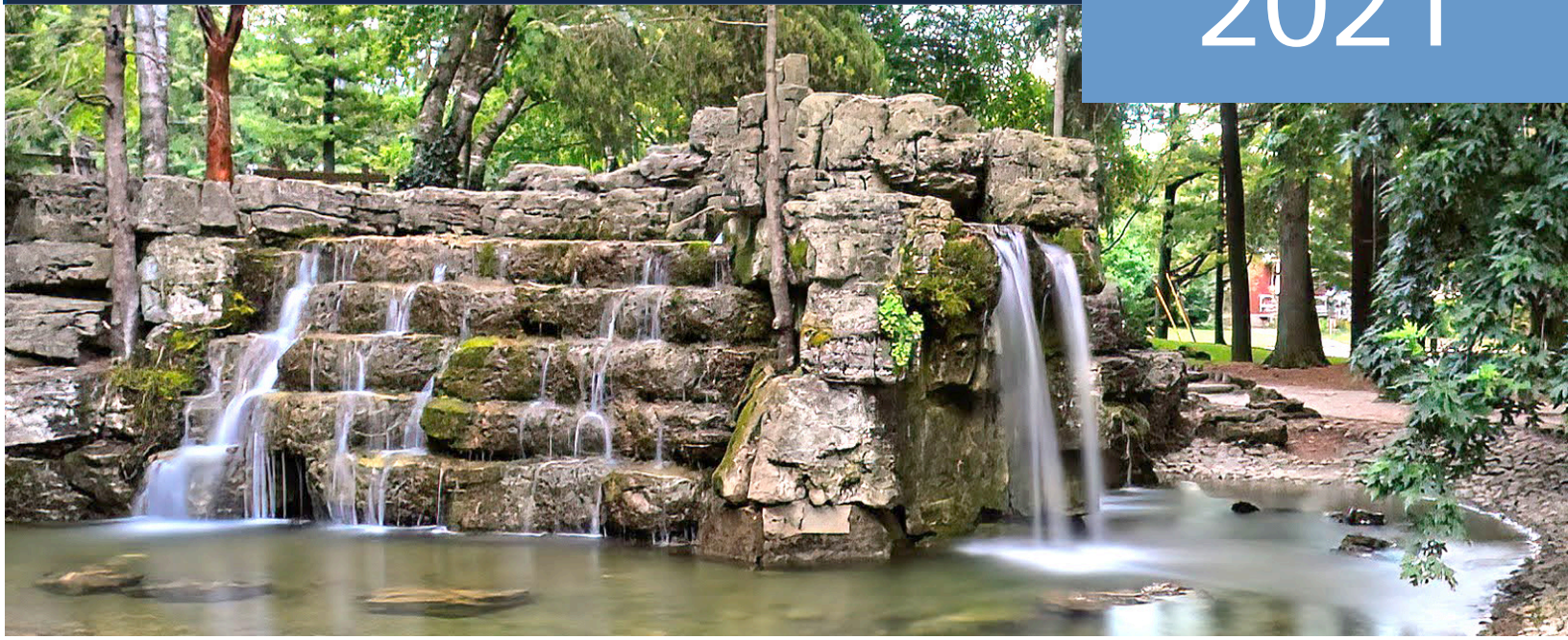


Asset Management Plan

City of Stratford

2021



This Asset Management Program was prepared by:



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

Key Statistics

<p>\$944.2 million Replacement cost of asset portfolio</p>	<p>\$68,149 Replacement cost of infrastructure per household</p>
<p>3.40% Target average annual infrastructure reinvestment rate</p>	<p>2.20% Actual average annual infrastructure reinvestment rate</p>
<p>63% Percentage of assets in fair or better condition</p>	<p>63% Percentage of annual infrastructure funding needs currently being met</p>
<p>20% Portion of total infrastructure funding that comes from the Gas Tax</p>	
<p>\$664 Annual infrastructure deficit per household</p>	<p>15 years Recommended timeframe for eliminating annual infrastructure deficit</p>

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Executive Summary

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

All municipalities in Ontario are required to complete an asset management plan (AMP) in accordance with Ontario Regulation 588/17 (O. Reg. 588/17). This AMP outlines the current state of asset management planning in the City of Stratford. It identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the City can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP includes the following asset categories:

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges & Culverts	Tax Levy
Stormwater Network	Tax Levy
Buildings & Facilities	Tax Levy
Machinery & Equipment	Tax Levy
Fleet	Tax Levy
Land Improvements	Tax Levy
Water Network	User Rates
Wastewater Network	User Rates

The overall replacement cost of the asset categories included in this AMP totals \$944.2 million. 62% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 37% 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 has used a combination of proactive lifecycle strategies (roads and underground

mains) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service. To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the City's average annual capital requirement totals \$21.5 million. Based on a historical analysis of sustainable capital funding sources, the City is committing approximately \$12.3 million towards capital projects per year. As a result, there is currently an annual funding gap of \$9.3 million.

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

Funding Source	Years Until Full Funding	Total Tax/Rate Change	Average Annual Tax/Rate Change
Tax-Funded Assets	10 Years	11.2%	0.7%
Rate-Funded (Water)	15 Years	27.2%	1.4%
Rate-Funded (Sanitary)	15 Years	14.9%	0.0% ¹

With the development of this AMP the City has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2021, with strong consideration for 2023 requirements. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2024. This AMP represents a snapshot in time and is based on the best available processes, data, and information at the City. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources. Several recommendations have been developed to guide the continuous refinement of the City's asset management program. These include:

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

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

¹ The average annual rate change is 0.0% for the sanitary system because as the City bridges the gap on its debt payments in the next 15 years, revenue will be freed up, thus requiring no rate changes.

Introduction & Context

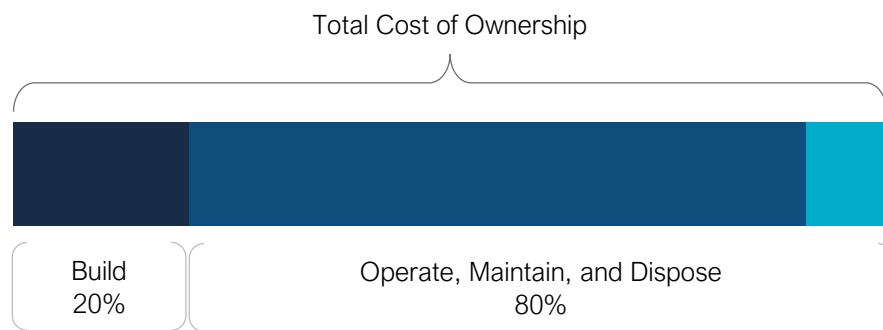
Key Insights

- The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio
- The City'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, 2021 and 2024

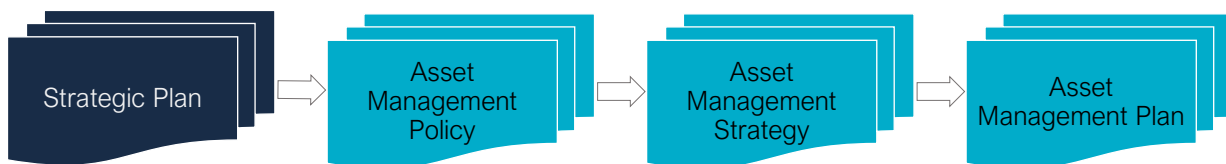
1.1 An Overview of Asset Management

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

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



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



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

1.1.1 Asset Management Policy

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

The City adopted their Strategic Asset Management Policy on June 24, 2019 in accordance with Ontario Regulation 588/17.

The objectives of the policy include:

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

1.1.2 Asset Management Strategy

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

The City'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 City’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 City 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 City as worth measuring and evaluating. The City 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 City 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 City 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

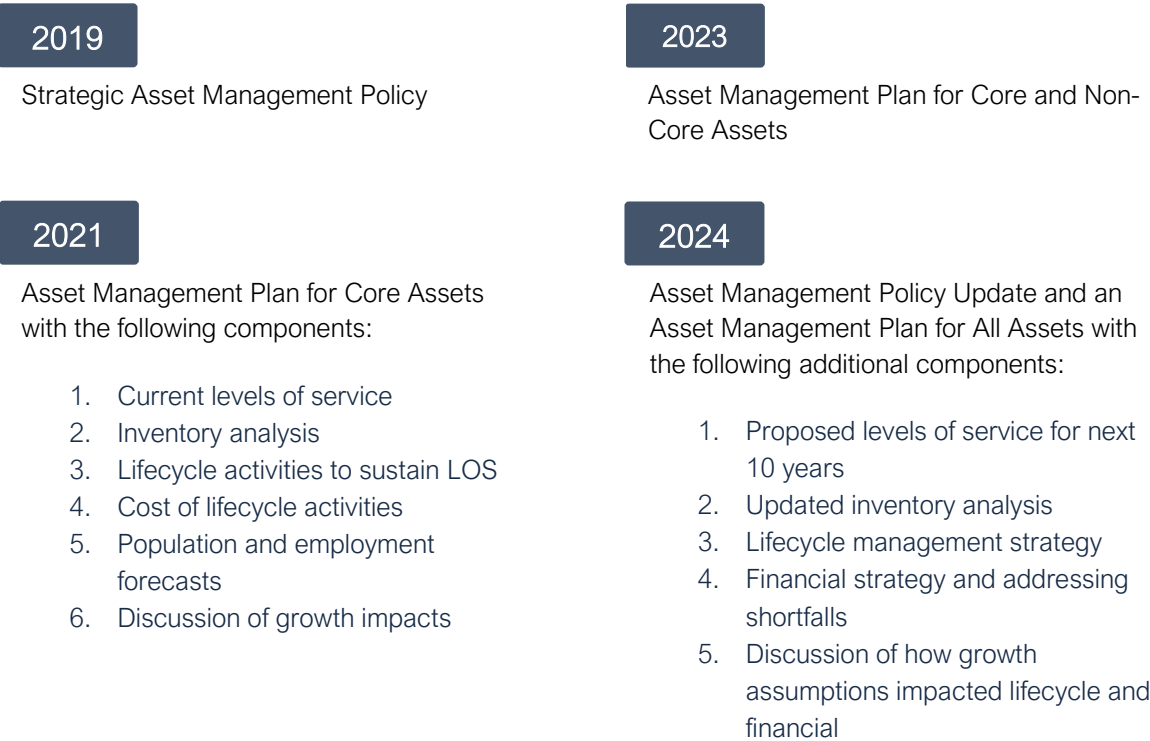
This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the City plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the City. 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 2024, the City 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.



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, 2023. Next to each requirement a page or section reference is included in addition to any necessary commentary.

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

1.4 Asset Management Roadmap

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

Asset Management Policy (Completion Date: Apr 11, 2019)

The asset management policy outlines the City's principles, goals, and roles and responsibilities in accordance with O.Reg.588/17 guidelines.

Asset Management Maturity Assessment (Completion Date: Mar 29, 2019)

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

Condition Assessment Program Development (Completion Date: Dec 19, 2018)

City staff received training on the development of condition assessment strategies for municipal assets. This included condition assessment guidelines as well as data collection templates to ensure asset condition data is collected consistently and updated regularly.

Asset Data Review and Refinement (Completion Date: January 30, 2020)

Asset inventory data was refined continuously over the course of this project using the latest road needs study, OSIMs, and Building Condition Assessments (BCA). Assets found in the GIS database were also transferred into the CityWide database and disaggregated.

Risk and Criticality Model Development (Completion Date: Aug 15, 2019)

Risk models were developed to determine the relative criticality of assets based on their probability and consequence of failure. These models assist with the prioritization and ranking of infrastructure needs.

Lifecycle Model Development (Completion Date: Feb 27, 2020)

The City's lifecycle management strategies were reviewed and documented to determine current practices and identify opportunities for improvement and potential cost avoidance.

Level of Service Framework Development (Completion Date: Feb 27, 2020)

A framework was developed to determine the current level of service provided to the community through municipal infrastructure.

AMP & Financial Strategy

Completion of this deliverable is set for the end of July 2020 and represents the culmination of the Asset Management Development Program.

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

1.5 Assets categories included in this AMP

This asset management plan for the City of Stratford is produced in compliance with Ontario Regulation 588/17. The July 2021 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 City’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	Tax Levy
Stormwater Network	Tax Levy
Buildings & Facilities	Tax Levy
Machinery & Equipment	Tax Levy
Fleet	Tax Levy
Land Improvements	Tax Levy
Water Network	User Rates
Wastewater Network	User Rates

1.6 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 City incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

1.7 Estimated Useful Life and Service Life Remaining

The estimated useful life (EUL) of an asset is the period over which the City 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 City can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the City can more accurately forecast when it will require replacement. The SLR is calculated as follows:

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

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

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

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

1.9 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 City’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.

