Asset Management Plan

Municipality of Southwest Middlesex

2020

This Asset Management Program was prepared by:

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

Key Statistics

Replacement cost of asset portfolio
$189.3 million

Replacement cost of infrastructure per household
$75,552

Percentage of assets in fair or better condition
75%

Percentage of assets with assessed condition data
19%

Annual capital infrastructure deficit
$2.8 million

Recommended timeframe for eliminating annual infrastructure deficit
10-20 Years

Target reinvestment rate
2.3%

Actual reinvestment rate
0.8%

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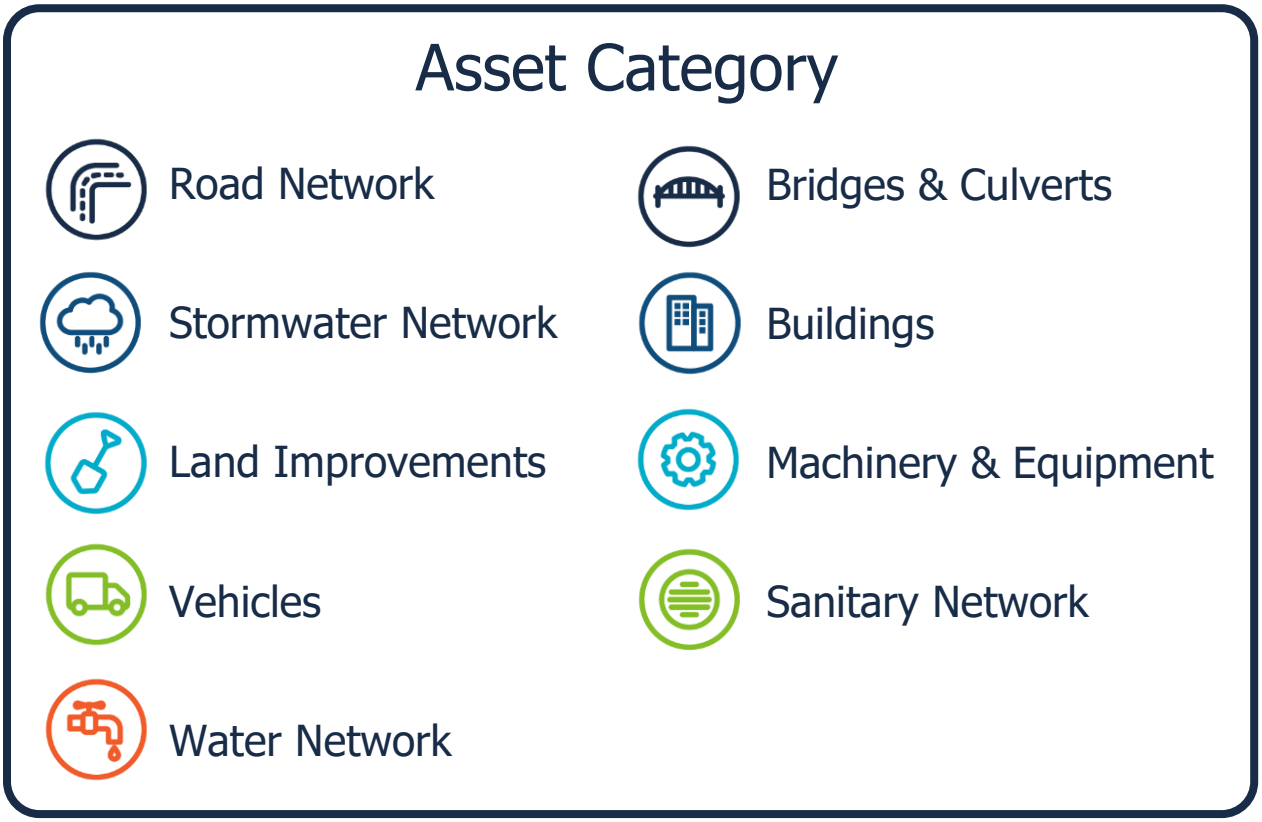
Executive Summary

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

Scope

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

This AMP include the following asset categories:



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

Findings

The overall replacement cost of the asset categories included in this AMP totals $189.3 million. 75% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 19% of assets. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

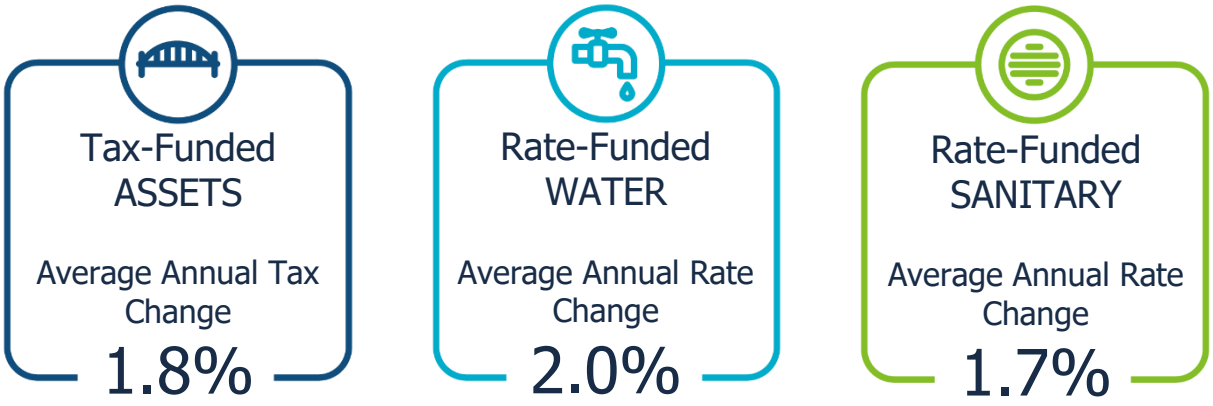
The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of 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 $4.3 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $1.5 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $2.8 million.

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

Recommendations

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



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

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

1 Introduction & Context

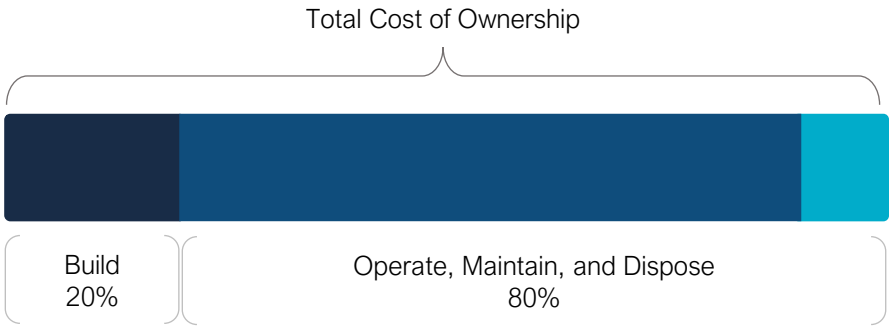
Key Insights

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

1.1 An Overview of Asset Management

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

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



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

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

1.1.1 Asset Management Policy

An asset management policy represents a statement of the principles guiding the 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.

The Municipality adopted a Strategic Asset Management Policy on June 26th, 2019 in accordance with Ontario Regulation 588/17.

Council approved policy demonstrates an organization-wide commitment to the good stewardship of municipal infrastructure assets, and to improve accountability and transparency to the community through the adoption of best practices regarding asset management planning. The policy defines the Municipality's asset management strategy by describing:

- Critical components of their asset management program,
- Roles and Responsibilities of key stakeholders, and
- Key principles of asset management.

1.1.2 Asset Management Strategy

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

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

1.1.3 Asset Management Plan

The asset management plan (AMP) presents the outcomes of the 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 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.

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

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

The 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. These risk scores can be used to prioritize maintenance, rehabilitation, and replacement strategies for critical assets.

1.2.3 Levels of Service

A level of service (LOS) is a measure of what the 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 the Municipality 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, Stormwater) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP. For non-core asset categories, the Municipality 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, Stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP. For non-core asset categories, the Municipality 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.

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

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

2024

Asset Management Plan for Core and Non-Core Assets

2025

Asset Management Policy Update and an Asset Management Plan for All Assets with the following additional components:

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

1.3.1 O. Reg. 588/17 Compliance Review

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

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

2 Scope and Methodology

Key Insights

- This asset management plan includes 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 Southwest Middlesex 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 stormwater).

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
Road Network	Tax Levy
Bridges & Culverts	
Stormwater Network	
Buildings	
Machinery & Equipment	
Vehicles	
Land Improvements	
Water Network	User Rates
Sanitary Network	

2.2 Deriving Replacement Costs

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

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

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the 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:

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

2.4 Reinvestment Rate

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

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

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

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

2.5 Deriving Asset Condition

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

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the 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.

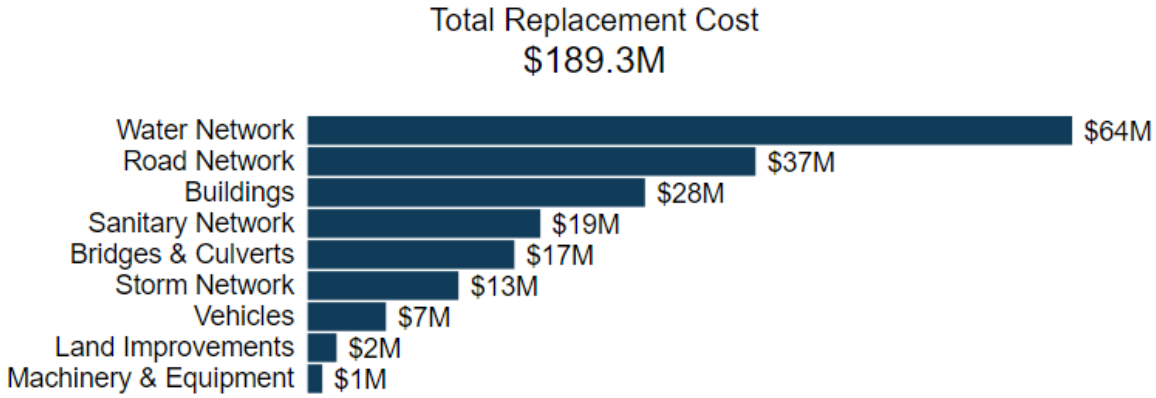
3 Portfolio Overview

Key Insights

- The total replacement cost of the Municipality's asset portfolio is $189.3 million
- The Municipality's target re-investment rate is 2.3%, and the actual re-investment rate is 0.8%, contributing to an expanding infrastructure deficit
- 75% of all assets are in fair or better condition
- 16% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements total $4.3 million per year across all assets

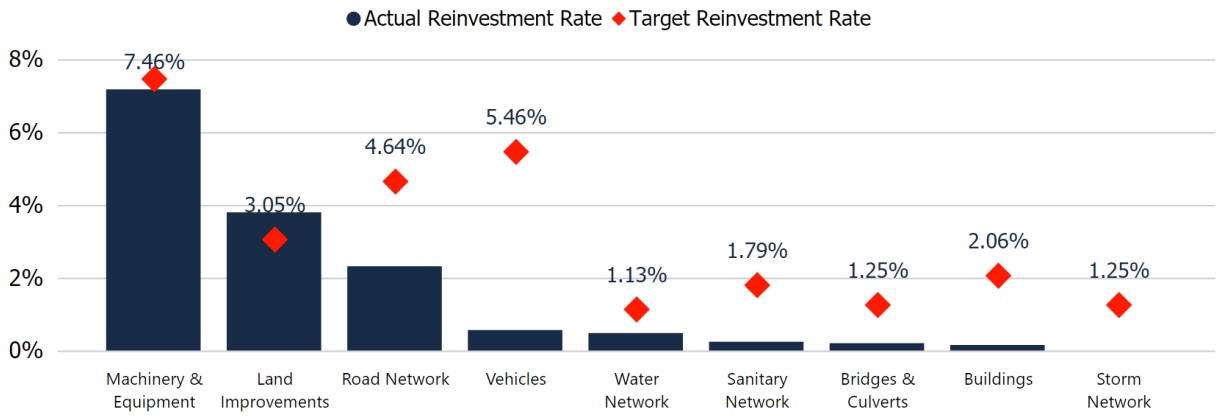
3.1 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of $189.3 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.



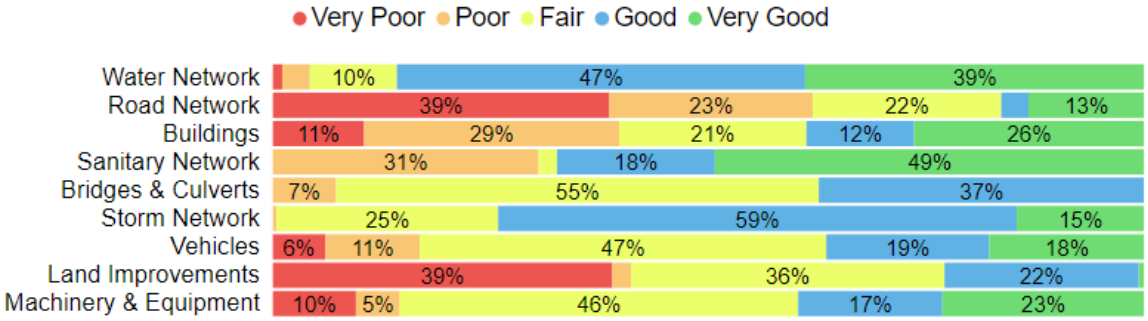
3.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Municipality should be allocating approximately $4.3 million annually, for a target reinvestment rate of 2.3%. Actual annual spending on infrastructure totals approximately $1.5 million, for an actual reinvestment rate of 0.8%.



3.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 75% of assets in Southwest Middlesex are in fair or better condition. This estimate relies on both age-based and field condition data.



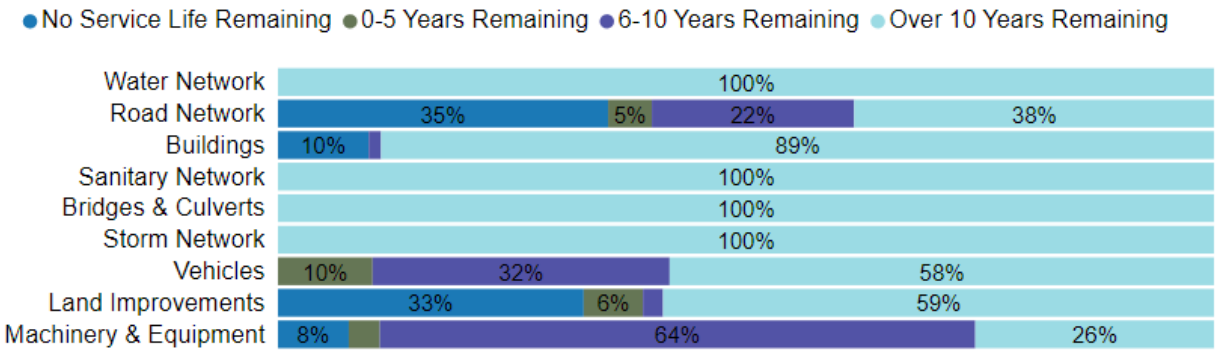
This AMP relies on assessed condition data for 19% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition[1]	Source of Condition Data
Road Network	All	0%	N/A
Bridges & Culverts	All	58%	2016 OSIMs
Stormwater Network	All	0%	N/A
Buildings	All	47%	Staff Assessments
Machinery & Equipment	All	25%	Staff Assessments
Vehicles	All	51%	Staff Assessments
Land Improvements	All	33%	Staff Assessments
Water Network	All	0%	N/A
Sanitary Network	All	0%	N/A

[1] Any asset category with 0% assessed condition has relied solely on age-based condition.

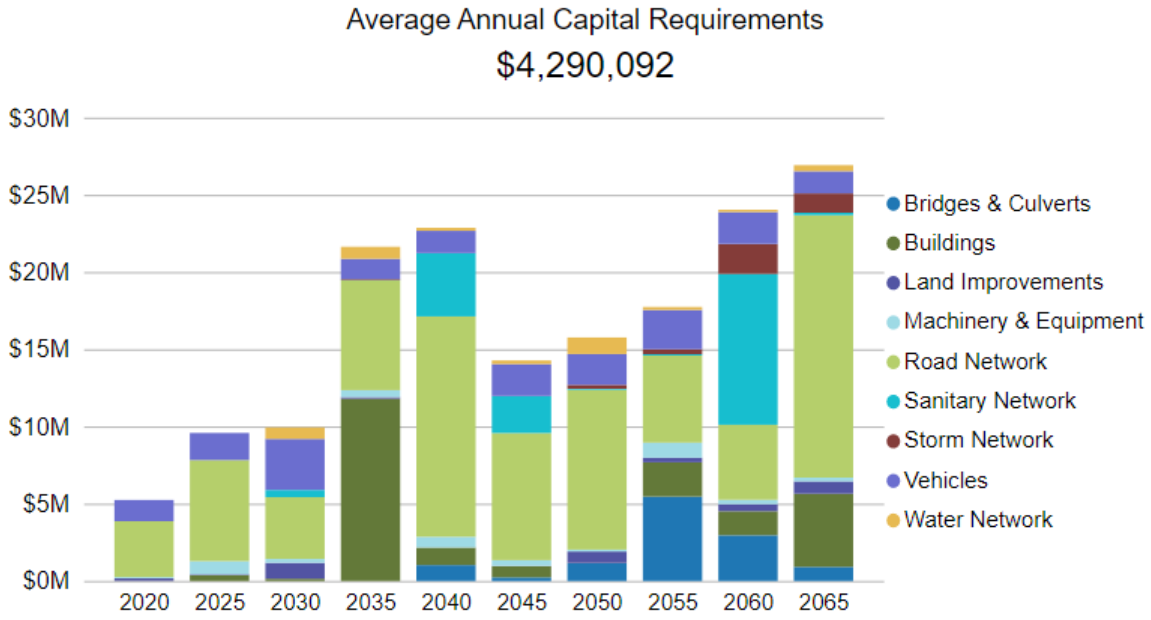
3.4 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 16% of the Municipality's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix A.



3.5 Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the Municipality can produce an accurate long-term capital forecast. The following graph identifies capital requirements over the next 50 years.



4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at $105.9 million
- 64% of tax-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately $3.2 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

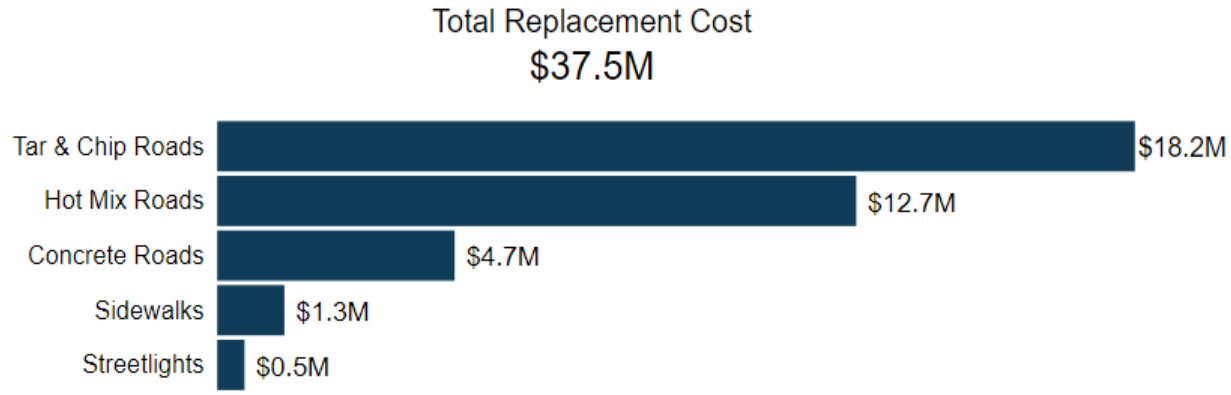
4.1 Road Network

The Road Network is a critical component of the provision of safe and efficient transportation services 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 including sidewalks and streetlights. The Municipality's roads and sidewalks are maintained by the Public Works department.

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 Municipality's Road Network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Concrete Roads	3,119m	User-Defined Cost	$4,709,426
Gravel Roads	359,911m	User-Defined Cost	Not Planned for Replacement[2]
Hot Mix Roads	14,709m	User-Defined Cost	$12,670,858
Sidewalks	18,973m	User-Defined Cost	$1,334,297
Streetlights	458	CPI Tables	$543,551
Tar & Chip Roads	40,243m	User-Defined Cost	$18,194,370
			$37,452,502

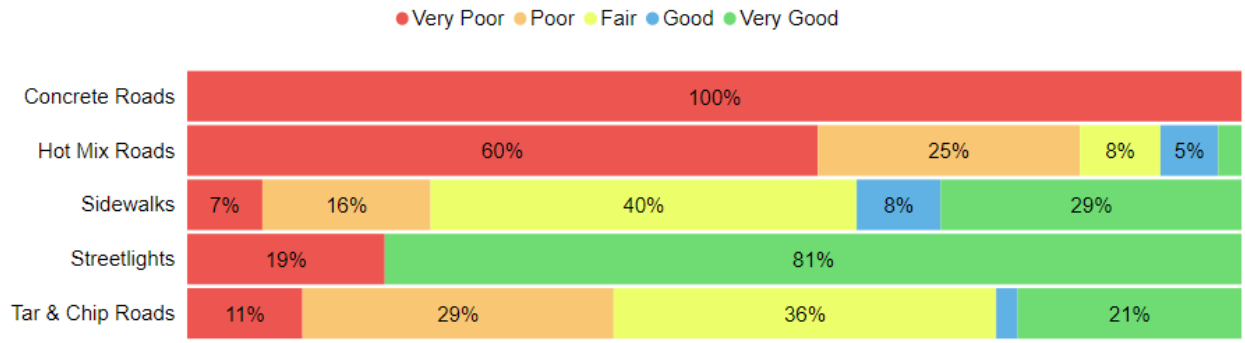


[2] Gravel roads undergo perpetual operating and maintenance activities. If maintained properly, they can theoretically have a limitless service life, and never be replaced.

