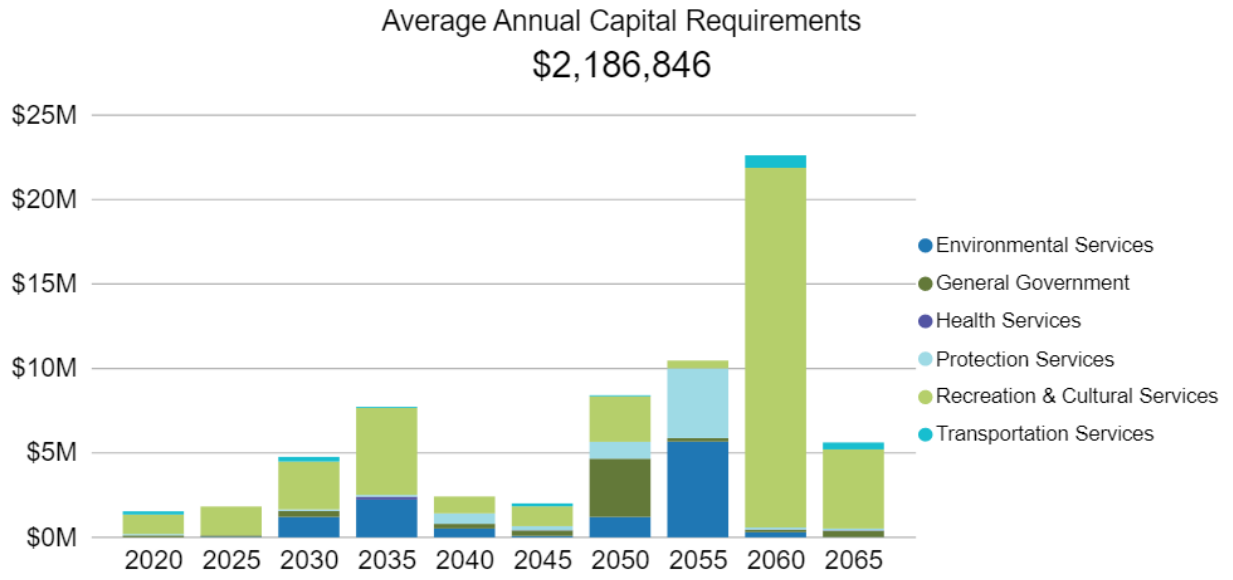
The following table outlines the Municipality's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Municipal buildings are subject to regular inspections to identify health & safety requirements as well as structural deficiencies that require additional attention
	Critical buildings (Water Treatment Plant, Wastewater Treatment Plant, Fire Stations etc.) have a detailed maintenance and rehabilitation schedule, while the maintenance of other facilities are dealt with on a case-by-case basis
Replacement	As a supplement to the knowledge and expertise of municipal staff, Strathroy-Caradoc regularly works with contractors to complete Facility Needs Assessment Studies.
	Assessments are completed strategically as buildings approach their end-of-life to determine whether replacement or rehabilitation is appropriate

Forecasted Capital Requirements

The following graphs forecasts capital requirements for building and facility assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average

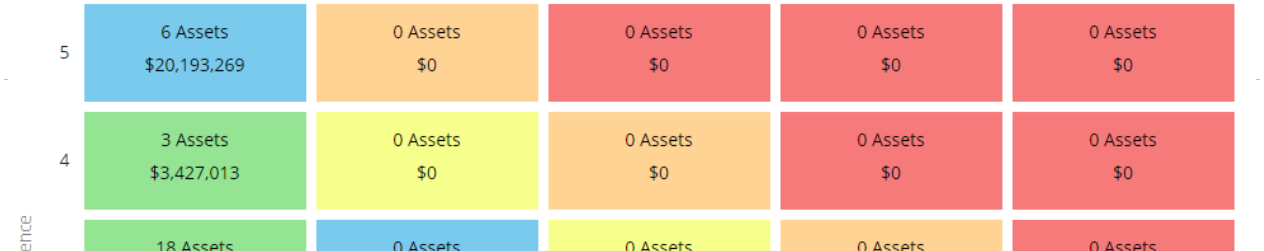
amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.



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

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.3.6 Levels of Service

Buildings & Facilities is considered a non-core asset category. As such, the Municipality has until July 1, 2024 to solidify the qualitative descriptions and technical metrics outlined in the tables below that measure the current level of service provided.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Strathroy-Caradoc's Buildings & Facilities.

Service Attribute	Qualitative Description	Current LOS (2019)
Accessible & Reliable	List of facilities that meet accessibility standards and any work that has been undertaken to achieve alignment.	TBD
Safe & Regulatory	Description of monthly and annual facilities inspection process.	TBD
Affordable	Description of the lifecycle activities (maintenance, rehabilitation and replacement) performed on municipal facilities.	TBD
Sustainable	Description of the current condition of municipal facilities and the plans that are in place to maintain or improve the provided level of service.	TBD

Technical Levels of Service

The following table include quantitative metrics that determine the technical level of service provided by Buildings & Facilities.

Service Attribute	Technical Metric	Current LOS (2019)
Accessible & Reliable	# of unplanned facility closures	TBD
Safe & Regulatory	# of service requests about unsafe conditions in facilities	TBD
	# of identified defects	TBD

Affordable	O&M cost / # of municipal facilities	TBD
	Total equivalent kWh energy consumption / ft^2 of all buildings and facilities	TBD
	Facility Usage %	TBD
	Annual capital reinvestment rate	0.41%
Sustainable	% of facilities that are in good or very good condition	TBD
	% of facilities that are in poor or very poor condition	TBD

4.3.7 Recommendations

Asset Inventory

- Staff should continue to refine and develop a component-based inventory for all buildings & facilities to allow for component-based lifecycle planning.
- Continue the consolidation of asset attribute data, condition data and updating replacement costs. In particular, the review of datasets such as insurance appraisals, external facility assessments, etc. that provide valuable asset data.

Condition Assessment Strategies

- The Municipality should formalize the internal condition assessment program that has been developed as part of the Roadmap project.
- A comprehensive structural assessment of all buildings & facilities is highly recommended to gain a better understanding of the overall heath and condition of each facility to identify accurate short- and long-term capital requirements.

Risk Management Strategies

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

Levels of Service

- Begin measuring current levels of service in accordance with the metrics that Strathroy-Caradoc 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 Machinery & Equipment

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

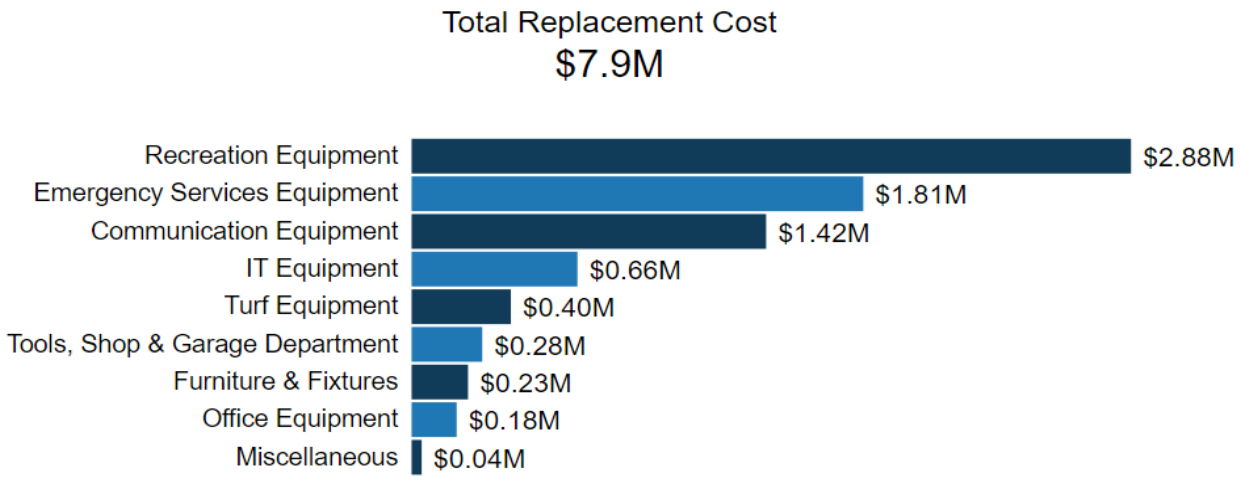
- custodial equipment to maintain facilities,
- emergency services equipment to support first responders,
- furniture & fixtures for facilities, offices, and buildings,
- IT equipment for communication, entertainment, and data management,
- recreation equipment for parks and sports facilities, and
- tools, shop & garage machinery equipment to ensure proper maintenance of vehicles and machinery.

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

4.4.1 Asset Inventory & Replacement Cost

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

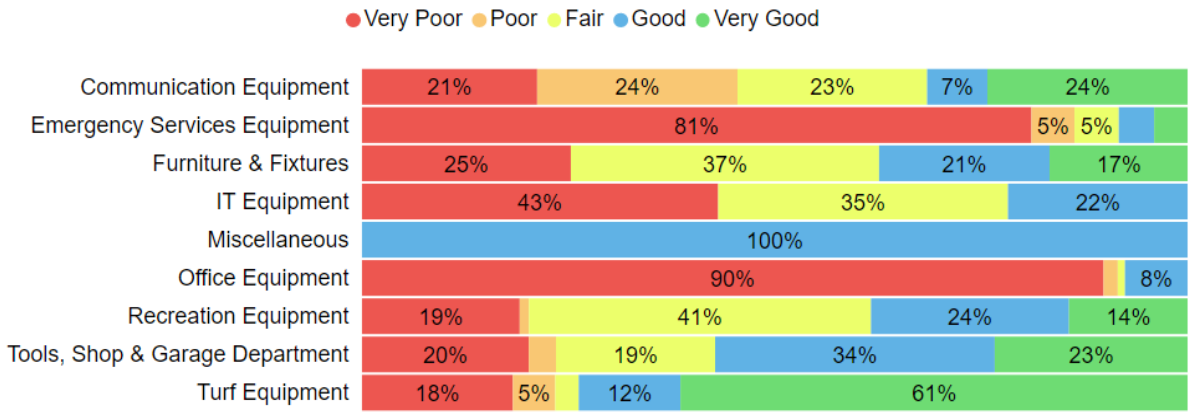
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Communication Equipment	205	CPI Inflation (Historical Cost)	$1,417,859
Emergency Services Equipment	417	CPI Inflation (Historical Cost)	$1,806,207
Furniture & Fixtures	169	CPI Inflation (Historical Cost)	$226,456
IT Equipment	132	CPI Inflation (Historical Cost)	$663,748
Miscellaneous	2	CPI Inflation (Historical Cost)	$41,209
Office Equipment	48	CPI Inflation (Historical Cost)	$180,905
Recreation Equipment	136	CPI Inflation (Historical Cost)	$2,876,286
Tools, Shop & Garage Department	58	CPI Inflation (Historical Cost)	$283,249
Turf Equipment	11	CPI Inflation (Historical Cost)	$397,842
			$7,893,761



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
Communication Equipment	56%	Fair	Age-based
Emergency Services Equipment	16%	Very Poor	Age-based
Furniture & Fixtures	53%	Fair	Age-based
IT Equipment	46%	Fair	Age-based
Miscellaneous	85%	Very Good	Age-based
Office Equipment	11%	Very Poor	Age-based
Recreation Equipment	59%	Fair	Age-based
Tools, Shop & Garage Department	61%	Good	Age-based
Turf Equipment	73%	Good	Age-based
	47%	**Fair**	



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

Current Approach to Condition Assessment

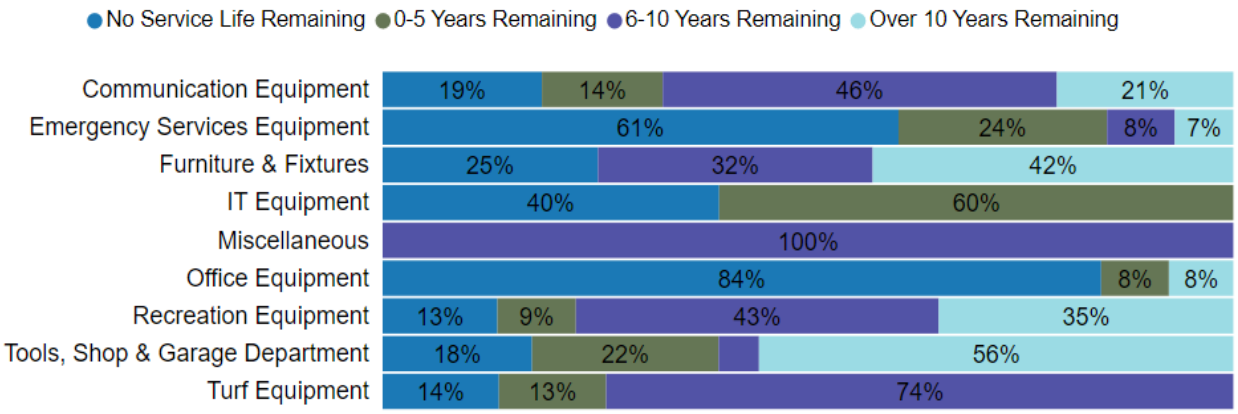
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the Municipality's current approach:

- Staff complete regular visual inspections of machinery & equipment to ensure they are in state of adequate repair.
- Aside from a structured reporting and tracking program in place for Fire and Emergency Services equipment assets, there are no formal condition assessment programs in place for the remaining Machinery & Equipment assets

4.4.3 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. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Communication Equipment	5-50 Years	7.67	7.17
Emergency Services Equipment	5-25 Years	12.25	-1.83
Furniture & Fixtures	10-50 Years	4.58	10.42
IT Equipment	0-15 Years	5.92	-1.58
Miscellaneous	10 Years	1.50	8.42
Office Equipment	5-25 Years	9.92	-3.33
Recreation Equipment	0-30 Years	6.25	6.67
Tools, Shop & Garage Department	10-25 Years	11.67	5.33
Turf Equipment	5-10 Years	6.00	3.50
		8.58	**2.33**



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

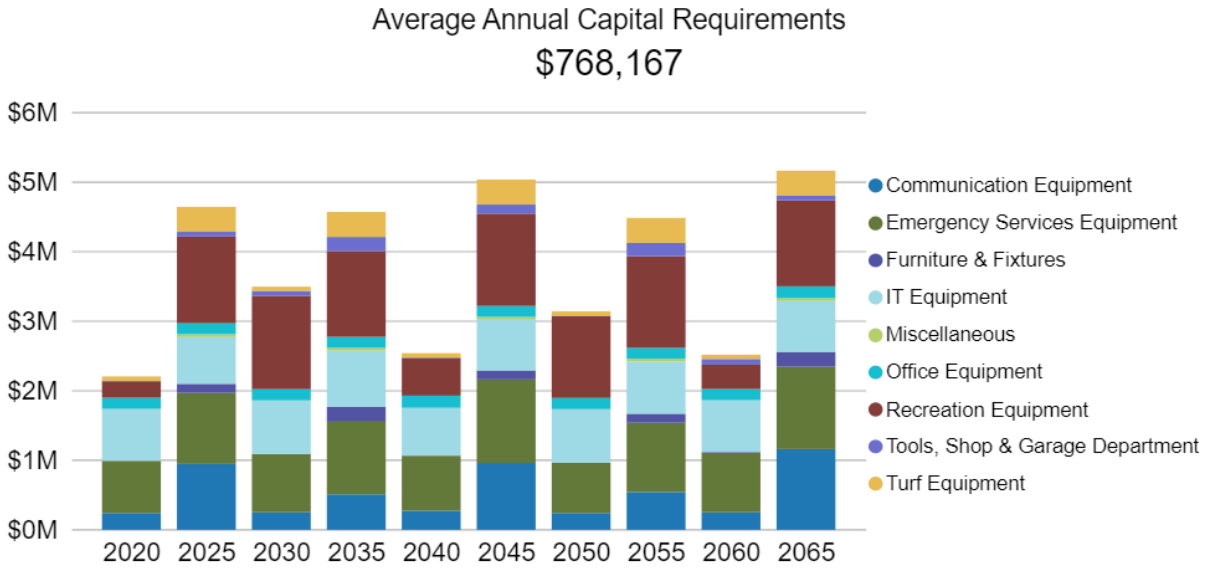
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