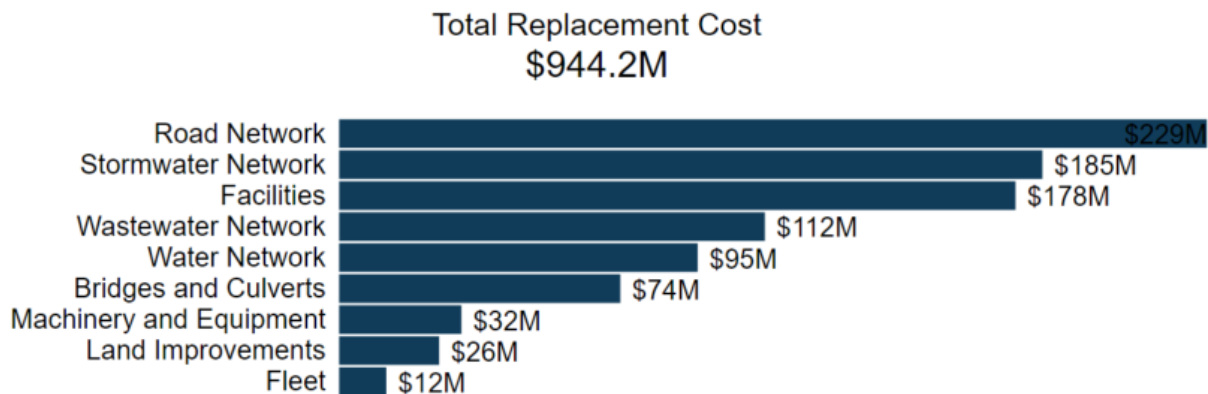
Portfolio Overview

Key Insights

- The total replacement cost of the City's asset portfolio is \$944.2 million
- The City's target re-investment rate is 3.4%, and the actual re-investment rate is 2.2%, contributing to an expanding infrastructure deficit
- 63% of all assets are in fair or better condition
- 36% of assets are projected to require replacement in the next 10 years
- Average annual capital requirements total \$21.5 million per year across all assets; with the City currently providing \$12.3 million

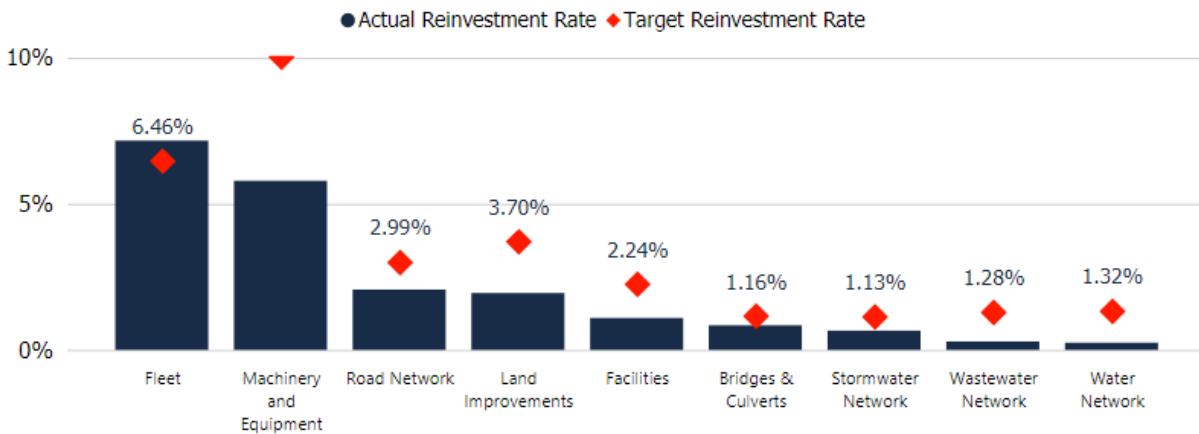
1.10 Total Replacement Cost of Asset Portfolio

The asset categories analysed in this AMP have a total replacement cost of \$944.2 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.



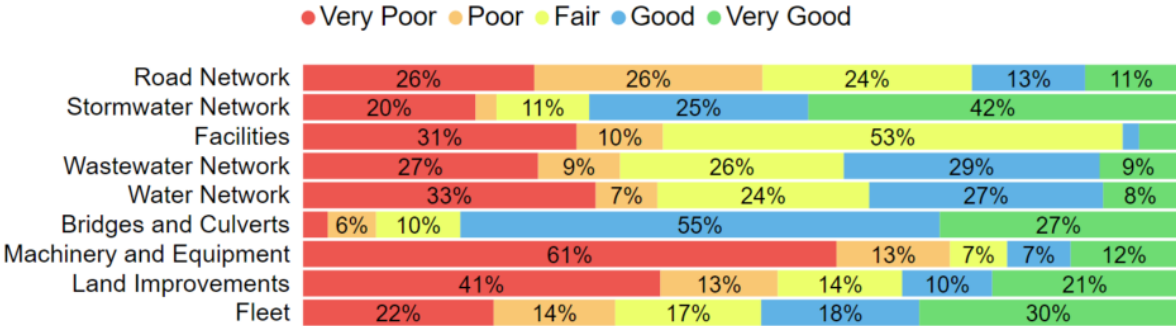
1.11 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the City should be allocating approximately \$21.5 million annually, for a target reinvestment rate of 3.4%. Actual annual spending on infrastructure totals approximately \$12.3 million, for an actual reinvestment rate of 2.20%.



1.12 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 60% of assets in Stratford are in fair or better condition. This estimate relies on both age-based and field condition data.

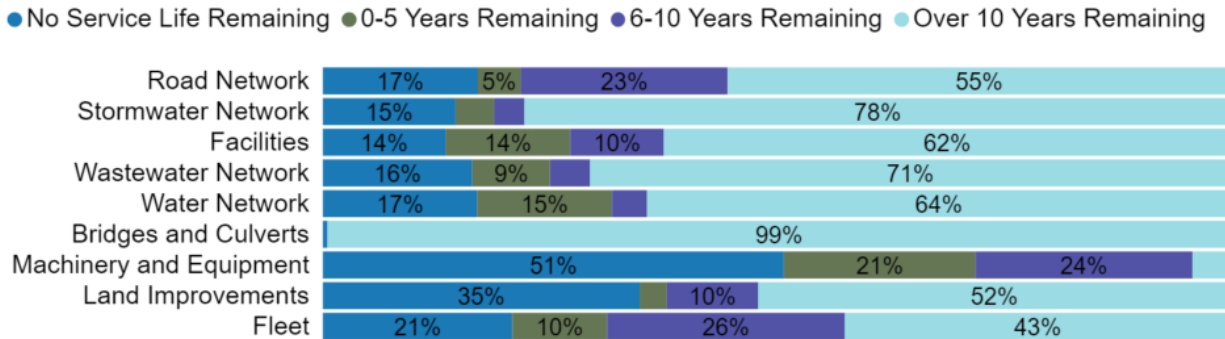


This AMP relies on assessed condition data for 36% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Road Network	Paved Roads	100%	2019 Road Needs Study
Bridges & Culverts	Bridges	100%	2019 OSIM Report
Bridges & Culverts	Retaining Walls	90%	2019 OSIM Report
Bridges & Culverts	Structural Culverts	100%	2019 OSIM Report
Stormwater Network	All	0%	N/A
Facilities	All	64%	2019 Building Condition Assessment
Machinery & Equipment	All	0%	N/A
Fleet	All	0%	N/A
Land Improvements	All	5%	Staff Assessments
Water Network	All	N/A	Third-party Assessments for Wells, Towers & Reservoirs Break history & water quality complaints for Mains
Wastewater Network	All	N/A	Third-party Assessments for Pumping Stations Regular CCTV Inspections for Mains

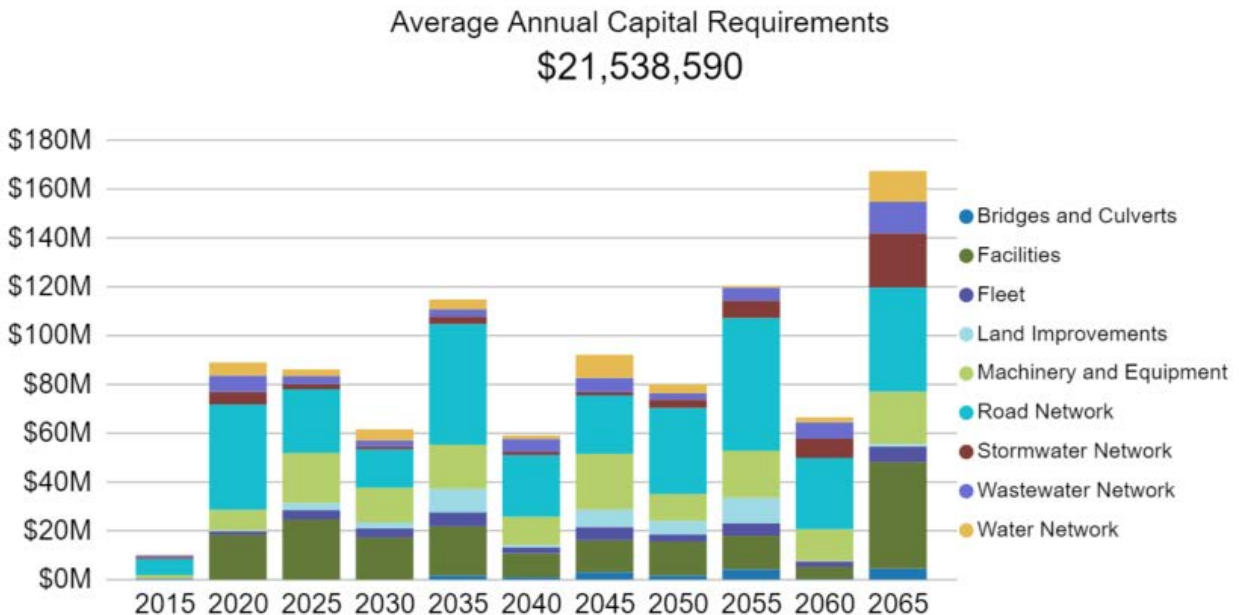
1.13 Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 36% of the City's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix A.



1.14 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 City can produce an accurate long-term capital forecast. The following graph identifies capital requirements over the next 50 years.



Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at \$737 million
- 62% 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 \$18.8 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

1.15 Road Network

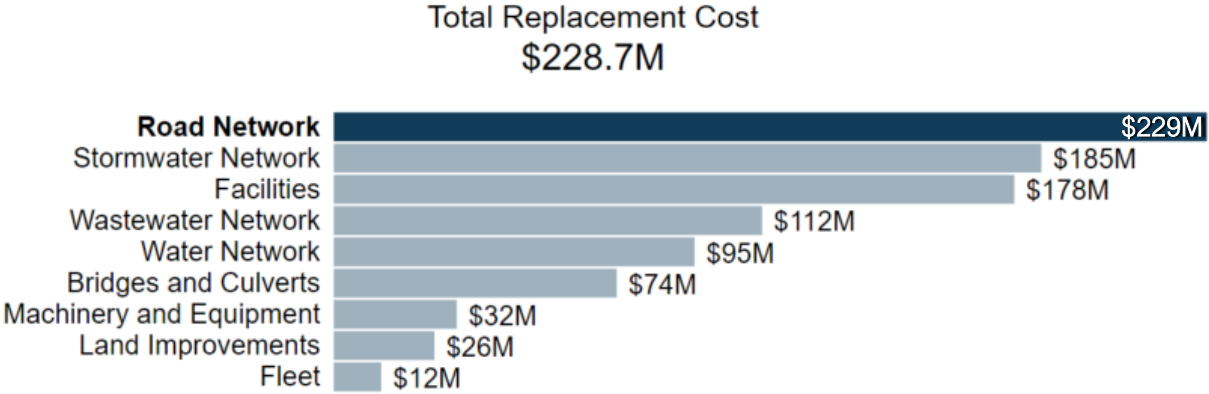
The Road Network is a critical component of the provision of safe and efficient transportation services and represents the highest value asset category in the City’s asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including sidewalks, traffic systems and streetlights. The City does not own any gravel/unpaved roads.

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

1.15.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Paved Roads	1,572,892 m	100% Cost/Unit	\$157,396,266
Sidewalks	229,846 m	100% Cost/Unit	\$45,969,287
Streetlights	4,201	100% CPI Tables	\$18,389,442
Traffic Systems ²	2,939	100% CPI Tables	\$6,941,267
			\$228,696,262

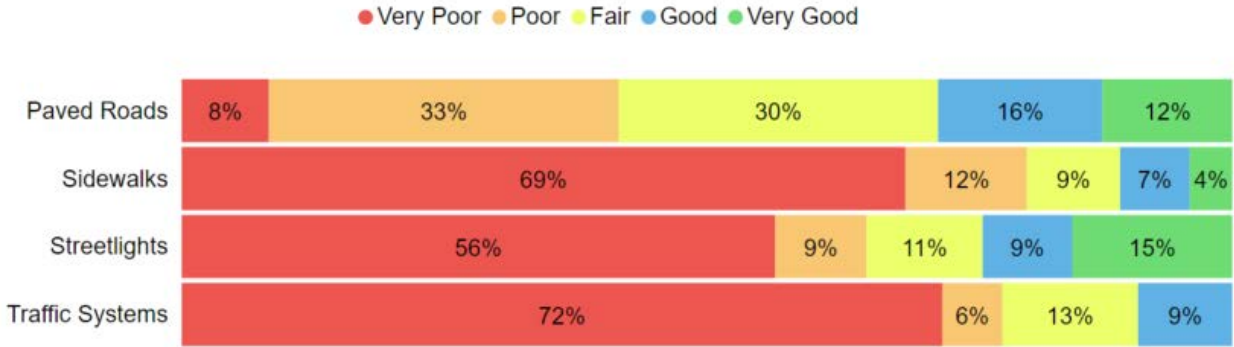


² Traffic Systems includes Traffic Signals, Box, and Signs

1.15.2 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
Paved Roads	57%	Fair	100% Assessed
Sidewalks	17%	Very Poor	Age Based
Streetlights	28%	Poor	Age Based
Traffic Systems	15%	Very Poor	Age Based
	45%	Fair	69% Assessed



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:

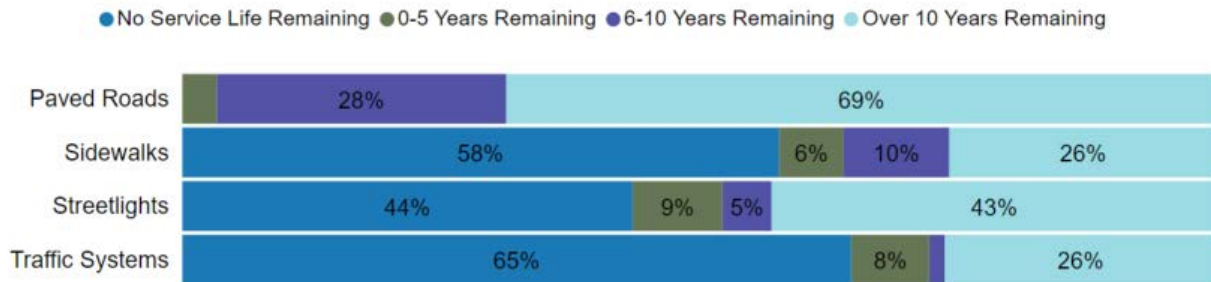
- A Road Needs Study was completed in 2019 that included a detailed assessment of the condition of each road segment
- Sidewalks are assessed annually as per Minimum Maintenance Standards (MMS)
- Most streetlights were replaced with LED lighting in 2016 and are subject to regular visual staff inspections. Festival Hydro also do routine inspections and notify City staff accordingly.
- Pothole patching is applied as per MMS requirements to repair and prevent pothole formations. Annual winter control activities such as road and sidewalk plowing, and snow removal are performed and exceed Minimum Maintenance Standards (MMS)
- Staff have a dedicated bi-annual crack sealing program of \$65,000/year

- Rehabilitation is prioritized using Pavement Condition Index (PCI), cost, and ADT. Pavement re-surfacing is applied to deteriorating road surfaces in an effort to extend the life of road assets and prevent the need for full road reconstruction.