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
Concrete Roads	0%[3]	Very Poor	Age-based
Hot Mix Roads	19%	Very Poor	Age-based
Sidewalks	55%	Fair	Age-based
Streetlights	69%	Good	Age-based
Tar & Chip Roads	52%	Fair	Age-based
	32%	**Poor**	**Age-based**



Current Approach to Condition Assessment

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

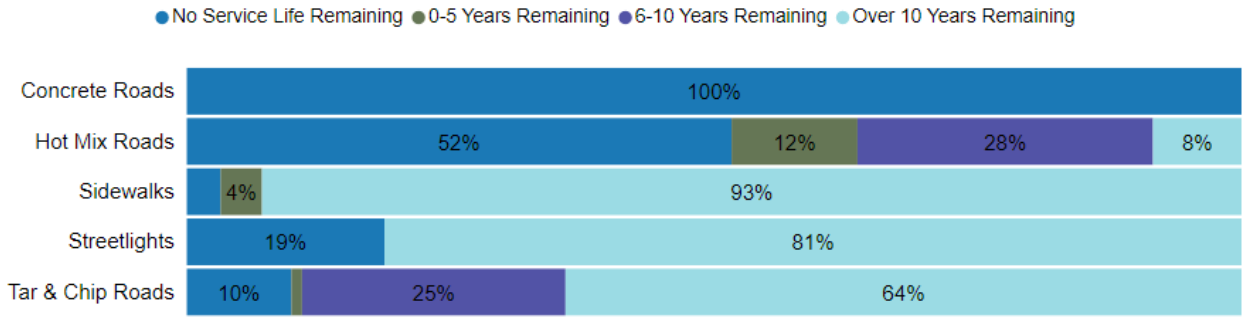
- The data in this AMP is not informed by a formal condition assessment strategy; The Municipality performs condition inspections of the roads during their road patrols to ensure their compliance with Minimum Maintenance Standards (MMS).
- The Municipality is currently in the process of updating their roads and sidewalks condition information through a detailed Roads Needs Study in order to capture pavement condition index (PCI) values and other valuable attributes. Moving forward, staff would like to conduct formal road needs studies on a regular basis, every five years on average.

[3] The road condition is entirely age-based; assessed condition would create a more accurate depiction of the road condition and likely increase condition for concrete roads above 0%.

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)
Concrete Roads	25 years	36.3	-11.3
Hot Mix Roads	20 years	22.2	-2.2
Sidewalks	50 years	22.3	27.7
Streetlights	30 years	25.8	4.2
Tar & Chip Roads	15 years	16.7	-1.7
		41.9	**18.6**



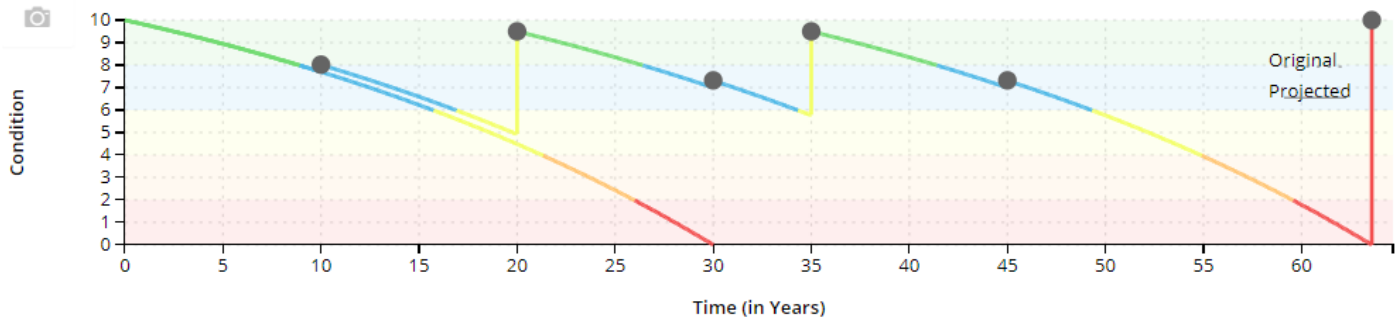
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

4.1.4 Lifecycle Management Strategy

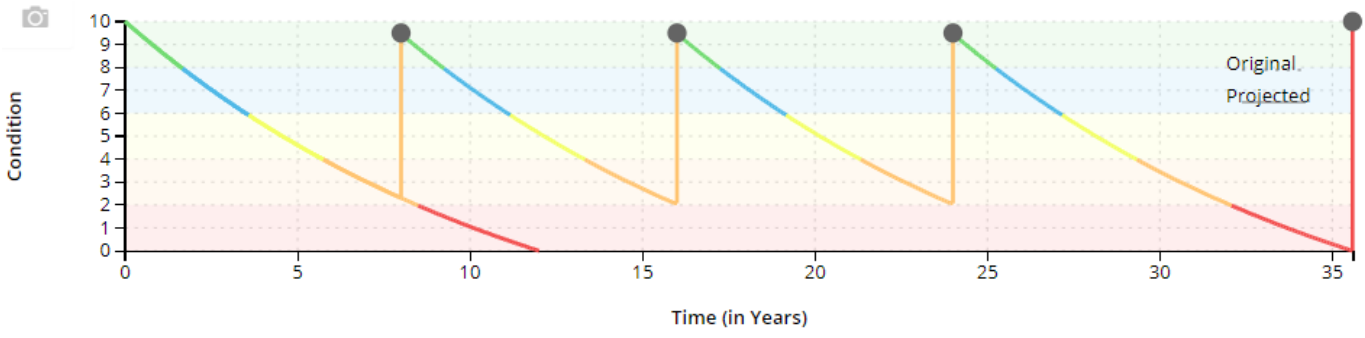
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

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

Hot Mix (HCB)		
Event Name	**Event Class**	**Event Trigger**
Single Mill & Pave	Rehabilitation	70% Condition
Double Mill & Pave	Rehabilitation	50% Condition
Full Reconstruction	Replacement	N/A



Tar & Chip (LCB)		
Event Name	**Event Class**	**Event Trigger**
Surface Treatment (Tar & Chip Resurfacing Program)	Rehabilitation	7 Years
Full Reconstruction	Replacement	20% Condition



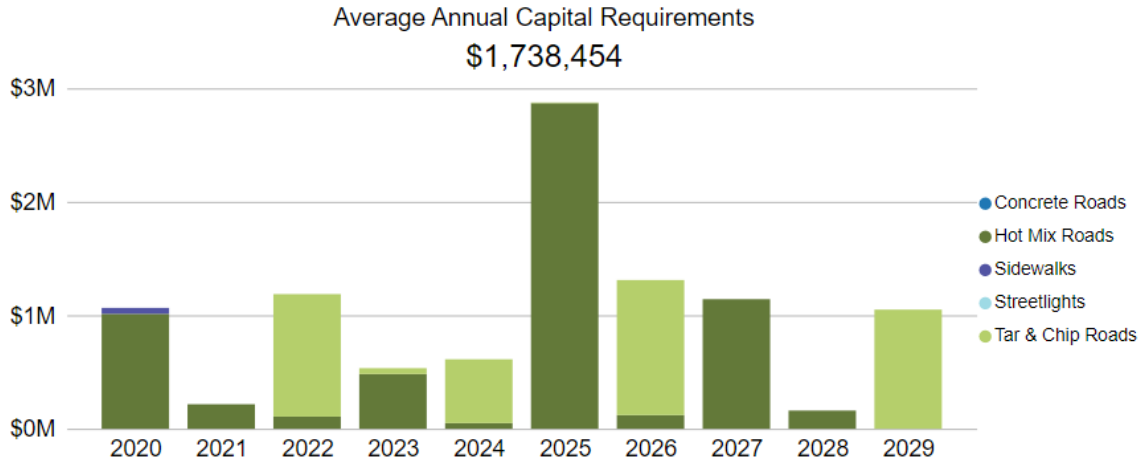
The following table further expands on the Municipality's current approach to lifecycle management:

Activity Type	Description of Current Strategy
Maintenance	Annual winter control activities to meet Minimum Maintenance Standards including road and sidewalk plowing, and snow removal.
	Activities such as crack sealing and pothole patching are completed as-needed.
	Gravel roads undergo ongoing maintenance activities including: • Dust Control/Calcium Chloride Application (annually) • Grading (multiple times annually) • Re-gravelling is done on an as-needed basis.
Rehabilitation	Surface treatments are performed every 6-8 years on surface treated roads. Ashpalt road rehabilitations are determined based on the road's performance, criticality, and available budget.
Replacement	Full road reconstruction is coordinated effectively with other Right-of-Way assets, including linear underground assets.

Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for Hot Mix (HCB) and Tar & Chip (LCB) Roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the Road Network.

The 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

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Risk to Current Asset Management Strategies

Asset Data and Information

There is a lack of confidence in the available condition data for roads. Staff plan to prioritize data refinement efforts to increase confidence in the accuracy and reliability of asset data and information for the next iteration of the plan. Once completed there will be greater confidence in the development of data-driven strategies to address infrastructure needs.

As it pertains to the spatial mapping and linking of the roads inventory to a GIS database, there is much room for improvement. As the database is refined and standardized, Staff will be able to correctly link their asset database to their GIS module. Staff currently rely more heavily on the County's GIS database, which limits their ability to update and make changes to their system.

Lifecycle Management Strategies

The current lifecycle management strategy for roads is considered more reactive than proactive. It is a challenge to find the right balance between maintenance, capital rehabilitation, and the reconstruction of roads. Staff hope to develop better defined strategies that will extend pavement lifecycle and a lower total cost. These strategies will require sustainable annual funding to minimize the deferral of capital works.

Climate Change & Extreme Weather Events

An increase in the frequency and intensity of precipitation events can result in flooding of sections of the road network. The drainage capacity of the road network is not sufficient to withstand heavy water flow, particularly on gravel roads. Further issues can arise as a result of flooding and poor drainage, such as accelerated deterioration caused by freeze/thaw cycles. Staff hope to identify problem areas and improve drainage through enhanced lifecycle strategies.

4.1.6 Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	The different levels of road class pavement conditions will be refined at a later date. The Municipality will attribute a surface condition rating for each road in the upcoming Road Needs Study.

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[4]	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0.024
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	1.91
Quality	Average pavement condition index for paved roads in the municipality	HCB: 20% LCB: 55.4%
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Fair
Performance	Capital reinvestment rate	2.31%

[4] The assumption was made that all roads were comprised of 2-lanes.

4.1.7 Recommendations

Asset Inventory

- Ensure data from future Road Needs Studies can be integrated and easily uploaded with Citywide inventory to enhance road data confidence for Roads and Sidewalks
- Appurtenances such as streetlights are currently pooled and lack any asset-specific detail. An LED replacement program was conducted in 2015/2016 where all the Municipality's streetlights were upgraded. This inventory should be uploaded into the asset management database, if possible.
- Other appurtenances such as road signs or small culverts (less than 3 metre span) are not currently tracked in the asset inventory; staff should seek to gather data on these assets
- The GIS database should be utilized more effectively by linking the assets correctly, using a unique identifier, in order to maintain the integrity and accuracy of the system. The visual maps will aid staff in prioritizing the right lifecycle events to coordinate and perform and optimizing their capital planning.

Condition Assessment Strategies

- The Municipality are currently conducting a detailed and comprehensive condition assessment of their road and sidewalk networks in 2021. Staff should consider completing an assessment of all roads on a regular schedule every 3-5 years.
- When road patrolling, Staff should consider utilizing a simple 1-5 rating scale to assess the condition of road appurtenances. Instead of the default age-based condition in the database, Staff can upload their internal field condition assessments into the system to leverage more realistic information.

Lifecycle Management Strategies

- Consider developing a dedicated budget for preventative maintenance activities such as crack sealing or micro-surfacing, if possible. These recurring activities have been shown to extend the life of roads by 2-4 years, if applied appropriately[5].
- Implement the identified lifecycle management strategies for paved roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of the Municipality's lifecycle management strategies at regular intervals to determine the impact to cost, condition, and risk.

[5] Barman, M. B. (2019, June). Cost/Benefit Analysis of the Effectiveness of Crack Sealing Techniques. Minnesota Department of Transportation Office of Research & Innovation. https://www.dot.state.mn.us/201926.pdf

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

- Update qualitative levels of service descriptions with updated maps and images/descriptions informed by upcoming studies.
- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Municipality believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per 2025 requirements of O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

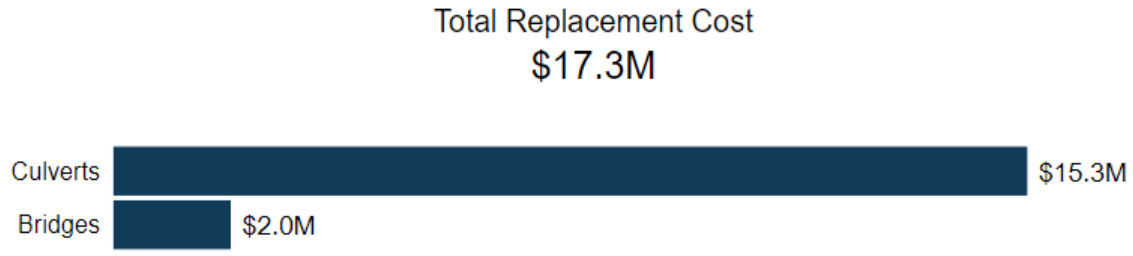
4.2 Bridges & Culverts

Bridges & Culverts represent a critical portion of the transportation services provided to the community. The Department of Public Works 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. Staff rely on recommendations from their latest Ontario Structural Inspection Manuals (OSIMs) when developing their capital plans. However, the data in this AMP is not entirely informed by the most recent OSIM report.

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.

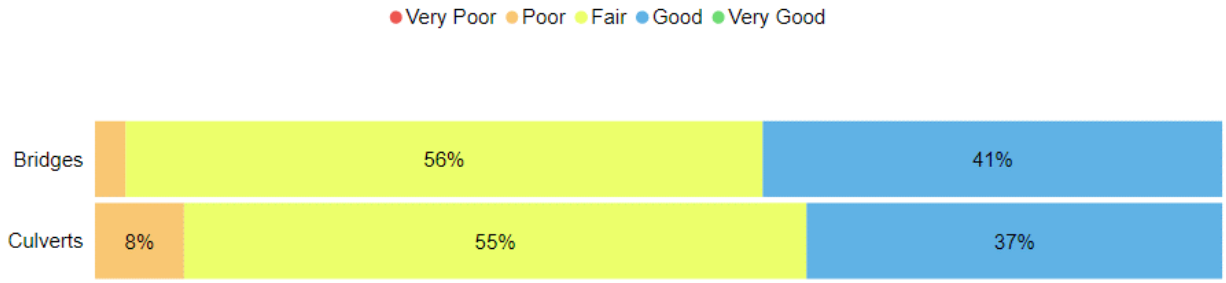
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	14	User-Defined Cost	$1,973,849
Culverts	69	User-Defined Cost	$15,328,739
			$17,302,588



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	55%	Fair	60% Assessed
Culverts	53%	Fair	57% Assessed
	53%	**Fair**	**58% Assessed**



The latest condition information available is from a 2016 OSIMs; however, these structural assets are currently being inspected as part of a 2020/2021 OSIMs inspection, and Staff will soon have more accurate and realistic condition and attribute information regarding these assets. To ensure that the Municipality's Bridges & Culverts 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 Bridges & Culverts.

Current Approach to Condition Assessment

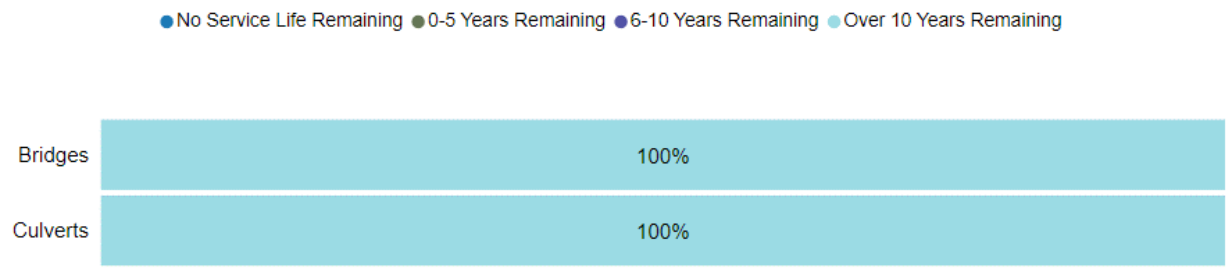
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the Municipality's current approach:

- 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 (OSIMs).
- Internal inspections are performed by Staff during road patrols.

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	80 Years	50.3	44.1
Culverts	50-80 Years	52.8	43.1
		52.3	**43.2**



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	Lifecycle activities are driven primarily by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIMs). Staff perform regular maintenance activities such as sweeping, washing, painting, and vegetation control. Structures are priortizied for replacement based on a combination of factors such as OSIM recommendations, available funding, health and safety concerns, and coordination with other right-of-way projects.
Inspection	The most recent inspection report will be completed in 2021.

Forecasted Capital Requirements

The Municipality's bridges and culverts are not expected to require capital funding in the next 10 years based on the current available information. However, the current information does not incorporate any relatively recent inspections or condition assessments which are critical to developing credible lifecycle strategies. The Municipality may need to allocate capital budget towards funding major rehabilitation or replacement for these bridges and culverts depending on the outcomes of the next OSIMs inspection. The next iteration of the plan will build upon the current strategies as more reliable information becomes available.

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

Risk to Current Asset Management Strategies

Organizational Capacity

Both short- and long-term planning requires regular collection and analysis of data to support asset management decision-making. Staff find it a continuous challenge to dedicate resource time towards data aggregation to ensure bridges and culverts condition and asset attribute data is regularly reviewed and updated in the asset management software.

Lifecycle Management Strategies

The current lifecycle management strategy for bridges and culverts are considered more reactive than proactive. It is a challenge to find the right balance between maintenance, capital rehabilitation, and the reconstruction of roads. Staff must continue to leverage recommendations from their latest OSIMs to develop effective asset management strategies to optimize capital funding and staff time.

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 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 Bridges & Culverts. The information in this table is informed by the 2019/2020 OSIM report.[6]

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)	Bridges and structural culverts are a key component of the municipal transportation network. None of the municipality's structures have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges & culverts and how this would affect use of the bridges & culverts	See Appendix B

[6] The data in this AMP is not informed by the most recent OSIM report, therefore does not align with the information in the LOS tables. The Municipality is working towards integrating the information from the OSIM report into the asset inventory to improve asset management decision-making.

Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by Bridges & Culverts. The information in this table is informed by the 2019/2020 OSIM report.

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of bridges in the Municipality with loading or dimensional restrictions	0%
Quality	Average bridge condition index value for bridges in the Municipality	70
	Average bridge condition index value for structural culverts in the Municipality	75
Performance	Capital re-investment rate	0.20%

4.2.7 Recommendations

Data Review/Validation

- Review inventory data and breakdown of assets to include assessed condition data, and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2 years.

Condition Assessment Strategies

- Upload the condition data from the next OSIMs report into the asset inventory to replace age-based condition data.

Risk Management Strategies

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

Lifecycle Management Strategies

- This AMP only includes capital costs associated with the reconstruction of bridges and culverts. The Municipality should work towards identifying projected capital rehabilitation and renewal costs for bridges and culverts and integrating these costs into long-term planning.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the 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 Stormwater Network

The Municipality is responsible for owning and maintaining a stormwater network of approximately 25 kilometres of storm sewer mains. Other supporting infrastructure such as manholes or catchbasins are not currently inventoried in the database.

Staff are working towards improving the reliability and completeness of their Stormwater Network inventory to assist with long-term asset management planning.

4.3.1 Asset Inventory & Replacement Cost

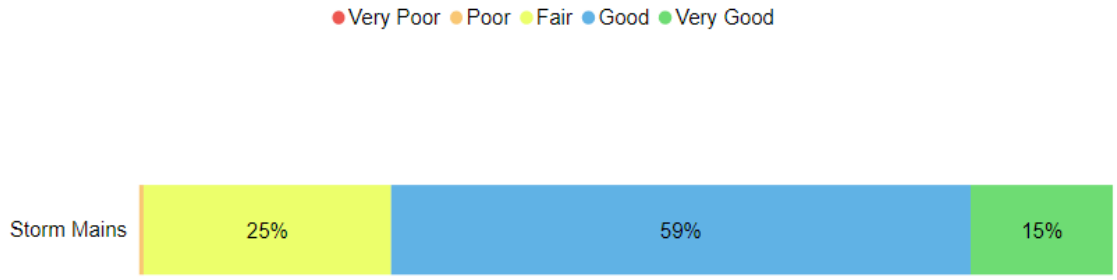
The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Municipality's Stormwater Network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Storm Mains	25,127m	User-Defined Cost	$12,631,800
			$12,631,800

4.3.2 Asset Condition

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

	Average Condition (%)	Average Condition Rating	Condition Source
Storm Mains	67%	Good	Age-Based
	67%	**Good**	**Age-Based**



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

Current Approach to Condition Assessment

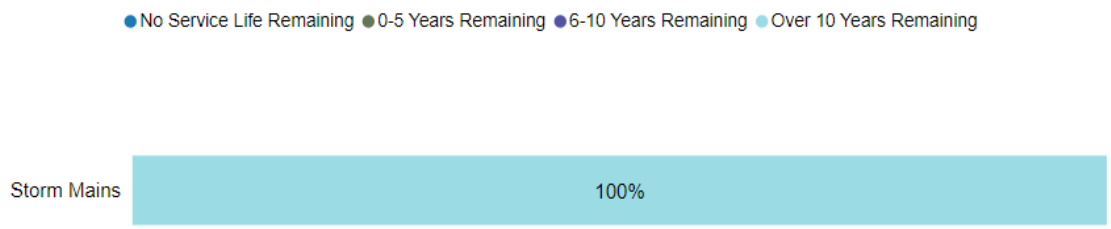
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- There are no formal condition assessment programs in place for the stormwater network. Staff are aware of trouble areas and inspect them on a more frequent basis.
- In the future, the Municipality is looking to put capital funding aside for CCTV to target problem areas identified in the sewer network.
- As the Municipality refines the available asset inventory for the stormwater network, a regular assessment cycle should be established.