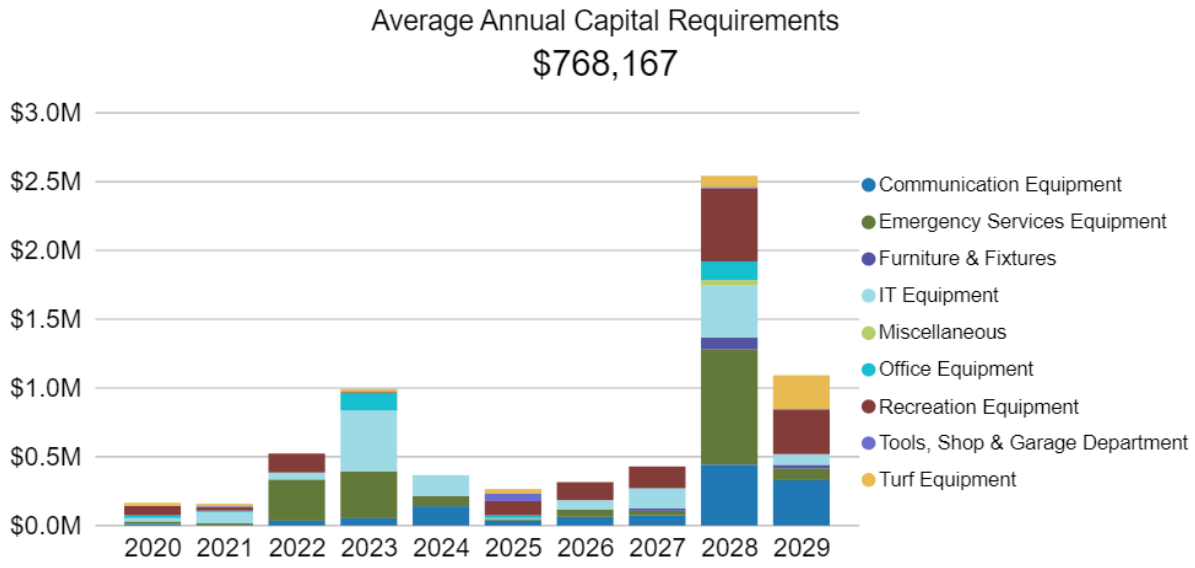
The following table outlines the Municipality's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance/ Rehabilitation	Maintenance program varies by department
	Fire Protection and Emergency Services equipment are subject to a much more rigorous inspection and maintenance program compared to most other departments
	Machinery & equipment is maintained according to manufacturer recommended actions and supplemented by the expertise of municipal staff
Replacement	The replacement of machinery & equipment depends on deficiencies identified by operators that may impact their ability to complete required tasks

Forecasted Capital Requirements

The following graphs forecasts capital requirements for machinery and equipment assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

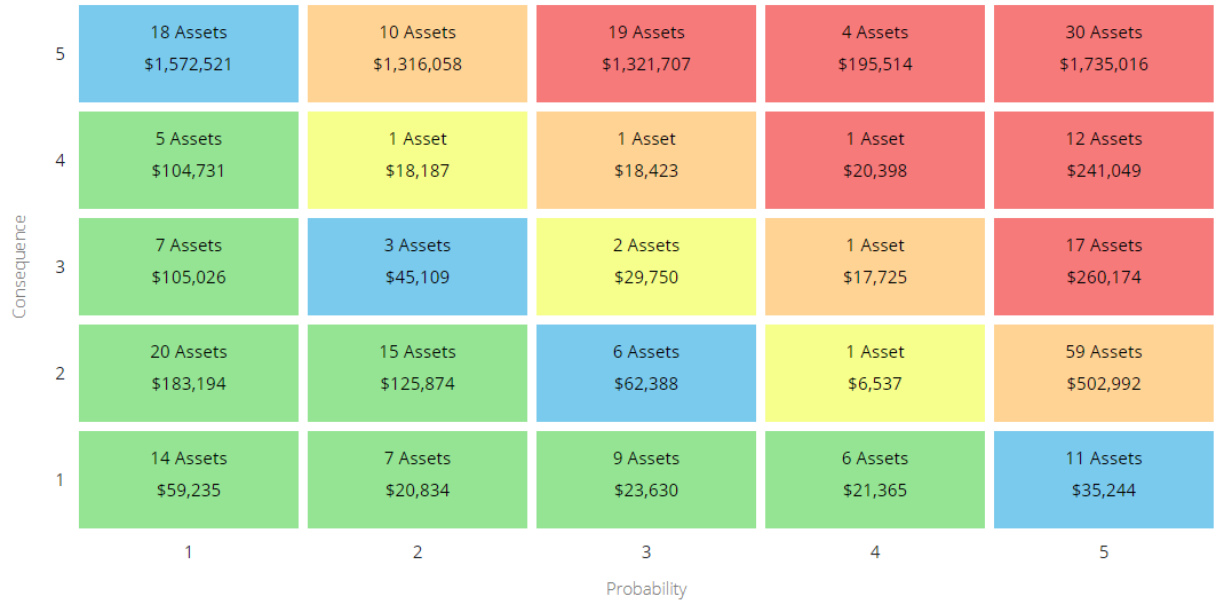




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.4.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.4.6 Levels of Service

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

4.4.7 Recommendations

Replacement Costs

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

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

- Develop metrics and begin measuring current levels of service. 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 Fleet

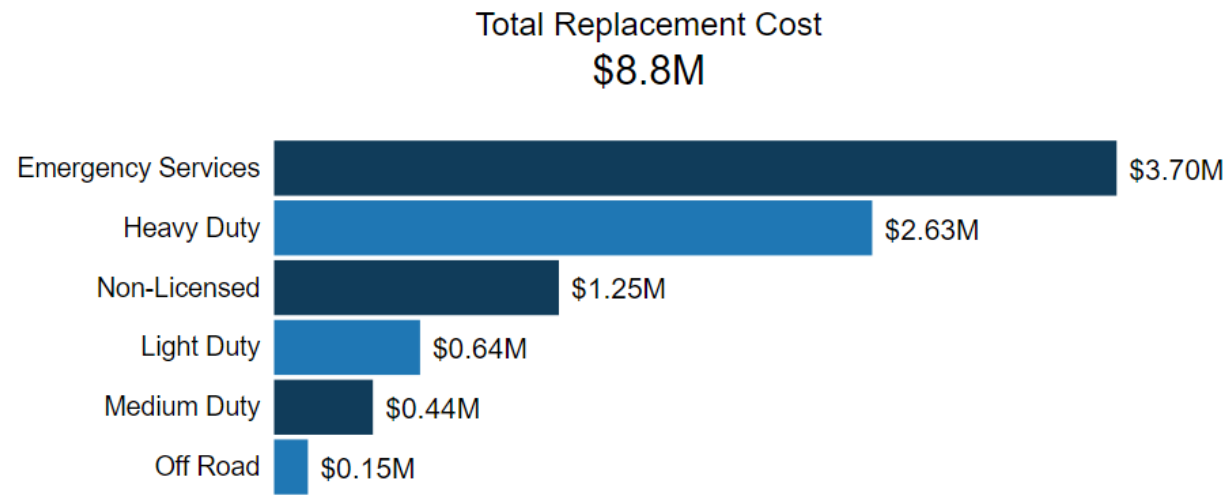
The fleet service is responsible for maintaining and replacing municipally owned vehicles and equipment under the municipal replacement strategy. Municipal vehicles are used to support several service areas, including:

- fire rescue vehicles that support emergency services,
- light-duty, medium-duty, & heavy-duty vehicles to support the maintenance of municipal infrastructure and address service requests,
- heavy-duty machinery to support the construction and rehabilitation of vital infrastructure, the removal of critical infrastructure, and
- attachments to support the operational needs of critical use vehicles and heavy-duty machinery.

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 Municipality's Fleet portfolio.

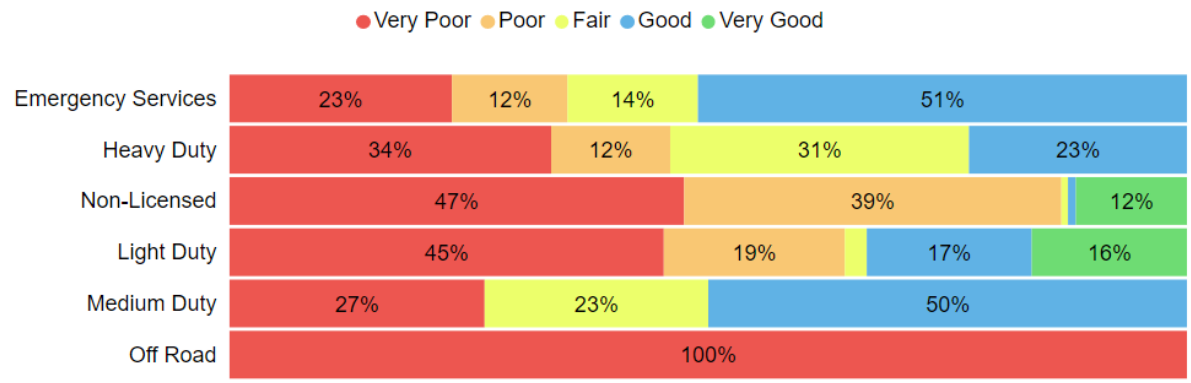
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Emergency Services	14	CPI Inflation (Historical Cost)	$3,701,857
Heavy Duty	15	CPI Inflation (Historical Cost)	$2,628,113
Non-Licensed	10	CPI Inflation (Historical Cost)	$1,252,147
Light Duty	17	CPI Inflation (Historical Cost)	$642,333
Medium Duty	14	CPI Inflation (Historical Cost)	$435,246
Off Road	2	CPI Inflation (Historical Cost)	$149,867
			$8,809,563



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
Emergency Services	49%	Fair	Age-based
Heavy Duty	45%	Fair	Age-based
Non-Licensed	31%	Poor	Age-based
Light Duty	48%	Fair	Age-based
Medium Duty	54%	Fair	Age-based
Off Road	0%	Very Poor	Age-based
	44%	**Fair**	



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

Current Approach to Condition Assessment

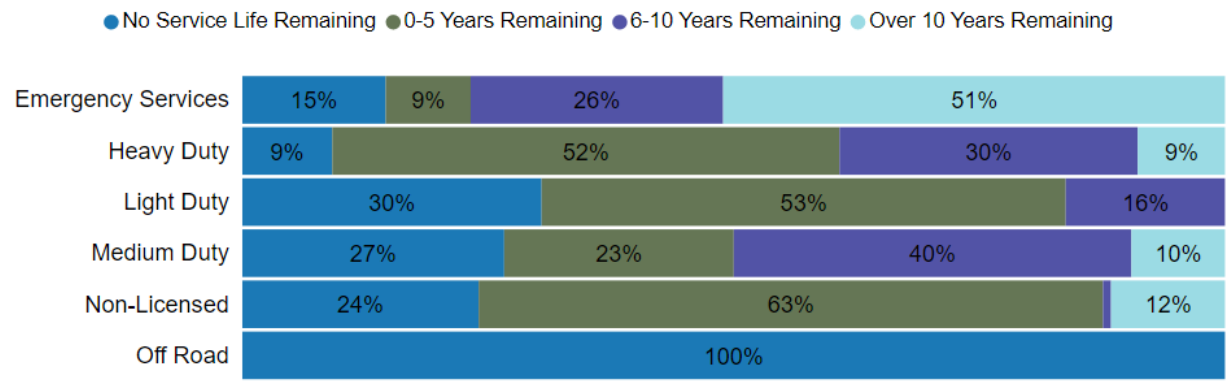
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections of vehicles to ensure they are in a state of adequate repair prior to operation.
- The mileage of vehicles is used as a proxy to determine remaining useful life and relative vehicle condition except for the Fire Department.

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. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Emergency Services	1-20 Years	13.67	1
Heavy Duty	1-15 Years	7.17	4.58
Non-Licensed	10-15 Years	7.33	5.17
Light Duty	2-10 Years	4.92	2.25
Medium Duty	5-15 Years	4.5	4.83
Off Road	10 Years	13.83	-3.83
		7.583	**3.25**



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

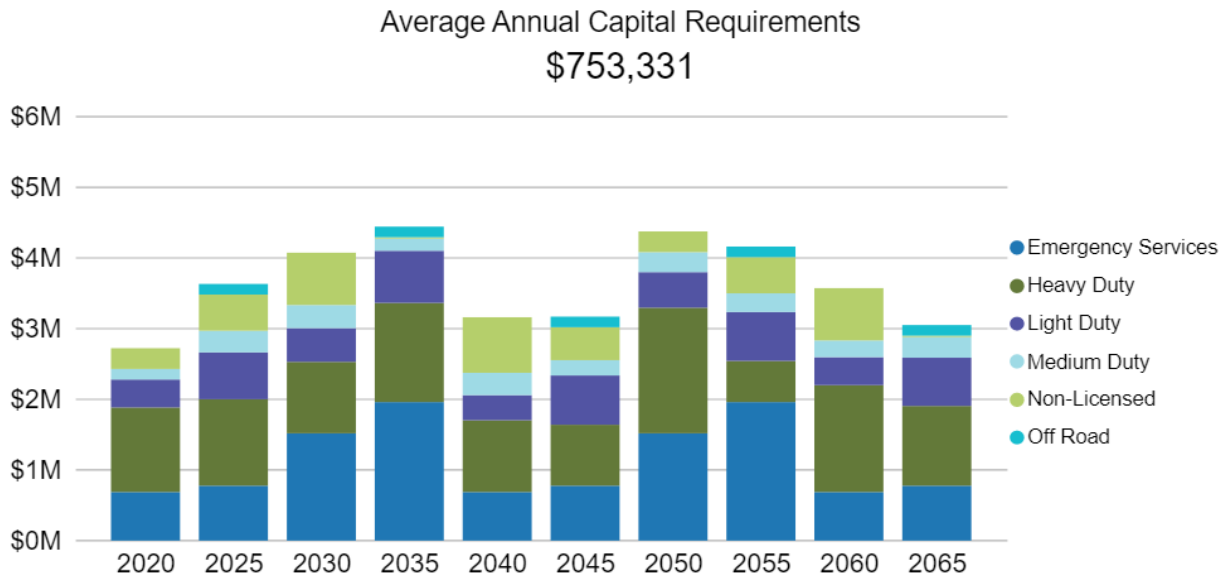
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

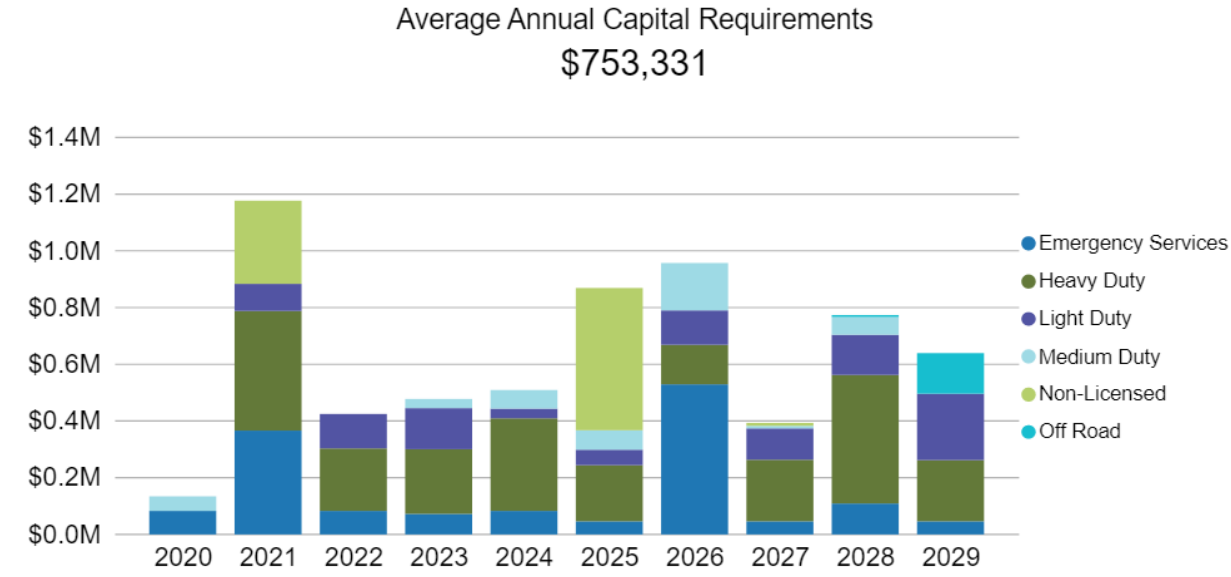
The following table outlines Strathroy-Caradoc's current lifecycle management strategy.