1.15.3 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)
Paved Roads	30 Years	43.5	13.3
Sidewalks	25-60 Years	46.8	-6.9
Streetlights	15-50 Years	41.5	4.5
Traffic Systems	20-30 Years	50.2	-20.2
		45.4	-4.1



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.

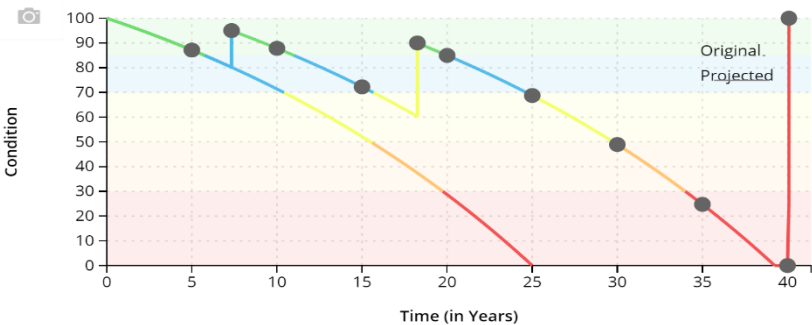
1.15.4 Lifecycle Management Strategy

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 various design class roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

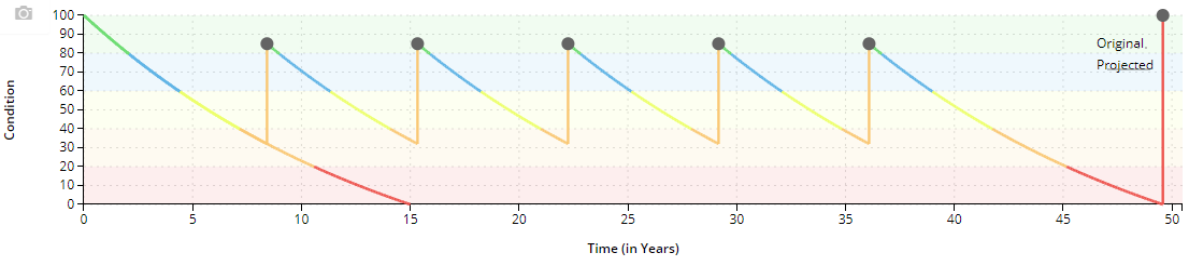
Paved Roads (Arterial/Collector Roads)

Event Name	Event Class	Event Trigger
Crack Sealing	Preventative Maintenance	Every 3-5 years
Single Lift Surface Overlay	Rehabilitation	80% Condition
Double Lift Surface Overlay	Rehabilitation	60% Condition
Full Reconstruction	Replacement	40 Years



Paved Roads (Local Roads)

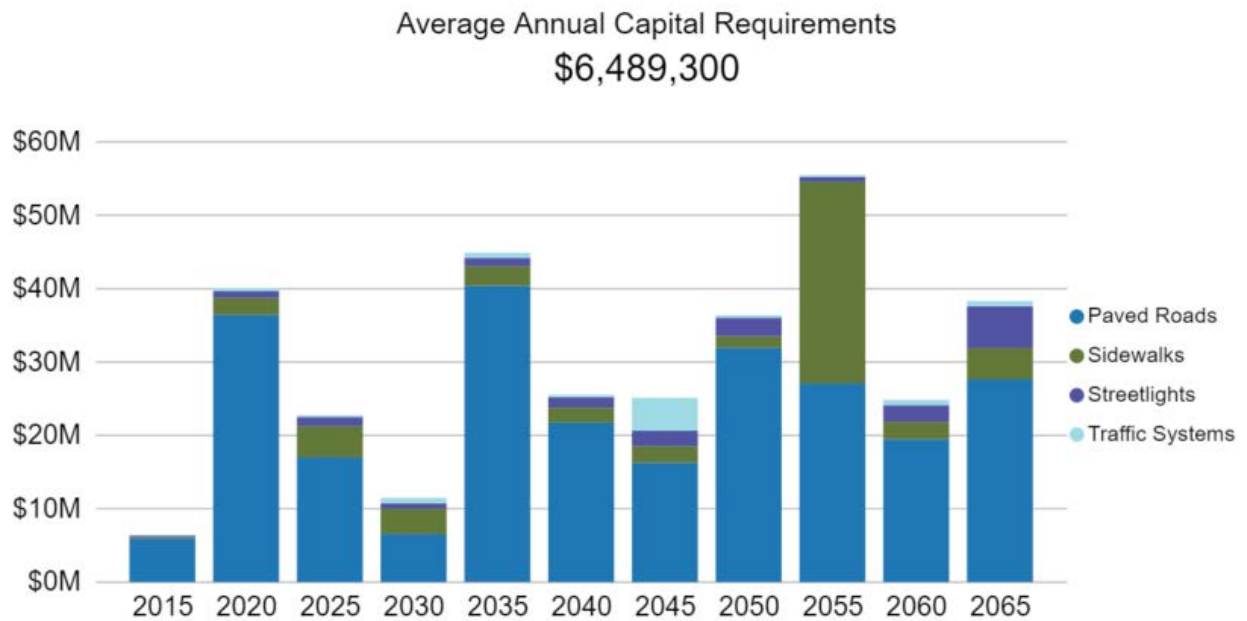
Event Name	Event Class	Event Trigger
Single Surface Treatment	Rehabilitation	8 Years (Repeated)
Full Reconstruction	Replacement	50 Years



Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for paved 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 City 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.

1.15.5 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.

Consequence	5 Severe	- \$0	- \$0	- \$0	- \$0	- \$0
	4 Major	52,694 m2 \$5,975,434	42,056 m2 \$4,746,661	16,232 m2 \$1,866,680	- \$0	- \$0
	3 Moderate	72,537 m2 \$7,756,084	157,814 m2 \$17,492,558	83,280 m2 \$9,243,446	35,545 m2 \$3,858,883	5,672 m2 \$527,450
	2 Minor	192,123 m2 \$18,285,453	323,754 m2 \$31,676,501	205,768 m2 \$19,581,003	163,331 m2 \$15,672,133	36,303 m2 \$3,435,964
	1 Insignificant	52,474 m2, m, unit(s) \$8,629,875	66,390 m2, m, unit(s) \$9,963,608	57,819 m2, m, unit(s) \$10,407,054	65,505 m2, m, unit(s) \$10,871,154	180,583 m2, m, unit(s) \$48,706,323
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.15.6 Levels of Service

The following tables identify the City’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 City 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	<p>The City completed a Road Condition Study in November 2019. Every road section received a surface condition rating (1-100).</p> <p>(0-55) Road surface exhibits moderate to significant deterioration and requires renewal or full replacement within 1-5 years</p> <p>(55-77) Road surface is in good condition or has been recently re-surfaced. Renewal or reconstruction is not required for 6-10+ years</p>

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km ²)	0.17
Scope	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km ²)	3.25
Scope	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km ²)	3.52
Quality	Average pavement condition index for paved roads in the municipality	57%
Performance	Capital reinvestment rate	1.60%

1.15.7 Recommendations

Asset Inventory

- Review sidewalk and streetlight inventory to determine whether all municipal assets within these asset segments have been accounted for.

Condition Assessment Strategies

- Link GIS data to CityWide AM inventory, and update condition, replacement cost, and other attribute information in a timely manner.
- The last comprehensive assessment of the road network was completed in 2019. Consider completing an updated assessment of all roads within the next 1-2 years.
- Assess right of way assets on a regular basis (e.g.: streetlights, traffic systems)

Lifecycle Management Strategies

- 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 City's lifecycle management strategies at regular intervals to determine the impact cost, condition, and risk.

Risk Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the City believes to provide meaningful and reliable inputs into asset management planning.

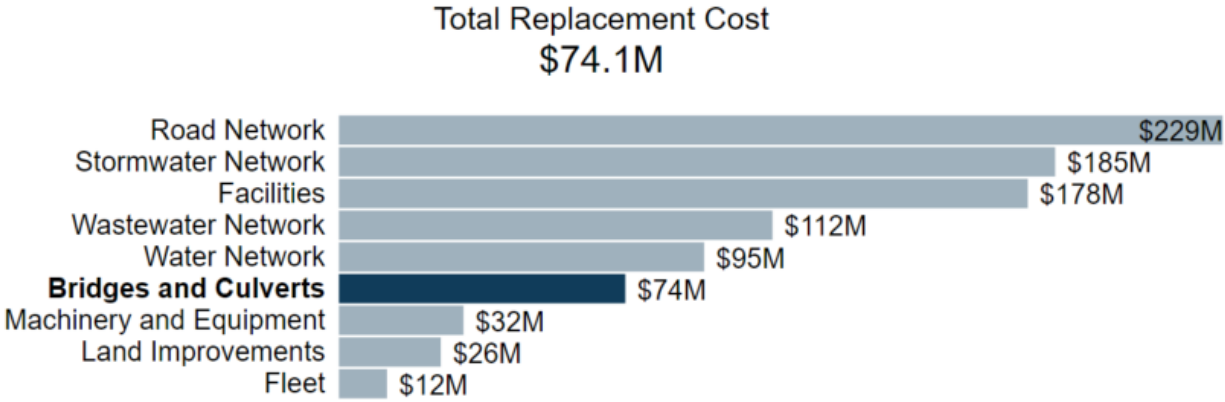
1.16 Bridges & Culverts

Bridges & Culverts represent a critical portion of the transportation services provided to the community. 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.

1.16.1 Asset Inventory & Replacement Cost

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

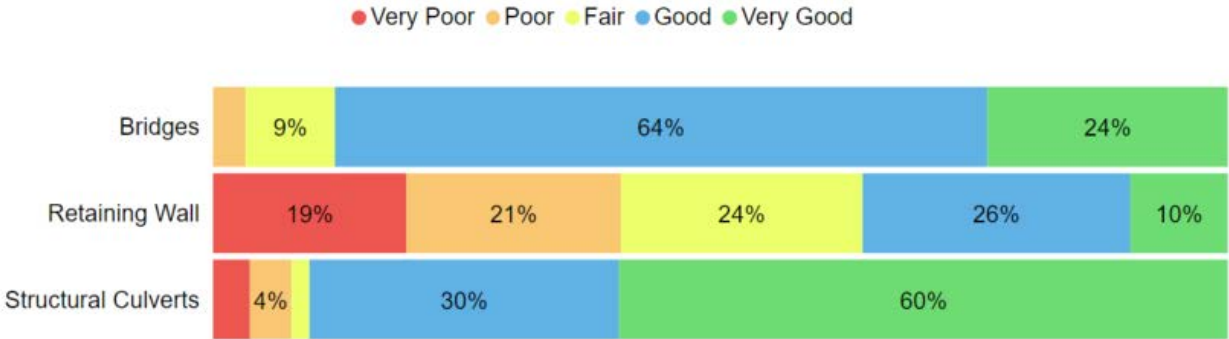
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	32	100% User-Defined Cost	\$54,476,920
Retaining Wall	10	100% User-Defined Cost	\$9,064,140
Structural Culverts	17	100% User-Defined Cost	\$10,590,500
			\$74,131,560



1.16.2 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	74%	Good	100% Assessed
Retaining Wall	49%	Fair	90% Assessed
Structural Culverts	85%	Very Good	100% Assessed
	72%	Good	99% Assessed



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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the 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 (or 4 years depending on contractor recommendations) in accordance with the Ontario Structure Inspection Manual (OSIM)

1.16.3 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	50-125 Years	56.9	62.0
Retaining Wall	75-100 Years	24.7	70.9
Structural Culverts	75-100 Years	47.3	61.6
		48.7	63.4



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.

1.16.4 Lifecycle Management Strategy

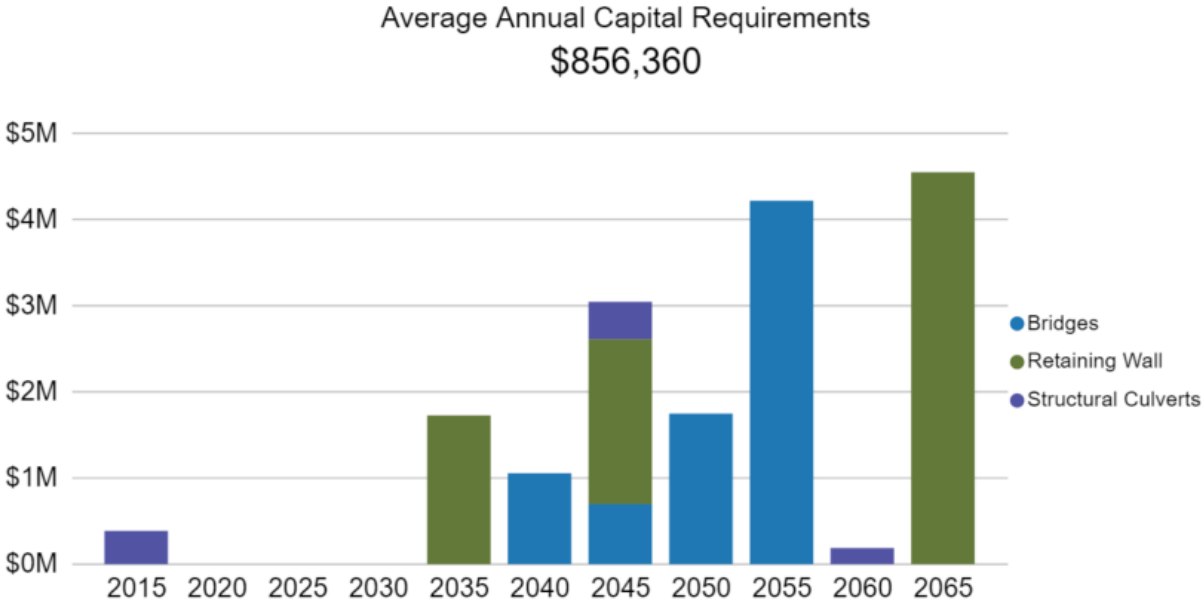
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	All lifecycle activities are driven by the results of mandated structural inspections completed according to the Ontario Structure Inspection Manual (OSIM)
Inspection	The most recent inspection report was completed in 2019

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City 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 A.