4.3.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Stormwater Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. 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)
Storm Mains	80 Years	26.6	53.4
		26.6	**53.4**



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	Maintenance activities are completed to a lesser degree compared to other underground linear infrastructure.
	Primary activities include catch basin cleaning and storm main flushing are performed on an as needed basis.
	CCTV inspections may be completed as budget becomes available and this information would be 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 typically reactive in nature. Staff consider the age, material, and neighboring assets to determine when to replace these assets.

Forecasted Capital Requirements

The Municipality's stormwater network is not expected to require capital funding in the next 10 years according to the current available information. Most of the Municipality's storm mains were constructed in the 1990s with an estimated useful life of 80 years, on average. The Municipality will not likely need to allocate capital budget towards funding major rehabilitation and replacement for the stormwater network in the short-term future.

4.3.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.

Risk to Current Asset Management Strategies

Asset Data & Information

There is a lack of confidence in the available inventory data for stormwater assets and its completeness. Staff plan to focus on data refinement efforts to increase confidence in the accuracy and reliability of asset data and information. Once completed there will be greater confidence in the development of data-driven strategies to address infrastructure needs.

The Stormwater network is also not as well linked to the GIS database as the other underground linear networks. Staff will benefit from spatially mapping these assets when coordinating projects.

Climate Change & Extreme Weather Events

An increase in the frequency and intensity of precipitation events can result in flooding throughout the Municipality. The stormwater network occasionally does not have the capacity to withstand heavy water flow. Staff hope to identify problem areas to enhance system resiliency through rehabilitation and replacement of assets in the stormwater network.

4.3.6 Levels of Service

The following tables identify the Municipality's current level of service for Stormwater 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 Stormwater Network.

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	See Appendix B

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties in municipality resilient to a 100-year storm	TBD[7]
	% of the municipal stormwater management system resilient to a 5-year storm	100%[8]
Performance	Capital reinvestment rate	0.0%

[7] The Municipality does not currently have data available to determine this technical metric. The rate of properties that are expected to be resilient to a 100-year storm is expected to be low. The Municipality worked with the Lower Thames Conservation Authority (LTVCA) to understand current available floodplain mapping for the area.
[8] This is based on the observations of municipal staff.

4.3.7 Recommendations

Asset Inventory

- The Municipality's Stormwater Network inventory remains at a basic level of maturity and staff do not have a high level of confidence in its accuracy or reliability. The development of a comprehensive inventory of the stormwater network, including GIS location data, should be priority.
- The inventorying of other stormwater assets should also be considered to improve the completeness of this asset class.

Condition Assessment Strategies

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

Risk Management Strategies

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

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the Stormwater Network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the 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.

4.4 Buildings

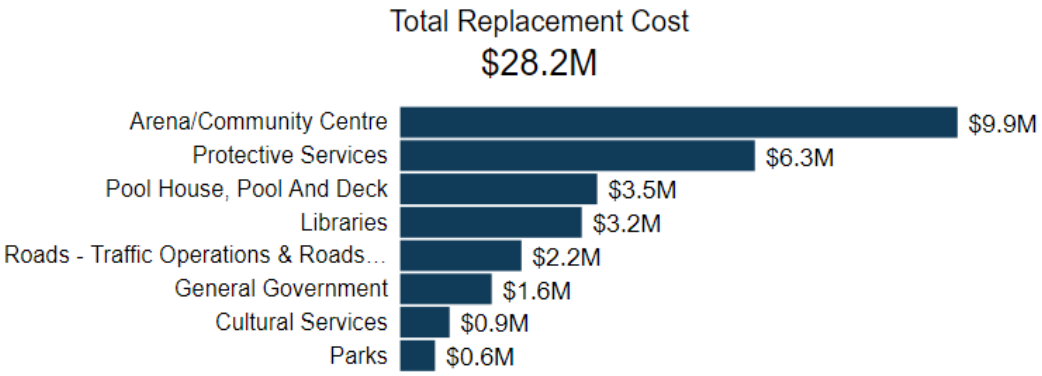
The Municipality of Southwest Middlesex owns and maintains several facilities and recreation centres that provide key services to the community. These include arenas and community centres; museums and other cultural and heritage buildings; municipal offices; libraries; Fire Halls and Police station; and Public Works garages and sheds.

Currently, many of these buildings are pooled and do not have the necessary breakdown or componentization to effectively manage their rehabilitation and/or replacement.

4.4.1 Asset Inventory & Replacement Cost

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

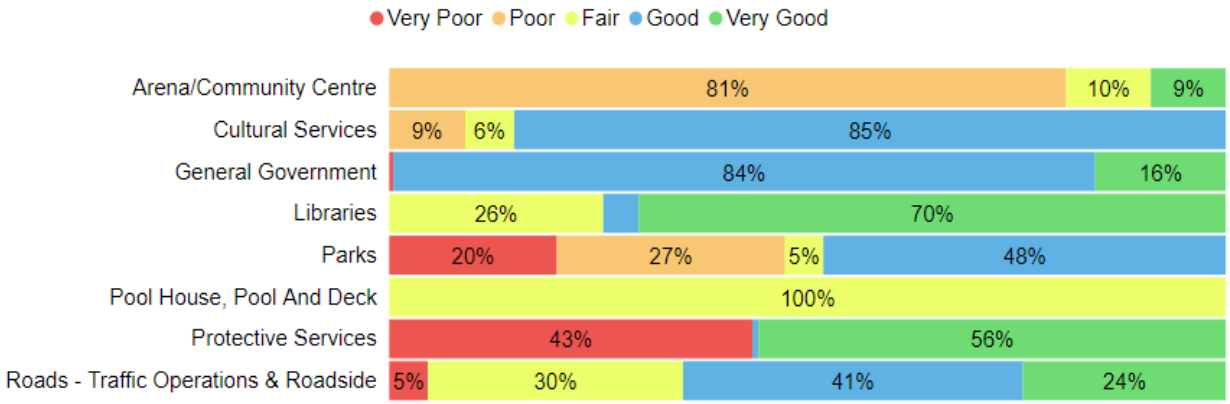
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Arena/Community Centre	10 Components (2 Buildings)	9% CPI Tables 91% User-Defined Cost	$9,891,908
Cultural Services	3 Components (3 Buildings)	15% CPI Tables 85% User-Defined Cost	$881,755
General Government	6 Components (1 Building)	CPI Tables	$1,638,247
Libraries	3 Components (3 Buildings)	CPI Tables	$3,226,196
Parks	7 Components (5 Buildings)	33% CPI Tables 67% User-Defined Cost	$623,680
Pool House, Pool And Deck	1 Component (1 Building)	User-Defined Cost	$3,500,000
Protective Services	9 Components (3 Buildings)	5% CPI Tables 95% User-Defined Cost	$6,297,152
Roads - Traffic Operations & Roadside	9 Components (6 Buildings)	34% CPI Tables 66% User-Defined Cost	$2,156,573
			$28,215,511



4.4.2 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Arena/Community Centre	42%	Fair	91% Assessed
Cultural Services	56%	Fair	Age-based
General Government	70%	Good	Age-based
Libraries	83%	Very Good	4% Assessed
Parks	42%	Very Poor	75% Assessed
Pool House, Pool And Deck	55%	Very Poor	100% Assessed
Protective Services	49%	Fair	Age-based
Roads - Traffic Operations & Roadside	69%	Good	14% Assessed
	54%	**Fair**	**47% Assessed**



To ensure that the Municipality's Buildings & Facilities 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 Buildings.

Current Approach to Condition Assessment

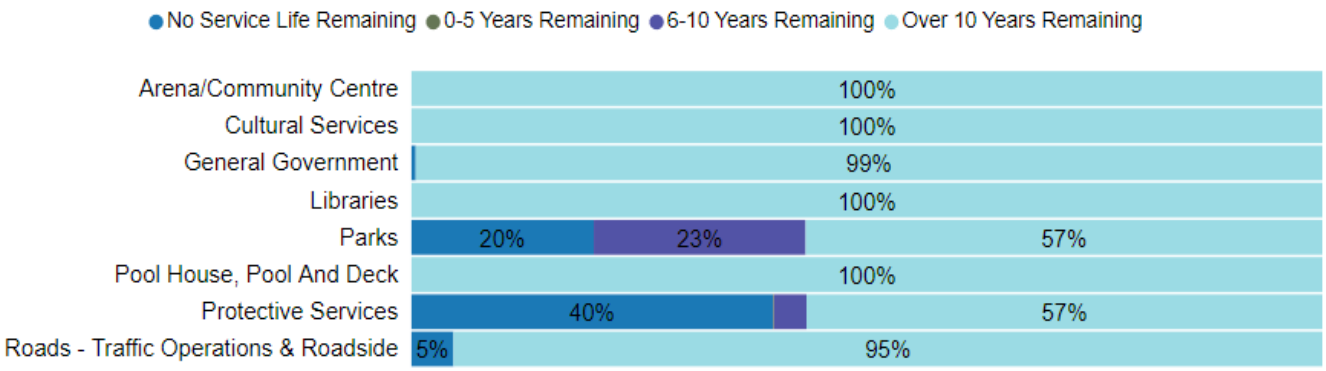
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Municipal staff perform ad-hoc visual inspections on buildings, as necessary, and document internal condition ratings within CityWide.
- Regulatory or Health and Safety inspections are completed, as required, by the Building Code Act and the Technical Standards and Safety Authority (TSSA).
- The Municipality is currently considering hiring a consultant to develop a building condition assessment (BCA) in order to componentize the buildings , following the North American UNIFORMAT Classification structure. The BCA would also provide Staff with a building condition index (BCI) and recommendations that will assist in the rehabilitation and replacement activities. With such a detailed breakdown of buildings, Staff will be able to make proactive lifecycle decisions on the components that encompass their various buildings and prioritize them accordingly.

4.4.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Buildings 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 Asset Age (Years)	Average Service Life Remaining (Years)
Arena/Community Centre	25-60 years	13.3	37.6
Cultural Services	50-60 years	30.8	22.4
General Government	5-60 years	10.4	40.4
Libraries	50-60 years	31.2	42.9
Parks	25-30 years	34.9	9.6
Pool House, Pool And Deck	30 years	52.5	16.4
Protective Services	10-60 years	25.3	28.7
Roads - Traffic Operations & Roadside	60 years	36.8	26.2
		25.8	**29.0**



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.

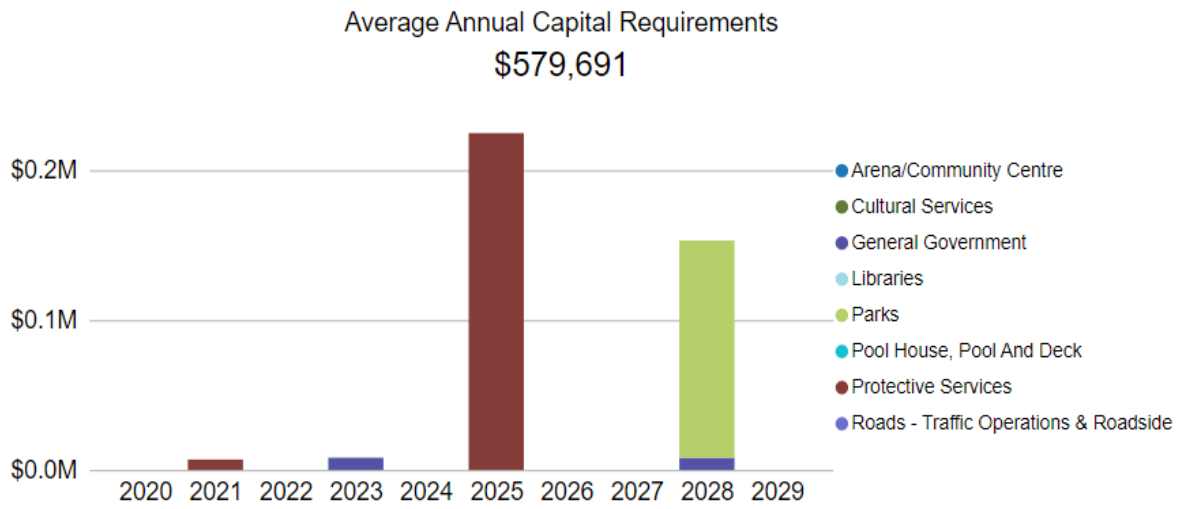
4.4.4 Lifecycle Management Strategy

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	Municipal buildings are subject to regular inspections to identify health & safety requirements as well as structural deficiencies that require additional attention.
	Rehabilitation activities are identified and prioritized based on age, performance, legislative or health and safety related issues, social importance, and available funding.
Replacement	Assessments are completed strategically as buildings approach their end-of-life to determine whether replacement or rehabilitation is appropriate.
	As a supplement to the knowledge and expertise of municipal staff the Municipality works with contractors to complete assessments of the buildings and facilities and address replacement needs.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement 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.

4.4.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. The risk criteria for non-core assets are limited to basic risk

factors including condition and historical cost. More detailed risk matrices should be developed for non-core asset by July 1, 2024. See Appendix C for the risk criteria.

Risk to Current Asset Management Strategies

Organizational Capacity
Both short- and long-term planning requires the regular collection of infrastructure data to support asset management decision-making. Staff find it a continuous challenge to dedicate staff resource time towards data collection to ensure that building components are documented, and condition and asset attribute data is regularly reviewed and updated.

Aging Infrastructure
As municipal buildings continue to age, there are a handful of structures that are approaching their original useful life. There is currently no decision-making process in place to determine how to plan for structures that will require replacement or disposal.

Beyond the structural or age-based deterioration of these assets, there are also challenges regarding the functional deterioration of these assets. As these assets age, they may still be in good working condition, but are no longer meeting the service demands of the community or have outdated technologies within them that need to be addressed. Staff consider both the structural and functional performance of these assets when prioritizing their rehabilitation and/or replacement.

4.4.6 Levels of Service

Buildings & Facilities is considered a non-core asset category. As such, the Municipality 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

Asset Inventory

- The Municipality's asset inventory contains many pooled assets while others are slightly componentized. Buildings consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a component-based inventory of all facilities to allow for component-based lifecycle planning.

Condition Assessment Strategies

- The Municipality should implement regular condition assessments for all facilities to better inform short- and long-term capital requirements. Using a simple condition rating scale, Staff would be able to visually inspect certain elements or components of these buildings and assign them a condition rating to apply instead of relying on an age-based condition.

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 and upgrade risk models for non-core assets by July 1, 2024.
- Update 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 defining and measuring current levels of service that 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 Machinery & Equipment

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

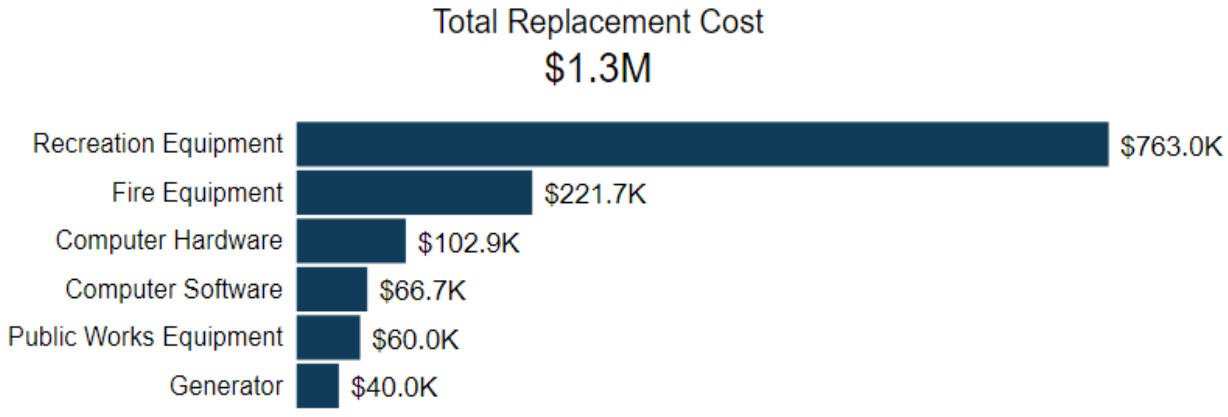
- Computer hardware for municipal staff
- Fire equipment to support the delivery of emergency services
- Machinery and equipment needed to maintain recreational buildings and parks
- Public Works equipment that are required to manage the transportation network.

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

4.5.1 Asset Inventory & Replacement Cost

The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the Municipality's Machinery & Equipment inventory.

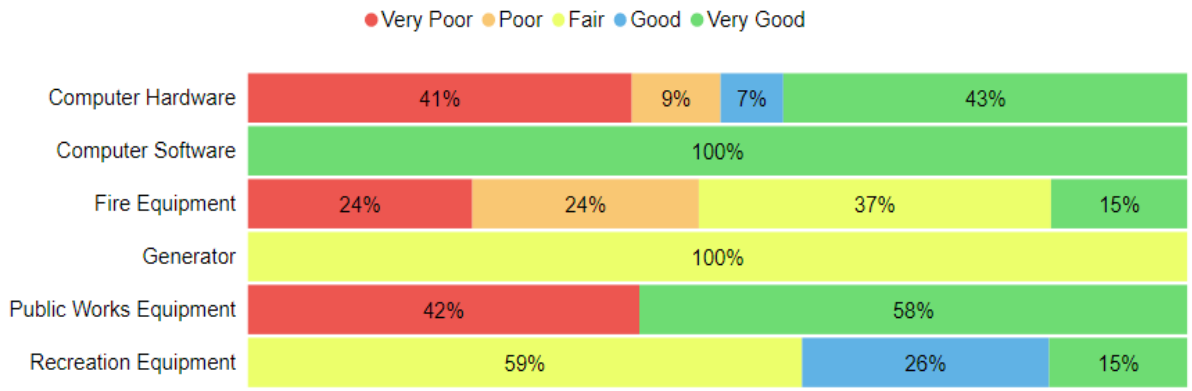
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Computer Hardware	11	CPI Tables	$102,893
Computer Software	1	CPI Tables	$66,749
Fire Equipment	9	67% CPI Tables and 33% User-Defined Cost	$221,676
Generator	1	User-Defined Cost	$40,000
Public Works Equipment	3	User-Defined Cost	$60,000
Recreation Equipment	14	User-Defined Cost	$763,000
			$1,254,318



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
Computer Hardware	48%	Fair	Age-based
Computer Software	95%	Very Good	Age-based
Fire Equipment	42%	Fair	24% Assessed
Generator	55%	Fair	100% Assessed
Public Works Equipment	64%	Good	42% Assessed
Recreation Equipment	58%	Fair	26% Assessed
	56%	**Fair**	**25% Assessed**



To ensure that the Municipality's Machinery & Equipment 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 Machinery & Equipment.

Current Approach to Condition Assessment

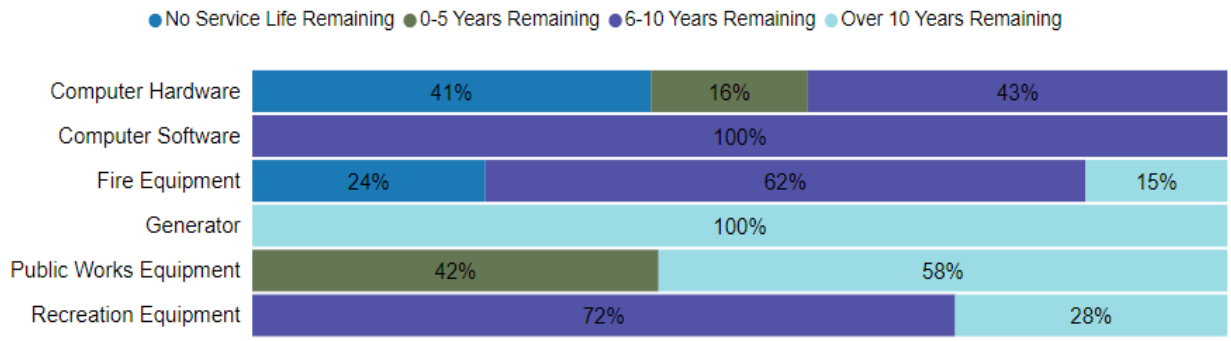
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Staff complete regular visual inspections of their machinery & equipment to ensure they are in a state of adequate repair.
- There are no formal condition assessment programs in place for the full inventory, however, Staff were able to assign most of the assets a cursory condition rating from Very Good to Very Poor based on their current performance and expected replacement schedule.