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Visual inspections completed and documented daily; fluids inspected at every fuel stop; tires inspected monthly
	Every 4-7000km includes a detailed inspection; tires are rotated and oil changed
	Annual preventative maintenance activities include system components check and additional detailed inspections
Replacement	Vehicle age, kilometres and annual repair costs are taken into consideration when determining appropriate treatment options

Forecasted Capital Requirements

The following graphs forecasts capital requirements for fleet assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

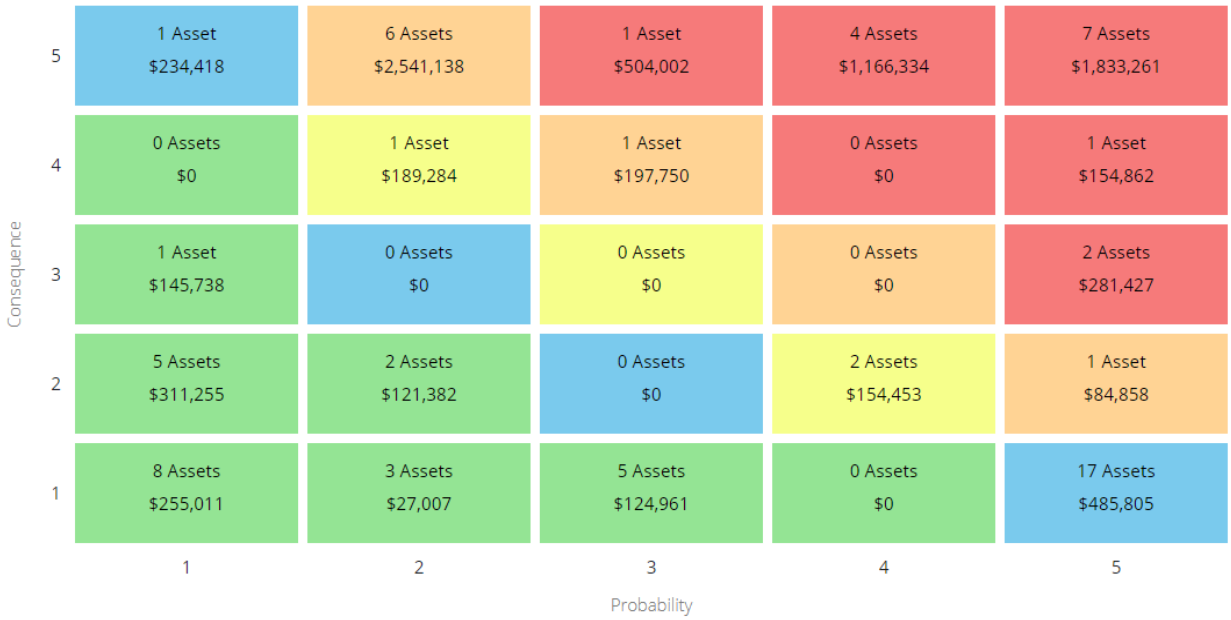




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.5.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.5.6 Levels of Service

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

4.5.7 Recommendations

Replacement Costs

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

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

- Develop metrics and begin measuring current levels of service. 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 & Land Improvements

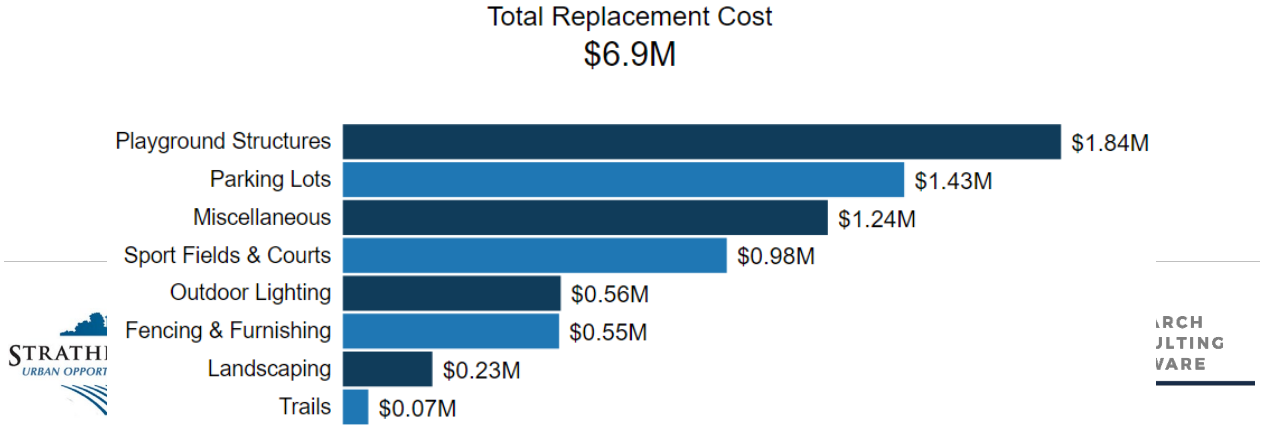
Strathroy-Caradoc owns and operates a number of assets that are categorized under the Parks & Land Improvements category and assist in providing the Municipality with community recreation and natural outdoor space. This category includes:

- Fields, courts, and rinks
- Skateboard parks
- Parking lots for municipal facilities and parks
- Parklands and Trails
- Fencing and signage
- Playgrounds
- Miscellaneous landscaping, irrigation and other purposed assets

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 Parks and Land Improvements inventory.

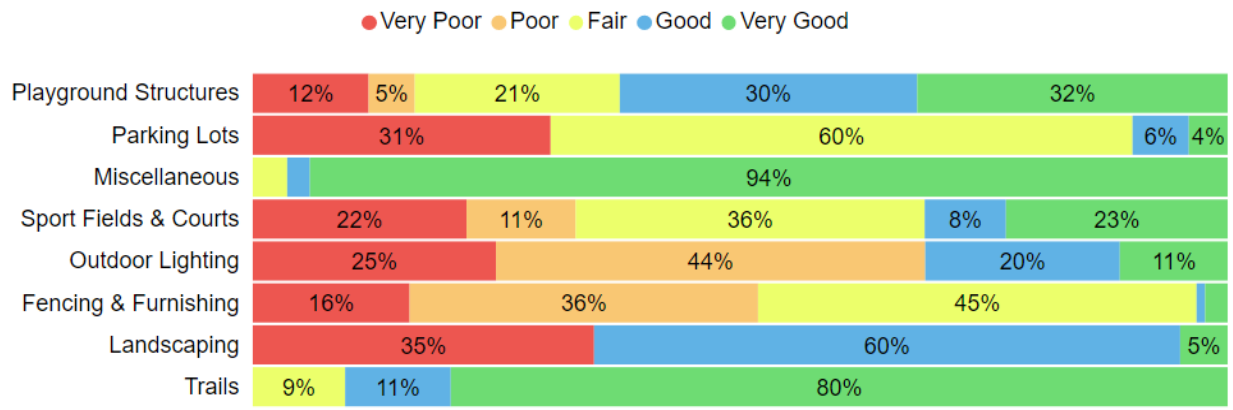
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Playground Structures	52	CPI Inflation (Historical Cost)	$1,835,083
Parking Lots	9	CPI Inflation (Historical Cost)	$1,434,571
Miscellaneous	6	CPI Inflation (Historical Cost)	$1,239,398
Sport Fields & Courts	39	CPI Inflation (Historical Cost)	$981,283
Outdoor Lighting	45	CPI Inflation (Historical Cost)	$557,285
Fencing & Furnishing	61	CPI Inflation (Historical Cost)	$552,994
Landscaping	29	CPI Inflation (Historical Cost)	$229,354
Trails	3	CPI Inflation (Historical Cost)	$65,822
			$4,862,738



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
Playground Structures	66%	Good	Age-based
Parking Lots	44%	Fair	Age-based
Miscellaneous	88%	Very Good	Age-based
Sport Fields & Courts	49%	Fair	Age-based
Outdoor Lighting	37%	Poor	Age-based
Fencing & Furnishing	38%	Poor	Age-based
Landscaping	51%	Fair	Age-based
Trails	91%	Very Good	Age-based
	59%	**Fair**	



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

Current Approach to Condition Assessment

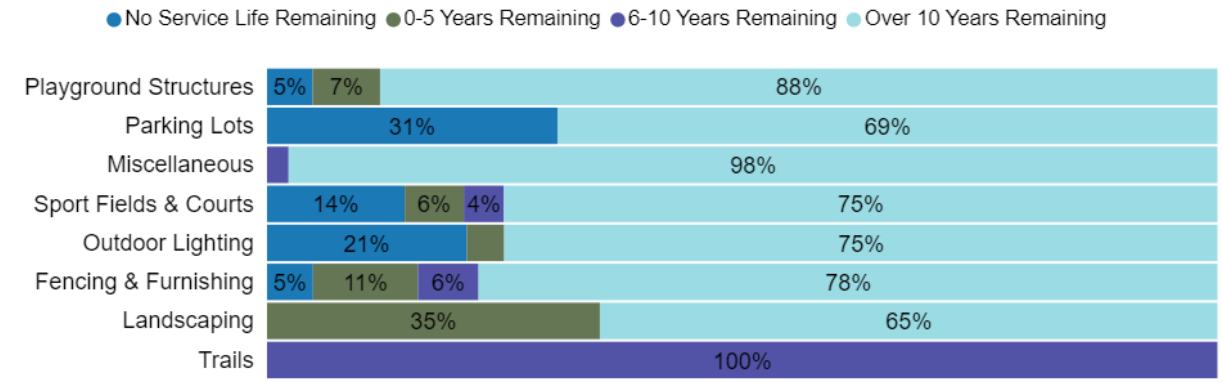
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections of parks and land improvements assets to ensure they are in a state of adequate repair.
- Staff conduct formal inspections of the outdoor play space, fixed play structures and surfacing in accordance with CAN/CSA-Z614-14 and required as per O. Reg. 137/15.
- There are no formal condition assessment programs in place for the other parks & land improvement assets.

4.6.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Playground Structures	20-50 Years	27.83	21
Parking Lots	10-50 Years	10.17	12.33
Miscellaneous	15-100 Years	5.92	30.08
Sport Fields & Courts	20-50 Years	16.08	24.75
Outdoor Lighting	25-50 Years	26.75	20.17
Fencing & Furnishing	20-50 Years	29.25	18.42
Landscaping	10-50 Years	7.58	17.42
Trails	10 Years	1.83	8.08
		22.33	**20.67**



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

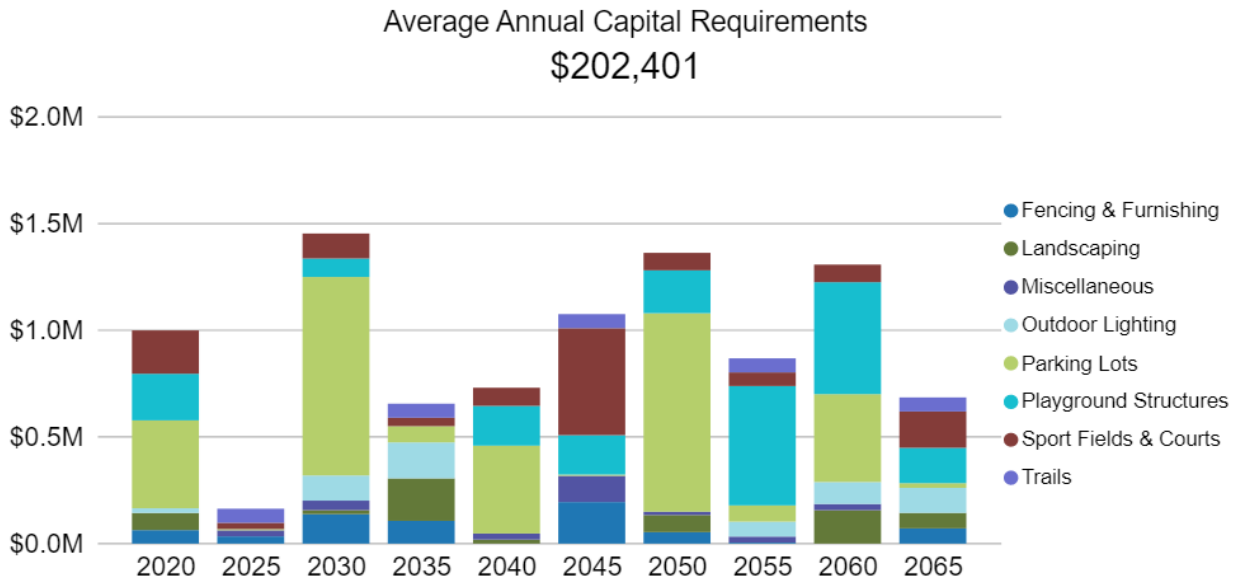
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

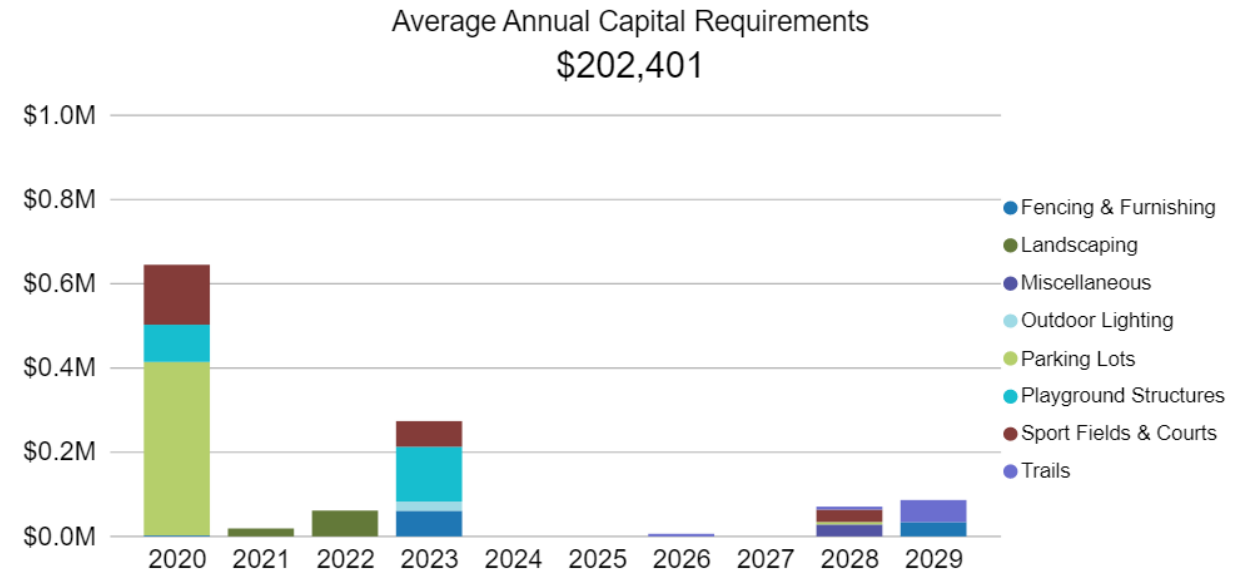
The following table outlines the Municipality's current lifecycle management strategy.

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

Forecasted Capital Requirements

The following graphs forecasts capital requirements for parks and land improvement assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

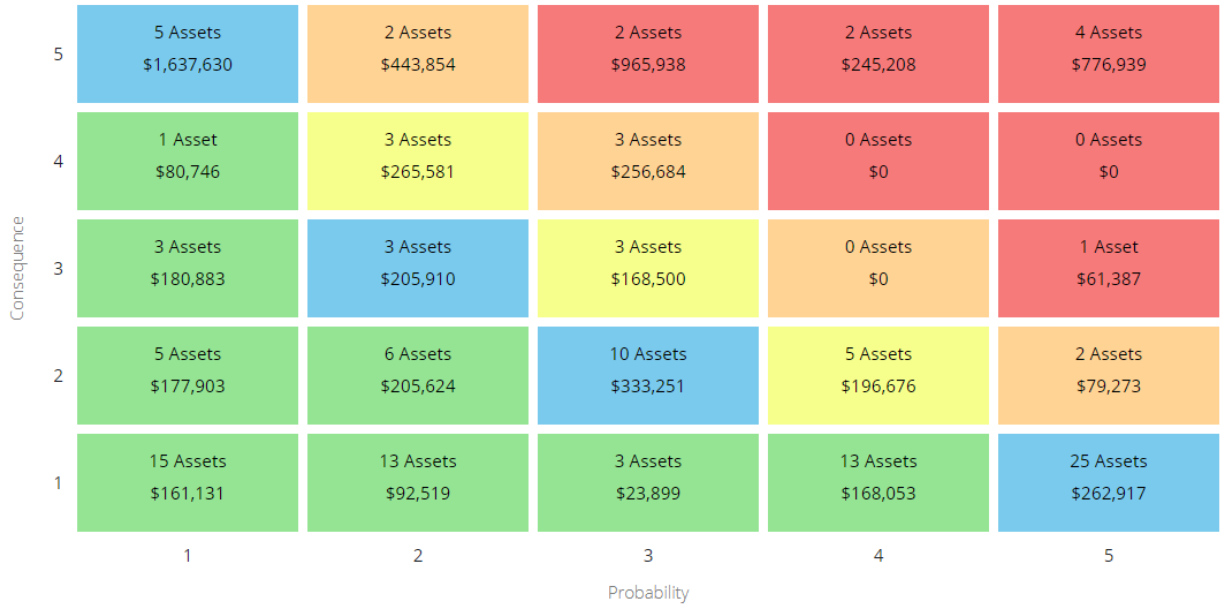




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

4.6.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.6.6 Levels of Service

Parks & Land Improvements is considered a non-core asset category. As such, Strathroy-Caradoc has until July 1, 2024 to solidify the qualitative descriptions and technical metrics outlined in the tables below that measure the current level of service provided.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Parks & Land Improvements category.

Service Attribute	Qualitative Description	Current LOS (2019)
Accessible & Reliable	Description, which may include maps, of municipal parks and their proximity to the surrounding community	TBD
Safe & Regulatory	Description of the park's inspection process and timelines for inspections	TBD
Affordable	Description of the lifecycle activities (maintenance, rehabilitation and replacement) performed on park assets.	TBD
Sustainable	Description of the current condition of parks and the plans that are in place to maintain or improve the provided level of service.	TBD

Technical Levels of Service

The following table include quantitative metrics that determine the technical level of service provided by the Parks & Land Improvements category.

Service Attribute	Technical Metric	Current LOS (2019)
Accessible & Reliable	Square metres of outdoor recreation facility space	TBD
Safe & Regulatory Affordable	# of service requests about unsafe conditions in parks	TBD
	# of identified defects	TBD
Sustainable Accessible & Reliable	O&M cost for parks / # of parks	TBD
	Annual capital reinvestment rate	0.59%
Safe & Regulatory	% of parks and recreation assets that are in good or very good condition	TBD
	% of parks and recreation assets that are in poor or very poor condition	TBD

4.6.7 Recommendations

Replacement Costs

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

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk assets.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.
- Formalize the internal condition assessment program that has been developed as a part of Roadmap project.

Risk Management Strategies

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

Levels of Service

- Begin measuring current levels of service in accordance with the metrics that Strathroy-Caradoc 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.