1.16.5 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.

Consequence	5 Severe	7 Assets \$10,842,800.00	0 Assets \$0.00	1 Asset \$3,548,400.00	1 Asset \$3,045,000.00	0 Assets \$0.00
	4 Major	9 Assets \$20,905,920.00	3 Assets \$6,824,600.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	3 Moderate	12 Assets \$4,731,000.00	5 Assets \$4,337,600.00	1 Asset \$386,500.00	2 Assets \$2,612,700.00	0 Assets \$0.00
	2 Minor	3 Assets \$6,194,200.00	2 Assets \$329,800.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	1 Insignificant	5 Assets \$376,040.00	3 Assets \$3,309,600.00	3 Assets \$3,905,350.00	1 Asset \$1,055,800.00	1 Asset \$1,726,250.00
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.16.6 Levels of Service

The following tables identify the City’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 City has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (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. Only one of the municipality's structures (Avondale Avenue Cemetery Entrance Bridge) 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

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of bridges in the City with loading or dimensional restrictions	3%
Quality	Average bridge condition index value for bridges in the City	74
	Average bridge condition index value for structural culverts in the City	85
Performance	Capital re-investment rate	0.80%

1.16.7 Recommendations

Data Review/Validation

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

Risk Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Lifecycle Management Strategies

- This AMP includes capital costs associated with the major rehabilitation/reconstruction of bridges and culverts as estimated by the OSIMs contractors. Staff should input more accurate/realistic values as that information becomes available.

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 City 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.

1.17 Stormwater Network

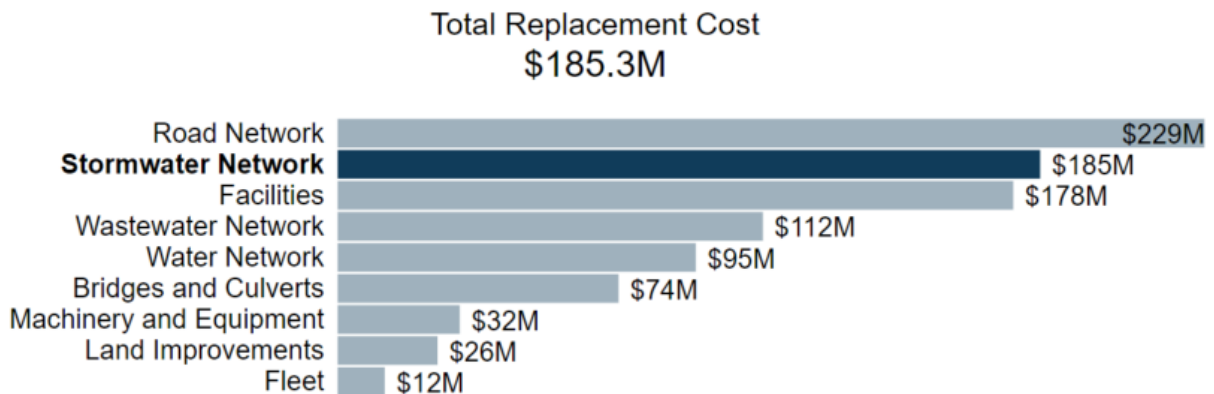
The City is responsible for owning and maintaining a stormwater network of storm sewer mains, catch basins, culverts (less than 3m diameter) and other supporting infrastructure.

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

1.17.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Catch Basins	4160	100% CPI Tables	\$13,405,432
Culverts	3,586 m	100% CPI Tables	\$1,850,717
Mains	169,143 m	100% Cost/Unit	\$124,069,505
Manholes	2206	100% CPI Tables	\$15,094,442
Municipal Drains ³	25,897 m	100% CPI Tables	\$1,570,998
Other ⁴	4,164 m	100% CPI Tables	\$15,621,297
Pump Stations	1	100% CPI Tables	\$961,564
Stormwater Pond Systems	319121 m ²	100% CPI Tables	\$12,723,392
			\$185,297,347



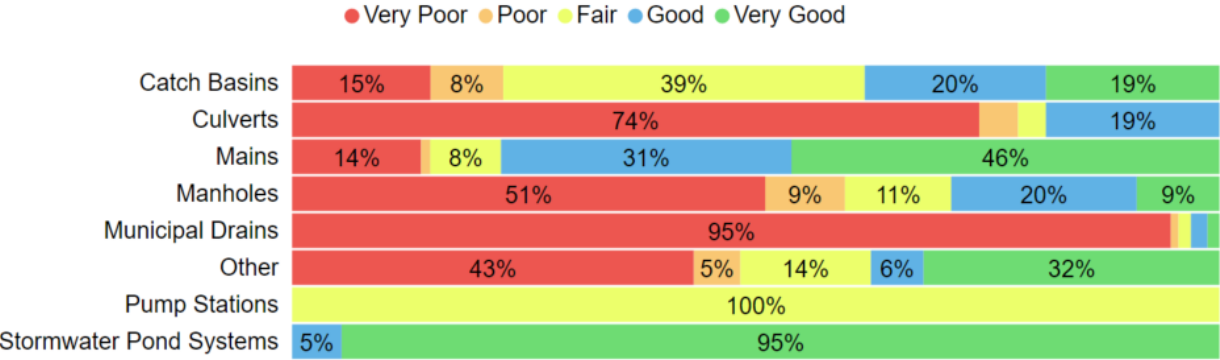
³ Although the City does not fully own the municipal drains, it is still partially responsible for administering maintenance of the system

⁴ Other includes storm ditch inlets, outfalls, and arches

1.17.2 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
Catch Basins	52%	Fair	Age Based
Culverts	17%	Very Poor	Age Based
Mains	69%	Good	Age Based
Manholes	61%	Good	Age Based
Municipal Drains	N/A	Fair - Poor	Age Based
Other	41%	Fair	Age Based
Pump Stations	40%	Fair	Assessed Condition
Stormwater Pond Systems	85%	Very Good	Age Based
	62%	Good	2% Assessed



Current Approach to Condition Assessment

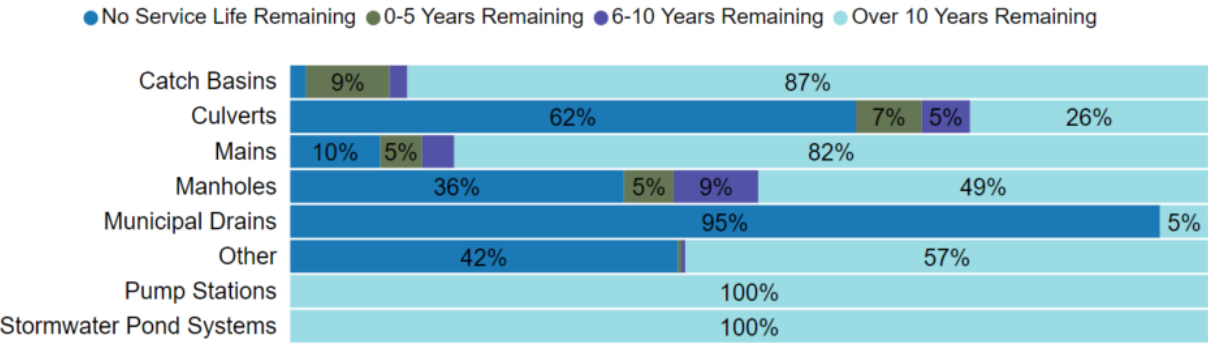
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality’s current approach:

- CCTV inspections occur on select storm mains on a project basis, but is recommended to do every 10-15 years. Trenchless re-lining activities are completed on select sewer mains in tandem with CCTV inspections.
- System flushing is usually performed every 5 years. Catch basins and oil-grit separators are inspected and cleaned annually to avoid blockages.

1.17.3 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)
Catch Basins	100 Years	47.2	52.8
Culverts	35 Years	34.0	0.3
Mains	35-100 Years	44.3	34.6
Manholes	100 Years	38.9	61.1
Municipal Drains	80 Years	101.2	-21.2
Other	100 Years	43.7	56.3
Pump Stations	50 Years	30.0	20
Stormwater Pond Systems	75-100 Years	15.7	71.0
		44.1	36.0



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.

1.17.4 Lifecycle Management Strategy

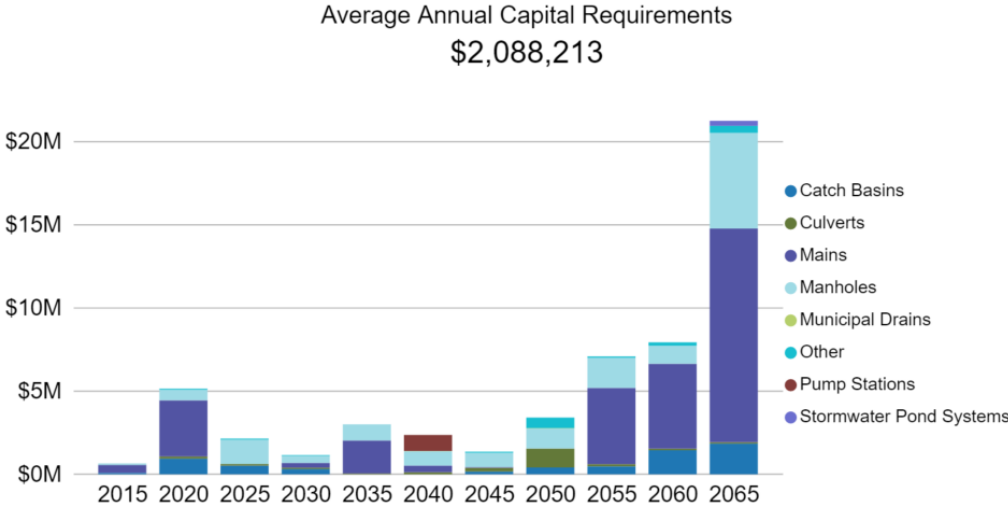
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the City’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
Maintenance	Primary activities include catch basin cleaning and storm main flushing, but only a small percentage of the entire network is completed per year
Maintenance	CCTV inspections and cleaning is completed as budget becomes available and this information will be used to drive forward rehabilitation and replacement plans
Maintenance	Staff will be undergoing major maintenance/clean-outs in the next few years to improve the service life of their stormwater pond systems
Rehabilitation	Trenchless re-lining reduces total lifecycle costs but requires a formal condition assessment program to determine viability
Replacement	Without the availability of up-to-date condition assessment information replacement activities are purely reactive in nature

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City 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 A.

1.17.5 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.

Consequence	5 Severe	4 Assets \$9,392,025.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	4 Major	2 Assets \$2,148,631.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	3 Moderate	5 Assets \$1,931,572.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	2 Minor	7 Assets \$1,565,192.00	1 Asset \$299,771.00	2 Assets \$748,541.25	0 Assets \$0.00	1 Asset \$961,564.00
	1 Insignificant	2,615 Assets \$69,134,312.93	2,465 Assets \$48,796,993.56	2,028 Assets \$10,178,659.30	931 Assets \$17,086,783.55	2,118 Assets \$23,053,301.66
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.17.6 Levels of Service

The following tables identify the City’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 City 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	70 ⁵
Scope	% of the municipal stormwater management system resilient to a 5-year storm	80% ⁶
Performance	Capital reinvestment rate	0.7%

^{5 5} According to the City’s 2004 Stormwater Master Plan

1.17.7 Recommendations

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

- 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 City 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.

1.18 Facilities

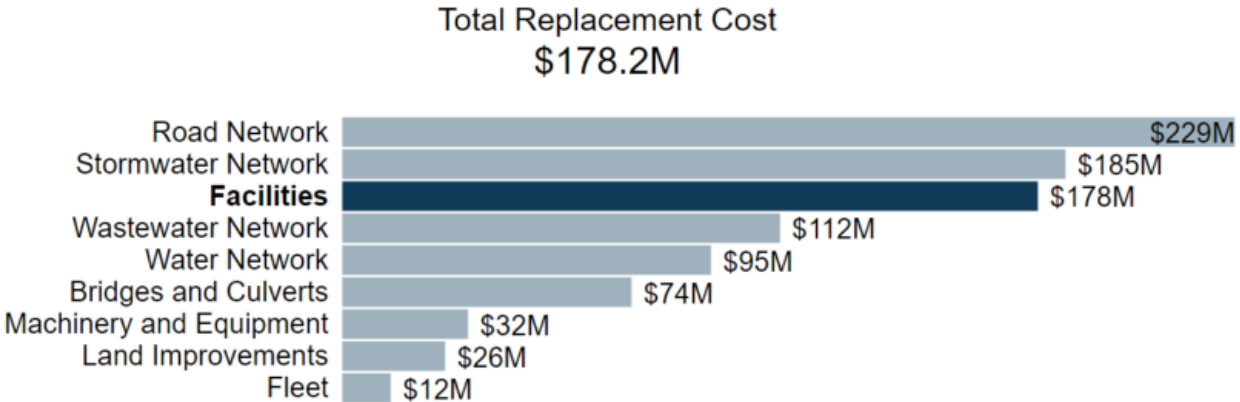
The City of Stratford owns and maintains several facilities and recreation centres that provide key services to the community. These include:

- administrative offices
- public libraries
- fire stations and associated offices and facilities
- public works garages and storage sheds
- arenas and community centres
- public housing