4.5.3 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)
Computer Hardware	5-10 years	9.9	-4.5
Computer Software	10 years	0.5	9.4
Fire Equipment	10-20 years	8.8	5.8
Generator	20 years	11.5	10.9
Public Works Equipment	10-15 years	5.2	10.3
Recreation Equipment	15-35 years	5.2	12.5
		12.0	**1.4**



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

4.5.4 Lifecycle Management Strategy

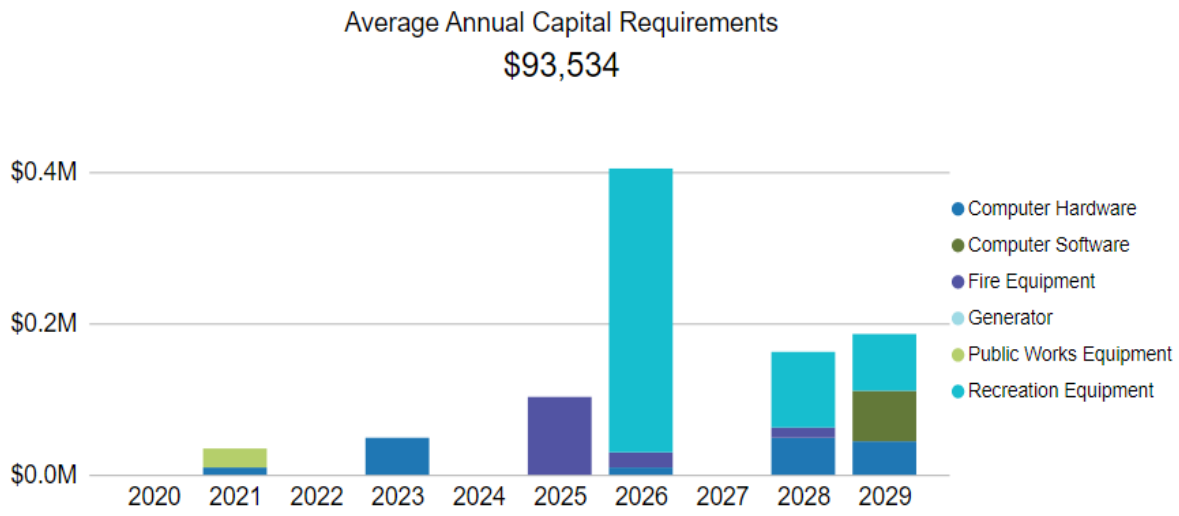
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance/ Rehabilitation	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 graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement 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.

4.5.5 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 risk criteria for non-core assets are limited to basic risk factors including condition and historical cost. More detailed risk matrices should be developed for non-core asset by July 1, 2024. See Appendix C for the criteria used to determine the risk rating of each asset.

4.5.6 Levels of Service

Machinery & Equipment is considered a non-core asset category. As such, the Municipality 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

- A portion of replacement costs used in this AMP are 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 and upgrade risk models for non-core assets by July 1, 2024.
- Update 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 that 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 Vehicles

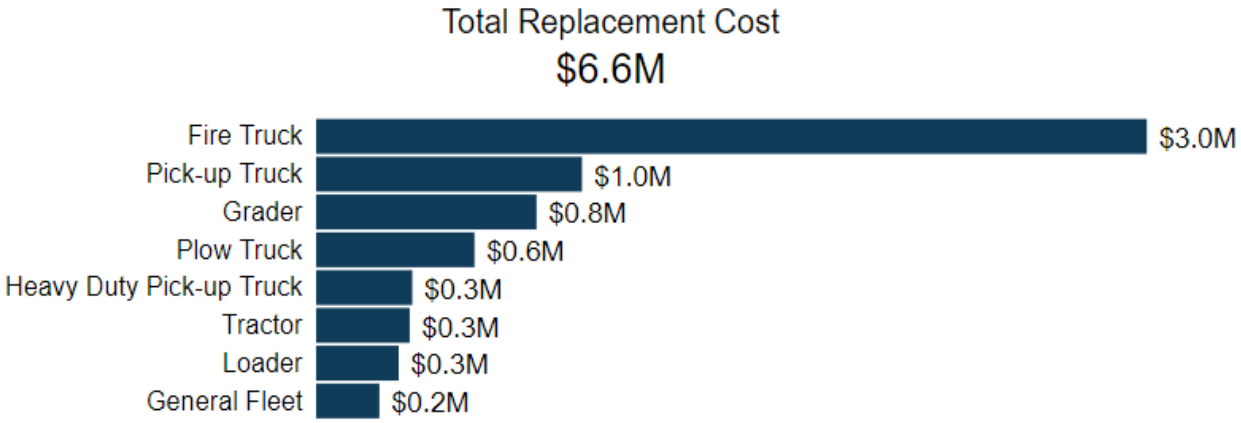
Vehicles allow staff to efficiently deliver municipal services and personnel. Municipal vehicles are used to support several service areas, including:

- Plow trucks for winter control activities
- Fire rescue vehicles to provide emergency services
- Pick-up trucks, graders, and loaders to support the maintenance of the transportation network and address service requests for Environmental Services and Parks & Recreation

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 Municipality's Vehicles.

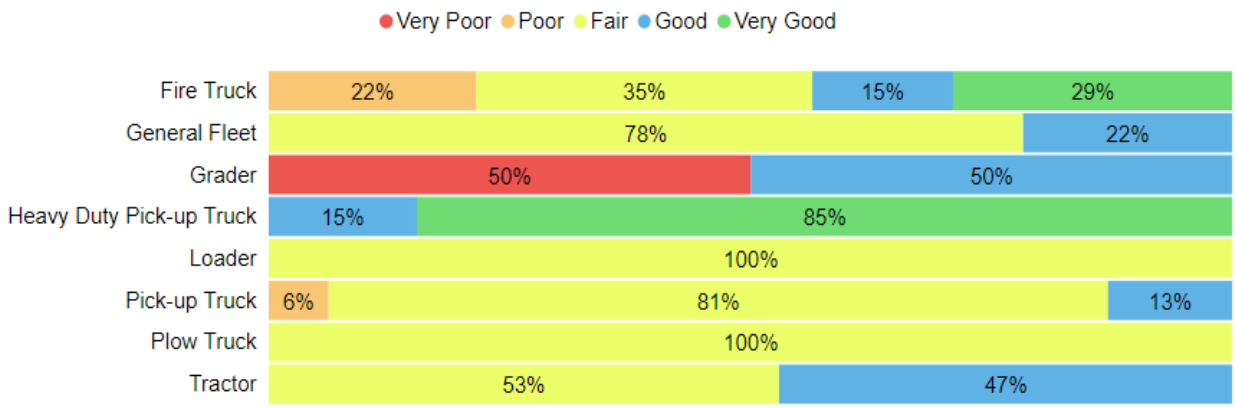
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Fire Truck	7	User-Defined Cost	$3,015,000
General Fleet	7	22% CPI Tables and 78% User-Defined Cost	$229,806
Grader	2	User-Defined Cost	$800,000
Heavy Duty Pick-up Truck	2	CPI Tables	$349,003
Loader	1	User-Defined Cost	$300,000
Pick-up Truck	8	User-Defined Cost	$965,000
Plow Truck	2	User-Defined Cost	$575,000
Tractor	3	11% CPI Tables and 89% User-Defined Cost	$339,855
			$6,573,664



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
Fire Truck	65%	Good	36% Assessed
General Fleet	56%	Fair	74% Assessed
Grader	45%	Fair	50% Assessed
Heavy Duty Pick-up Truck	93%	Very Good	Age-based
Loader	45%	Fair	100% Assessed
Pick-up Truck	54%	Fair	6% Assessed
Plow Truck	58%	Fair	57% Assessed
Tractor	68%	Good	41% Assessed
	61%	**Good**	**51% Assessed**



To ensure that the Municipality's Vehicles 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 Vehicles.

Current Approach to Condition Assessment

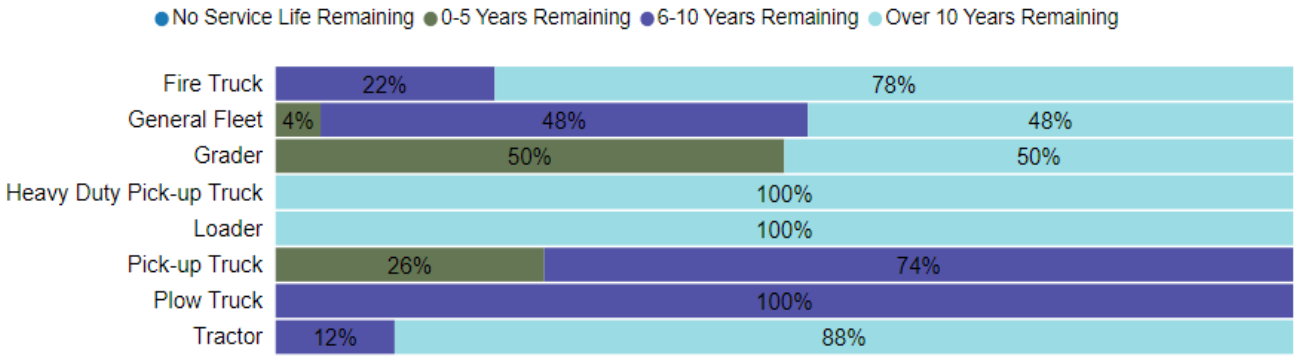
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- A mechanic regularly inspects vehicles to ensure they are in state of adequate repair prior to operation
- Health and safety regulations, such as the National Fire Protection Association (NFPA), are factored in when inspecting fire-related vehicles.

4.6.3 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)
Fire Truck	25-30 years	11.3	18.1
General Fleet	10-30 years	15.9	11.9
Grader	15 years	9.0	6.7
Heavy Duty Pick-up Truck	15 years	2.5	12.5
Loader	25 years	15.5	11.2
Pick-up Truck	8-15 years	7.0	5.4
Plow Truck	15 years	8.0	8.8
Tractor	10-25 years	7.2	12.3
		10.1	**11.2**



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.

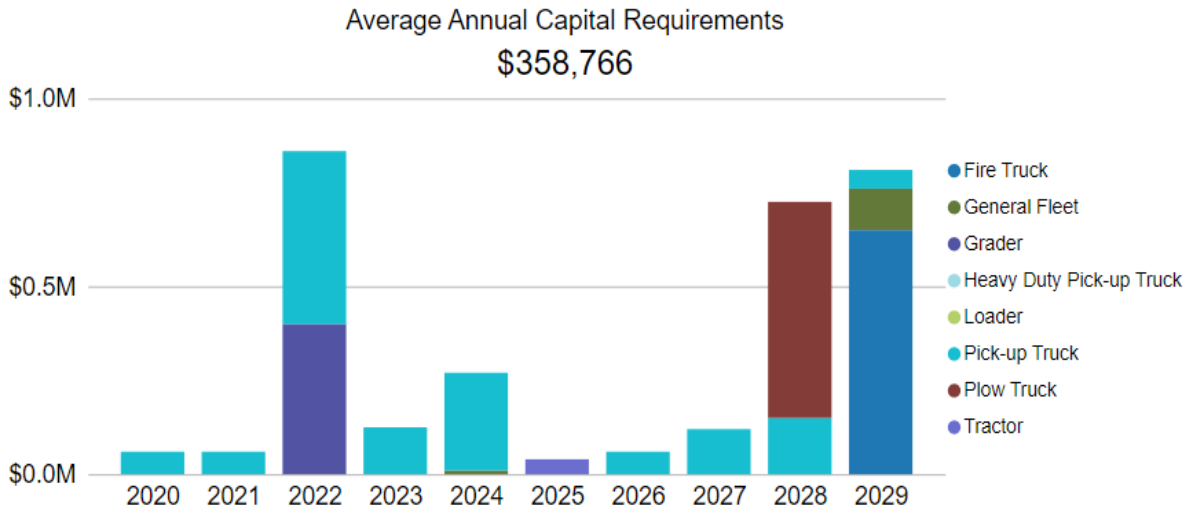
4.6.4 Lifecycle Management Strategy

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
Maintenance / Rehabilitation	Visual inspections completed and documented on a regular basis; Maintenance activities such as oil changes or tire rotations are completed as required.
Replacement	Vehicle age, mileage, repair costs and performance are taken into consideration when determining appropriate treatment options. Staff try to maximize the service life of vehicles, where possible.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement 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.

4.6.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. The risk criteria for non-core assets are limited to basic risk factors including condition and historical cost. More detailed risk matrices should be developed for non-core asset by July 1, 2024. See Appendix C for the criteria used to determine the risk rating of each asset.

Risk to Current Asset Management Strategies

Aging Infrastructure & Capital Funding
As municipal vehicles continue to age, there are a handful of assets that are approaching their original useful life. Accumulating enough funding in capital reserves to proactively rehabilitate or replace vehicles can be challenging.

4.6.6 Levels of Service

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

4.6.7 Recommendations

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk vehicles.
- 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 and upgrade risk models for non-core assets by July 1, 2024.
- Update risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Begin measuring current levels of service in accordance with the metrics that the Municipality would like to track for their vehicles.
- 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 Land Improvements

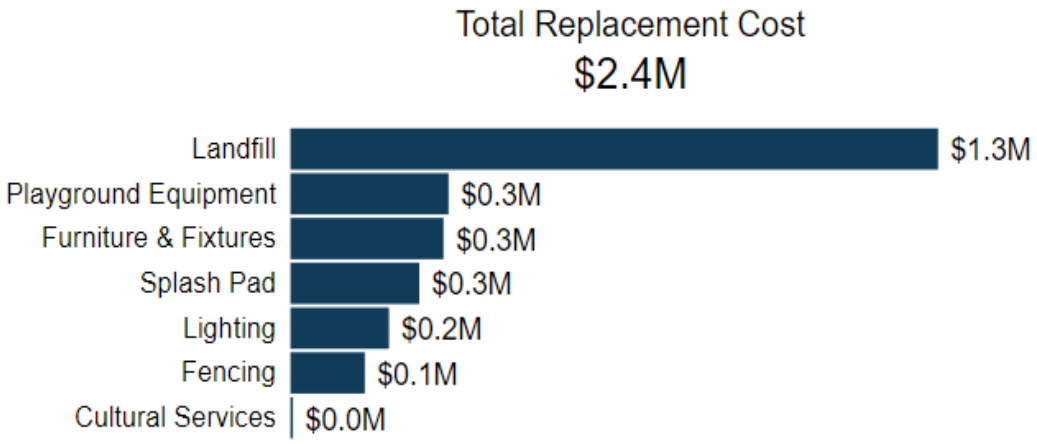
The Municipality of Southwest Middlesex owns a small number of assets that are considered Land Improvements. This category includes:

- Playground equipment, benches, and bleachers
- Fencing, lighting, and solar panels
- Miscellaneous landscaping and other assets

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 Land Improvements inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Cultural Services[9]	1	CPI Tables	$5,570
Fencing	1	CPI Tables	$144,634
Furniture & Fixtures	8	CPI Tables	$296,893
Landfills	4	37% CPI Tables and 63% User-Defined Cost	$1,254,155
Lighting	1	CPI Tables	$191,379
Playground Equipment	7	User-Defined Cost	$306,718
Splash Pad	1	User-Defined Cost	$250,000
			$2,449,349

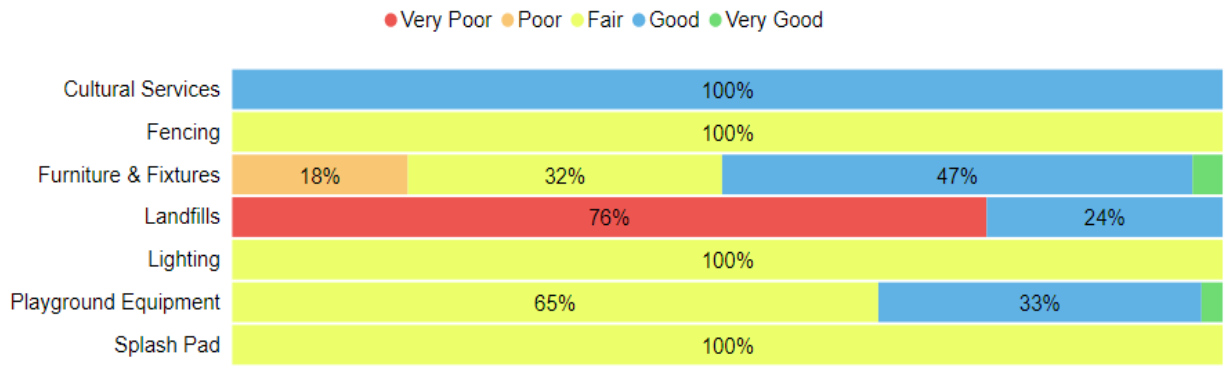


[9] Caboose asset

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
Cultural Services	71%	Good	Age-based
Fencing	50%	Fair	100% Assessed
Furniture & Fixtures	57%	Fair	27% Assessed
Landfills	16%	Very Poor	Age-based
Lighting	45%	Fair	100% Assessed
Playground Equipment	56%	Fair	49% Assessed
Splash Pad	60%	Good	100% Assessed
	35%	**Poor**	**33% Assessed**



To ensure that the Municipality's Land Improvements 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 Land Improvements.

Current Approach to Condition Assessment

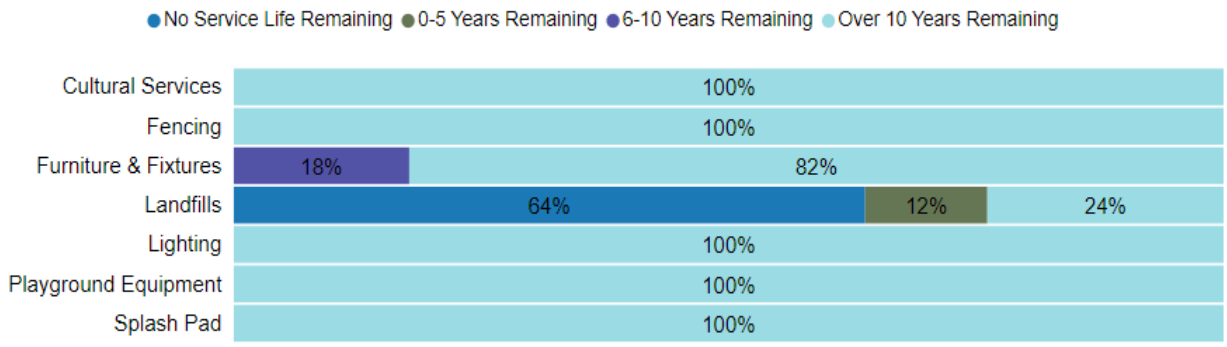
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Staff complete regular visual inspections of land improvements assets in accordance to ensure they are in state of adequate repair. Any health and safety issues are prioritized, where appropriate.
- There are no formal condition assessment programs in place for land improvement assets.
- Playgrounds are not currently inspected by a CSA certified inspector; however, Staff would like to have their internal staff trained to do these inspections themselves in future years instead of contracting out the work.

4.7.3 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)
Cultural Services	60 years	17.5	42.5
Fencing	30 years	29.5	14.9
Furniture & Fixtures	15-25 years	11.9	12.3
Landfills	50 years	34.3	15.8
Lighting	30 years	19.5	13.4
Playground Equipment	25-30 years	13.3	15.4
Splash Pad	20 years	8.4	11.9
		17.4	**15.6**



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

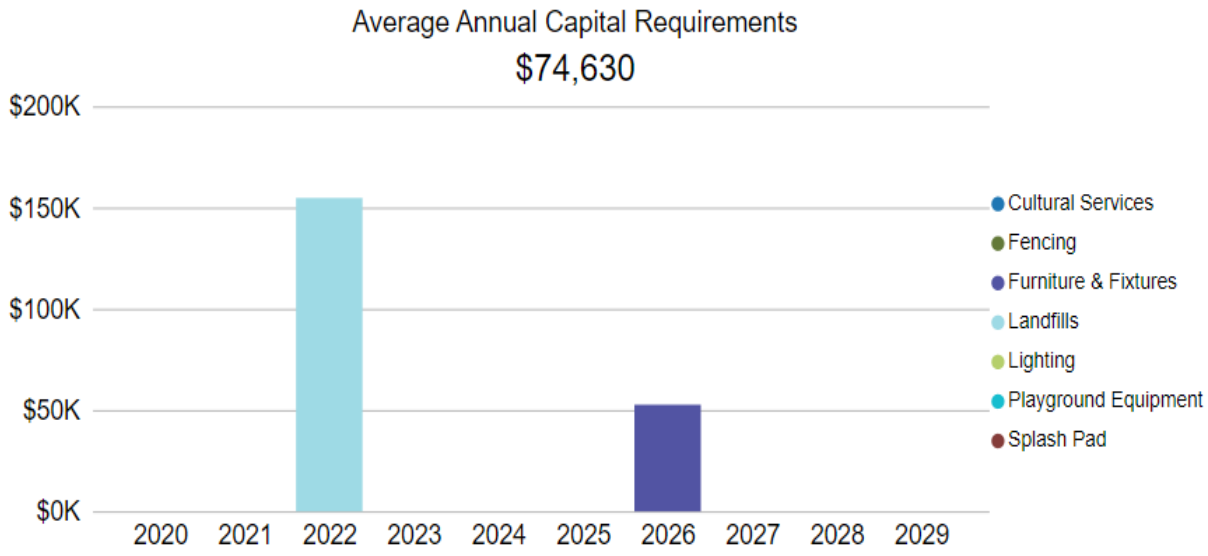
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenanace, Rehabilitation & Replacement	The Land Improvements asset category includes several unique asset types and lifecycle requirements are dealt with on a case-by-case basis. Many of these assets rely on age-based condition, and in most cases, that is a fairly reliable indicator of the quality and performance of the asset. Staff also consider public complaints and the criticality of the assets when prioritizing their rehabilitation or replacement.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement 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

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. The risk criteria for non-core assets are limited to basic risk factors including condition and historical cost. More detailed risk matrices should be developed

for non-core asset by July 1, 2024. See Appendix C for the criteria used to determine the risk rating of each asset.

4.7.6 Levels of Service

Land Improvements are considered a non-core asset category. As such, the Municipality has until July 1, 2024, to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

4.7.7 Recommendations

Replacement Costs

- A portion of replacement costs used in this AMP are 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.