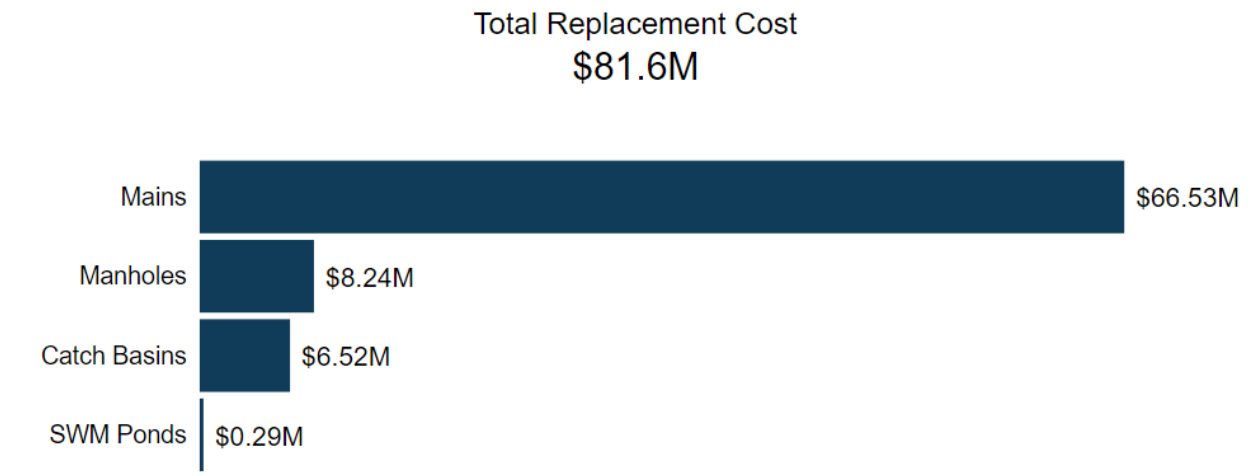
4.7 Storm Water System

The Storm Water system is designed to manage the flow of stormwater. In recent years, this asset category has become increasingly relevant due to the increasing intensity and frequency of extreme weather events. The Engineering and Public Works Department oversees the storm water system.

4.7.1 Asset Inventory & Replacement Cost

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

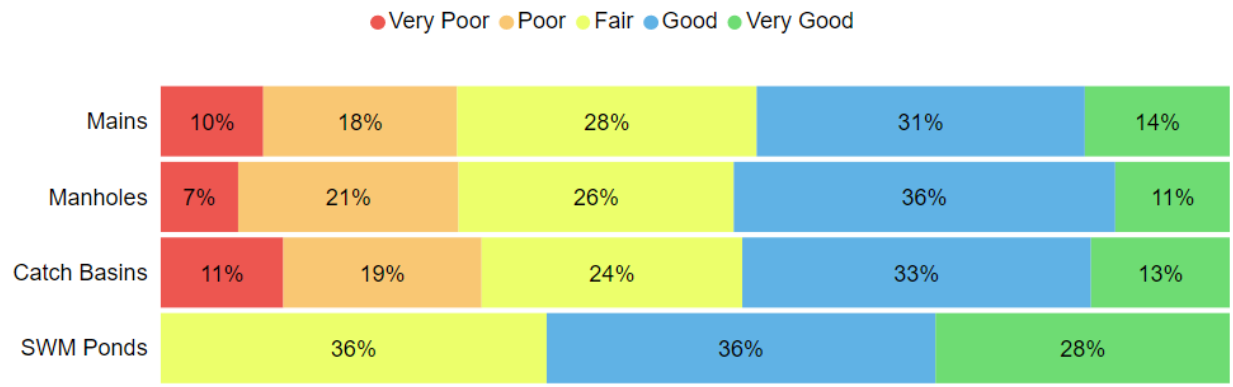
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Mains	77 km	Cost per Unit	$66,528,356
Manholes	987	Cost per Unit	$8,238,000
Catch Basins	1,629	Cost per Unit	$6,516,000
SWM Ponds	9	CPI Inflation (Historical Cost)	$288,212
			$81,570,568



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
Mains	64%	Good	Age-based
Manholes	65%	Good	Age-based
Catch Basins	63%	Good	Age-based
SWM Ponds	78%	Good	Age-based
	64%	**Good**	



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

Current Approach to Condition Assessment

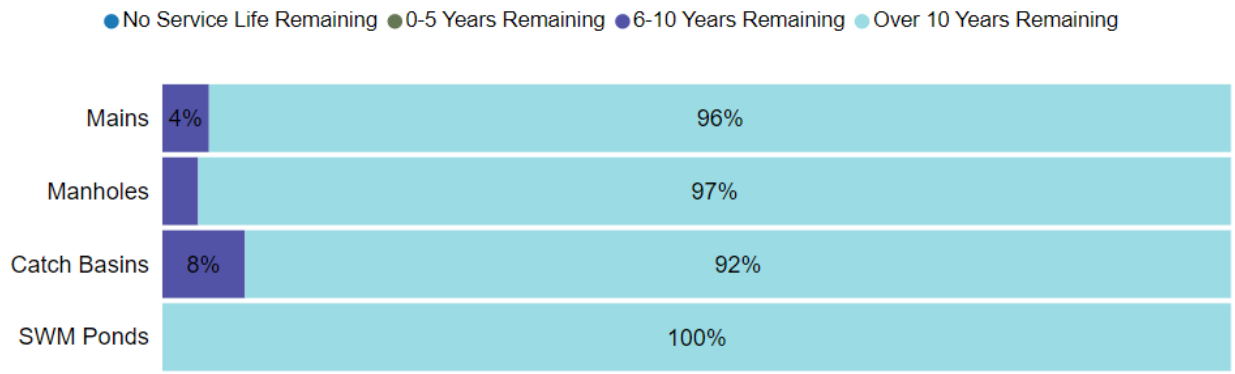
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- There are no formal condition assessment programs in place for the storm water system.
- The Municipality should consider establishing an industry best practice assessment cycle for the storm water system.

4.7.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Mains	50-90 Years	25	50
Manholes	75 Years	26.25	48.75
Catch Basins	50 Years	27.5	47.42
SWM Ponds	50 Years	15.58	59.33
		26.33	**48.58**



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

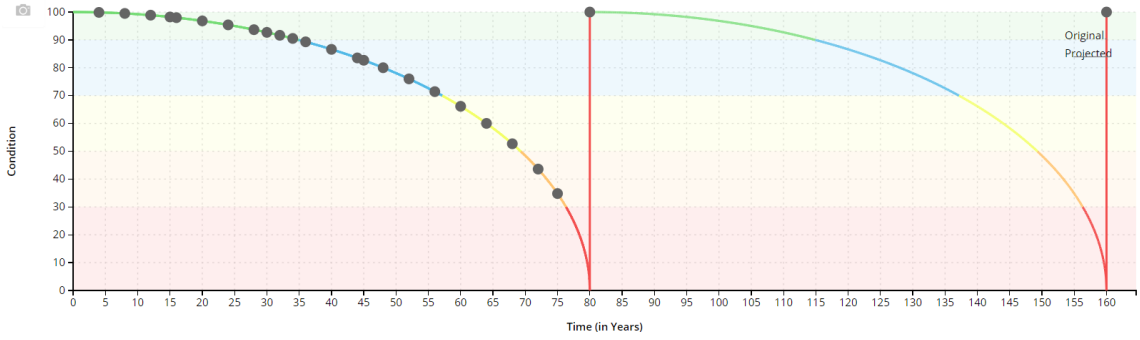
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Primary activities include catch basin cleaning and storm main flushing, but only a small percentage of the entire network is completed per year
	CCTV inspections and cleaning are completed as budget becomes available and this information is used to drive forward rehabilitation and replacement plans
Rehabilitation	Trenchless re-lining has the potential to reduce total lifecycle costs but would require a formal condition assessment program to determine viability
Replacement	Without the availability of up-to-date condition assessment information replacement activities are purely reactive in nature

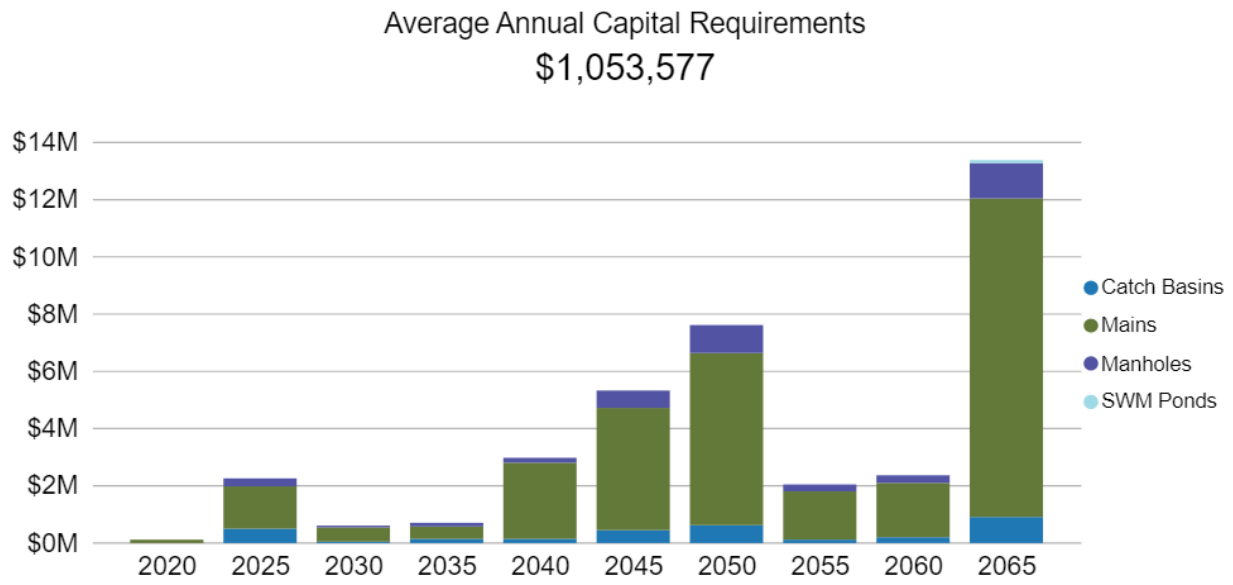
The following lifecycle strategy have been developed as a proactive approach to managing the lifecycle of storm mains. A trenchless re-lining strategy is expected to extend the service life of storm mains at a lower total cost of ownership.

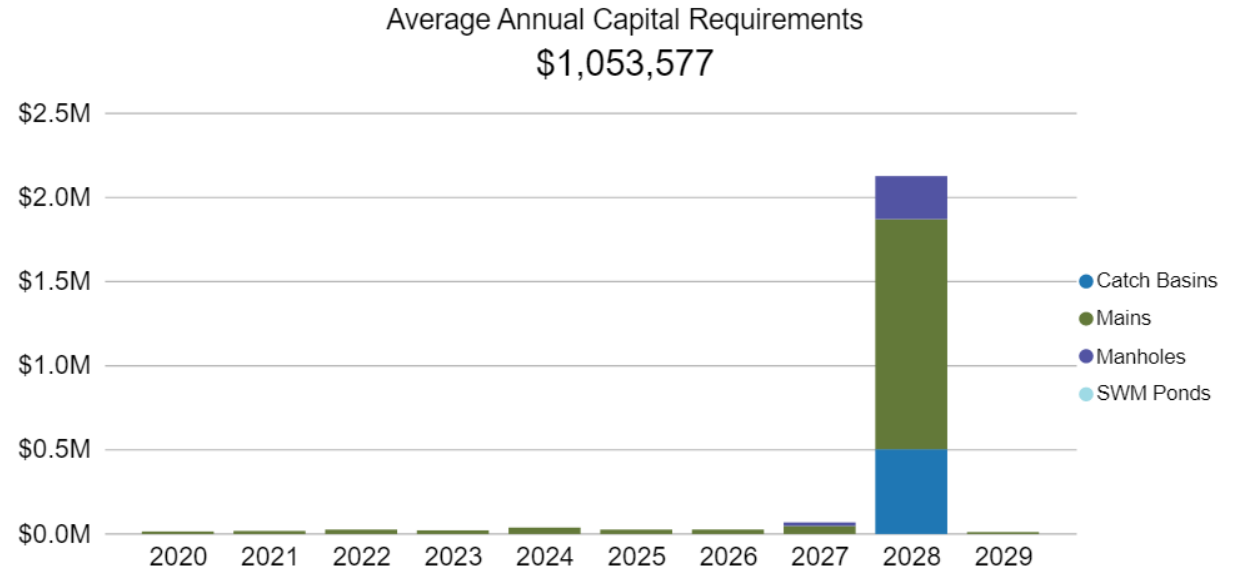
Storm Mains – Best Practice Strategy		
Event Name	Event Class	Event Trigger
Camera Inspection – 6.5% of network per year	Preventative Maintenance	Every 15 Years
Sewer Flushing – 25% of network per year	Maintenance	Every 4 Years
Rodding / Boring	Maintenance	As Required
Trench-less Lining	Rehabilitation	Condition at 0 - 10%
Full Reconstruction	Replacement	150 Years



Forecasted Capital Requirements

The following graphs forecasts capital requirements for machinery and equipment assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

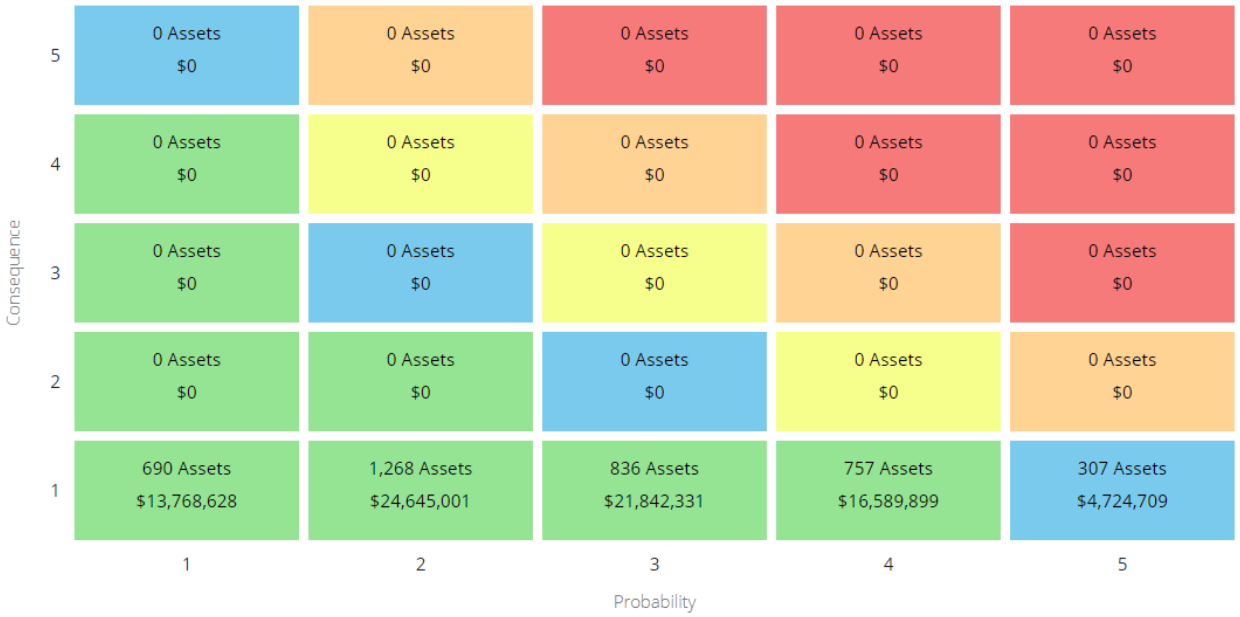




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

4.7.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

4.7.6 Levels of Service

The following tables identify Strathroy-Caradoc's current levels of service for the Storm Water system. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Municipality 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 Water System.

Service Attribute	Qualitative Description	Current LOS (2019)
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 stormwater system	TBD [See Appendix B for Maps]

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties in municipality resilient to a 100-year storm	TBD
	% of the municipal stormwater management system resilient to a 5-year storm	TBD
Performance	Annual capital reinvestment rate	0.26%

4.7.7 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data from various data sources into the primary asset inventory to ensure that all relevant asset types are included.
- Review and revise replacement costs and critical attribute data on a regular basis.

Condition Assessment Strategies

- Consider formalizing the internal condition assessment program that have been developed for linear storm assets as part of the Roadmap project and expanding it to include other relevant stormwater assets.

Risk Management Strategies

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

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the Storm Water System 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 Strathroy-Caradoc 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 $331 million.
- 67% of rate-funded assets are in fair or better condition.
- 7% of assets are projected to require replacement in the next 10 years.
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately $3.8 million.