1.18.1 Asset Inventory & Replacement Cost

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

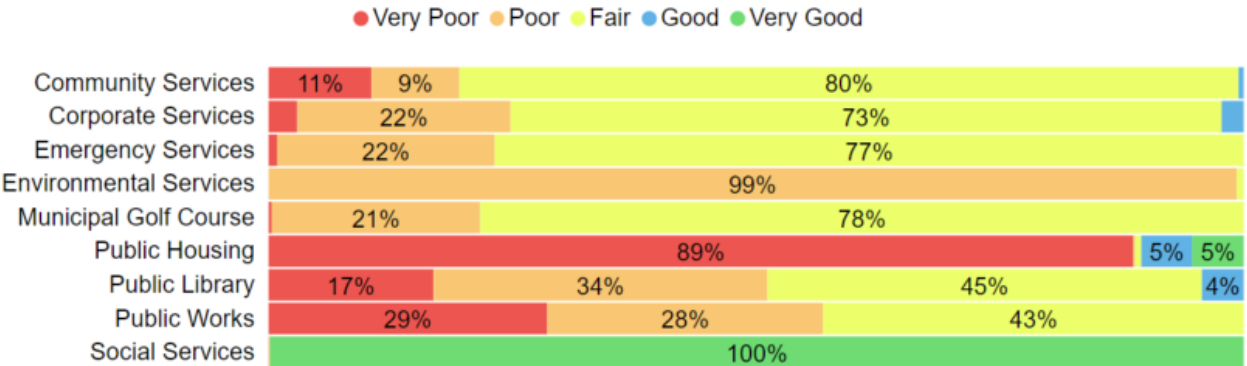
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Community Services	11,446	100% User-Defined Cost	\$86,274,936
Corporate Services	835	100% User-Defined Cost	\$12,040,000
Emergency Services	1,210	100% User-Defined Cost	\$11,420,000
Environmental Services	5	100% User-Defined Cost	\$199,127
Municipal Golf Course	97	100% User-Defined Cost	\$1,000,000
Public Library	496	100% User-Defined Cost	\$2,500,000
Public Housing	208	100% CPI Tables	\$47,802,639
Public Works	694	100% User-Defined Cost	\$11,726,625
Social Services	6	100% CPI Tables	\$5,248,693
			\$178,212,020



1.18.2 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
Community Services	53%	Fair	90% Assessed
Corporate Services	55%	Fair	100% Assessed
Emergency Services	55%	Fair	100% Assessed
Environmental Services	56%	Fair	95% Assessed
Municipal Golf Course	55%	Fair	100% Assessed
Public Library	46%	Fair	100% Assessed
Public Housing	12%	Very Poor	Age Based
Public Works	40%	Fair	66% Assessed
Social Services	99%	Very Good	Age Based
	43%	Fair	64% Assessed



To ensure that the City’s Facilities continues to provide an acceptable level of service, the City 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 Facilities.

Current Approach to Condition Assessment

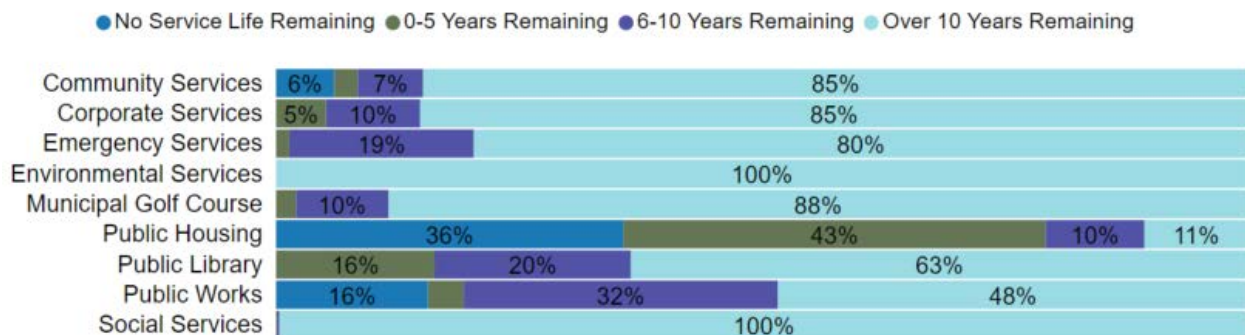
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality’s current approach:

- Detailed condition assessments have been completed in 2019 for 23 of the City’s most critical buildings. This included an assessment of each facility’s general condition, required repairs and recommended upgrades
- Maintenance activities are undertaken as a result of internal inspections, prioritizing activities related to health and safety and regulatory compliance.
- Social Housing buildings are managed in great detail/componentization and are inspected on a regular basis.

1.18.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Community Services	5-50 Years	21.0	12.0
Corporate Services	5-50 Years	23.9	17.6
Emergency Services	5-50 Years	19.6	19.0
Environmental Services	5-50 Years	22.7	23.3
Municipal Golf Course	10-50 Years	34.1	17.3
Public Library	5-50 Years	27.7	8.9
Public Housing	10-50 Years	12.8	12.8
Public Works	5-50 Years	22.0	19.0
Social Services	10-50 years	2.3	21.8
		21.0	17.4



1.18.4 Lifecycle Management Strategy

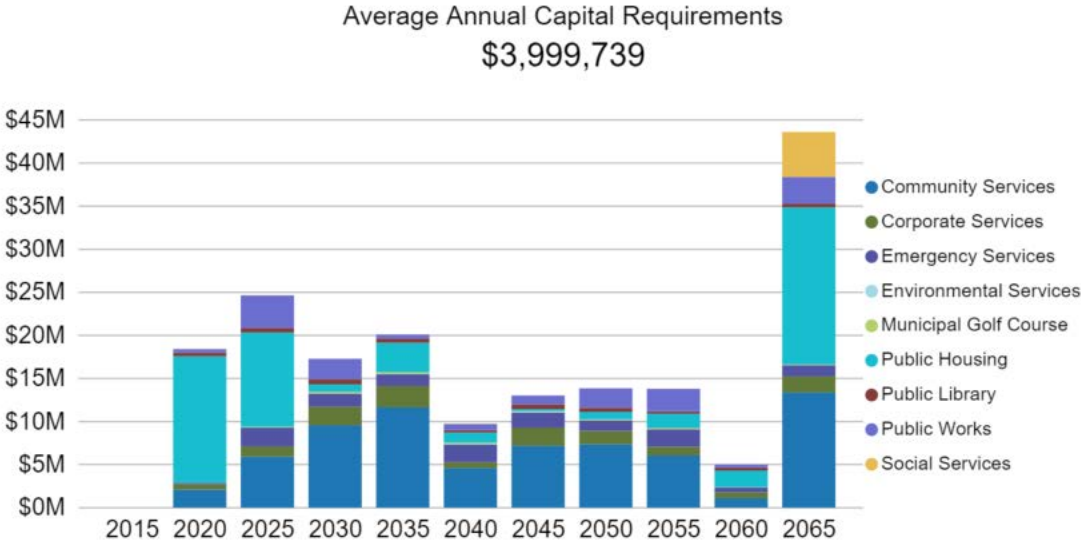
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the City’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
Maintenance / Rehabilitation	Critical buildings have more detailed maintenance and rehabilitation schedule, while the maintenance of other facilities are dealt with on a case-by-case basis
Replacement	As a supplement to the knowledge and expertise of municipal staff the City regularly works with contractors to complete Building Condition Assessments
Replacement	Assessments are completed strategically as buildings approach their end-of-life to determine whether replacement or rehabilitation is appropriate

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City 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 A.

1.18.5 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.

Consequence	5 Severe	1 Asset \$5,181,551.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	4 Major	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	2 Assets \$5,545,308.00
	3 Moderate	1 Asset \$306,719.00	2 Assets \$1,538,244.00	1 Asset \$575,523.00	0 Assets \$0.00	7 Assets \$13,680,471.00
	2 Minor	6 Assets \$1,119,075.00	4 Assets \$788,788.00	0 Assets \$0.00	3 Assets \$942,189.00	20 Assets \$25,501,793.00
	1 Insignificant	67 Assets \$1,367,224.00	129 Assets \$2,804,198.00	846 Assets \$95,403,211.00	376 Assets \$17,153,703.00	91 Assets \$10,254,023.00
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.18.6 Levels of Service

Facilities are considered a non-core asset category. As such, the City has until July 1, 2023 to determine the qualitative descriptions and technical metrics that measure the current level of service provided. Below are metrics that City staff will start tracking as information is gathered.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description of the current condition of municipal facilities and the plans that are in place to maintain or improve the provided level of service	See Technical Levels of Service

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	# of unplanned facility closures	TBD
Scope	# of service requests about unsafe conditions in facilities	TBD
Quality	% of facilities that are in good or very good condition	6
Quality	% of facilities that are in poor or very poor condition	41
Performance	Capital reinvestment rate	0.7%

1.18.7 Recommendations

Asset Inventory

- Staff have started breaking down their facilities into major components, and should continue to do so for all building assets to allow for component-based lifecycle planning.

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

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

1.19 Machinery & Equipment

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

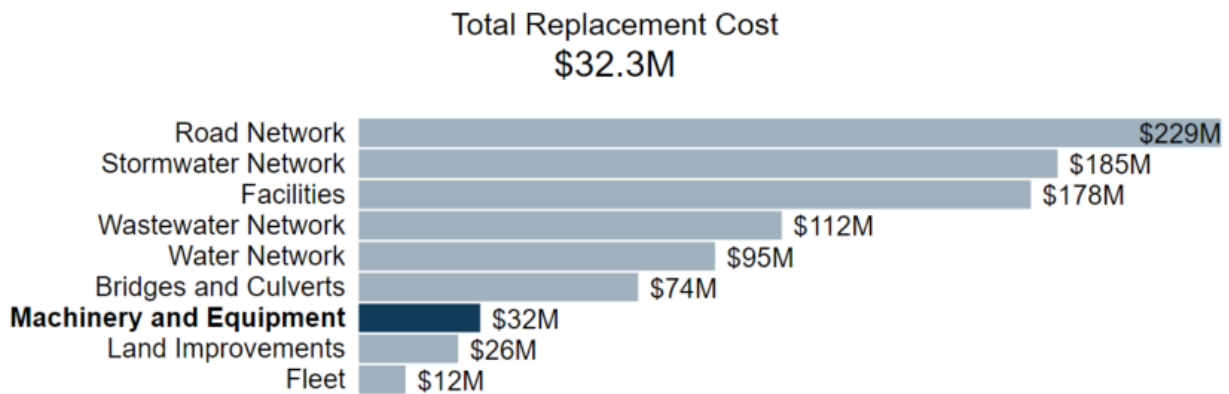
- Landscaping equipment to maintain public parks
- Fire equipment to support the delivery of emergency services
- Plows and sand hoppers to provide winter control activities

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

1.19.1 Asset Inventory & Replacement Cost

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

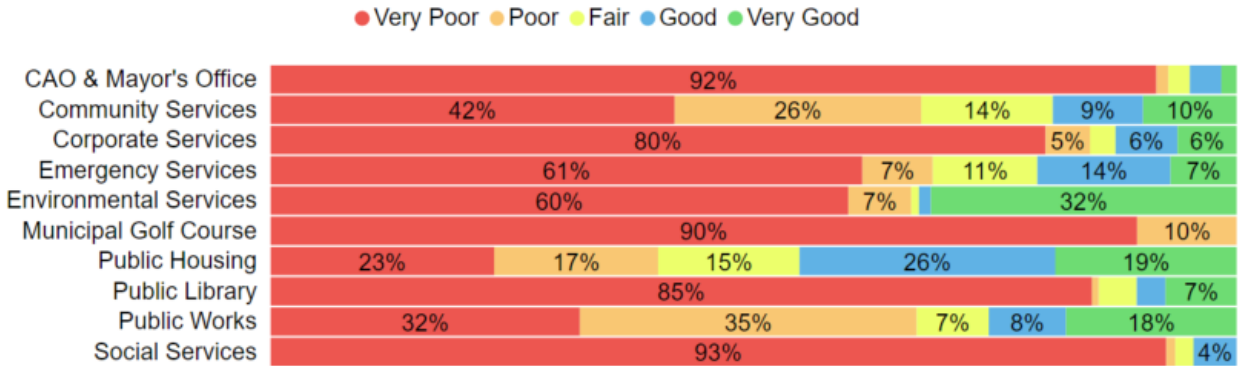
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
CAO & Mayor's Office	13	100% CPI Tables	\$105,407
Community Services	170	100% CPI Tables	\$4,981,887
Corporate Services	1045	100% CPI Tables	\$4,714,726
Emergency Services	857	100% CPI Tables	\$5,969,766
Environmental Services	47	100% CPI Tables	\$4,676,230
Municipal Golf Course	541	100% CPI Tables	\$1,159,894
Public Library	111,222	100% CPI Tables	\$4,197,767
Public Housing	136	100% CPI Tables	\$474,891
Public Works	82	100% CPI Tables	\$4,928,800
Social Services	88	100% CPI Tables	\$1,059,431
			\$32,268,799



1.19.2 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
CAO & Mayor's Office	5%	Very Poor	Age Based
Community Services	24%	Poor	Age Based
Corporate Services	14%	Very Poor	Age Based
Emergency Services	23%	Poor	Age Based
Environmental Services	32%	Poor	Age Based
Municipal Golf Course	3%	Very Poor	Age Based
Public Library	11%	Very Poor	Age Based
Public Housing	51%	Fair	Age Based
Public Works	37%	Poor	Age Based
Social Services	5%	Very Poor	Age Based
	24%	Poor	Age Based