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 and upgrade risk models for non-core assets by July 1, 2024.
- Update 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 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 $83.4 million
- 90% of rate-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately $1.1 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

5.1 Water Network

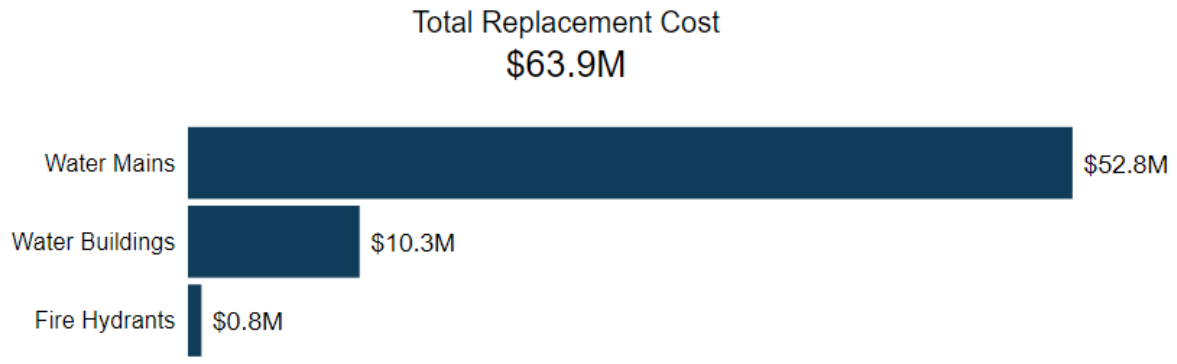
The Municipality's water network consists of watermains, valves, fire hydrants, reservoir, treatment plant, booster and bulk water stations, and water tower and standpipes. The water services provided by the Municipality are overseen by Ontario Clean Water Agency (OCWA). This includes the Village of Glencoe, Appin, Melbourne and Wardsville and all rural water mains.

The Tri-County Water Board System is jointly owned by the Municipalities of West Elgin, Dutton-Dunwich, Chatham-Kent, Southwest Middlesex, and the Village of Newbury, and a joint municipal service board governs the management of the system. The system provides water to the five municipalities, including the Municipality of Southwest Middlesex. The Municipality of Southwest Middlesex is responsible for approximately 25% of the Tri-County Water System as a result of investment in the system. The Board will be developing an asset management plan of their own, complete with a financial plan that incorporates the municipalities' financial proportional responsibilities

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 Municipality's Water Network inventory.

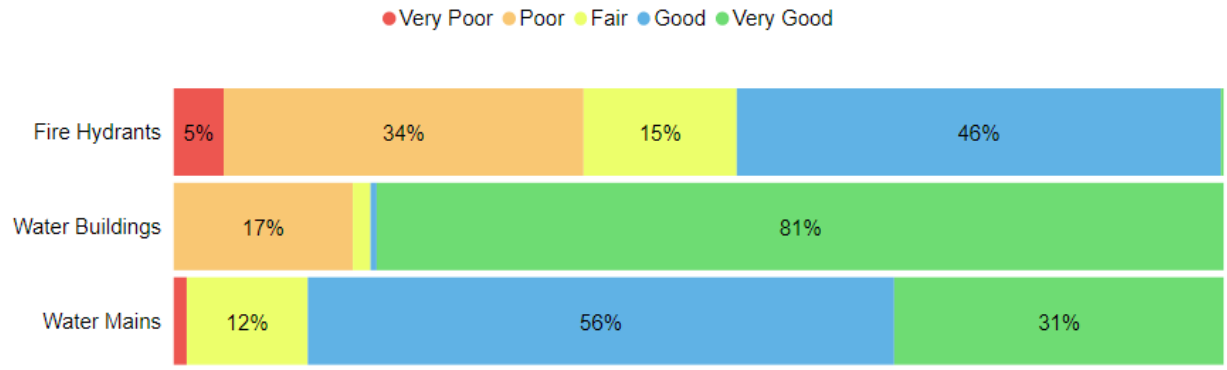
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Fire Hydrants	161	CPI Tables	$815,978
Water Buildings	8	CPI Tables	$10,259,152
Water Mains	112,934 m	User-Defined Cost	$52,831,780
			$63,906,910



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
Fire Hydrants	54%	Fair	Age-based
Water Buildings	76%	Good	Age-based
Water Mains	71%	Good	Age-based
	71%	**Good**	**Age-based**



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

Current Approach to Condition Assessment

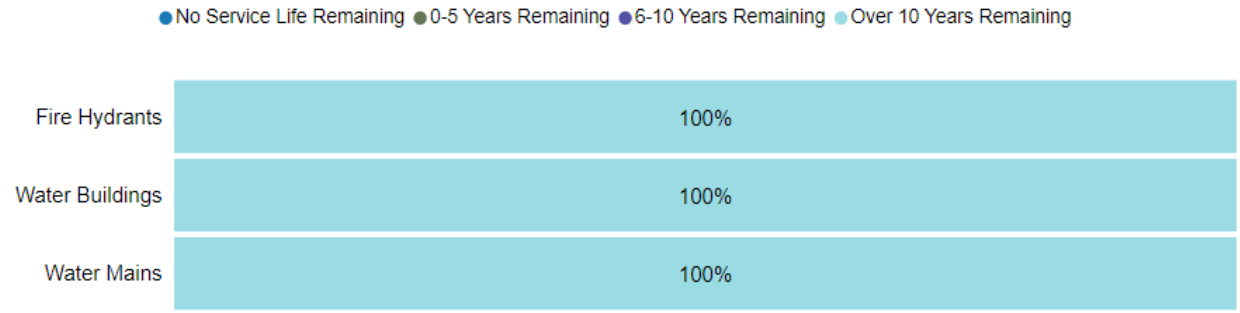
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Municipal staff primarily rely on a combination of age, material, and break history of water mains to determine the projected condition.
- OCWA manages and maintains the distribution system as well as water buildings as part of their agreement with the Municipality.
- Vertical assets such as the booster stations or treatment plant are inspected on a regular basis according to pertinent regulations such as O.Reg. 170/03 and the Clean Water Act.

5.1.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Water Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. 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)
Fire Hydrants	60 years	30.3	29.8
Water Buildings	60 years	29.4	30.6
Water Mains	60-100 years	30.6	65.9
		30.5	**54.3**



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

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	Routine flushing and valve exercising occurs in the spring and fall along with monthly flushing of dead end watermains in order to maintain adequate residuals throughout the distribution system. Chlorine residuals are monitored by continious analyzers at three various lcatoins within the Municipality.
	Periodic pressure testing and colour coding is completed to identify deficiencies and potential leaks on problem areas by OCWA.
Rehabilitation & Replacement	Trenchless re-lining of water mains may be completed for viable candidates when possible; especially in the case of looping a watermain section.
	OCWA develops a 6-year capital plan that identifies capital and significant operating costs for rehabilitation and/or replacement, in accordance with O.Reg. 453/07.

Forecasted Capital Requirements

The Municipality's water network is not expected to require capital funding in the next 10 years based on the current asset inventory and componentization available. However, OCWA's forecast has identified some capital costs that may be undertaken. These costs are related to specific assets and components that are not currently inventoried in the CityWide database. Appendix A captures these costs. As staff continue to refine and componentize their water network, these capital forecasts will be integrated into the system.

5.1.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Risk to Current Asset Management Strategies

Asset Data & Information

There is room for improvement when it comes to adding more detail to the available inventory and condition data for water assets. This information can be obtained from OCWA and uploaded into Citywide on a regular basis. That way, there will be more cohesion with the financial forecasts that OCWA develops for the Municipality.

Capital Funding Strategies

Major capital rehabilitation projects for water network assets are entirely dependant on the availability of grant funding opportunities. Replacement and rehabilitation of underground water assets must be coordinated with above ground assets, which can be costly. When grants are not available, infrastructure projects may be deferred. Developing an annual capital funding strategy could reduce dependency on grant funding and help prevent deferral of capital works.

5.1.6 Levels of Service

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

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	See Appendix B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix B
Reliability	Description of boil water advisories and service interruptions	N/A

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties connected to the municipal water system	88%
	% of properties where fire flow is available	~100%[10]
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0
Performance	Capital re-investment rate	0.48%

[10] Adequate flowrate and pressure was assumed present at any fire hydrant nearby a property.

5.1.7 Recommendations

Asset Inventory

- There are a number of water buildings that require further segmentation. Buildings consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a component-based inventory of all water buildings to allow for component-based lifecycle planning.
- Inventory point assets such as valves and upload into database for a more complete water network.

Condition Assessment Strategies

- Integrate condition assessments and ratings from OCWA into the CityWide database.

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 Strategies

- Incorporate lifecycle strategies identified by OCWA through their forecast plan, where possible.

Levels of Service

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

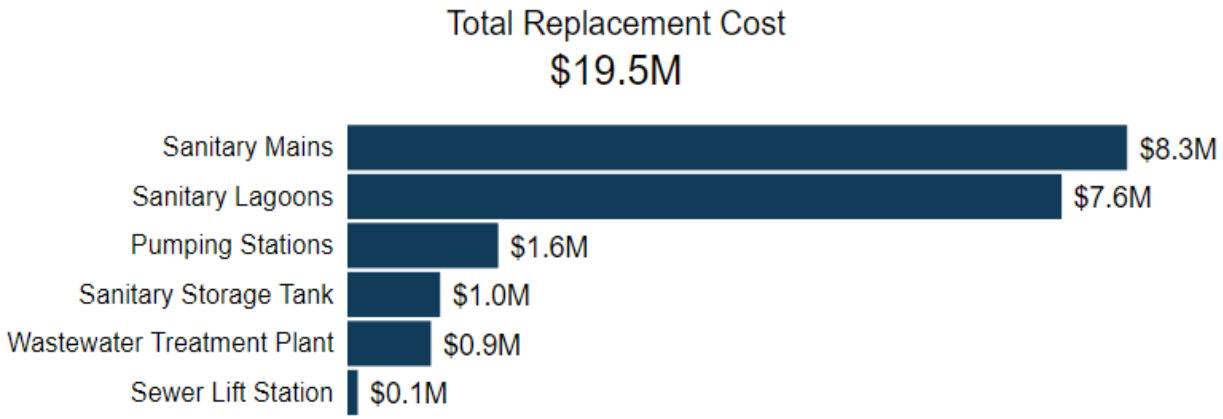
5.2 Sanitary Network

The Municipality maintains a multitude of assets such as sanitary mains, treatment plants, lagoons, and other vertical assets. Although not inventoried, the Municipality also has point assets, such as manholes, that it maintains. OCWA operates the Glencoe Sanitary Sewer System and the Wardsville Sanitary Sewer System.

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 Municipality's Sanitary Network inventory.

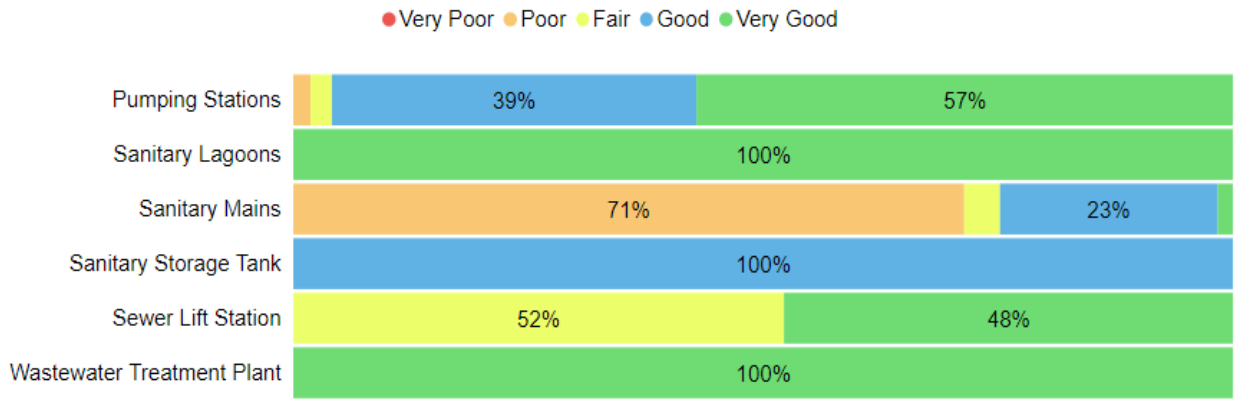
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Pumping Stations	6	CPI Tables	$1,604,625
Sanitary Lagoons	3	CPI Tables	$7,591,198
Sanitary Mains	29,621 Length (m)	User-Defined Cost	$8,287,287
Sanitary Storage Tank	7	CPI Tables	$987,307
Sewer Lift Station	2	CPI Tables	$111,923
Wastewater Treatment Plant	8	CPI Tables	$889,757
			$19,472,097



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
Pumping Stations	76%	Good	Age-based
Sanitary Lagoons	85%	Very Good	Age-based
Sanitary Mains	44%	Fair	Age-based
Sanitary Storage Tank	68%	Good	Age-based
Sewer Lift Station	68%	Good	Age-based
Wastewater Treatment Plant	92%	Very Good	Age-based
	66%	**Fair**	**Age-based**



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

Current Approach to Condition Assessment

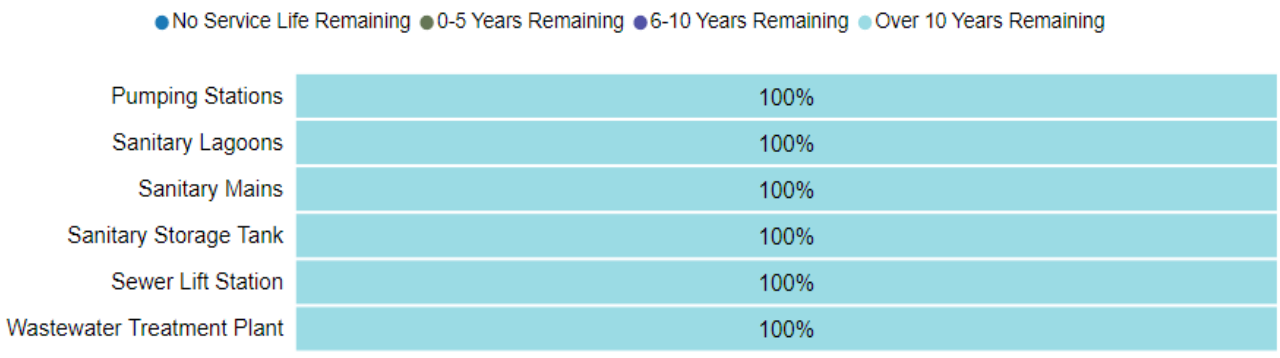
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- OCWA inspects and assesses the condition and performance of the collection system and vertical assets.
- No formal CCTV inspection programs are in place to inspect the sanitary mains. It is done on an as needed basis.

5.2.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Sanitary 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)
Pumping Stations	60 years	22.5	37.5
Sanitary Lagoons	50 years	5.5	44.5
Sanitary Mains	60-100 years	37.0	36.0
Sanitary Storage Tank	15 years	19.5	40.5
Sewer Lift Station	60 years	18.5	41.5
Wastewater Treatment Plant	15-60 years	1.5	19.2
		34.8	**35.8**



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

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

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

Activity Type	Description of Current Strategy
Maintenance	Flushing is completed on the network as required by OCWA.
	CCTV inspections are performed on sewer mains as necessary for capital replacements or to assess trouble areas. Effluent discharge from the treatment plants is sampled on a weekly basis following Environmental Compliance Approval (ECA) requirements.
Rehabilitation /Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life. None of the Municipality's mains are older than 1972, with an average useful life of 60 years. Staff have focused on replacing any metallic piping with PVC, where applicable.
	Sanitary infrastructure is typically the highest priority among sub-surface infrastructure and tends to drive forward priorities for both water and storm sewer infrastructure with the goal of achieving cost savings through project coordination. Repair and replacement strategies are recommended by OCWA based on severity and criticality of the assets and regulatory requirements.

Forecasted Capital Requirements

The Municipality's water network is not expected to require capital funding in next 10 years. The Municipality will not likely need to allocate capital budget towards funding major rehabilitation and replacement for the water network in the short-term future.

5.2.5 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2019 inventory data. 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 the Municipality's current level of service for Sanitary 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 Sanitary Network.

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	See Appendix B
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	The Municipality does not own any combined sewers
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	The Municipality does not own any combined sewers
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter into sanitary sewers due to cracks in sanitary mains or through indirect connections (e.g. weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed capacity. In some cases, this can cause water and/or sewage to overflow backup into homes. the disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits directing storm water to the storm drain system can help to reduce the chance of this occurring.

Service Attribute	Qualitative Description	Current LOS (2019)
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	The municipality follows a series of design standards that integrate servicing requirements and land use considerations when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties connected to the municipal wastewater system	75%
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	N/A
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0
Performance	Capital re-investment rate	0.24%

5.2.7 Recommendations

Asset Inventory

- There are a number of buildings including pumping stations, lift stations, and treatment plants that require further segmentation. Buildings consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a component-based inventory of all water buildings to allow for component-based lifecycle planning.
- Point assets such as manholes should be inventoried and uploaded into CityWide to improve the completeness of the sanitary network.

Condition Assessment Strategies

- Conduct CCTV sewer inspections for the entire sewer network to develop a baseline for all linear assets. These condition assessments will improve the dependability of the risk matrices and subsequent lifecycle strategies.

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

- A trenchless re-lining strategy is expected to extend the service life of sanitary mains at a lower total cost of ownership and should be implemented to extend the life of infrastructure at the lowest total cost of ownership.
- Evaluate the efficacy of the 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 mandated by O.Reg. 588/17. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

6 Impacts of Growth

Key Insights

- Understanding the key drivers of growth and demand will allow the Municipality to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure
- The costs related to growth and evolving demand should be considered in long-term funding strategies that are designed to maintain the current level of service

6.1 Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the 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 Southwest Middlesex Official Plan (2007)

The Municipality of Southwest Middlesex's Official Plan was adopted by Council on the 19th of December 2007. The plan was then modified and approved by the County of Middlesex on the 8th of December 2008. The Official Plan was last consolidated in June of 2019.

The objective of Southwest Middlesex's Official Plan is to provide general guidance for growth and development until 2026. The plan provides the following population history and projections:

	2011	2016	2026
Historical & Forecast Total Population	5,890	5,723	5,885

In 2019, the Municipality developed an Economic Development Strategy. One of the Municipality's strategic priorities is "economic vitality with a focus on planning for marketing and developing assets for continuing economic growth." The Strategy explores population growth projections and opportunities for economic growth. Southwest Middlesex has a labour force of approximately 3,089 and a very low unemployment rate (3.5%) compared to the provincial average (5.8%). The Strategy identifies long-term employment growth as a primary goal of the Municipality and plans to conduct an Employment Land Assessment Study to explore development opportunities with underutilized lands.

The Strategy also notes a current population of approximately 5,800 (2019). The population in Southwest Middlesex has been steadily declining over the last 15 years, the Strategy projects a decline of 2.2% in the next five years (2019-2024). The Official Plan, in conjunction with the Economic Development Strategy, indicates that Southwest Middlesex's population growth will continue to steadily decline in the coming years.

6.1.2 County of Middlesex Official Plan (2006)

The County of Middlesex's Official Plan was adopted by the County Council on September 9th of 1997. The Official Plan was amended and consolidated on July 11th of 2006. The County is currently reviewing the Official Plan and has released updated population and housing projections based on 2016 census population information.

The County is projecting population growth between 2016 and 2046 to range from 0.9% and 1.5% and housing growth to range from 1.3% to 1.9%. According to the County, the Municipality of Southwest Middlesex may experience mild population growth and potential decline between 2016 and 2046. The following table provides a summary of low and high growth scenarios.

	2016 (historical)	2021	2036	2046
Population Projections (low growth scenerio)	5,700	5,700	5,900	5,900
Population Projections (high growth scenerio)	5,700	5,780	6,480	6,370
Housing Projections (low growth scenerio)	2,360	2,400	2,690	2,800
Housing Projections (high growth scenerio)	2,360	2,400	2,950	3,060

6.2 Impact of Growth on Lifecycle Activities

By July 1, 2025, the Municipality'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.

As the municipality's population is expected to remain the same with potential moderate increases and declines in the coming years, demand will evolve, and it is likely that funding will need to be reprioritized. As growth-related assets are constructed, retired, or acquired, they should be integrated into the AMP. Furthermore, the municipality will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

7 Financial Strategy

Key Insights

- The Municipality is committing approximately $1.5 million towards capital projects per year from sustainable revenue sources
- Given the annual capital requirement of $4.3 million, there is currently a funding gap of $2.8 million annually
- For tax-funded assets, we recommend increasing tax revenues by 1.8% each year for the next 20 years to achieve a sustainable level of funding
- For rate-funded assets, we recommend increasing rate revenues each year for the next 10 years by 2.0% for the Water Network and 1.7% for the Sanitary Network to achieve a sustainable level of funding

7.1 Financial Strategy Overview

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

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

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

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

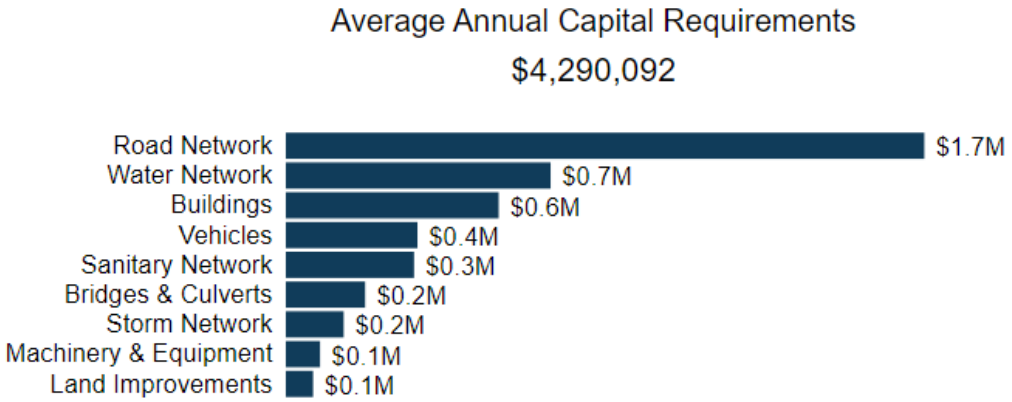
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Municipality's approach to the following:

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

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the 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 $4,290,092 annually to address capital requirements for the assets included in this AMP.