5.1 Water Distribution

The Municipality owns and operates two municipal drinking water systems, which are supplied by the Lake Huron Primary System. Water distribution and transmission services are overseen by the Public Works department. Strathroy-Caradoc is responsible for the:

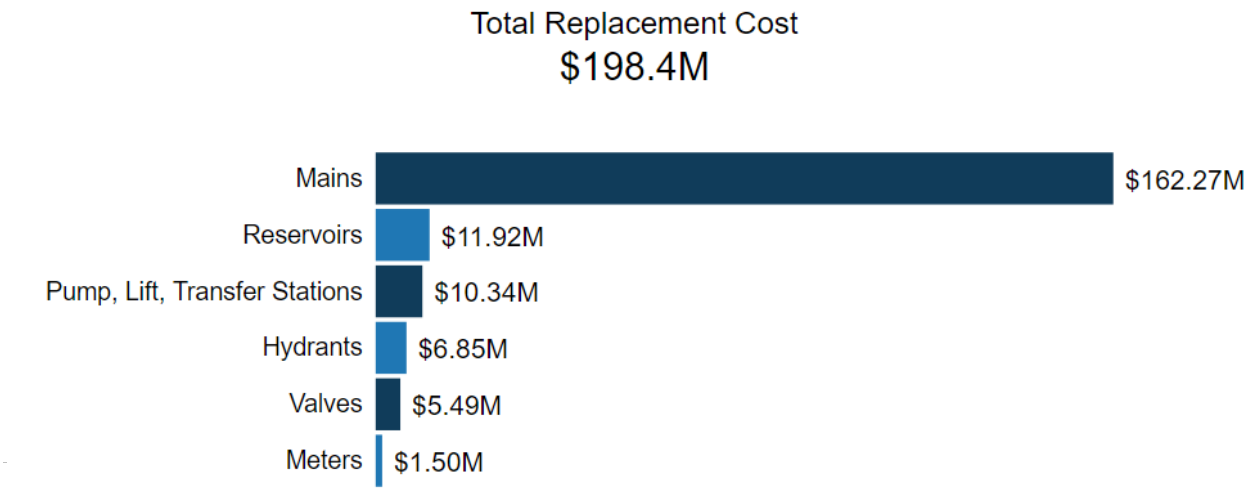
- Water Supply
- Storage Facilities
- Distribution System

Strathroy-Caradoc also conducted a water and wastewater rate study in 2019 to determine the appropriate rate structure and rate increases, and forecasts over a 10-year period.

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 Water inventory.

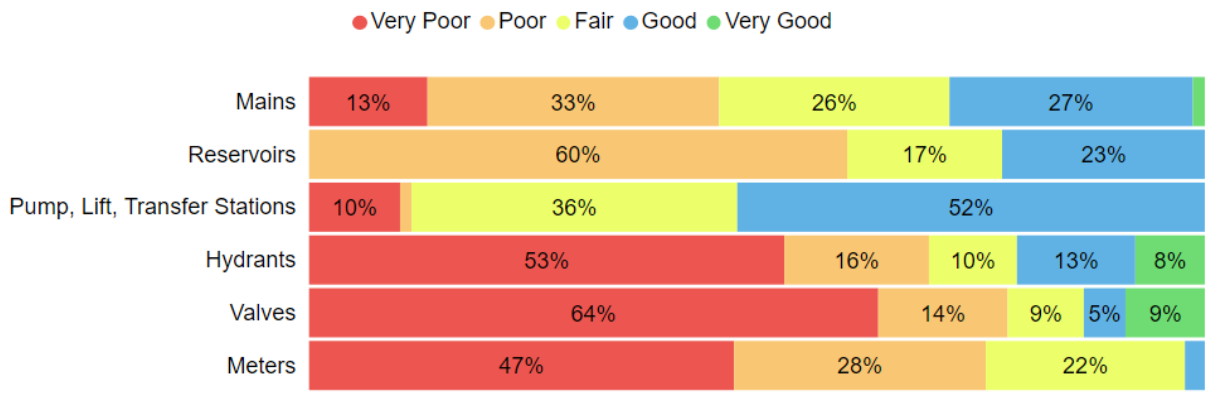
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Mains	141 km	Cost per Unit, CPI Inflation (Historical Cost)	$162,270,826
Reservoirs	7	CPI Inflation (Historical Cost)	$11,923,894
Pump, Lift, Transfer Stations	12	CPI Inflation (Historical Cost)	$10,342,964
Hydrants	855	Cost per Unit	$6,846,000
Valves	1,055	CPI Inflation (Historical Cost)	$5,490,098
Meters	5,734	CPI Inflation (Historical Cost)	$1,496,841
			$198,370,623



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
Mains	54%	Fair	Age-based
Reservoirs	45%	Fair	Age-based
Pump, Lift, Transfer Stations	59%	Fair	Age-based
Hydrants	29%	Poor	Age-based
Valves	23%	Poor	Age-based
Meters	26%	Poor	Age-based
	52%	**Fair**	



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

Current Approach to Condition Assessment

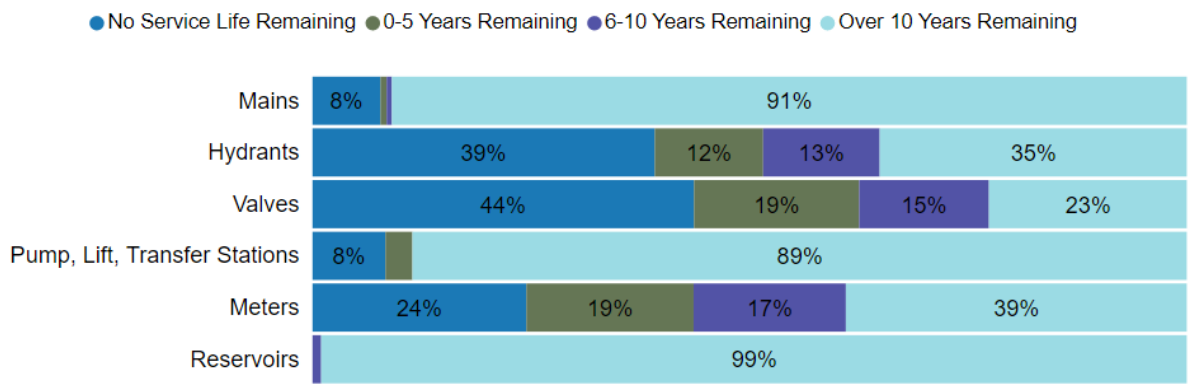
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff primarily rely on the age and material of water assets to determine the projected condition of water mains.
- Aside from the inspections required under O. Reg. 170/3, there are no formal condition assessment programs in place for the Water System.

5.1.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Mains	50-90 Years	43.75	31.17
Reservoirs	15-75 Years	23.83	23.33
Pump, Lift, Transfer Stations	10-90 Years	18.25	19.25
Hydrants	30-90 Years	26.58	3.58
Valves	30-90 Years	42.08	-12
Meters	30 Years	27.5	2.5
		37.5	**6.17**



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

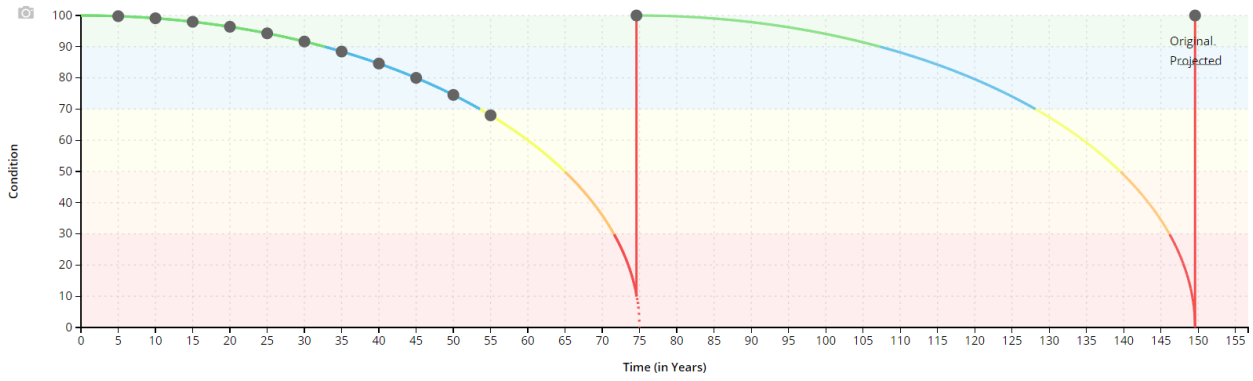
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Some proactive lifecycle activities performed
	Periodic pressure testing to identify deficiencies and potential leaks
	Main valves are exercised annually and Hydrants are flushed biannually
Rehabilitation	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life
Replacement	Replacement activities are identified based on an analysis of the main break rate as well as any issues identified during regular maintenance activities

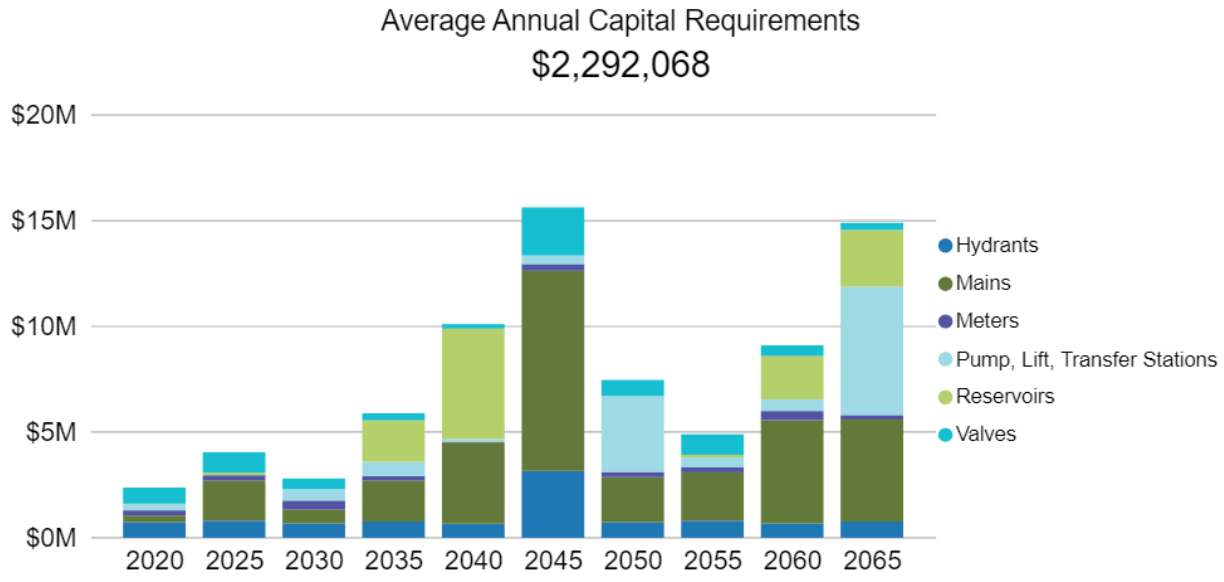
The following strategy, based on input from staff and the current lifecycle management strategy, had been developed and serves as a more formal approach to managing the lifecycle of water mains.

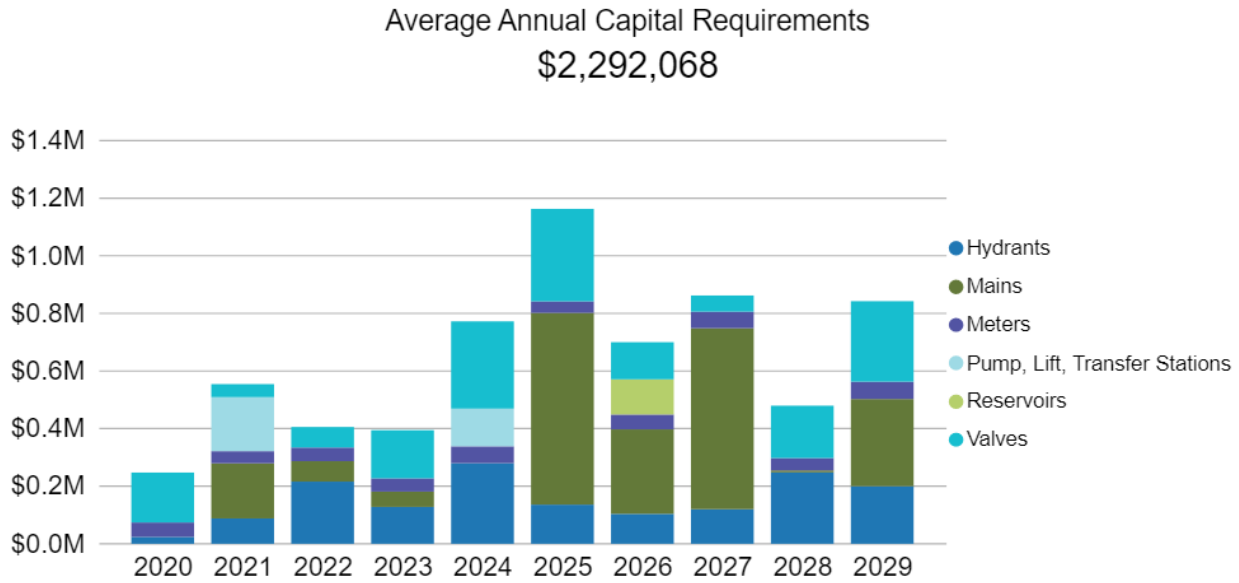
Water Mains – Best Practice Strategy		
Event Name	Event Class	Event Trigger
Flushing – 20% of network per year	Preventative Maintenance	Annually
Trench-less Lining – Structural Lining	Rehabilitation	Condition at 10 - 20%
Full Reconstruction	Replacement	Condition at 0 – 10%



Forecasted Capital Requirements

The following graphs forecasts capital requirements for water assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average amount per year that the Strathroy-Caradoc should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

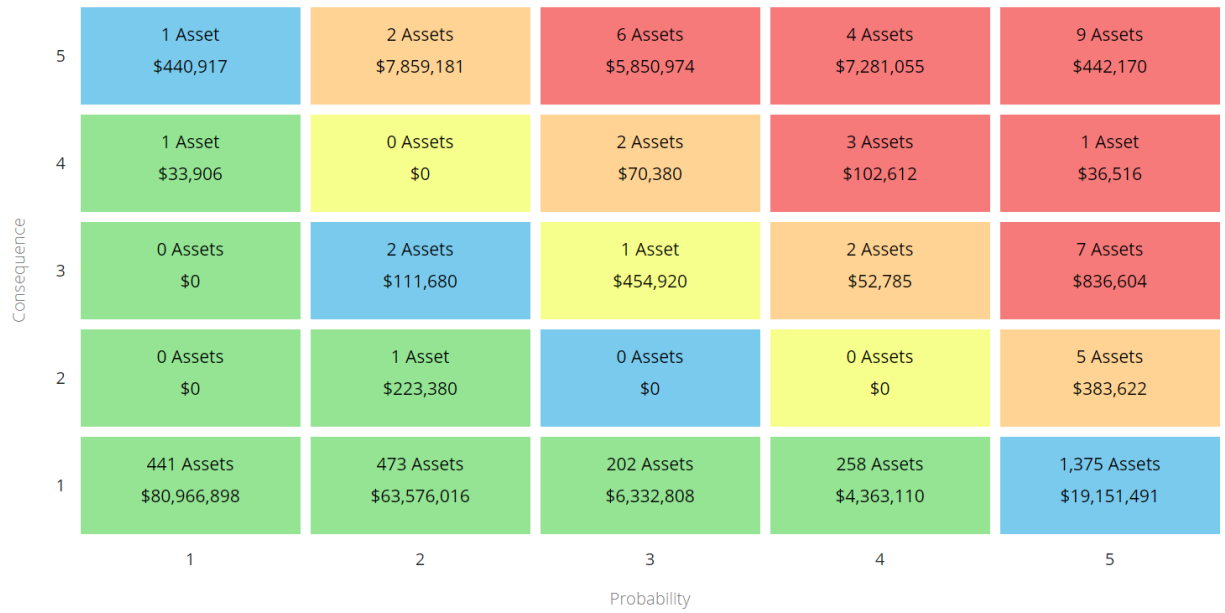




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.1.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

5.1.6 Levels of Service

The following tables identify Strathroy-Caradoc's current level of service for the Water System. These metrics comprise of the community and technical levels of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Municipality 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 System.

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	TBD [See Appendix B for Maps]
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	TBD [See Appendix B for Maps]
Reliability	Description of boil water advisories and service interruptions	TBD

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties connected to the municipal water system	TBD
	% of properties where fire flow is available	TBD
Reliability	# of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system	TBD
	# 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	TBD
Performance	Annual capital reinvestment rate	0.96%

5.1.7 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data from various data sources into the primary asset inventory to ensure that all relevant asset types are included.
- Review and revise replacement costs and critical asset attribute data on a regular basis.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water system assets.
- Formalize the internal condition assessment program that has been developed for specific water distribution system assets during the Roadmap project.

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 Strathroy-Caradoc 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 Wastewater System

The Municipality owns two wastewater systems, and the Engineering and Public Works department is responsible for providing collection and treatment services like:

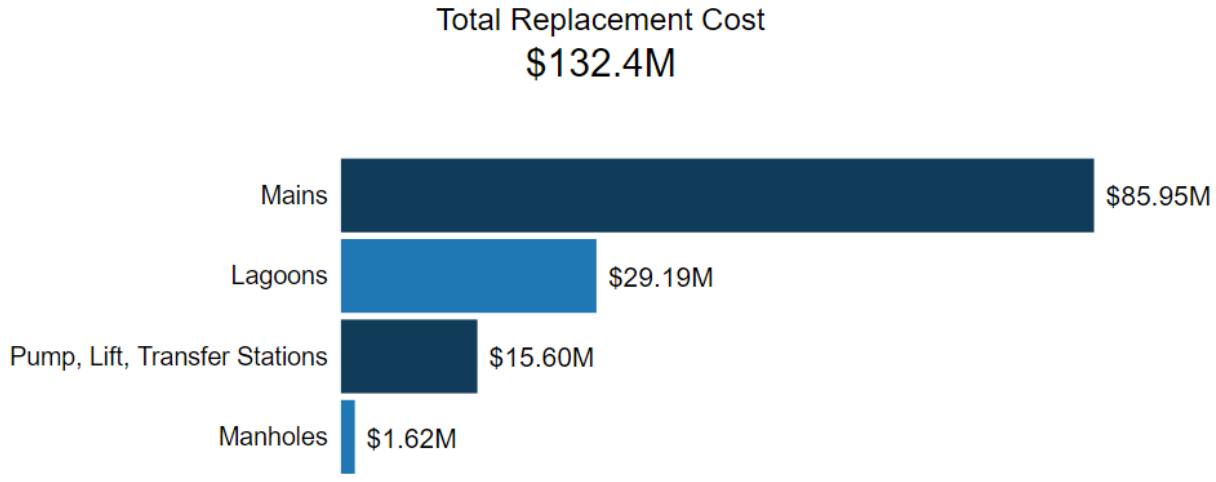
- Wastewater Treatment
- Pumping Stations
- Sewer Collection System

Strathroy-Caradoc conducted a water and wastewater rate study in 2019 to determine the appropriate rate structure and rate increases, and capital spending forecasts over a 10-year period.