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

Current Approach to Condition Assessment

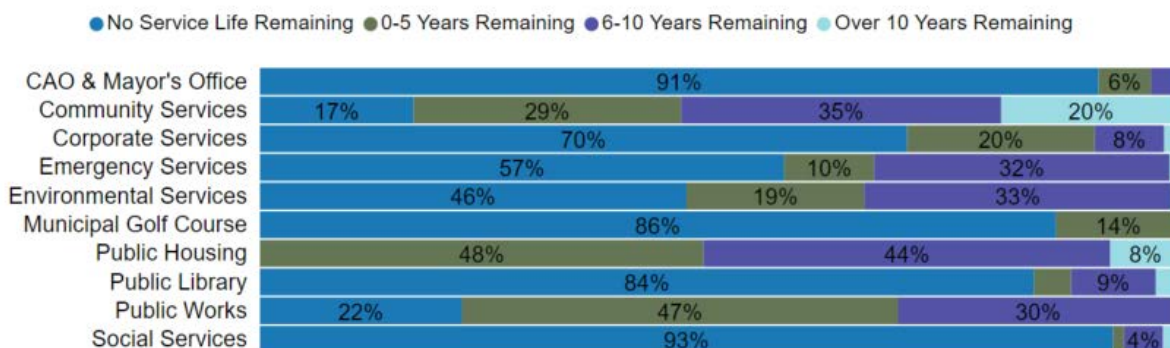
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections of machinery & equipment to ensure they are in state of adequate repair. The replacement of machinery & equipment depends on deficiencies identified by operators that may impact their ability to complete required tasks.
- There are no formal condition assessment programs in place, although some machinery & equipment were assigned cursory condition ratings for this AMP

1.19.3 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)
CAO & Mayor's Office	5-15 Years	4.8	4.1
Community Services	5-30 Years	4.8	6.1
Corporate Services	5-20 Years	7.8	0.0
Emergency Services	4-40 Years	7.1	2.7
Environmental Services	10-50 Years	11.1	2.7
Municipal Golf Course	10-20 Years	22.1	-5.4
Public Library	5-20 Years	4.0	4.5
Public Housing	10-25 Years	5.0	5.6
Public Works	10-20 Years	7.0	3.4
Social Services	5-25 Years	4.1	6.5
		6.6	3.7



1.19.4 Lifecycle Management Strategy

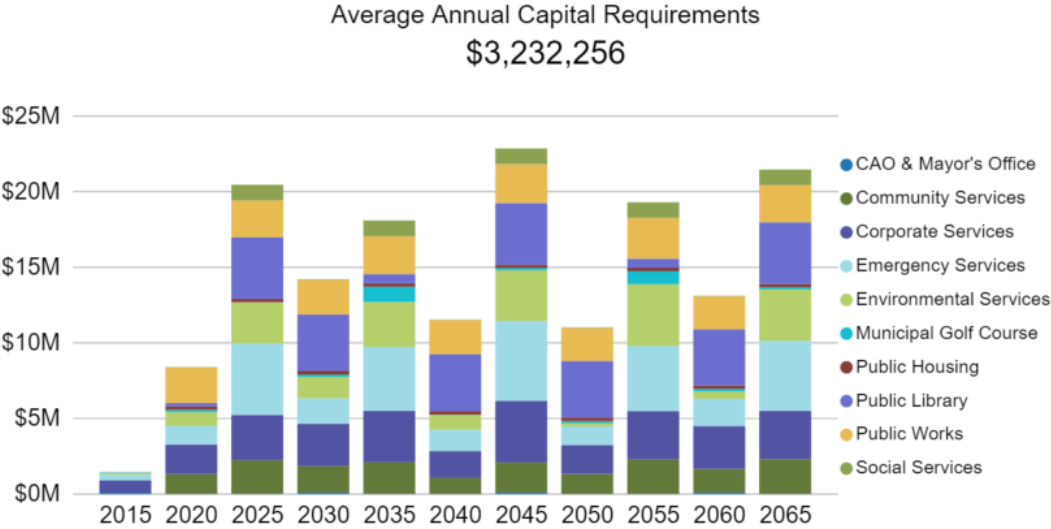
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance/Rehabilitation	Maintenance program varies by department
Maintenance/Rehabilitation	Fire Protection Services equipment is subject to a much more rigorous inspection and maintenance program compared to most other departments
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 City 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 A.

1.19.5 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.

Consequence	5 Severe	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	1 Asset \$3,477,663.00
	4 Major	2 Assets \$1,378,920.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	1 Asset \$969,725.00
	3 Moderate	3 Assets \$835,616.00	2 Assets \$710,503.00	2 Assets \$1,067,891.00	1 Asset \$557,611.00	5 Assets \$3,080,371.00
	2 Minor	4 Assets \$596,155.00	2 Assets \$370,559.00	2 Assets \$297,915.00	9 Assets \$2,154,481.00	14 Assets \$2,921,374.00
	1 Insignificant	118 Assets \$1,126,807.00	240 Assets \$1,261,730.00	186 Assets \$751,739.00	127 Assets \$1,467,325.00	309 Assets \$9,242,414.00
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.19.6 Levels of Service

Machinery & Equipment is considered a non-core asset category. As such, the City has until July 1, 2023 to determine the qualitative descriptions and technical metrics that measure the current level of service provided. Below are metrics that City staff will start tracking as information is gathered.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description of the current condition of machinery & equipment and the plans that are in place to maintain or improve the provided level of service	See Technical Levels of Service

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of heavy equipment inspected annually	TBD
Quality	% of machinery & equipment that is in good or very good condition	19
Quality	% of machinery & equipment that is in poor or very poor condition	74
Performance	Capital reinvestment rate	5.8%

1.19.7 Recommendations

Replacement Costs

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

Condition Assessment Strategies

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

Risk Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

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

1.20 Fleet

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

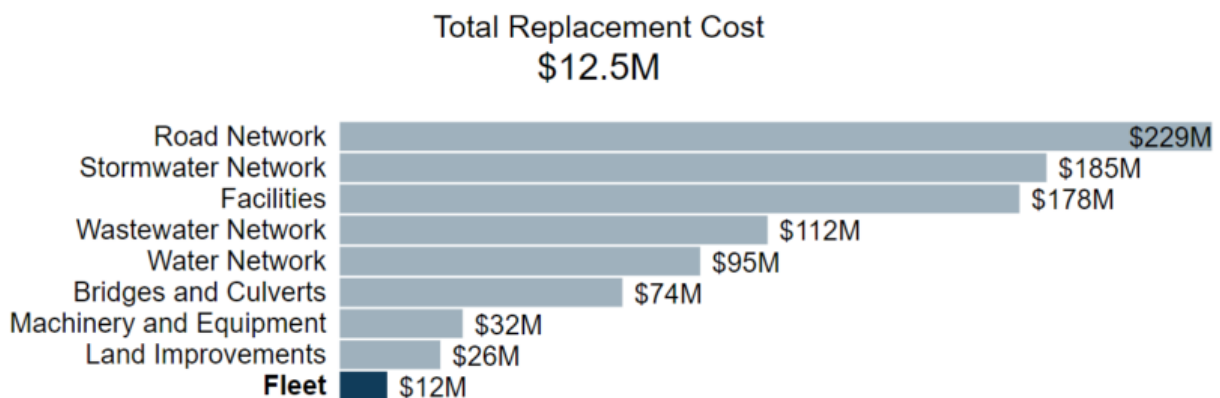
- fire rescue vehicles to provide emergency services
- pick-up trucks to support the maintenance of the transportation network and address service requests for Environmental Services and Parks & Recreation
- transit buses to support affordable transportation

Staff classify their Fleet into three major classifications: Emergency Services, Transit and Corporate Fleet.

1.20.1 Asset Inventory & Replacement Cost

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

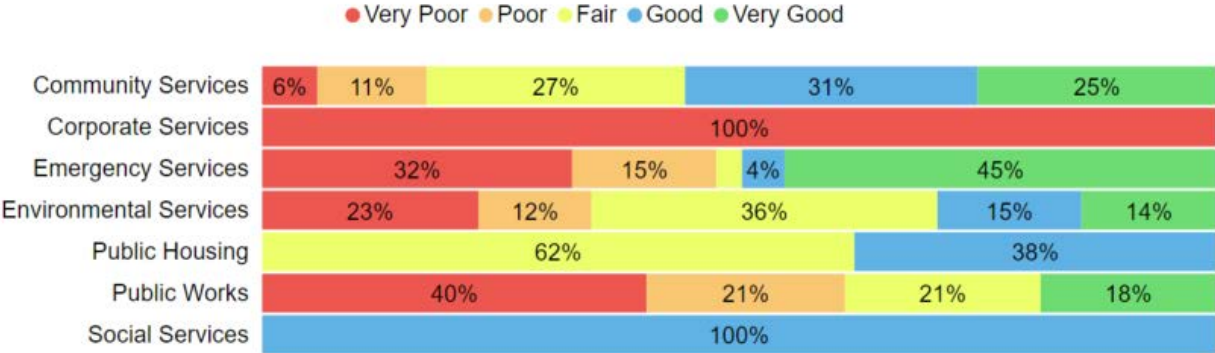
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Community Services	42	100% CPI Tables	\$6,127,981
Corporate Services	1	100% User-Defined Cost	\$150,000
Emergency Services	38	18% CPI Tables; 82% User-Defined Cost	\$4,930,555
Environmental Services	8	100% CPI Tables	\$318,432
Public Housing	4	100% CPI Tables	\$152,515
Public Works	24	100% CPI Tables	\$768,577
Social Services	1	100% CPI Tables	\$34,147
			\$12,482,207



1.20.2 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
Community Services	63%	Good	Age Based
Corporate Services	0%	Very Poor	Age Based
Emergency Services	42%	Fair	Age Based
Environmental Services	46%	Fair	Age Based
Public Housing	62%	Good	Age Based
Public Works	35%	Poor	Age Based
Social Services	67%	Good	Age Based
	51%	Fair	Age Based



To ensure that the City's Fleet continue to provide an acceptable level of service, the City should monitor the average condition of all assets.

Current Approach to Condition Assessment

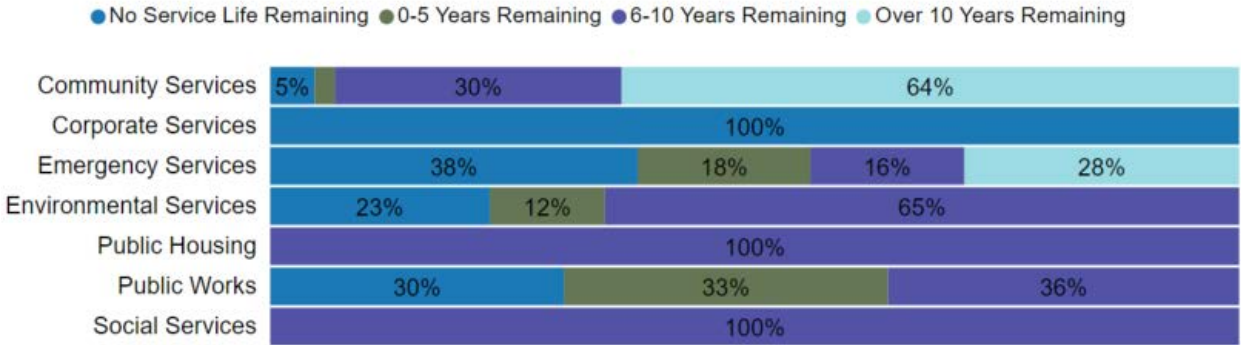
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete daily visual inspections and documentation of vehicles to ensure they are in state of adequate repair prior to operation
- The mileage of vehicles is used as a proxy to determine remaining useful life and relative vehicle condition except for the Fire Department
- End of Life replacement generally occurs as mandated by MTO and NFPA requirements

1.20.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Fleet 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)
Community Services	10-20 Years	6.6	8.6
Corporate Services	15 Years	22.3	-7.3
Emergency Services	10-25 Years	7.5	3.1
Environmental Services	10 Years	6.2	3.8
Public Housing	10 Years	3.8	6.3
Public Works	7-10 Years	8.1	1.6
Social Services	5 Years	3.3	6.6
		7.2	4.8



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.

1.20.4 Lifecycle Management Strategy

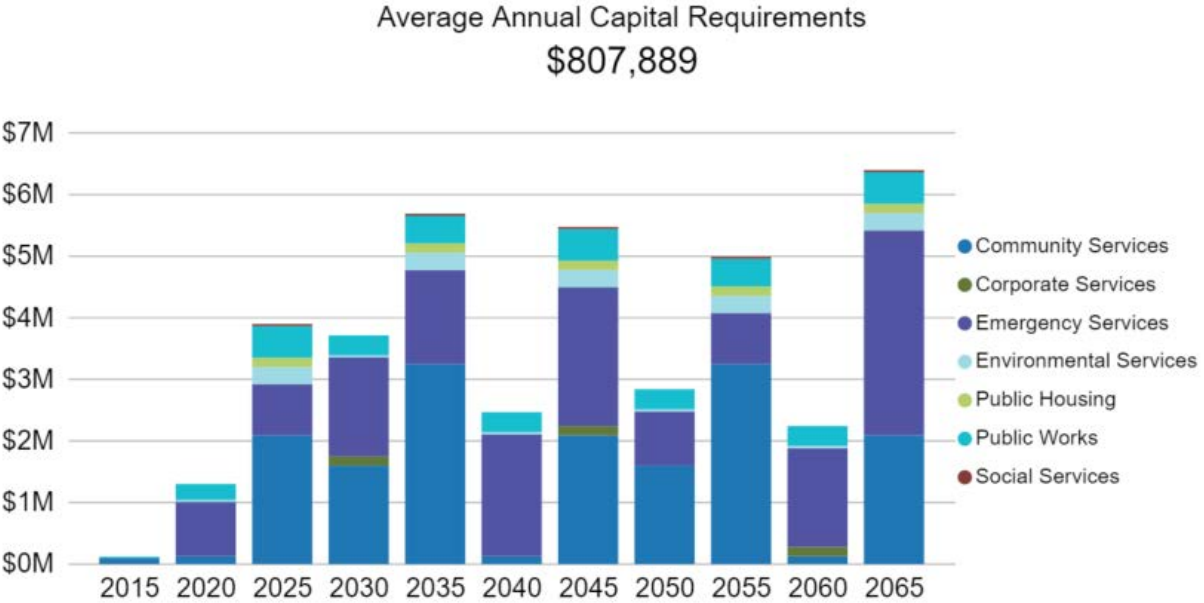
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

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

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City 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 A.

1.20.5 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.