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

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

1. **Replacement Only Scenario**: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.

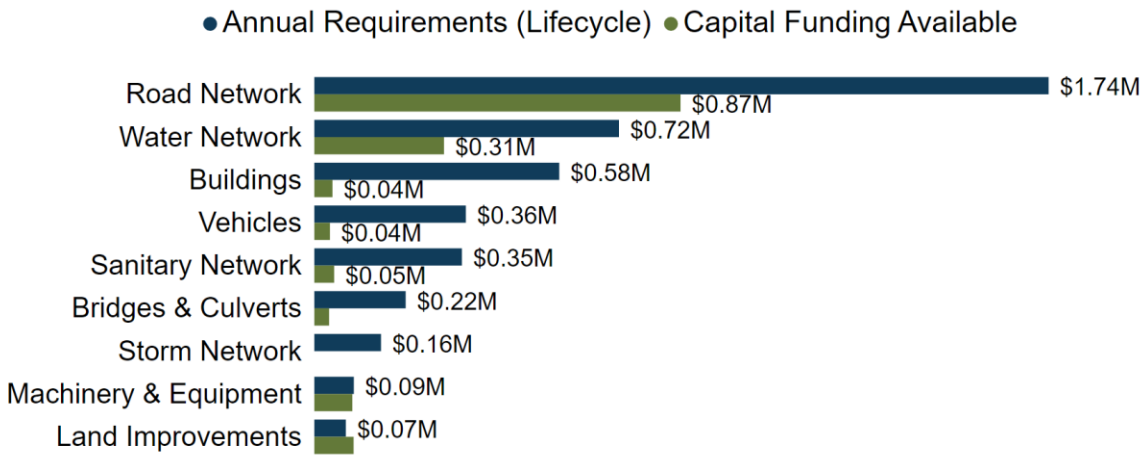
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	$2,080,000	$1,738,000	$341,000

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of $341,000 for the Road Network. This represents an overall reduction of the annual requirements for roads by 16%. 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, the Municipality is committing approximately $1,519,000 towards capital projects per year. Given the annual capital requirement of $4,290,000, there is currently a funding gap of $2,771,092 million annually.



7.2 Funding Objective

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

1. **Tax Funded Assets:** Road Network, Stormwater Network, Bridges & Culverts, Buildings, Machinery & Equipment, Land Improvements, Vehicles
2. **Rate-Funded Assets:** Water Network, Sanitary Network

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

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

7.3 Financial Profile: Tax Funded Assets

7.3.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Taxes	Gas Tax	OCIF	Total Available	
Bridges & Culverts	216,000	35,000	0	0	35,000	181,000
Buildings	580,000	43,000	0	0	43,000	537,000
Land Improvements	75,000	93,000	0	0	93,000	-18,000
Machinery & Equipment	94,000	90,000	0	0	90,000	4,000
Road Network	1,738,000	93,000	364,000	410,000	867,000	871,000
Storm Network	158,000	0	0	0	0	158,000
Vehicles	359,000	37,000	0	0	37,000	322,000
	3,220,000	**391,000**	**364,000**	**410,000**	**1,165,000**	**2,054,000**

The average annual CapEx requirement for the above categories is $3.22 million. Annual revenue currently allocated to these assets for capital purposes is $1.17 million leaving an annual deficit of $2.05 million. Put differently, these infrastructure categories are currently funded at 36% of their long-term requirements.

7.3.2 Full Funding Requirements

In 2019, Municipality of Southwest Middlesex has annual tax revenues of $5.39 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:

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

Asset Category	Tax Change Required for Full Funding
Bridges & Culverts	3.4%
Buildings	10.0%
Land Improvements	-0.3%
Machinery & Equipment	0.1%
Road Network	16.2%
Storm Network	2.9%
Vehicles	6.0%
	38.3%

a) Southwest Middlesex's formula based OCIF grant is scheduled to grow from $410,000 in 2019 to $414,000 in 2020.
b) Southwest Middlesex's debt payments for these asset categories will be increasing by $29,000 over the next 5 years and decreasing by $67,000 over the next 10 years. Debt payment decreases will be $50,000 and $171,000 over the next 15 and 20 years respectively.

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

	Without Capturing Changes				With Capturing Changes			
	5 Years	**10 Years**	**15 Years**	**20 Years**	**5 Years**	**10 Years**	**15 Years**	**20 Years**
Infrastructure Deficit	2,054,413	2,054,413	2,054,413	2,054,413	2,054,413	2,054,413	2,054,413	2,054,413
Change in Debt Costs	N/A	N/A	N/A	N/A	29,000	-67,000	-50,000	-171,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	0	0	0	0
Resulting Infrastructure Deficit:	2,054,413	2,054,413	2,054,413	2,054,413	2,083,413	1,987,413	2,004,413	1,883,413
Tax Increase Required	38.1%	38.1%	38.1%	38.1%	38.7%	36.9%	37.2%	35.0%
Annually:	7.6%	3.8%	2.5%	1.9%	7.7%	3.7%	2.5%	1.8%

7.3.3 Financial Strategy Recommendations

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

a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
b) increasing tax revenue by 1.8% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax and OCIF revenue as outlined previously.
d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable, since this funding is a multi-year commitment[11].
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full CapEx funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $11.7 million for the Road Network, $2.7 million for the Buildings, $95 thousand for Machinery & Equipment, and $800 thousand for Land Improvements.

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

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

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Oper	OCIF	Total Available	
Water Network	721,000	1,477,000	-1,170,000	0	307,000	414,000
Sanitary Network	349,000	848,000	-801,000	0	47,000	302,000
	1,070,000	**2,325,000**	**-1,971,000**	**0**	**354,000**	**716,000**

The average annual CapEx requirement for the above categories is $1.07 million. Annual revenue currently allocated to these assets for capital purposes is $354 thousand leaving an annual deficit of $716 thousand. Put differently, these infrastructure categories are currently funded at 33% of their long-term requirements.

7.4.2 Full Funding Requirements

In 2019, Southwest Middlesex had annual sanitary revenues of $848 thousand and annual water revenues of $1.48 million. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Tax Change Required for Full Funding
Water Network	28%
Sanitary Network	35.7%

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

Without Capturing Debt Cost Changes								
	Water Network				Sanitary Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	414,260	414,260	414,260	414,260	302,282	302,282	302,282	302,282
Tax Increase Required	28.0%	28.0%	28.0%	28.0%	35.6%	35.6%	35.6%	35.6%
Annually:	**5.6%**	**2.8%**	**1.9%**	**1.4%**	**7.1%**	**3.6%**	**2.4%**	**1.8%**

With Capturing Debt Cost Changes								
	Water Network				Sanitary Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	414,260	414,260	414,260	414,260	302,282	302,282	302,282	302,282
Less: Decrease in debt payments	-125,000	-125,000	-125,000	-125,000	-155,000	-155,000	-155,000	-155,000
Net deficit	289,260	289,260	289,260	289,260	147,282	147,282	147,282	147,282
Tax Increase Required	19.6%	19.6%	19.6%	19.6%	17.4%	17.4%	17.4%	17.4%
Annually:	**3.9%**	**2.0%**	**1.3%**	**1.0%**	**3.5%**	**1.7%**	**1.2%**	**0.9%**

7.4.3 Financial Strategy Recommendations

Considering the above information, we recommend the 10-year option that includes debt cost reallocations. This involves full CapEx funding being achieved over 10 years by:

a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
b) increasing rate revenues by 2.0% for the Water Network and 1.7% for the Sanitary Network each year for the next 10 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

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

Although this strategy achieves full CapEx funding for rate-funded assets in 10 years, the recommendation does require prioritizing capital projects to fit the annual funding available. Current data shows no pent-up investment demand for the Water and Sanitary Network.

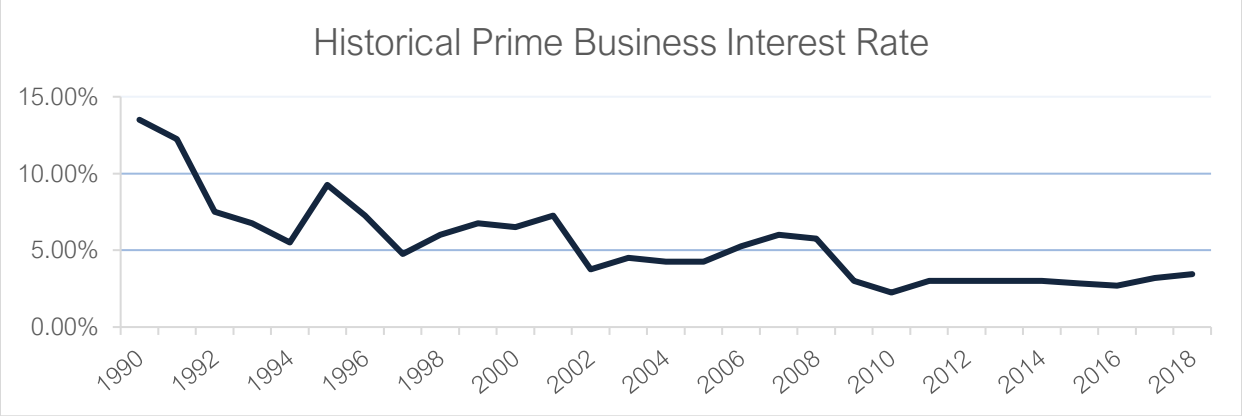
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

1.6 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1 million project financed at 3.0%[12] over 15 years would result in a 26% premium or $260,000 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:



[12] 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 Southwest Middlesex has historically used debt for investing in the asset categories as listed. There is currently $6,339,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $642,000, well within its provincially prescribed maximum of $1,640,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2015	2016	2017	2018	2019
Bridges & Culverts	0	0	0	0	0	0
Buildings	1,911,000	0	0	2,068,000	0	0
Land Improvements	245,000	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Road Network	0	0	0	0	0	0
Storm Network	0	0	0	0	0	0
Vehicles	733,000	0	0	771,000	114,000	0
Total Tax Funded:	**2,889,000**	**0**	**0**	**0**	**0**	**0**
Water Network	251,000	0	0	0	0	0
Sanitary Sewer Network	310,000	0	0	0	0	0
Total Rate Funded:	**561,000**	**0**	**0**	**0**	**0**	**0**

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2019	2020	2021	2022	2023	2024	2029
Bridges & Culverts	0	0	0	0	0	0	0
Buildings	79,000	82,000	84,000	87,000	89,000	92,000	107,000
Land Improvements	18,000	18,000	19,000	19,000	20,000	21,000	7,000
Machinery & Equipment	0	0	0	0	0	0	0
Road Network	0	0	0	0	0	0	0
Storm Network	0	0	0	0	0	0	0
Vehicles	84,000	87,000	89,000	92,000	95,000	97,000	0
Total Tax Funded:	**181,000**	**187,000**	**192,000**	**198,000**	**204,000**	**210,000**	**114,000**
Water Network	125,000	125,000	125,000	0	0	0	0
Sanitary Sewer Network	155,000	155,000	155,000	0	0	0	0
Total Rate Funded:	**280,00**	**280,000**	**280,000**	**0**	**0**	**0**	**0**

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

7.7 Use of Reserves

7.7.1 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 Southwest Middlesex.

Asset Category	Balance at December 31, 2019
Bridges & Culverts	574,000
Buildings	900,000
Land Improvements	198,000
Machinery & Equipment	480,000
Road Network	485,000
Storm Network	166,000
Vehicles	79,000
Total Tax Funded:	**2,882,000**
Water Network	2,396,000
Sanitary Sewer Network	102,000
Total Rate Funded:	**2,498,000**

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 consider when determining their capital reserve requirements include:

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

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Southwest Middlesex '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.

7.7.2 Recommendation

In 2025, Ontario Regulation 588/17 will require the Municipality Southwest Middlesex to integrate proposed levels of service for all asset categories in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

8 Appendices

Key Insights

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

Appendix A: 10-Year Capital Requirements

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

Road Network

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Concrete Roads	$4,709,426	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hot Mix Roads	$6,148,712	$1,013,485	$216,495	$107,432	$482,460	$50,065	$2,870,626	$120,500	$1,142,599	$160,862	$0
Sidewalks	$43,135	$52,292	$0	$0	$0	$0	$0	$0	$0	$0	$0
Streetlights	$101,950	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tar & Chip Roads	$1,808,856	$0	$0	$1,079,760	$51,738	$562,645	$6,020	$1,190,862	$0	$0	$1,050,520
Total:	$11,663,899	$1,065,776	$216,495	$1,187,192	$751,663	$637,601	$2,671,014	$986,561	$288,077	$1,303,461	$1,050,520

Bridges & Culverts

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Stormwater Network

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Storm Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Buildings											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Arena/Community Centre	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cultural Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
General Government	$8,242	$0	$0	$0	$0	$0	$8,242	$0	$0	$0	$0
Libraries	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Parks	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$145,000	$0
Pool House, Pool And Deck	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Protective Services	$2,500,000	$0	$7,002	$0	$0	$0	$224,861	$0	$0	$0	$0
Roads - Traffic Operations & Roadside	$100,044	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$2,733,286	**$0**	**$7,002**	**$0**	**$0**	**$0**	**$233,103**	**$0**	**$0**	**$145,000**	**$0**

Machinery & Equipment											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Computer Hardware	$42,052	$0	$9,705	$0	$6,865	$0	$42,052	$9,705	$0	$6,865	$44,271
Computer Software	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$66,749
Fire Equipment	$53,000	$0	$0	$0	$0	$0	$102,889	$20,000	$0	$13,531	$0
Generator	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Public Works Equipment	$0	$0	$25,000	$0	$0	$0	$0	$0	$0	$0	$0
Recreation Equipment	$0	$0	$0	$0	$0	$0	$0	$375,000	$0	$100,000	$75,000
Computer Hardware	$42,052	$0	$9,705	$0	$6,865	$0	$42,052	$9,705	$0	$6,865	$44,271
	$95,052	**$0**	**$34,705**	**$0**	**$6,865**	**$0**	**$144,941**	**$404,705**	**$0**	**$120,396**	**$186,020**

Vehicles											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Fire Truck	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$650,000
General Fleet	$0	$0	$0	$0	$0	$10,234	$0	$0	$0	$0	$110,000
Grader	$0	$0	$0	$400,000	$0	$0	$0	$0	$0	$0	$0
Heavy Duty Pick-up Truck	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Loader	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pick-up Truck	$0	$60,000	$60,000	$460,000	$125,000	$260,000	$0	$60,000	$120,000	$150,000	$50,000
Plow Truck	$0	$0	$0	$0	$0	$0	$0	$0	$0	$575,000	$0
Tractor	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$60,000**	**$60,000**	**$860,000**	**$125,000**	**$270,234**	**$0**	**$60,000**	**$120,000**	**$725,000**	**$810,000**

Land Improvements											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Cultural Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fencing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Furniture & Fixtures	$0	$0	$0	$0	$0	$0	$0	$52,678	$0	$0	$0
Landfills	$0	$0	$0	$154,804	$0	$0	$0	$0	$0	$0	$0
Lighting	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Playground Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Splash Pad	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$0**	**$0**	**$154,804**	**$0**	**$0**	**$0**	**$52,678**	**$0**	**$0**	**$0**

Sanitary Network											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Pumping Stations	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Lagoons	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Storage Tank	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sewer Lift Station	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Wastewater Treatment Plant	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Water Network											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Fire Hydrants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

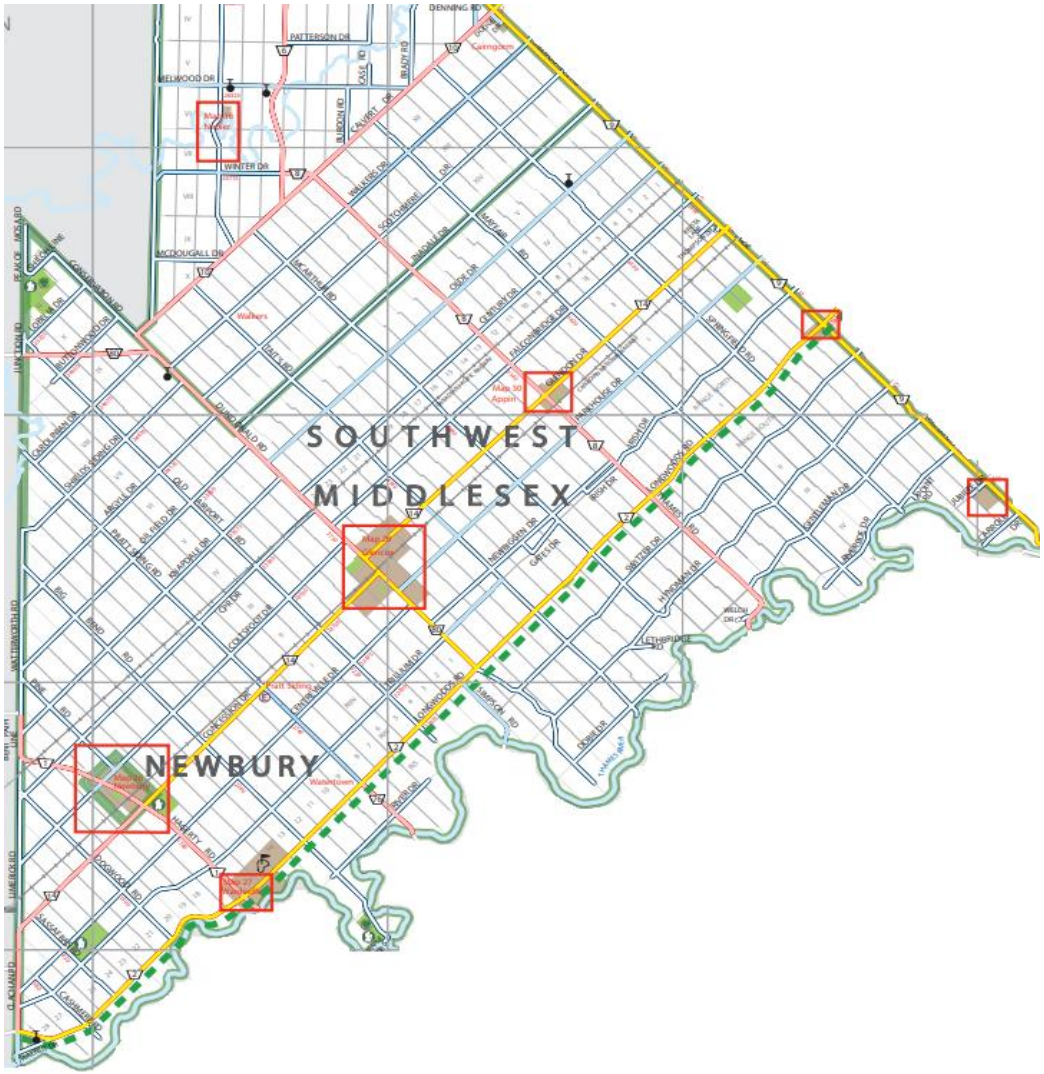
Category	Asset	Characteristics (from Permit/CofA)	Installation Year	Proposed Works	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
Reservoir		11901 Graham Rd. West Lorne	1975													
Water Storage	Reservoir	1,893 m3		Inspection					8,000							$8,000
Pumps	Two fixed-speed split-case pump (3A and 3B)	34 L/s (2,943 m^3/d) at 61m TDH		Replace --> Rebuild	10,000							5,000				$15,000
Pumps	Two fixed-speed split-case pump (2A and 2B)	14.2 L/s (1,226 m^3/d) at 61m TDH		Rebuild--> Replace	5,000									10,000		$15,000
Motors	Electric Motors (3A and 3B)	45hp		Replace --> Replace								4,000	4,000			$8,000
Motors	Electric Motors (2A and 2B)	20hp		Replace x2									6,000			$6,000
Valves	Flow Control Valves x4			Rebuild x4 --> Rebuild --> Rebuild x3			10,000				4,000	9,000				$23,000
Valves	Isolation Valves x8			Replace x4 --> Replace x4	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	$16,500
Instrumentation	Flow Meter			Replace	10,000											$10,000
Instrumentation	Level Transmitter			Replace		3,000										$3,000
Instrumentation	Pressure trasmitter			Replace			3,000									$3,000
Tank	Sodium hypochlorite solution tank	350L		No work												$0
Pumps	Two chemical metering pumps	7.8 L/hr		Replace --> Replace --> Replace	5,000					5,000	5,000					$15,000
Analyzer	Free chlorine analyzer			Replace --> new probes	500	500	500	3,000	500	500	500	500	500	500	500	$8,000
Instrumentation	Pocket Colourimeter			Replace									1,000			$1,000
Controls	Chlorine pump Controller			Replace				5,000								$5,000
Panel	Chlorine injection Panel			No work												$0
HVAC	Chemical room Exhaust Fan, Electric Unit Heater x2			Inspection/Maintenance	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	$11,000
Electric	UPS x2 - PLC and Analyzer			Replace x2 --> Replace x2 --> Replace x2	500	500	500	500	500	500	500	500	500	500	500	$5,500
Electric	PLC Panel & Contents			Upgrade	6,000											$6,000
Controls	Alarm Dialer			Replace	10,000											$10,000
Valves	Altitude Valve - Inlet Flow Control			Rebuild --> Rebuild				2,500					3,000			$5,500
Valves	Check Valve - Swing			Replace						10,000						$10,000
Pumps	Sump Pump			Replace		500		500		500		500				$2,000
SCADA	SCADA System			No Work												$0
Pipes	Pump gallery pipe replacement			Replace corroded piping					10,000							$10,000
					$49,500	**$7,000**	**$16,500**	**$14,000**	**$21,500**	**$19,000**	**$12,500**	**$22,000**	**$17,500**	**$13,500**	**$3,500**	**$196,500**
New Glencoe Water Tower		99 industrial Rd. Glencoe	2011													
Water Storage	Elevated storage tank	3,600 m^3 useable volume		Inspection			8,000					8,000				$16,000
Tank	Sodium hypochlorite solution tank			No Work												$0
Instrumentati	Flow Meter			Replace				12,000								$12,000
Instrumentati	Level Transmitter			Replace		2,500					2,500					$5,000
Instrumentati	Pressure Gauge			Replace						500						$500
Pumps	Two chemical metering pumps	7 L/hr		Rebuild --> Rebuild	3,000					3,000					3,000	$9,000
Analyzer	Chlorine analyzer x2 (Inlet and Outlet)			New Probes x 2	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	$11,000
Controls	Chlorine pump Controller			Replace				5,000								$5,000
Controls	Chlorine injection Panel			Replace	500	500	500	500	500	500	500	500	500	500	500	$5,500
Instrumentation	Pocket Colourimeter															$0
HVAC	Electric Unit Heater x2			Replace --> Replace --> Replace --> Replace		1,000	1,000			1,000	1,000					$4,000
HVAC	Louver electric - *(x2)*			Replace x2				2,000								$2,000
Electric	Battery Bank/ UPS - PLC			Replace	1,200			500				1,200				$2,900
Controls	PLC Panel & Contents			Replace			6,000									$6,000
Valves	Check Valves - Waffer *(x2)*			Replace				8,000								$8,000
Controls	Installation of Alarm Dialer			Installation												$0
																$0
					$5,700	**$5,000**	**$16,500**	**$29,000**	**$1,500**	**$6,000**	**$5,000**	**$10,700**	**$1,500**	**$1,500**	**$4,500**	**$86,900**