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 Wastewater inventory.

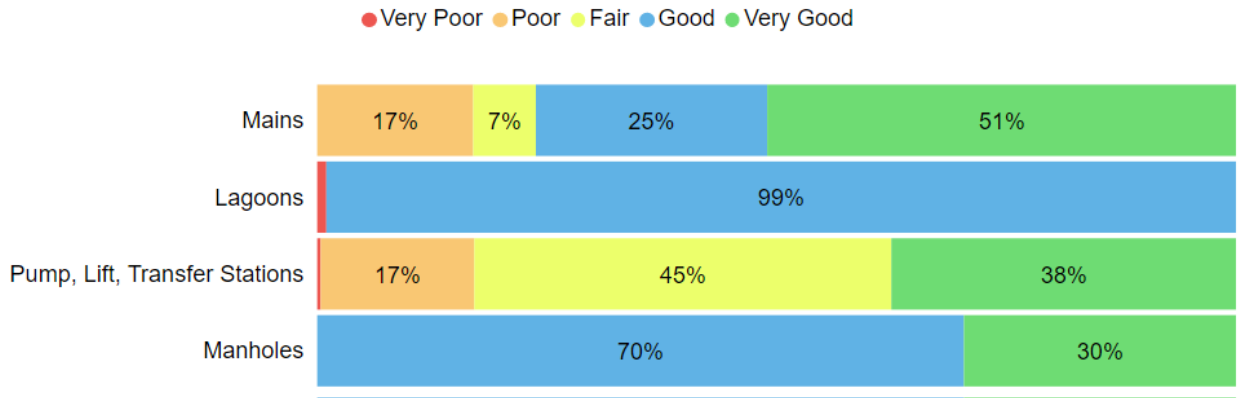
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Mains	90 km	Cost per Unit	$85,952,281
Lagoons	4	CPI Inflation (Historical Cost)	$29,186,166
Pump, Lift, Transfer Stations	10	CPI Inflation (Historical Cost)	$15,601,182
Manholes	108	Cost per Unit	$1,620,000
			$132,359,629



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
Mains	82%	Good	Age-based
Lagoons	73%	Good	Age-based
Pump, Lift, Transfer Stations	63%	Good	Age-based
Manholes	90%	Very Good	Age-based
	78%	**Good**	



To ensure that the Wastewater System continues to provide an acceptable level of service, Strathroy-Caradoc 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 Wastewater System.

Current Approach to Condition Assessment

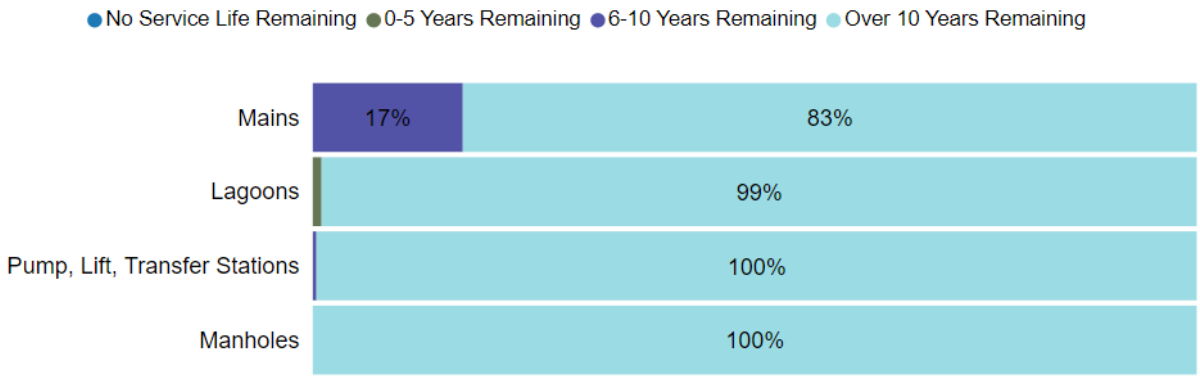
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Strathroy-Caradoc should consider establishing an industry best practice assessment cycle for wastewater mains.

5.2.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Mains	90-100 Years	34.42	40.58
Lagoons	10-75 Years	12.08	41.25
Pump, Lift, Transfer Stations	10-75 Years	34.33	29.08
Manholes	75 Years	7.75	67.25
		32.25	**42.5**



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

5.2.4 Lifecycle Management Strategy

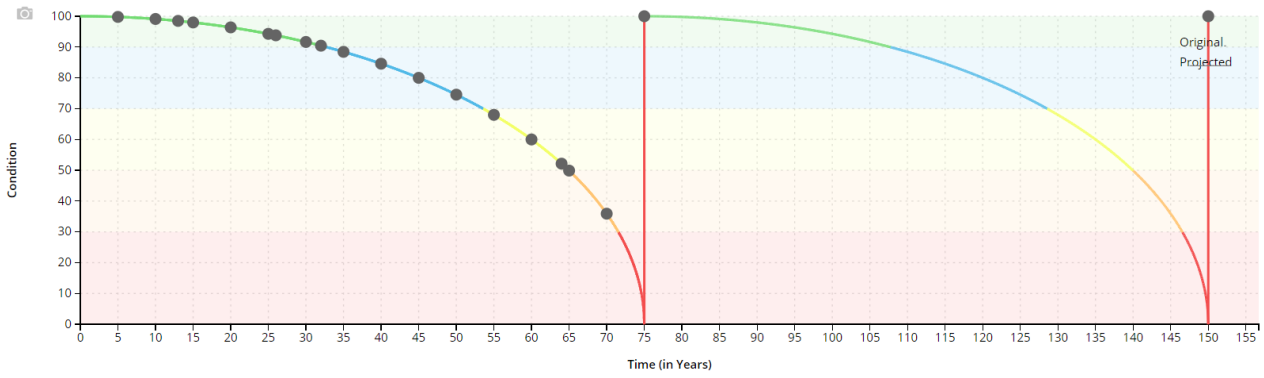
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

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

Activity Type	Description of Current Strategy
Maintenance	There is currently no regular maintenance schedule used by Strathroy-Caradoc, but there is interest in establishing an effective system.
Rehabilitation	Municipal staff complete sewer lining work on deteriorated on wastewater mains as a cost-effective and long-term rehabilitation methods.
Replacement	

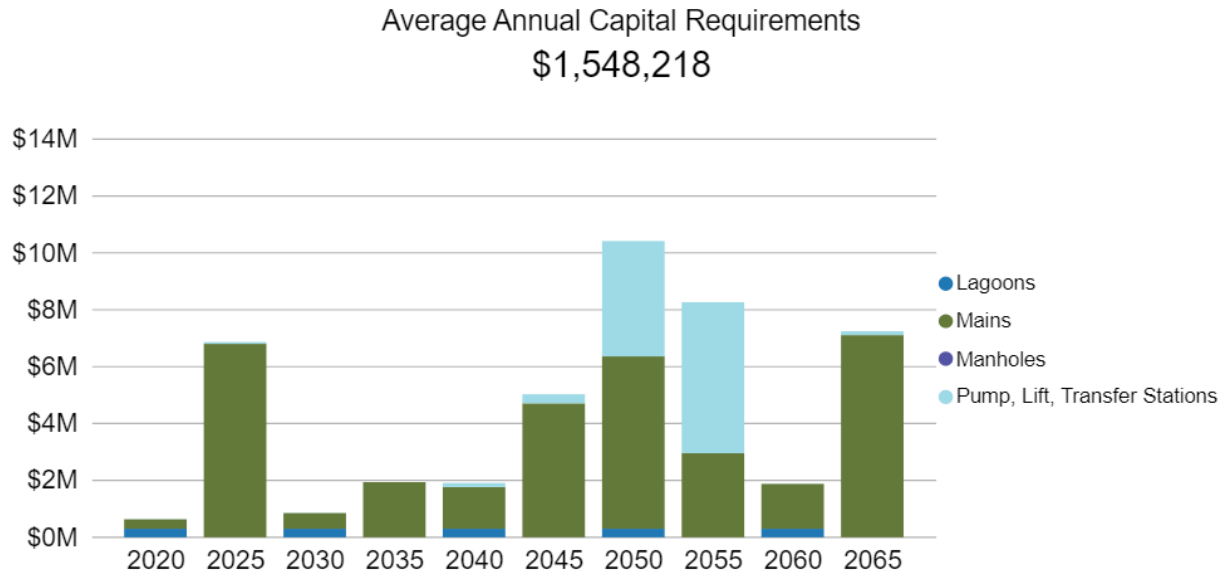
In discussions with municipal staff, the following lifecycle strategy has been developed as a proactive approach to managing the lifecycle of wastewater mains.

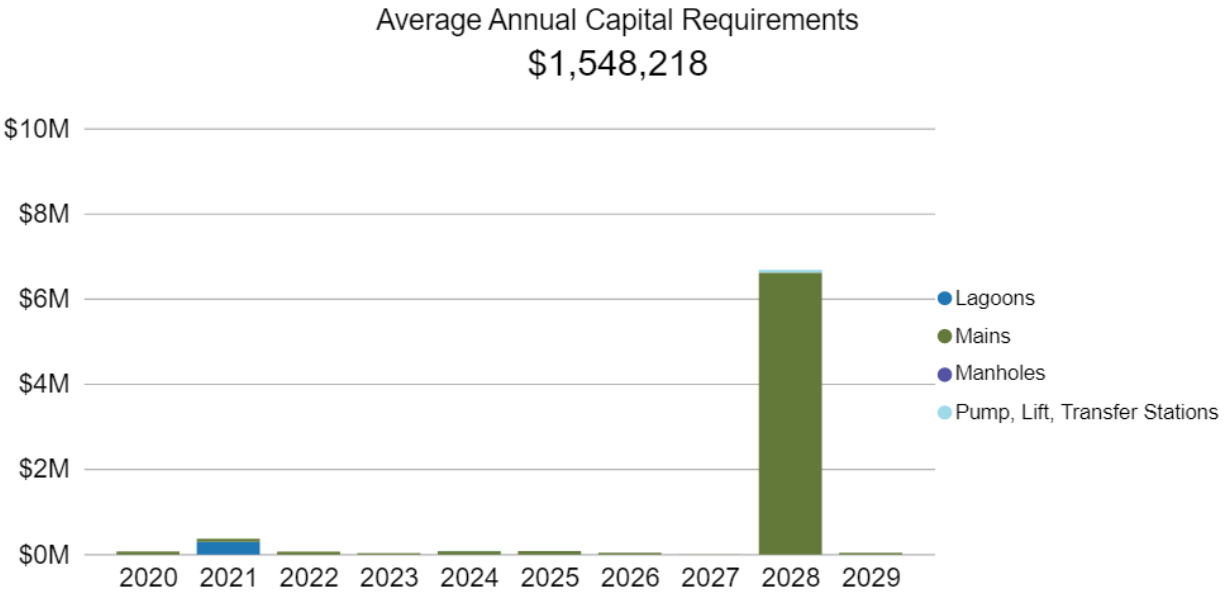
Wastewater Mains – Best Practice Strategy		
Event Name	Event Class	Event Trigger
Smoke Testing – 7.5% of network per year	Preventative Maintenance	Every 13 Years
CCTV/ Zoom Camera Inspection – 6.7% of network per year	Preventative Maintenance	Every 15 Years
Flushing & Cleaning – 20% of network per year	Maintenance	Every 5 Years
Boring/Rodding – 3.1% of network per year	Maintenance	Every 32 Years
Trench-less Lining	Rehabilitation	Condition at 10 – 20%
Full Reconstruction	Replacement	Condition at 0 – 10%



Forecasted Capital Requirements

The following graphs forecasts capital requirements for wastewater assets over the next 50-years and 10-years, respectively. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.

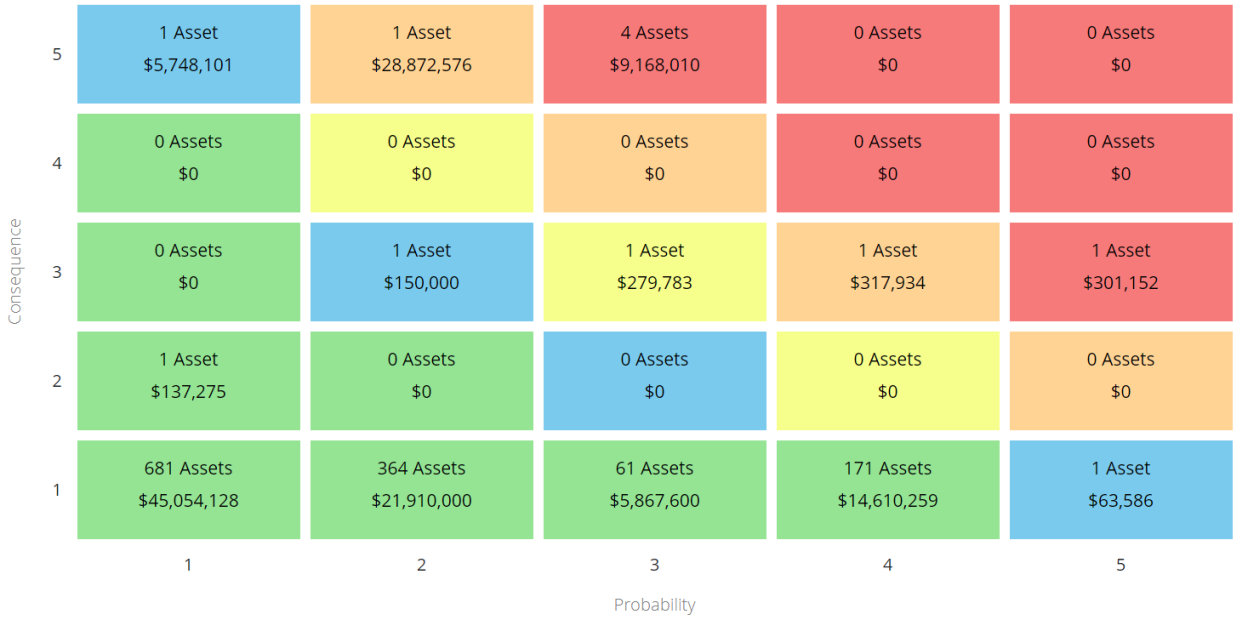




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.2.5 Risk & Criticality

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 2019 inventory data.



The identification of these critical assets by using the risk framework allows Strathroy-Caradoc to determine appropriate risk mitigation strategies and treatment options. These may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Critical assets do not necessarily require immediate renewal or replacement.

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

5.2.6 Levels of Service

The following tables identify Strathroy-Caradoc's current levels of service for the Wastewater System. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Municipality 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 Wastewater System.

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	TBD [See Appendix B for Maps]
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	TBD
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	TBD
	Description of how sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	TBD
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	TBD

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties connected to the municipal wastewater system	TBD
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	TBD
	# of connection-days per year due to sanitary main backups compared to the total number of properties connected to the municipal wastewater system	TBD
	# of connection-days per year due to sanitary service backups compared to the total number of properties connected to the municipal wastewater system	TBD
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	TBD
Performance	Capital re-investment rate	1.34%

5.2.7 Recommendations

Asset Inventory

- Continue to refine and consolidate asset data from various data sources into the primary asset inventory to ensure that all relevant asset types are included.
- Review and revise replacement costs and critical attribute data on a regular basis.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk wastewater assets.
- Formalize the condition assessment program that has been developed for specific wastewater assets as part of the Roadmap project.

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

- Consider a trenchless re-lining strategy for wastewater mains; it is expected to extend the service life of wastewater mains at a lower total cost of ownership and should be implemented to extend the life of infrastructure at the lowest total cost of ownership.
- Evaluate the efficacy of the Municipality'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 Municipality 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 Strathroy-Caradoc to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure.

- Strathroy-Caradoc's estimated population in 2019 was approximately 22,150.

- Moderate population and employment growth are expected.

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

6.1 Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Municipality 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 Official Plan of the Municipality of Strathroy-Caradoc (April 2018)

The Official Plan of the Municipality of Strathroy-Caradoc was adopted by Council on April 18,2006 and the County of Middlesex approved the Official Plan with modifications on July 17,2007.
The Official Plan is a planning document for the purpose of guiding the future development of Strathroy-Caradoc. The Municipality has produced a consolidated version that incorporates all modifications, subsequent approvals, Ontario Municipal Board decisions and amendments to the Plan up to and including April 3, 2018.

The Plan includes a growth management strategy that is designed to:

- direct the majority of future growth to the Strathroy and Mount Brydges area,
- minimize the loss of prime agricultural land,
- protect natural heritage,
- enable farm operations the ability to expand and adapt to changing markets and technology,
- minimize the potential conflicts between farm operations and rural residents,
- make efficient use of land and the capital investment in infrastructure by the Municipality and senior levels of government,
- strengthen the established settlements in the Municipality, and
- limit the costs associated with ‘sprawl’ or the random urbanization of the countryside.