Consequence	5 Severe	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	4 Major	3 Assets \$1,782,262.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	3 Moderate	1 Asset \$700,000.00	3 Assets \$1,488,516.00	2 Assets \$1,110,023.00	2 Assets \$1,248,976.00	1 Asset \$1,800,000.00
	2 Minor	0 Assets \$0.00	1 Asset \$135,114.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	1 Insignificant	27 Assets \$1,201,889.00	15 Assets \$633,235.00	20 Assets \$1,019,689.00	13 Assets \$484,952.00	25 Assets \$923,897.00
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.20.6 Levels of Service

Vehicles are considered a non-core asset category. As such, the City has until July 1, 2023 to determine the qualitative descriptions and technical metrics that measure the current level of service provided. Below are metrics that City staff will start tracking as information is gathered.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description of the current condition of municipal vehicles and the plans that are in place to maintain or improve the provided level of service	See Technical Levels of Service

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	Average % of unscheduled downtime for vehicles	TBD
Quality	% of vehicles that are in good or very good condition	49
Quality	% of vehicles that are in poor or very poor condition	34
Performance	Capital reinvestment rate	7.1%

1.20.7 Recommendations

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment and centralize within CityWide.
- 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

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

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

1.21 Land Improvements

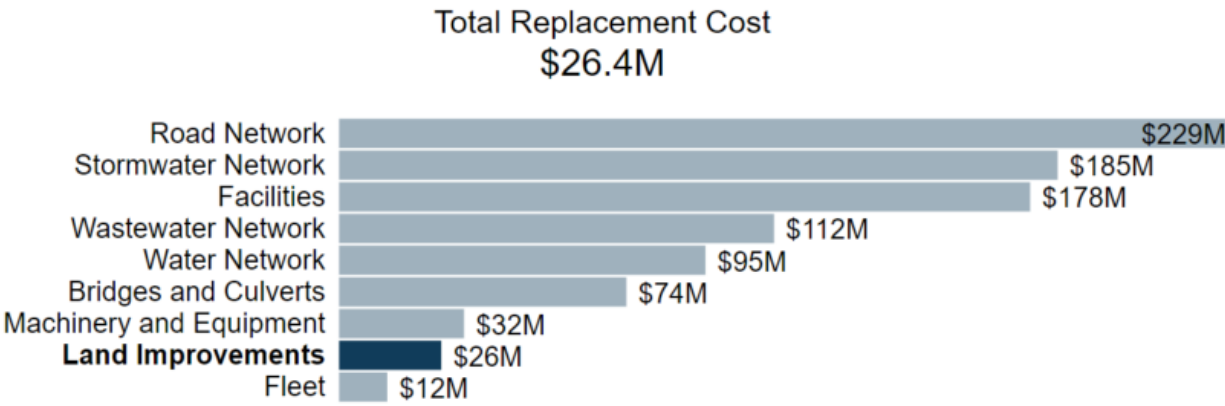
The City of Stratford owns a plethora of assets that are considered Land Improvements. This category includes:

- Parking lots for municipal facilities
- Parks, parkettes, trails
- Sport structures, tennis courts, skate parks, playgrounds
- Fencing and signage
- Miscellaneous landscaping and other assets

1.21.1 Asset Inventory & Replacement Cost

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

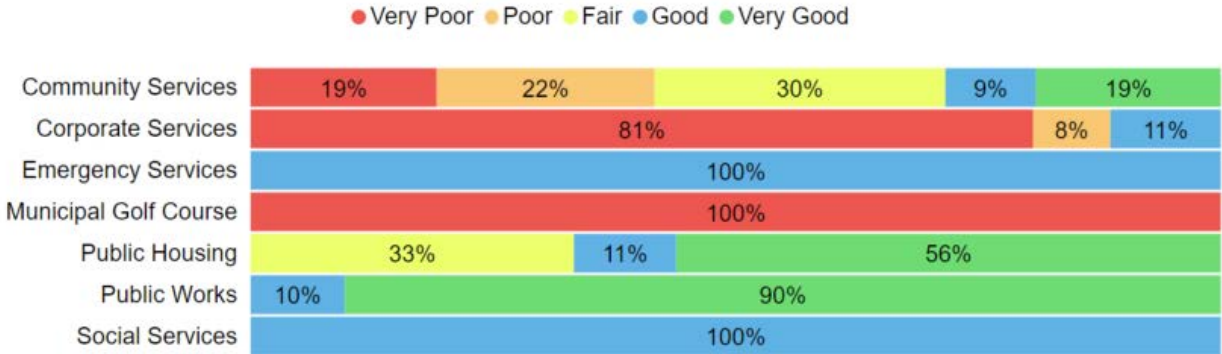
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Community Services	93	100% CPI Tables	\$12,238,085
Corporate Services	10	100% CPI Tables	\$10,047,423
Emergency Services	1	100% CPI Tables	\$17,091
Municipal Golf Course	1	100% CPI Tables	\$346,231
Public Housing	11	100% CPI Tables	\$264,578
Public Works	5	100% CPI Tables	\$3,440,400
Social Services	2	100% CPI Tables	\$54,990
			\$26,408,798



1.21.2 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
Community Services	50%	Fair	11% Assessed
Corporate Services	9%	Very Poor	Age Based
Emergency Services	75%	Good	Age Based
Municipal Golf Course	0%	Very Poor	Age Based
Public Housing	79%	Good	Age Based
Public Works	90%	Very Good	Age Based
Social Services	70%	Good	Age Based
	40%	Fair	5% Assessed



To ensure that the City’s Land Improvements continues to provide an acceptable level of service, the City 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 to ensure they are in state of adequate repair. Parks are subjected to scheduled mowing and landscaping, prescribed by asset usage and season.
- Parks are subject to weekly inspections using internal resources. Play structures are inspected for CSA compliance.

- Playground structures are replaced on a 10-year cycle. Re-claying is done on an as-needed basis
- Parking lots are crack sealed on an as-needed basis

1.21.3 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)
Community Services	10-60 Years	18.3	11.2
Corporate Services	20-40 Years	27.6	-1.6
Emergency Services	30 Years	7.5	22.5
Municipal Golf Course	30 Years	35.5	-5.5
Public Housing	20-25 Years	4.3	16.5
Public Works	20-60 Years	4.2	27.8
Social Services	20 Years	6.0	14.0
		17.1	11.3



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.

1.21.4 Lifecycle Management Strategy

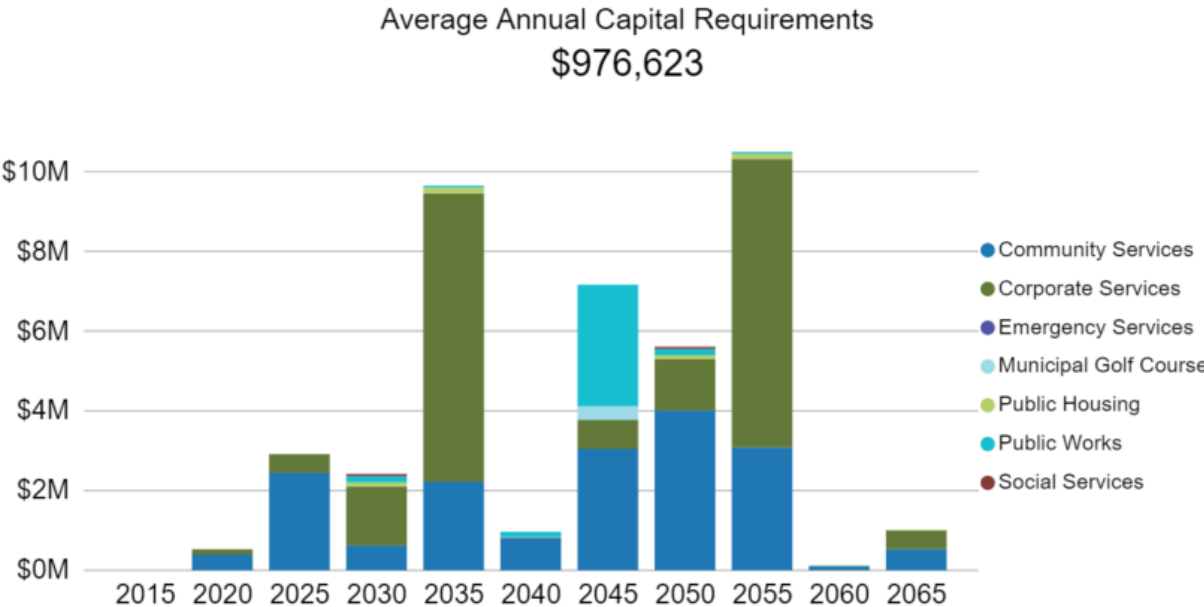
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

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

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City 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 A.

1.21.5 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.

Consequence	5 Severe	2 Assets \$4,346,650.00	1 Asset \$1,145,605.00	1 Asset \$2,845,635.00	0 Assets \$0.00	1 Asset \$5,611,048.00
	4 Major	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	1 Asset \$957,775.00	1 Asset \$1,083,550.00
	3 Moderate	1 Asset \$271,076.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	2 Assets \$1,201,601.00
	2 Minor	4 Assets \$652,238.00	4 Assets \$624,467.00	2 Assets \$500,360.00	4 Assets \$2,152,108.00	3 Assets \$785,473.00
	1 Insignificant	17 Assets \$487,063.00	25 Assets \$950,586.00	10 Assets \$445,017.00	12 Assets \$438,673.00	32 Assets \$2,111,016.00
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.21.6 Levels of Service

Land Improvements are considered a non-core asset category. As such, the City has until July 1, 2023 to determine the qualitative descriptions and technical metrics that measure the current level of service provided. Below are metrics that City staff will start tracking as information is gathered.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description of the current condition of parks and the plans that are in place to maintain or improve the provided level of service	See Technical Levels of Service

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of households that have access to public open spaces within 10 minutes of walking distance from their home	TBD
Quality	% of parks and recreation assets that are in good or very good condition	28
Quality	% of parks and recreation assets that are in poor or very poor condition	61
Performance	Capital reinvestment rate	1.9%

1.21.7 Recommendations

Replacement Costs

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

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk assets and update within CityWide.
- 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

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

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

Analysis of Rate-funded Assets

Key Insights

- Rate-funded assets are valued at \$207 million
- 57% 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 \$2.7 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

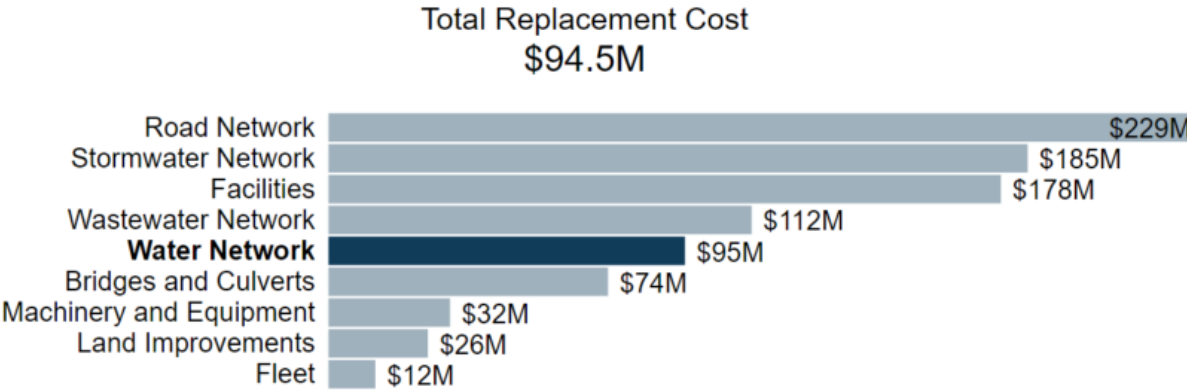
1.22 Water Network

The water services provided by the City are overseen by the Environmental Services department. The department is responsible for watermains, hydrants, wells, water towers and reservoirs. Enhancement and growth-related activities are recommended in the 2018 Water Infrastructure Evaluation and Needs Assessment Report over a 20-year horizon.

1.22.1 Asset Inventory & Replacement Cost

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

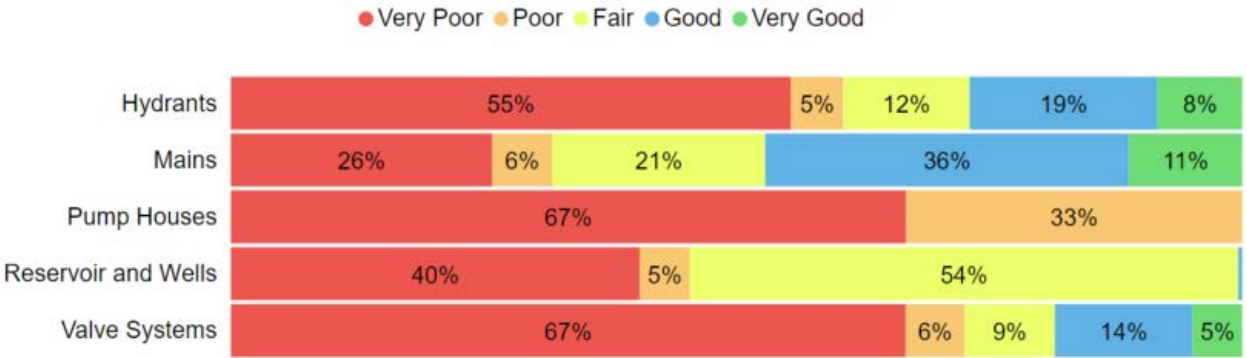
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Hydrants	905	100% CPI Tables	\$4,122,443
Mains	184,240 m	100% Cost/Unit	\$66,189,229
Pump Houses	7	100% Cost/Unit	\$4,511,590
Reservoir and Wells	19	100% CPI Tables	\$14,787,619
Valve Systems	1,661	100% CPI Tables	\$4,896,946
			\$94,507,827



1.22.2 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Hydrants	30%	Poor	Age Based
Mains	74%	Good	Age Based
Pump Houses	14%	Very Poor	Age Based
Reservoir and Wells	34%	Poor	Assessed Condition
Valve Systems	21%	Poor	Age Based
	57%	Fair	Age Based



To ensure that the City’s Water Network continues to provide an acceptable level of service, the City should monitor the average condition of all assets.