Category	Asset	Characteristics (from Permit/CofA)	Installation Year	Proposed Works	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
Melbourne Water Standpipe and Control Bld.		6547 Longwoods Rd., Melbourne	1978													
Water Storage	Melbourne standpipe	1,485 m^3		Inspection		3,000			5,000					5,000		$13,000
Instrumentation	Flow Meter			Replace						8,000						$8,000
Instrumentation	Level Transmitter			Replace	3,000						3,000					$6,000
Instrumentation	Pressure Gauge			Replace					500							$500
Pumps	Two chemical metering pumps	3.4L/hr		Replace --> Rebuild --> Rebuild	5,000				2,000	2,000				5,000		$14,000
Tank	Sodium hypochlorite solution tank	200L		No Work												$0
Controls	Chlorine injection Panel			Replace									5,000			$5,000
Controls	Change chlorine dosing point			Engineering Work	50,000											$50,000
Instrumentation	Chlorine Analyzer			Replace	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	$11,000
Controls	Alarm Dialer			Replace		5,000					3,000					$8,000
Controls	PLC Panel & Contents			Replace							5,000					$5,000
Electric	Battery Bank/ UPS - Instrumentation			Replace	500		500		500		500		500		500	$3,000
Electric	Electric Unit Heater 01			Replace --> Replace				1,000				1,000				$2,000
Valves	Check Valves - Waffer *(x2)*			Replace x2						6,000						$6,000
Building	Prefabricated storage facility	1.8m x 3m x 2.1m high														$0
					$59,500	**$9,000**	**$1,500**	**$2,000**	**$9,000**	**$17,000**	**$12,500**	**$2,000**	**$6,500**	**$11,000**	**$1,500**	**$131,500**
Appin Water Booster Station/Valve Chamber		5140 Parkhouse Dr., Appin	1985													
Controls	Flow Control Valve			Replace						6,000						$6,000
Pumps	Sump Pump			Replace --> Replace --> Replace	500		500		500		500		500		500	$3,000
Controls	PLC Panel & Contents			Replace							6,000					$6,000
Electrical	Battery Bank/ UPS			Replace --> Replace	1,000			500						1,000		$2,500
					$1,500	**$0**	**$500**	**$500**	**$500**	**$6,000**	**$6,500**	**$0**	**$500**	**$1,000**	**$500**	**$17,500**
South West Middlesex Distribution System			1975													
	Hydrant and Secondary valve			Repairs	15,000	10,000	10,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	$75,000
	Isolation/ Air relief chamber			Repairs	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	$55,000
	Distribution flow meters and PRVs			Replacements				4,000				5,000				$9,000
	Distribution System			Testing & Colour Coding					10,000							$10,000
	Distribution System			Leak detection	8,000					10,000						$18,000
					$28,000	**$15,000**	**$15,000**	**$14,000**	**$20,000**	**$20,000**	**$10,000**	**$15,000**	**$10,000**	**$10,000**	**$10,000**	**$167,000**
Total Major Maintenance and Capital Costs for the Drinking Water System					**$144,200**	**$36,000**	**$50,000**	**$59,500**	**$52,500**	**$68,000**	**$46,500**	**$49,700**	**$36,000**	**$37,000**	**$20,000**	**$599,400**
Contingency 15%					**$21,630**	**$5,400**	**$7,500**	**$8,925**	**$7,875**	**$10,200**	**$6,975**	**$7,455**	**$5,400**	**$5,550**	**$3,000**	**$89,910**
Total with contingency					**$165,830**	**$41,400**	**$57,500**	**$68,425**	**$60,375**	**$78,200**	**$53,475**	**$57,155**	**$41,400**	**$42,550**	**$23,000**	**$689,310**

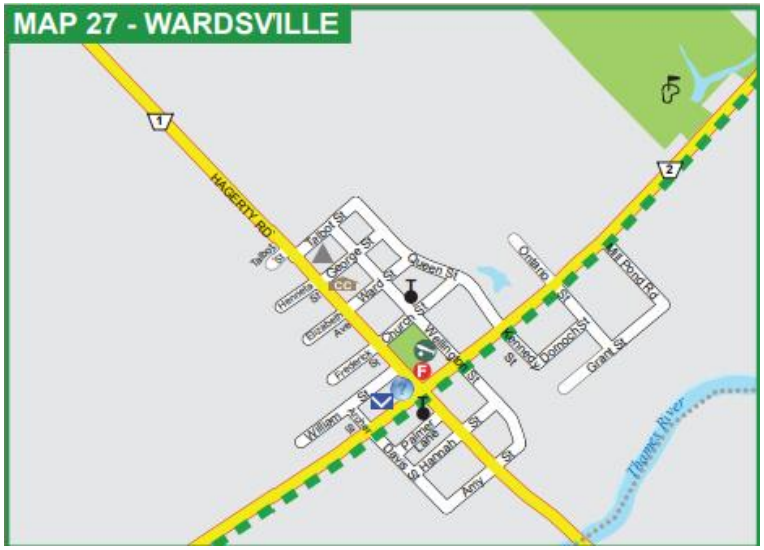
Note: These costs are estimates only and do not represent a quote for OCWA to undertake the work

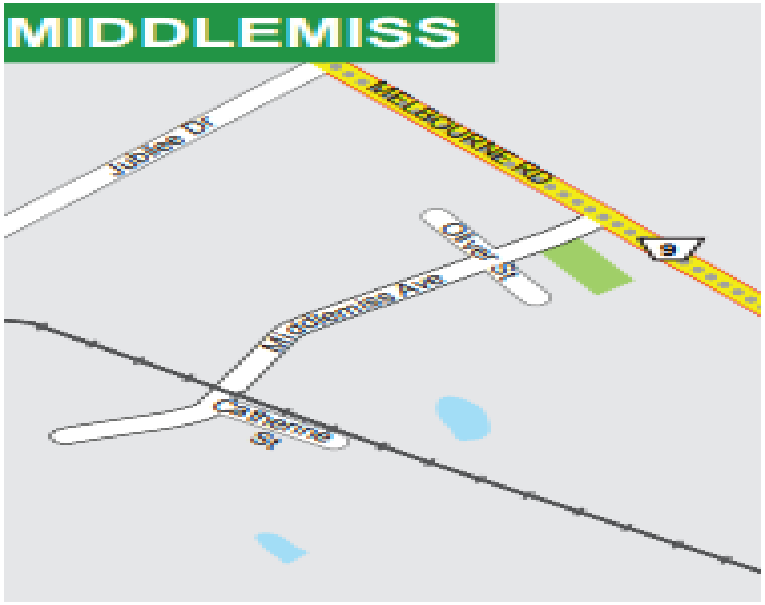
Appendix B: Level of Service Maps

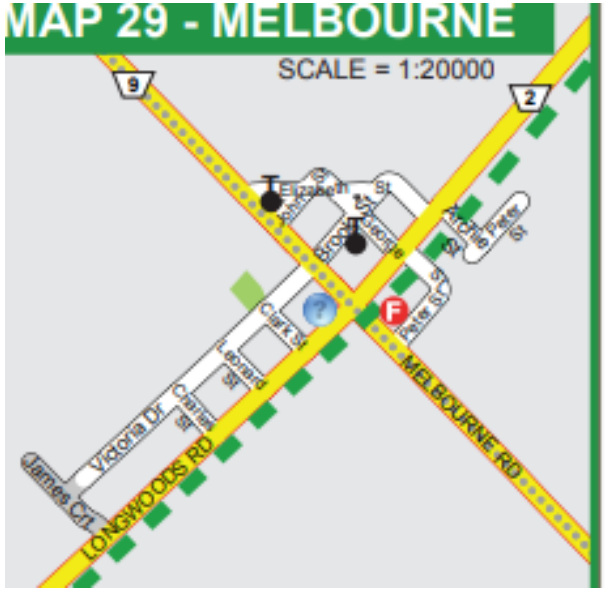
Road Network Map




MAP 28 - GLENCOE
DUNDONALD RD
APPIN RD
MAIN ST
CONCESSION DR
Industrial Rd
Parkhouse Dr
Centreville Dr
14
80


MAP 27 - WARDSVILLE
HAGERTY RD
Thames River
1
2


MIDDLEMISS
MELBOURNE RD
Jubilee Dr
Middlemiss Ave
Oliver St
Catherine St
9

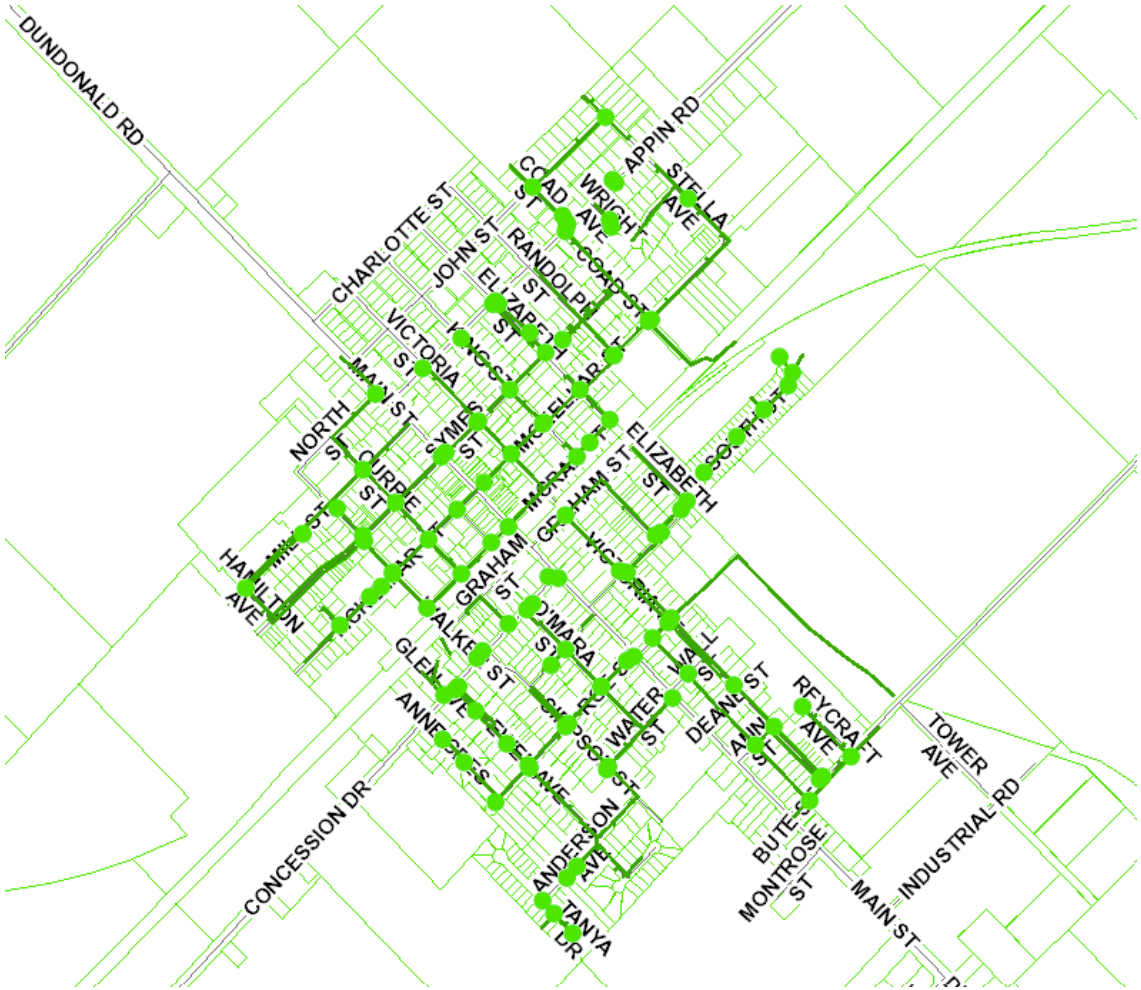

MAP 29 - MELBOURNE
SCALE = 1:20000
9
2
Elizabeth St
Broad St
Victoria Ave
Archie Fraser Dr
Clark Dr
Peter St
Leonard St
Charles St
Victoria Dr
James Crt
LONGWOODS RD
MELBOURNE RD


MAP 30 - APPIN
McMaster Pl
GLENDON DR
Dugald St
8
14
Wellington Ave
Elgin St
CC
Argyle St
Front Ave
THAMES RD

Images of Bridge in Good Condition
Pratt Siding Road – B101

Images of Culvert in Fair Condition
Big Bend Road – C117

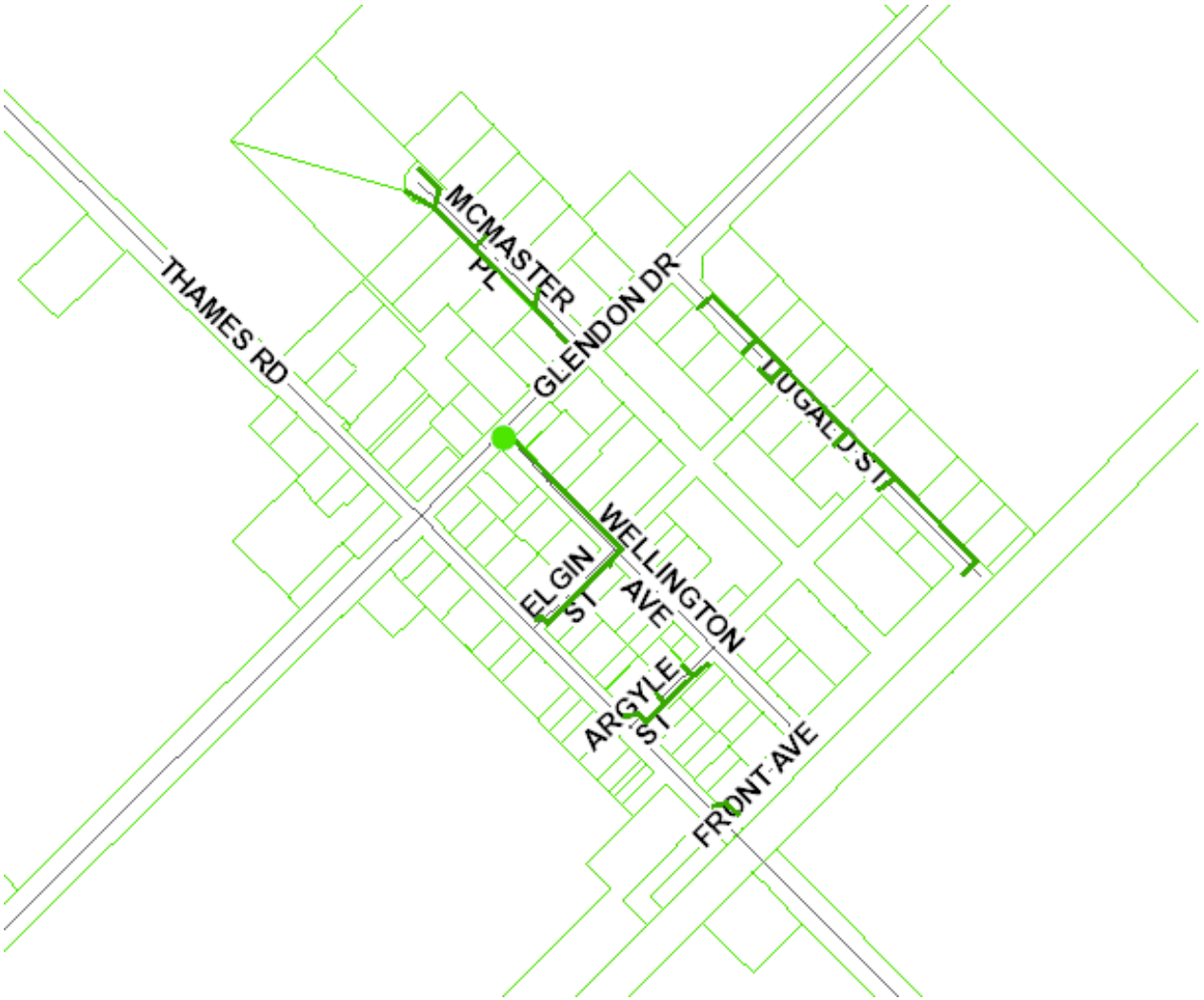
Stormwater Network Map



Glencoe

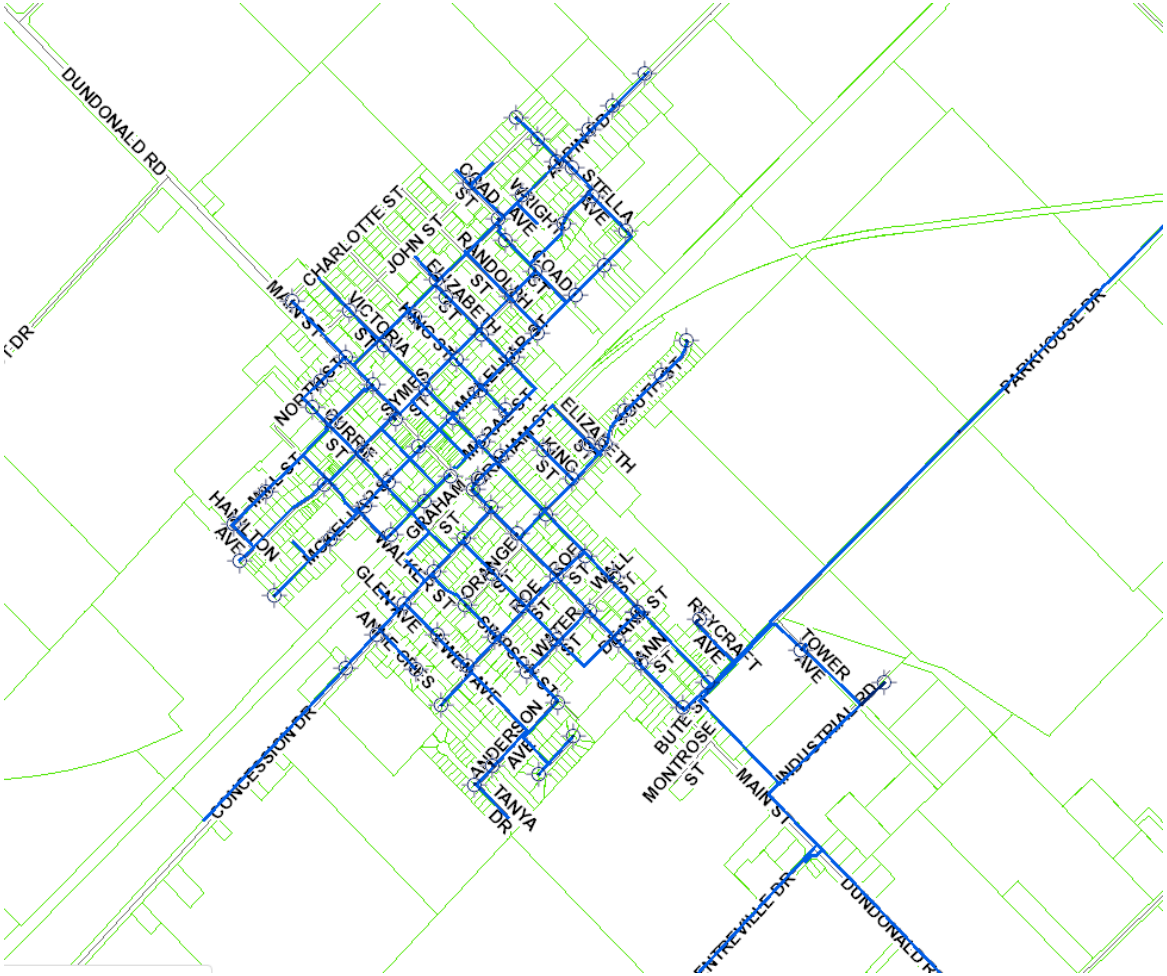

HAGERTY RD
TALBOT ST
TALBOT ST
GEORGE ST
QUEEN ST
HENRIETA ST
WARD ST
CHURCH ST
ELIZABETH AVE
FREDERICK ST
ONTARIO ST
MILL POND RD
DORNOCH ST
GRANT ST
LONGWOODS RD
WELLINGTON ST
WILLIAM ST
ARCHER ST
PALMER LANE
HANNA ST
ANN ST