6.1.2 Middlesex County Official Plan (July 2018)

The Middlesex County Official Plan was adopted in 1997 and approved in 1999. It was then amended by Official Plan Amendment No. 2 in 2006. It sets out the planning framework, general policies and land use policies for the County, with a panning period to 2026. The County updated its projections in 2018 after the release of the 2016 Census population information.

The policy framework provides direction to lower-tier municipalities on matters including managing growth, protecting resources and natural heritage, and coordination between municipalities on cross-boundary (inter-municipal) issues. All lower-tier Official Plans are required to conform to the County Official Plan.

6.1.3 Development Charges Background Study (December 2019)

A Development Charges Background Study for the Municipality was prepared in 2019 by Hemson Consulting Ltd., based on the methodology required under the Development Charges Act.

The following tables outline the population and employment forecasts allocated to Strathroy-Caradoc in the study:

Historical and Forecasted Census Population			
Municipality	2016	2026	2036
Strathroy-Caradoc	20,884	24,337	26,624

Historical and Forecasted Employment by Place of Work			
Municipality	2016	2026	2036
Strathroy-Caradoc	8,259	9,643	10,549

As a requirement of the Development Charges Act under subsection 10(2)(c), an analysis must be undertaken to assess the long-term capital and operating cost impacts for the capital infrastructure projects identified within the Development Charges.

The background study must also include an asset management plan that deals with all assets proposed to be funded, in whole or in part, by D.C.s. The asset management plan must show that the assets are financially sustainable over their full lifecycle.

6.2 Impact of Growth on Lifecycle Activities

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

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Municipality's AMP.

7 Financial Strategy

Key Insights

- Strathroy-Caradoc is committing approximately $6,682,000 towards capital projects per year from sustainable revenue sources.

- Given the annual capital requirement of $13,181,402 there is currently a funding gap of $6,499,402 annually.

- For tax-funded assets, we recommend increasing tax revenues by 2.0% each year for the next 15 years to achieve a sustainable level of funding.

- For the water system, we recommend increasing rate revenues by 0.4% annually for the next 20 years to achieve a sustainable level of funding.

- The wastewater system is already fully-funded for the existing infrastructure.

7.1 Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with a long-term financial plan (LTFP)[3]financial planning and long-term budgeting. The development of a comprehensive financial plan will allow Strathroy-Caradoc to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

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

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

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

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

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

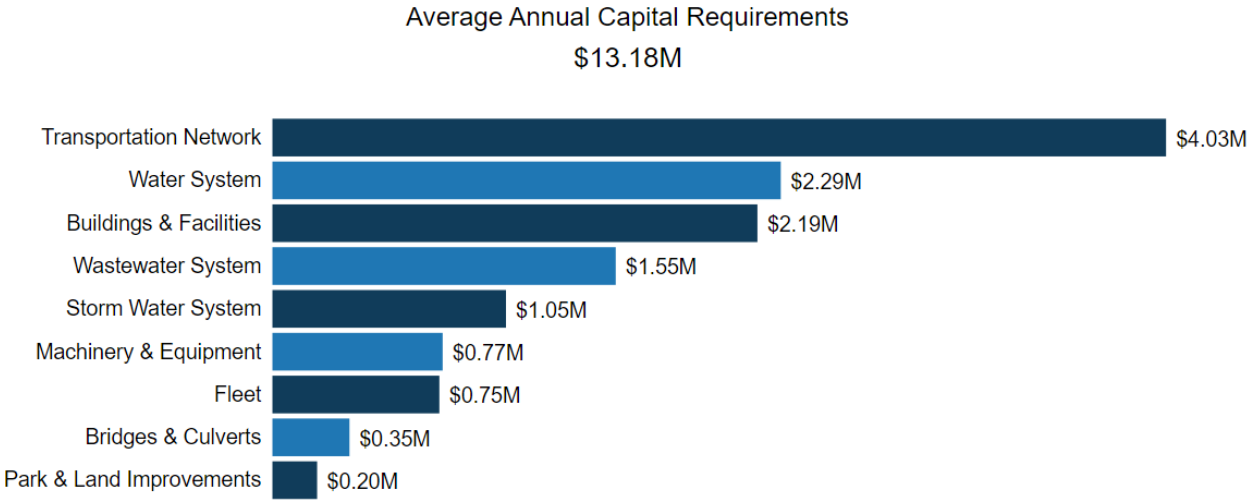
[3] Strathroy-Caradoc has not prepared a corporate-wide Long-Term Financial Plan (LTFP).

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

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the Municipality 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 Municipality must allocate approximately $13.2 million annually to address capital expenditures (CapEx) for the assets included in this AMP.



For most asset classes 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 Transportation Network, Storm Water System, Water System and Wastewater System; lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of Strathroy-Caradoc’s roads, storm mains, water mains and wastewater 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 roads, storm mains, water mains and wastewater mains:

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.

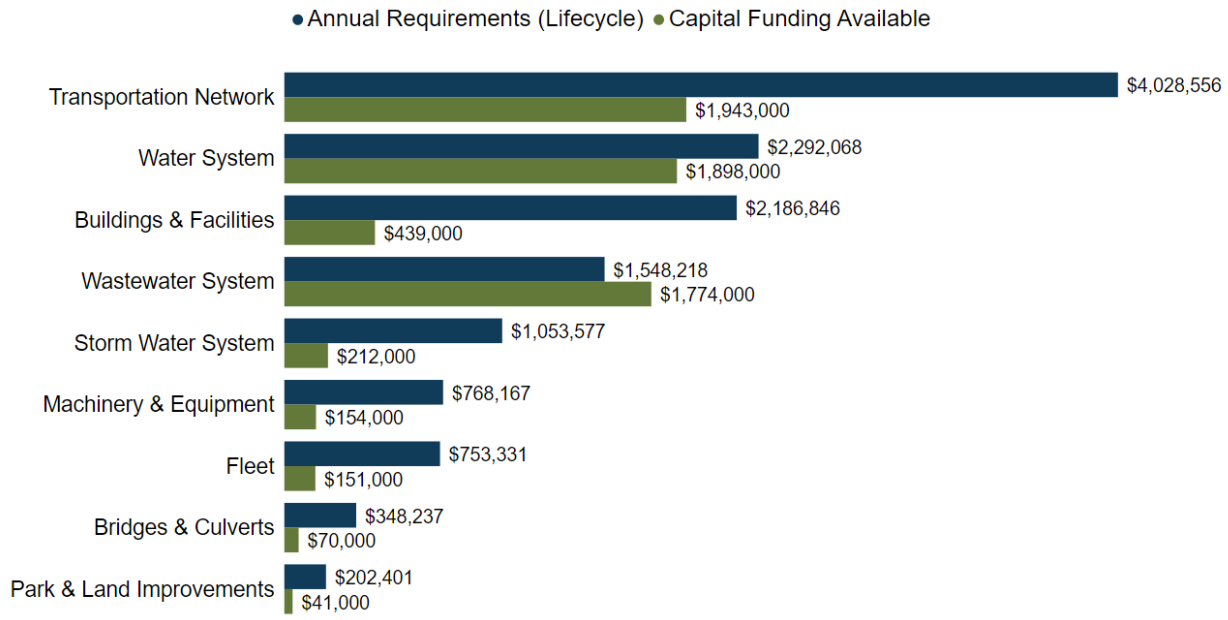
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Transportation Network	$7,126,043	$4,028,556	$3,097,487
Storm Water System	$1,087,608	$1,053,577	$34,031
Water System	$3,019,914	$2,292,068	$727,846
Wastewater System	$1,795,185	$1,548,218	$246,967

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of $3,097,487 for the Transportation Network, $34,031for the Storm Water System, $727,846 for Water System and $246,967 for the Wastewater System. This represents an overall reduction of the annual requirements for each category by 43%, 3%, 24%, and 14% respectively. As the lifecycle strategy scenario represents the lowest cost option available to the Municipality, 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, Strathroy-Caradoc is committing approximately $6,682,000 towards capital projects per year from sustainable revenue sources.



Given the annual capital requirement of $13,181,402, there is currently a funding gap of $4,106,331 annually.

7.2 Funding Objective

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

1. **Tax Funded Assets:** Transportation Network, Storm Water System, Bridges & Culverts, Buildings & Facilities, Machinery & Equipment, Parks & Land Improvements, Fleet
2. **Rate-Funded Assets:** Water System, Wastewater System

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

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

7.3 Financial Profile: Tax Funded Assets

7.3.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Taxes	Gas Tax	OCIF	Total Available	
Transportation Network	4,029,000	810,000	668,000	465,000	1,943,000	2,086,000
Storm Water System	1,054,000	212,000	0	0	212,000	842,000
Bridges & Culverts	348,000	70,000	0	0	70,000	278,000
Buildings & Facilities	2,187,000	439,000	0	0	439,000	1,748,000
Machinery & Equipment	768,000	154,000	0	0	154,000	614,000
Park & Land Improvements	202,000	41,000	0	0	41,000	161,000
Fleet	753,000	151,000	0	0	151,000	602,000
	9,341,000	**1,877,000**	**668,000**	**465,000**	**3,010,000**	**6,331,000**

The average annual investment requirement for the above categories is $9,341,000. Annual revenue currently allocated to these assets for capital purposes is $3,010,000 leaving an annual deficit of $6,331,000. Put differently, these infrastructure categories are currently funded at 32% of their long-term requirements.

7.3.2 Full Funding Requirements

In 2020, the Municipality of Strathroy-Caradoc had budgeted annual tax revenues of $18.6 Million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Transportation Network	11.2%
Storm Water System	4.5%
Bridges & Culverts	1.5%
Buildings & Facilities	9.4%
Machinery & Equipment	3.3%
Park & Land Improvements	0.9%
Fleet	3.2%

	34.0%

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

a) Strathroy-Caradoc's debt payments for these asset categories will be decreasing by $266,000 over the next 5 years and by $620,000 over the next 10+ years.

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

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	6,331,000	6,331,000	6,331,000	6,331,000	6,331,000	6,331,000	6,331,000	6,331,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-266,000	-620,000	-620,000	-620,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	0	0	0	0
Resulting Infrastructure Deficit:	**5**	**10**	**15**	**20**	**5**	**10**	**15**	**20**
Tax Increase Required	34.0%	34.0%	34.0%	34.0%	32.6%	30.7%	30.7%	30.7%
Annually:	**6.8%**	**3.4%**	**2.3%**	**1.7%**	**6.5%**	**3.1%**	**2.0%**	**1.5%**

7.3.3 Financial Strategy Recommendations

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

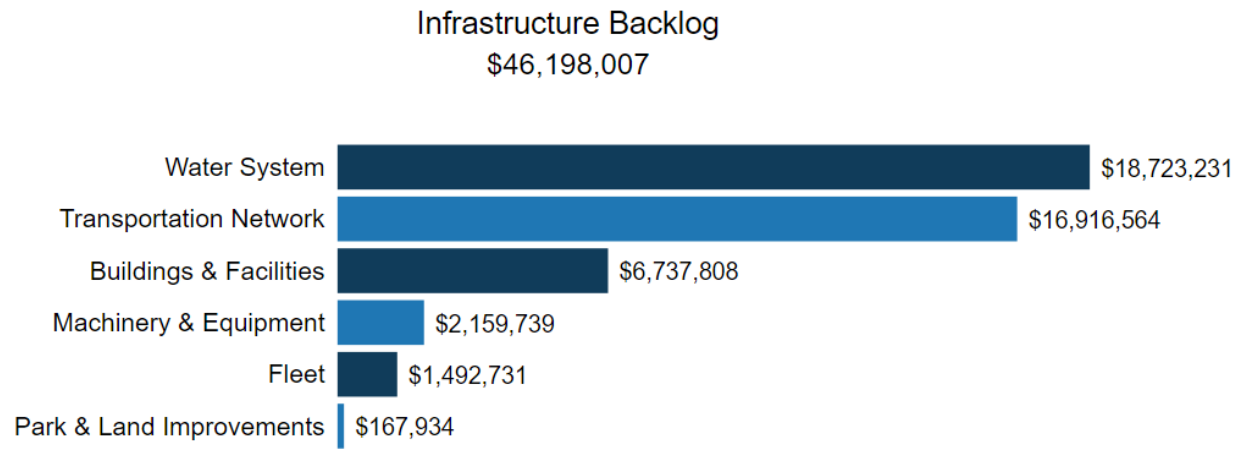
a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above;
b) increasing tax revenues dedicated to CapEx by approx. 2.0% each year for the next 15 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP;
c) allocating the government transfer revenues (e.g., Gas Tax and OCIF) for capital assets as outlined previously; and
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. Based on best practices, this periodic funding should not be incorporated into an AMP unless there are firm commitments in place. We have included the government transfer funding, as provided by the Finance Department.[4]
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes may be challenging. However, a lack of intentional asset funding planning today may have even greater consequences in terms of infrastructure failure.

[4] The Municipality should take advantage of all available grant funding programs and transfers from other levels of government. The financial strategy within this AMP has only included the known capital funding as provided by the Municipality's finance department, and there is an expectation the Municipality should be eligible for additional capital funding from senior governments within the next twenty years that could reduce the tax burden. Depending on the outcome of this review, there may be changes that impact its availability.

Although this option achieves full funding on an annual basis in 15 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a major pent-up investment demand of various service areas, the most significant areas of capital investment requirements that are primarily tax funded are:



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.

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

The following table shows, by asset category, Strathroy-Caradoc's average annual CapEx requirements, current rate funding positions[5], and the annual deficit across the rate funded utilities.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Oper	OCIF	Total Available	
Water System	2,292,000	4,491,000	-2,593,000	0	1,898,000	394,000
Wastewater System	1,548,000	3,587,000	-1,813,000	0	1,774,000	-226,000
	3,840,000	**8,078,000**	**-4,406,000**	**0**	**3,672,000**	**168,000**

The average annual investment requirement for the above categories is $3.8 Million. Annual rate revenues currently allocated to these assets for capital purposes is nearly $3.7 Million leaving a total annual deficit for both utilities combined of $168K. Stated differently, the two utility infrastructure categories are currently funded at 96% of their long-term requirements. This is a significant positive for the Municipality and ongoing management of its utilities.

7.4.2 Full Funding Requirements

In 2020, Strathroy-Caradoc had budgeted annual wastewater rate revenues of $3,587,000 and annual water rate revenues of $4,491,000. In the following tables, we have analyzed the various scenarios of long-term funding options up to 20 years.

Net infrastructure deficit if capturing decreases in debt payments:

	Water System				Wastewater System			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	394,000	394,000	394,000	394,000	-226,000	-226,000	-226,000	-226,000
Less: decrease in debt payments	-44,000	-44,000	-44,000	-44,000	-196,000	-196,000	-196,000	-196,000
Tax Increase Required	7.8%	7.8%	7.8%	7.8%	-11.8%	-11.8%	-11.8%	-11.8%
Annually:	**1.6%**	**0.8%**	**0.5%**	**0.4%**	**-2.4%**	**-1.2%**	**-0.8%**	**-0.6%**

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

7.4.3 Financial Strategy Recommendations

Considering all of the above information, we recommend maintaining the current status quo funding model for the Water utility and Wastewater utility rate funded assets. This is based on the Municipality's Wastewater system already being fully-funded for the existing infrastructure, and the Water utility is trending towards being fully-funded within the time horizon analyzed. This involves striving to maintain full funding for both utilities by:

a) Maintaining the current rates (i.e., no rate hikes recommended at this time) and revenue allocations for CapEx purposes, for Water and Wastewater services each year for the next twenty years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP. Specifically, for Water infrastructure, consider a 0.4% annual rate increase for the next twenty years.

b) Reallocating the cash applied to utility debt payments for the infrastructure deficit as the debt servicing costs decrease.

c) Increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. We acknowledge that raising rate revenues consistently for the next twenty years to invest in infrastructure purposes is **not** necessary, especially for the Wastewater utility.

2. We also recognize the Strathroy-Caradoc has had a reasonable funding strategy for the utility infrastructure, and the data suggests the Strathroy-Caradoc has a successful approach to asset management, CapEx investments and financing of the utility's capital assets. Therefore, no rate increases needed at all for existing Wastewater infrastructure, and there is only a negligible increase necessary for the Water infrastructure over the twenty years.

3. Assumption is that no new debt will be taken on to pay for existing infrastructure.

4. We recognize that Strathroy-Caradoc may also have other utility related revenues in addition to the rates, such as other charges and government transfer revenues.

5. It is reasonable to propose that periodic senior government infrastructure funding should be available during the period analyzed. However, this periodic funding has not been incorporated into an AMP unless there are firm commitments in place.

6. Also, Strathroy-Caradoc could choose to implement a potential rate increase at any time during the next twenty years for one of the following reasons: new technical information/data that amends the infrastructure investment requirement, and/or

Strathroy-Caradoc wishes to fund specific Water or Wastewater Capital Reserves for future infrastructure needs.

7. Any increase in rates required for future operations would be in addition to the above recommendations.

Although this option focuses on the full funding of Wastewater, it maintains the annual rates for both utilities and provides financial sustainability over the period modeled. The recommendations do require prioritizing capital projects to fit the resulting annual funding available.

The Municipality is currently in an enviable financial position to address the utility infrastructure needs; however, it is important to be mindful of the changes to the state of infrastructure and financials during the next twenty years.