Wardsville

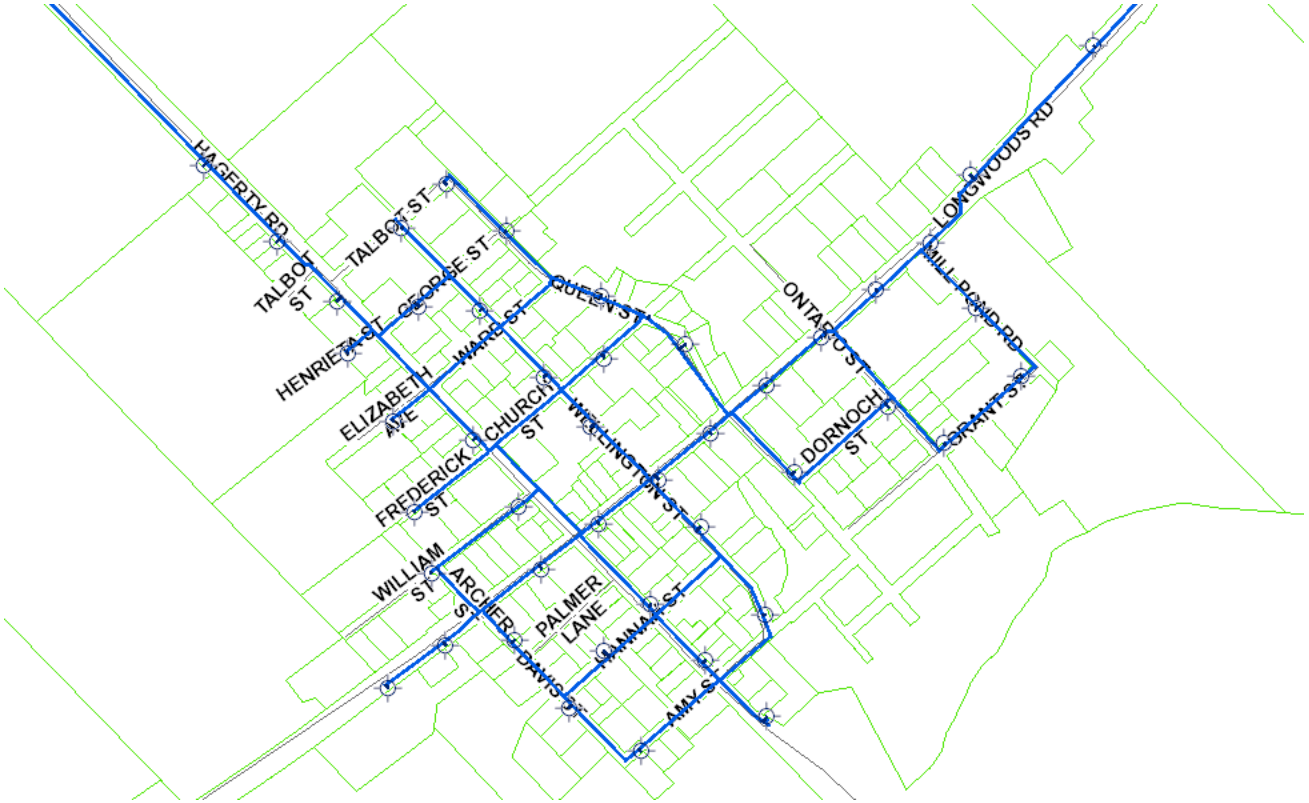

MCMASTER PL
GLENDON DR
THAMES RD
DUGALD ST
WELLINGTON AVE
ELGIN ST
ARGYLE ST
FRONT AVE

Appin

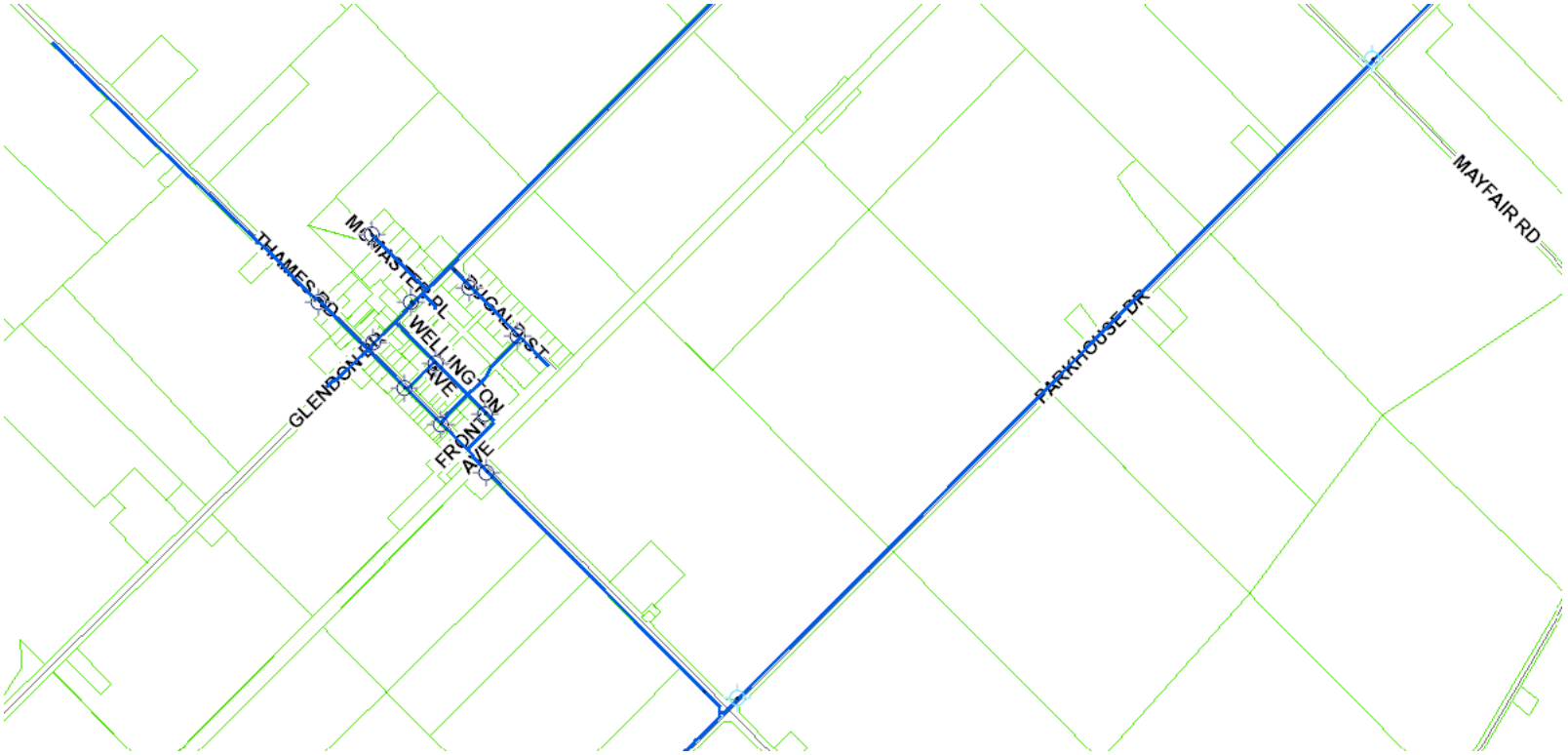
Water Network Map



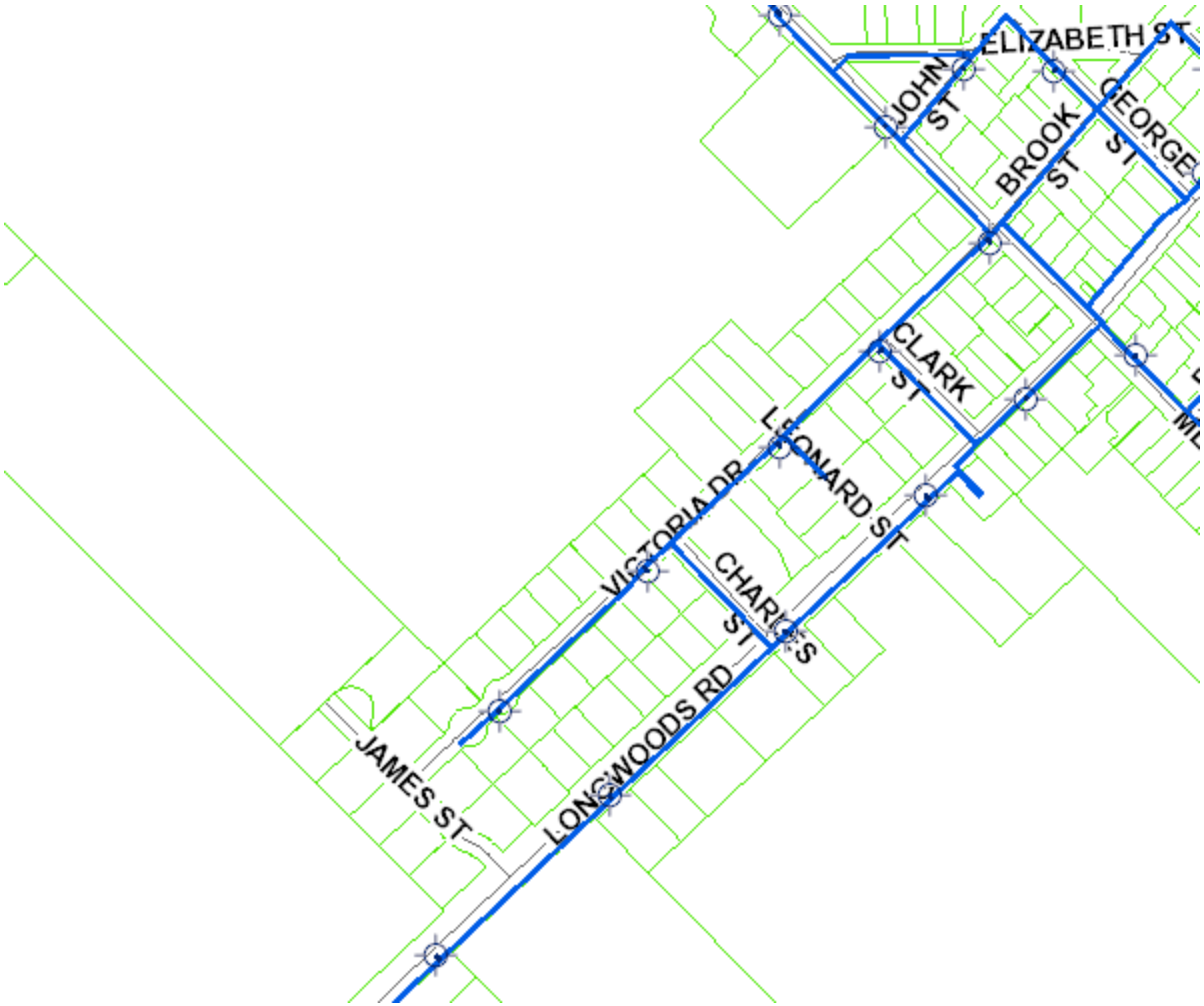
Glencoe


HAGERTY RD
TALBOT ST
TALBOT ST
GEORGE ST
QUEEN ST
HENRIETTA ST
WARE ST
ELIZABETH AVE
CHURCH ST
WELLINGTON ST
FREDERICK ST
WILLIAM ST
ARCHER ST
PALMER LANE
DAVIS ST
HANNAH ST
AMY ST
ONTARIO ST
DORNOCH ST
LONGWOODS RD
MILL POND RD
GRANT ST

Wardsville

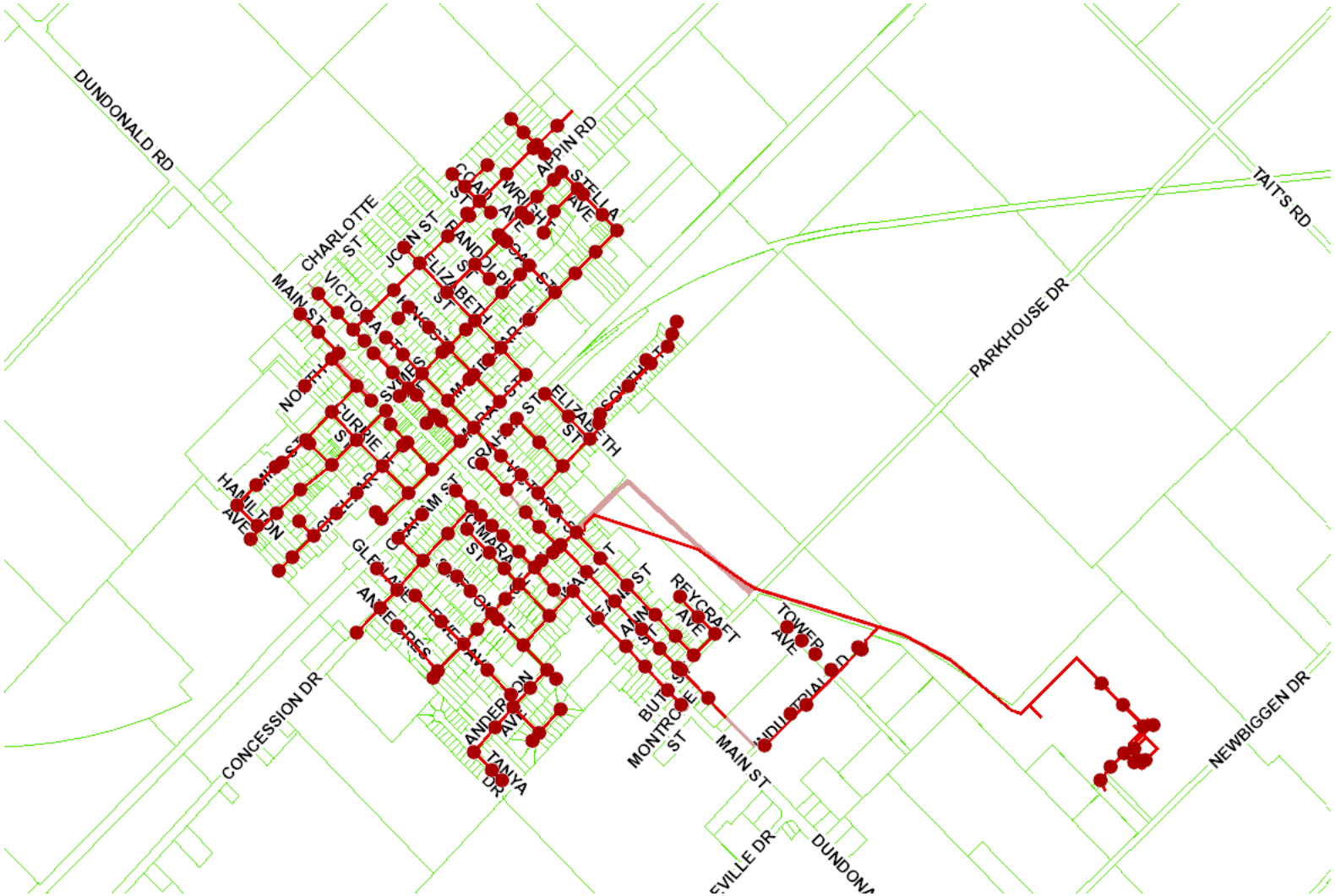

THAMES RD
GLENDON HILL
MASTER PL
WELLINGTON AVE
SUGAR ST
FRONT AVE
PARKHOUSE DR
MAYFAIR RD

Appin

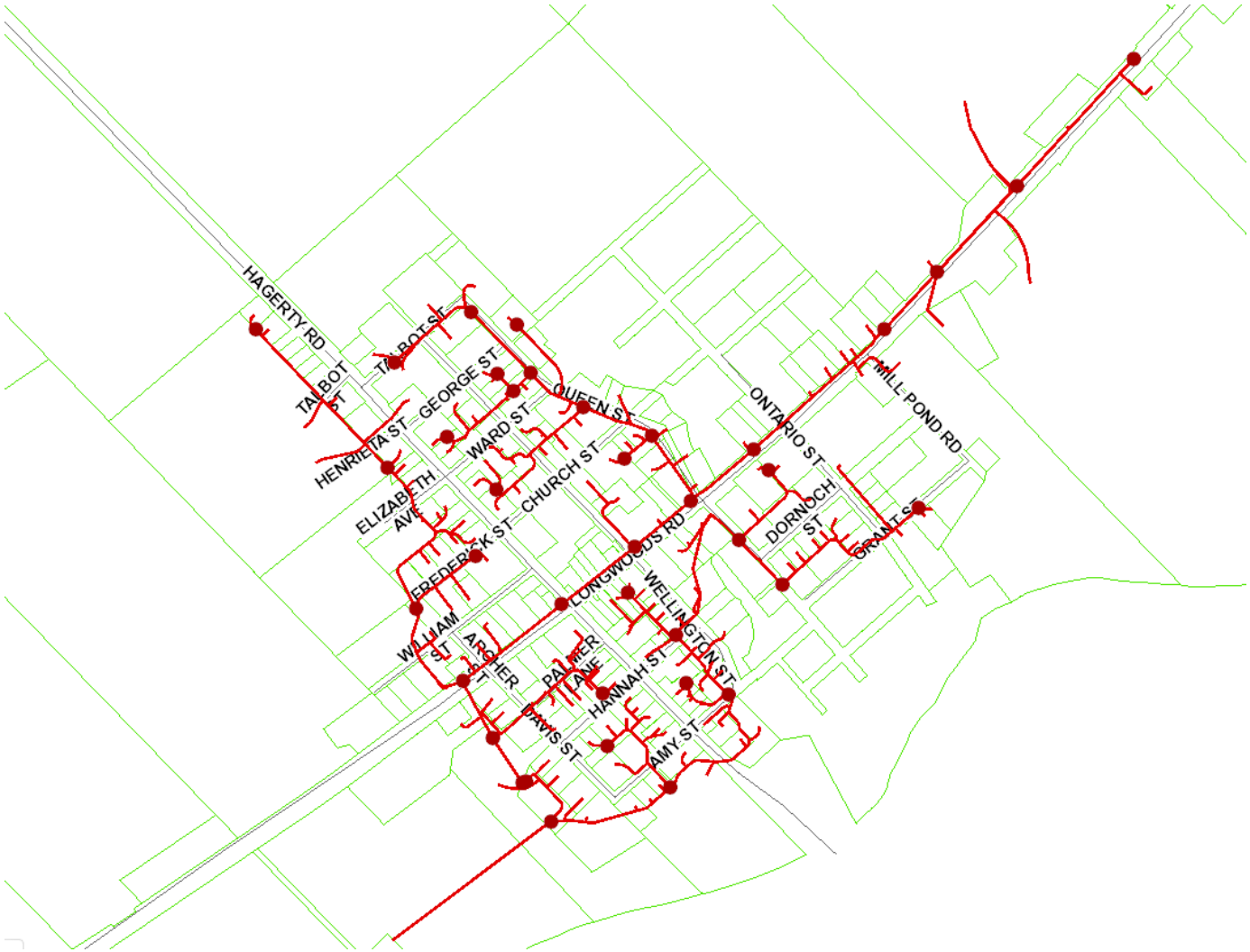

ELIZABETH ST
JOHN ST
BROOK ST
GEORGE ST
CLARK ST
LEONARD ST
VICTORIA DR
CHARLES ST
LONGWOODS RD
JAMES ST

Melbourne

Sanitary Sewer Network



Glencoe


HAGERTY RD
TALBOT ST
TALBOT ST
GEORGE ST
QUEEN ST
HENRIETTA ST
WARD ST
CHURCH ST
ELIZABETH AVE
FREDERICK ST
ONTARIO ST
MILL POND RD
DORNOCH ST
GRANT ST
LONGWOODS RD
WELLINGTON ST
WILLIAM ST
ARCHER ST
PALMER LANE
HANNAH ST
DAVIS ST
AMY ST

Wardsville

Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Road Network (Roads)	Condition	70	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Surface Type	30	Concrete	1
			Hot Mix	2
			Tar & Chip	3
			Gravel	4
Bridges & Culverts Stormwater Network Sanitary Network (Mains)	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Water Network (Mains)	Condition	60%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Pipe Material	20%	PVC	2
			Copper	3
			Cast Iron	4
	Main Breaks per Segment	20%	0-2	2
			2-4	3
			4-6	4
			6-8	5

Consequence of Failure

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Roads)	Economic (60%)	Replacement Cost	$10,000	1
			$25,000	2
			$50,000	3
			$250,000	4
			$500,000	5
	Operational (40%)	Road Class	Class 6	2
			Class 5	3
			Class 4	4
Bridges & Culverts	Economic (60%)	Replacement Cost	$10,000	1
			$25,000	2
			$50,000	3
			$250,000	4
			$500,000	5
	Social (40%)	Detour Distance (kms) (30%)	0-2 kms	1
			2-4 kms	2
			4-6 kms	3
			6-8 kms	4
			10+ kms	5
		Special Routes (10%)	Bicycle Use	2
			Bus Routes	4
			Heavy Transport	5
Stormwater Network	Operational (100%)	Pipe Size (mm)	100 and less	1
			150-200	2
			250-350	3
			375-525	4
			600 and more	5

Asset Category	Risk Classification	Risk Criteria	Value/Range	Consequence of Failure Score
Water and Sanitary Network (Mains)	Operational (70%)	Pipe Size (100%)	100 and less	1
			150-200	2
			250-350	3
			375-525	4
			600 and more	5
	Strategic (30%)	Bury Depth (m)	1.5 and less	1
			2	2
			2.5	3
			3	4
			3.5	5
		Soil Type	Neutral	1
			Patrially Corrosive	3
			Highly Corrosive	4

Appendix D: Condition Assessment Guidelines

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

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