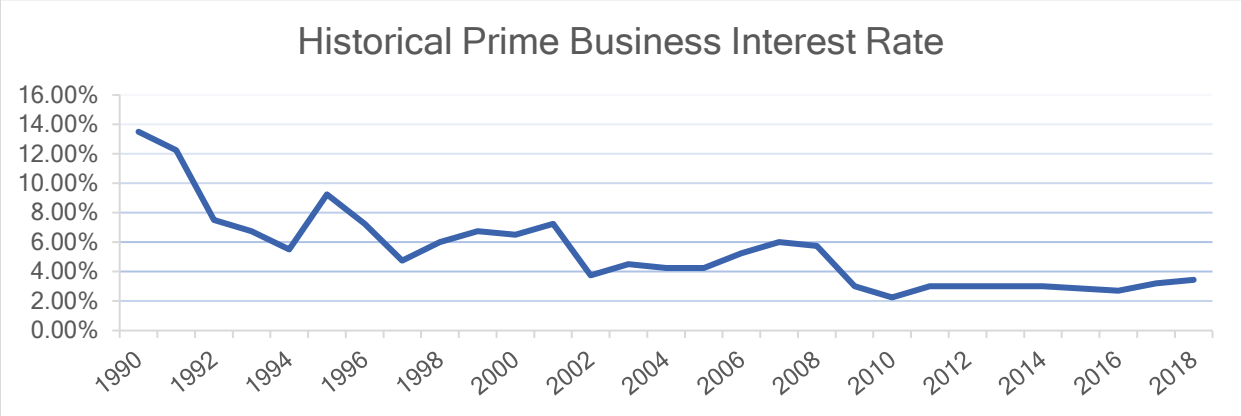
Today, the Municipality is well prepared to fund the current Water and Wastewater infrastructure requirements because the current annual funding plan (considering debt repayments) is sufficient over the next twenty years.

7.5 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[6] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

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

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



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

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

The following tables outline how Strathroy-Caradoc has historically used debt for investing in the asset categories as listed. There is currently $4,466,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $860,000, well within its provincially prescribed maximum of $6,362,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2015	2016	2017	2018	2019
Transportation Network	226,000	0	754,000	0	0	0
Storm Water System	1,454,000	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Buildings & Facilities	1,717,000	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Park & Land Improvements	0	0	0	0	0	0
Fleet	732,000	0	833,000	0	0	0
Total Tax Funded:	**4,129,000**	**0**	**1,587,000**	**0**	**0**	**0**
Water System	83,000	0	0	0	0	0
Wastewater System	254,000	0	0	0	0	0
Total Rate Funded:	**337,000**	**0**	**0**	**0**	**0**	**0**

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2020	2021	2022	2023	2024	2025	2030
Transportation Network	154,000	76,000	0	0	0	0	0
Storm Water System	241,000	241,000	241,000	241,000	241,000	241,000	0
Bridges & Culverts	0	0	0	0	0	0	0
Buildings & Facilities	76,000	75,000	74,000	72,000	27,000	27,000	0
Machinery & Equipment	0	0	0	0	0	0	0
Park & Land Improvements	0	0	0	0	0	0	0
Fleet	149,000	145,000	142,000	138,000	88,000	86,000	0
Total Tax Funded:	**620,000**	**537,000**	**457,000**	**451,000**	**356,000**	**354,000**	**0**
Water System	44,000	44,000	0	0	0	0	0
Wastewater System	196,000	65,000	0	0	0	0	0
Total Rate Funded:	**240,000**	**109,000**	**0**	**0**	**0**	**0**	**0**

The revenue options outlined in this plan allow Strathroy-Caradoc 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 Strathroy-Caradoc.

Asset Category	Balance at December 31, 2019
Transportation Network	622,000
Storm Water System	522,000
Bridges & Culverts	522,000
Buildings & Facilities	1,027,000
Machinery & Equipment	522,000
Park & Land Improvements	522,000
Fleet	1,325,000
Total Tax Funded:	**5,062,000**
Water Network	12,800,000
Wastewater System	7,534,000
Total Rate Funded:	**20,334,000**

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

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

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

Appendix A: 10-Year Capital Requirements

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

Transportation Network											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Asphalt Roads	$7,469,985	$584,694	$253,153	$618,088	$125,867	$805,123	$653,924	$2,660,596	$4,533,475	$1,925,782	$2,948,262
Curb & Gutter	$1,278,520	$52,094	$449,502	$119,294	$123,404	$475,425	$0	$70,455	$83,172	$26,277	$52,861
Sidewalks	$11,247	$0	$0	$0	$0	$3,735	$0	$0	$0	$39,629	$0
Street Lights	$1,172,831	$0	$0	$0	$0	$0	$304,390	$0	$0	$0	$0
Tar & Chip Roads	$6,983,981	$146,883	$54	$0	$0	$0	$0	$306,052	$682,161	$660,153	$108
	$16,916,564	**$783,671**	**$702,709**	**$737,382**	**$249,271**	**$1,284,283**	**$958,314**	**$3,037,103**	**$5,298,808**	**$2,651,841**	**$3,001,231**

Storm Water System											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Catch Basins	$0	$0	$0	$0	$0	$0	$0	$0	$0	$504,000	$0
Mains	$0	$14,870	$18,027	$26,100	$21,618	$37,964	$26,113	$26,461	$47,796	$1,367,305	$11,320
Manholes	$0	$0	$0	$0	$0	$0	$0	$0	$21,000	$256,000	$0
	$0	**$14,870**	**$18,027**	**$26,100**	**$21,618**	**$37,964**	**$26,113**	**$26,461**	**$68,796**	**$2,127,305**	**$11,320**

Buildings & Facilities											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Environmental Services	$2,641,670	$0	$0	$0	$0	$0	$0	$11,138	$0	$0	$25,665
General Government	$2,673,870	$84,285	$29,858	$0	$0	$0	$0	$6,226	$0	$72,679	$0
Protection Services	$164,646	$0	$59,589	$0	$0	$23,006	$0	$0	$0	$0	$0
Recreation & Cultural Services	$1,218,994	$285,000	$73,948	$0	$485,128	$308,000	$393,000	$995,688	$287,272	$15,886	$0
Transportation Services	$38,628	$0	$0	$0	$191,335	$0	$0	$0	$0	$0	$0
	$6,737,808	**$369,285**	**$163,395**	**$0**	**$676,463**	**$331,006**	**$393,000**	**$1,013,052**	**$287,272**	**$88,565**	**$25,665**

Machinery & Equipment											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Communication Equipment	$252,898	$12,586	$0	$35,540	$0	$140,874	$90,825	$63,124	$73,316	$190,054	$330,028
Emergency Services Equipment	$1,076,738	$18,059	$16,293	$299,642	$53,269	$62,016	$299,274	$67,848	$34,755	$12,136	$42,347
Furniture & Fixtures	$57,317	$0	$0	$0	$0	$0	$0	$0	$18,187	$28,541	$26,348
IT Equipment	$238,054	$24,433	$23,881	$0	$374,073	$171,520	$148,542	$78,296	$80,706	$334,831	$136,212
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$41,209	$0
Office Equipment	$133,415	$19,303	$9,704	$3,111	$1,578	$0	$146,680	$0	$3,111	$1,578	$0
Recreation Equipment	$319,351	$68,936	$24,070	$137,616	$0	$0	$109,432	$130,464	$157,448	$221,531	$315,488
Tools, Shop & Garage Department	$49,750	$0	$7,537	$0	$0	$0	$54,544	$0	$0	$9,317	$4,120
Turf Equipment	$32,216	$22,204	$18,369	$0	$20,398	$0	$33,532	$0	$0	$48,945	$244,382
	$2,159,739	**$165,521**	**$99,854**	**$475,909**	**$449,318**	**$374,410**	**$882,829**	**$339,732**	**$367,523**	**$888,142**	**$1,098,925**

Fleet											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Emergency Services	$540,437	$0	$319,939	$129,425	$0	$129,425	$26,198	$575,858	$0	$129,425	$0
Heavy Duty	$240,906	$0	$421,649	$220,400	$189,284	$326,525	$236,394	$139,299	$217,081	$492,688	$215,569
Light Duty	$195,610	$0	$95,706	$121,382	$110,580	$79,098	$89,091	$140,863	$110,580	$64,385	$203,431
Medium Duty	$64,694	$51,306	$0	$0	$0	$33,163	$100,819	$199,334	$8,978	$30,271	$0
Non-Licensed	$301,217	$0	$293,246	$0	$0	$0	$501,707	$0	$10,239	$0	$0
Off Road	$149,867	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$1,492,731	**$51,306**	**$1,130,540**	**$471,207**	**$299,864**	**$568,211**	**$954,209**	**$1,055,354**	**$346,878**	**$716,769**	**$419,000**

Parks & Land Improvements											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Fencing & Furnishing	$24,404	$2,438	$0	$0	$61,000	$0	$0	$0	$0	$0	$34,049
Landscaping	$0	$0	$18,919	$61,387	$0	$0	$0	$0	$0	$0	$0
Miscellaneous	$0	$0	$0	$0	$0	$0	$0	$0	$0	$28,349	$0
Outdoor Lighting	$117,122	$0	$0	$0	$21,963	$0	$0	$0	$0	$0	$0
Parking Lots	$26,408	$411,965	$0	$0	$0	$0	$0	$0	$0	$0	$0
Playground Structures	$0	$88,445	$0	$0	$129,986	$0	$0	$0	$0	$0	$0
Sport Fields & Courts	$0	$142,267	$0	$0	$60,973	$0	$0	$0	$0	$29,298	$0
Trails	$0	$0	$0	$0	$0	$0	$0	$6,249	$0	$7,129	$52,444
	$167,934	**$645,115**	**$18,919**	**$61,387**	**$273,922**	**$0**	**$0**	**$6,249**	**$0**	**$64,776**	**$86,493**

Water System											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Hydrants	$2,656,000	$24,000	$88,000	$216,000	$128,000	$280,000	$136,000	$104,000	$120,000	$248,000	$200,000
Mains	$12,662,518	$0	$0	$0	$0	$209,040	$168,060	$0	$0	$191,430	$70,830
Meters	$316,404	$49,980	$42,126	$47,430	$46,206	$58,446	$40,290	$51,510	$57,630	$42,840	$60,231
Pump, Lift, Transfer Stations	$865,980	$0	$187,680	$0	$0	$130,837	$0	$0	$0	$0	$0
Reservoirs	$0	$0	$0	$0	$0	$0	$0	$122,208	$0	$0	$0
Valves	$2,222,329	$173,311	$45,146	$71,199	$167,114	$303,067	$320,879	$128,927	$55,932	$181,772	$279,397
	$18,723,231	**$247,291**	**$362,952**	**$334,629**	**$341,320**	**$981,390**	**$665,229**	**$406,645**	**$233,562**	**$664,042**	**$610,458**

Wastewater System											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Lagoons	$0	$0	$301,152	$0	$0	$0	$0	$0	$0	$0	$0
Mains	$0	$74,191	$71,831	$70,597	$35,067	$81,750	$85,017	$44,226	$3,653	$6,627,352	$42,678
Pump, Lift, Transfer Stations	$0	$0	$0	$0	$0	$7,267	$0	$0	$0	$63,586	$0
	$0	**$74,191**	**$372,983**	**$70,597**	**$35,067**	**$89,017**	**$85,017**	**$44,226**	**$3,653**	**$6,690,938**	**$42,678**

Asset Portfolio											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges & Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Buildings & Facilities	$6,737,808	$369,285	$163,395	$0	$676,463	$331,006	$393,000	$1,013,052	$287,272	$88,565	$25,665
Fleet	$1,492,731	$51,306	$1,130,540	$471,207	$299,864	$568,211	$954,209	$1,055,354	$346,878	$716,769	$419,000
Machinery & Equipment	$2,159,739	$165,521	$99,854	$475,909	$449,318	$374,410	$882,829	$339,732	$367,523	$888,142	$1,098,925
Park & Land Improvements	$167,934	$645,115	$18,919	$61,387	$273,922	$0	$0	$6,249	$0	$64,776	$86,493
Storm Water System	$0	$14,870	$18,027	$26,100	$21,618	$37,964	$26,113	$26,461	$68,796	$2,127,305	$11,320
Transportation Network	$16,916,564	$793,036	$750,725	$767,553	$253,953	$1,313,978	$993,375	$3,041,786	$5,339,879	$2,707,294	$3,010,597
Wastewater System	$0	$74,191	$372,983	$70,597	$35,067	$89,017	$85,017	$44,226	$3,653	$6,690,938	$42,678
Water System	$18,723,231	$247,291	$362,952	$334,629	$341,320	$981,390	$665,229	$406,645	$233,562	$664,042	$610,458
	$46,198,007	**$2,360,616**	**$2,917,395**	**$2,207,381**	**$2,351,525**	**$3,695,976**	**$3,999,771**	**$5,933,504**	**$6,647,563**	**$13,947,831**	**$5,305,135**

Appendix B: Level of Service Maps

[Maps to be populated]

Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Transportation Network (Roads)	Condition	100%	85-100	1
			75-84	2
			50-74	3
			30-49	4
			0-29	5
Transportation Network Bridges & Culverts Storm Water System Buildings & Facilities Machinery & Equipment Fleet Parks & Land Improvements Water System Wastewater System	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Wastewater System (Mains) Storm Water System (Mains)	Condition	100%	90-100	1
			70-89	2
			50-69	3
			30-49	4
			0-29	5
Water System (Mains)	Condition	75%	90-100	1
			70-89	2
			50-69	3
			30-49	4
			0-29	5
	Pipe Material	25%	PVC	2
			PVC DR18	2
			Ductile Iron	4
			Cast Iron	5

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Transportation Network (Roads)	Econimic (40%)	Replacement Cost (100%)	$0-$50,000	1
			$50,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1,000,000	4
			$1,000,000-$50,000,000	5
	Operational (30%)	Service Class (10%)	3	5
			4	4
			5	3
			6	2
	Social Weight (30%)	Design Class (50%)	200	1
			300	2
			400	2
			500	4
			C/R	4
			L/R	3
			LCI	5
Bridges & Culverts	Economic (100%)	Replacement Cost (100%)	$0-$50,000	1
			$50,000-$250,000	2
			$250,000-$500,000	3
			$500,000-$1,000,000	4
			$1,000,000+	5
Transportation Network Storm Water System Water System Wastewater System	Economic (100%)	Replacement Cost (100%)	$0-$50,000	1
			$50,000-$150,000	2
			$150,000-$250,000	3
			$250,000-$500,000	4
			$500,000+	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Buildings & Facilities	Economic (80%)	Replacement Cost (100%)	$0-$100,000	1
			$100,001-$250,000	2
			$250,001-$500,000	3
			$500,001-$750,000	4
			$750,000-$10,000,000	5
	Operational (20%)	Facility Type (100%)	Portable Structure	1
			Storage	1
			Library	2
			Community Centre	2
			Administration	3
			Operations	3
			Recreational Facility	4
			Social Housing	4
			EMS	5
			Fire	5
			Police	5
Fleet	Economic (80%)	Replacement Cost (100%)	$0-$25,000	1
			$25,001-$75,000	2
			$75,001-$125,000	3
			$125,001-$200,000	4
			$200,000+	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Machinery & Equipment	Economic (100%)	Replacement Cost (100%)	$0-$25,000	1
			$25,001-$75,000	2
			$75,001-$125,000	3
			$125,001-$200,000	4
			$200,000+	5
Parks & Land Improvements	Economic (75%)	Replacement Cost (100%)	$0-$25,000	1
			$25,001-$75,000	2
			$75,001-$125,000	3
			$125,001-$200,000	4
			$200,000+	5
	Social (25%	Park Type	Open Space	1
			Parkette	2
			Neighbourhood Park	3
			Community Park	3
			Special Use Park	4
			Town Wide Park	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score

Storm Water System (Mains)	Economic (40%)	Replacement Cost (60%)	$0-$50,000	1
			$50,000-$200,000	2
			$200,000-$400,000	3
			$400,000-$600,000	4
			$600,000+	5
		Depth (m) (40%	0-3	1
			3-5	2
			5-7	3
			7-8	4
			8+	5
	Social (40%)	Pipe Diameter (mm) (100%)	0-350 mm	1
			350-700mm	2
			700-1050mm	3
			1050-1400mm	4
			1400mm+	5
	Operational (20%)	Pipe Material (100%)	65D	2
			PVC	2
			PVC Stub	2
			Ribbed PVC	2
			Ribbed PVC 11	2
			Ribbed PVC Stub	2
			SDR35PVC	2
			Concrete	3

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Wastewater System (Mains)	Economic (60%)	Replacement Cost (60%)	$0-$50,000	1
			$50,000-$200,000	2

			$200,000-$400,000	3
			$400,000-$600,000	4
			$600,000+	5
		Depth (m) (40%)	0-3	1
			3-4	2
			4-5	3
			5-6	4
			6+	5
	Environmental (20%)	Main Type (100%)	Gravity Mains	3
			Force Mains	5
	Social (20%)	Pipe Diameter (100%)	0-150mm	1
			150-300mm	2
			300-450mm	3
			450-600mm	4
			600mm+	5
Water System (Mains)	Economic (50%)	Replacement Cost (100%)	$0-$50,000	1
			$50,000-$200,000	2
			$200,000-$400,000	3
			$400,000-$600,000	4
			$600,000+	5
	Social (50%)	Pipe Diameter (mm) (100%)	0-150mm	1
			150-300mm	2
			300-400mm	3
			400-500mm	4
			500mm+	5

Appendix D: Condition Assessment Guidelines

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

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, The Municipality'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, and
- 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 Municipality'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 Municipality 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 Municipality 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 Municipality 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 Municipality 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