Current Approach to Condition Assessment

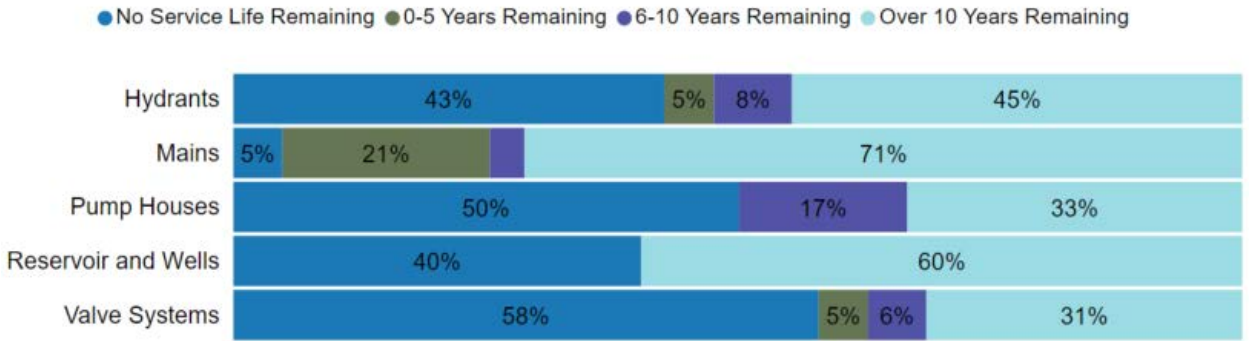
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality’s current approach:

- Staff primarily rely on the age, pipe material, break history, and dirty water complaints to determine the projected condition of water mains.
- A trenchless water relining program is being developed for 2020.
- Main flushing and valve turning is completed on the network (300 valves/year). Hydrant valves are exercised regularly
- Fire flow and pressure testing is performed annually (50/year). Uni-directional flushing is performed over a 4 year cycle.

1.22.3 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)
Hydrants	50 Years	44.5	5.5
Mains	50-100 Years	48.8	26.0
Pump Houses	35-50 Years	48.6	-0.8
Reservoir and Wells	50 Years	57.8	2.7
Valve Systems	35 Years	44.3	-9.3
		46.0	7.0

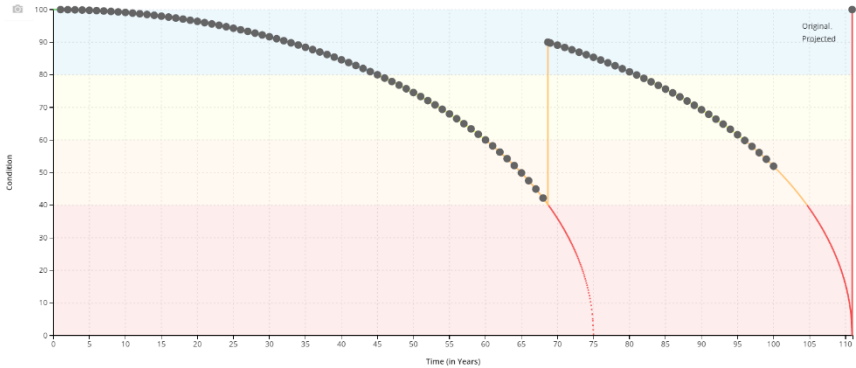


Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

1.22.4 Lifecycle Management Strategy

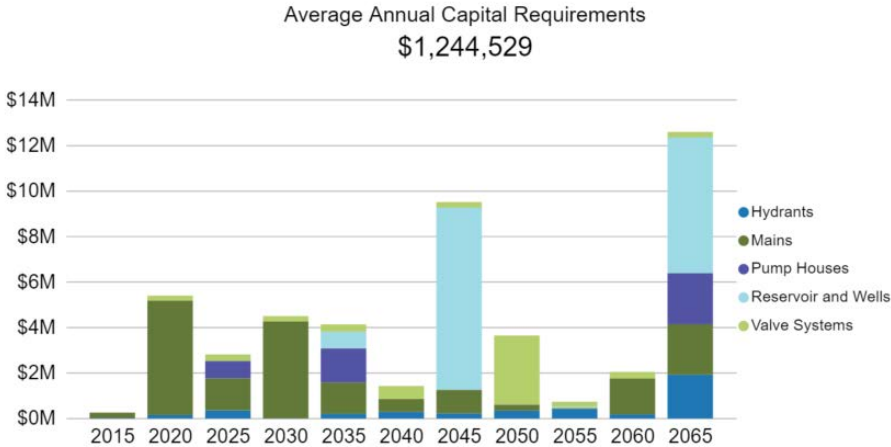
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset’s characteristics, location, utilization, maintenance history and environment. The following lifecycle strategy has been developed as a proactive approach to managing the lifecycle of water mains.

Water Mains		
Event Name	Event Class	Event Trigger
Flushing/Valve Exercising	Maintenance	Annually
Uni-directional flushing	Maintenance	Every 4 Years
Cathodic Protection	Preventative Maintenance	Annually for first 25 Years
Trenchless Re-lining	Rehabilitation	40%-60% Condition
Full Reconstruction	Replacement	N/A



Forecasted Capital Requirements

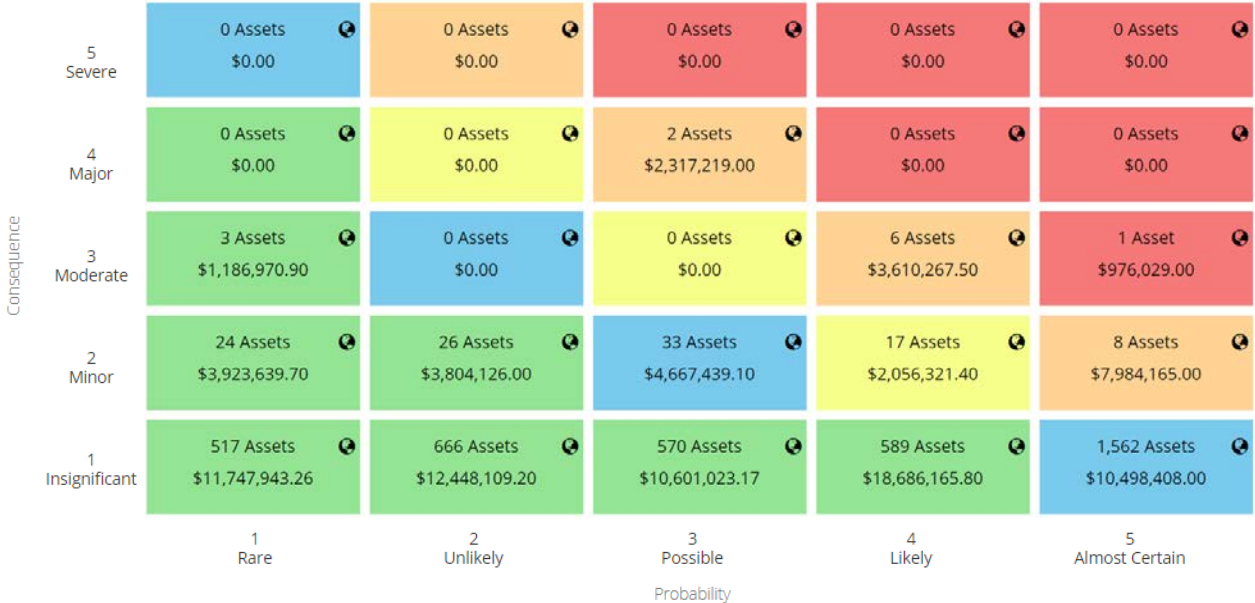
The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the City should allocate towards funding rehabilitation and replacement needs.



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 A.

1.22.5 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.



Critical Assets

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

1.22.6 Levels of Service

The following tables identify the City'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 City 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	No boil water advisories were issued during this time

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	78%
Scope	% of properties where fire flow is available	100%
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 ⁷
Reliability	# 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	TBD
Reliability	# of occurrences where water quality parameters are not met (e.g. chlorine residual)	0 ³
Performance	% of the water system that is in good or very good condition	35
Performance	% of the water system that is in poor or very poor condition	47
Performance	# of complaints about dirty water or low pressure	10
Performance	Capital re-investment rate	0.2%

⁷ According to 2019 Water Quality Report for the City of Stratford Water Distribution and Supply

1.22.7 Recommendations

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water network assets.

Risk Management Strategies

- Continue to develop water infrastructure evaluation and needs assessments on a regular basis to highlight areas of growth, deficiencies, capacity issues, and provide accurate costing.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

Levels of Service

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

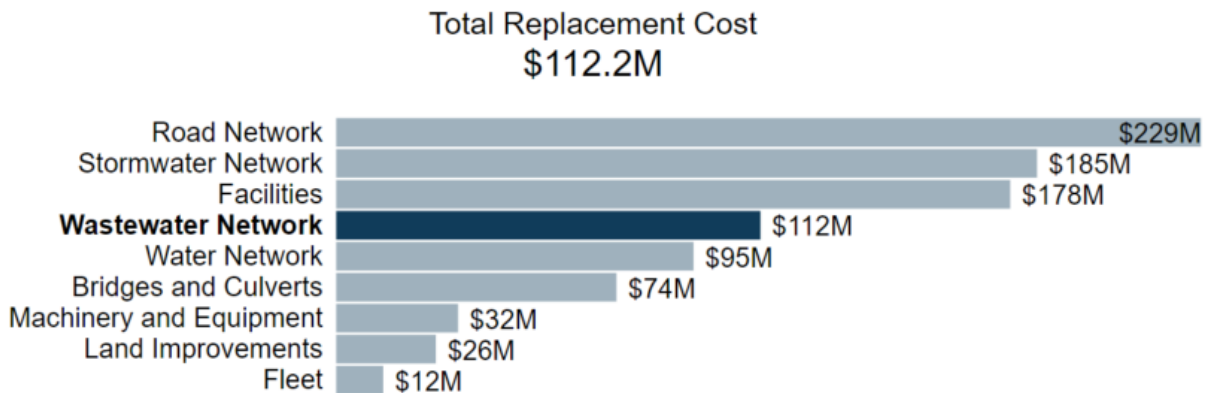
1.23 Wastewater Network

The sewer services provided by the City are overseen by the Environmental Services department. The department is responsible for sanitary sewers, pumping stations, and manholes. The sanitary treatment plant is managed by OCWA.

1.23.1 Asset Inventory & Replacement Cost

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

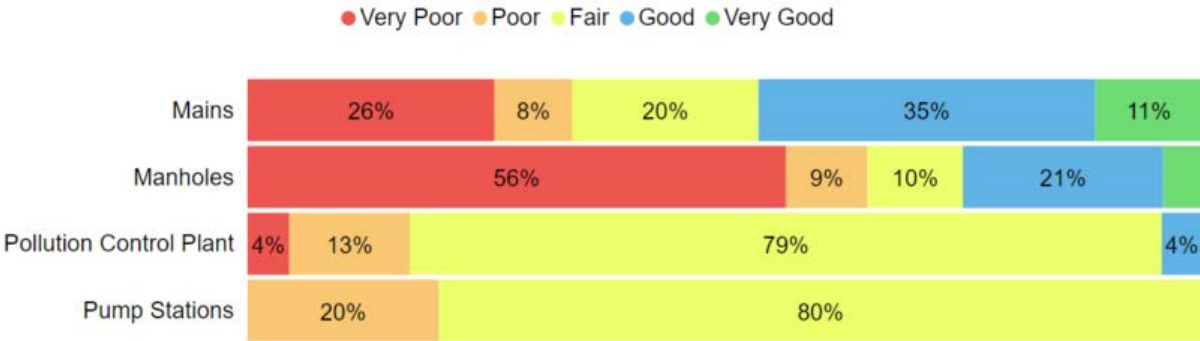
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Mains	169,586 m	100% Cost/Unit	\$83,794,121
Manholes	2121	100% CPI Tables	\$14,719,492
Pollution Control Plant	396	100% User Defined	\$3,950,000
Pump Stations	11	100% CPI Tables	\$9,727,195
			\$112,190,808



1.23.2 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Mains	57%	Fair	Age Based
Manholes	27%	Fair	Age Based
Pollution Control Plant	56%	Fair	Assessed Condition
Pump Stations	43%	Fair	Assessed Condition
	52%	Fair	



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

Current Approach to Condition Assessment

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

- CCTV inspections are completed for sanitary mains on a regular cycle. Rehabilitation projects are also prioritized by growth and capacity considerations, in addition to condition.
- Trenchless re-lining program is in place and has a dedicated budget
- Rodding and boring is performed on an as-needed basis. Smoke testing is performed every 15 years or when necessary. Brick manholes are being replaced on an as-needed basis
- System flushing is performed every 4 years; broken out by City zones. Forcemains are not flushed or CCTV inspected due to their pressurised nature.
- Pumping stations were assessed in 2014 by an external consultant and are inspected on a weekly basis by internal City staff. The diesel generators are also inspected as per Technical Standards and Safety Authority (TSSA) requirements.

1.23.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Mains	50 - 100 Years	47.8	27.2
Manholes	100 Years	45.8	4.2
Pollution Control Plant	5-50 Years	22.8	23.5
Pump Stations	50 Years	36.3	21.9
		46.5	16.9

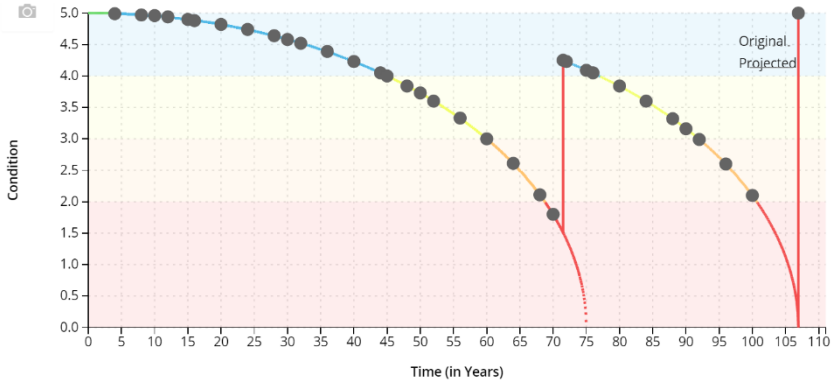


Each asset’s Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

1.23.4 Lifecycle Management Strategy

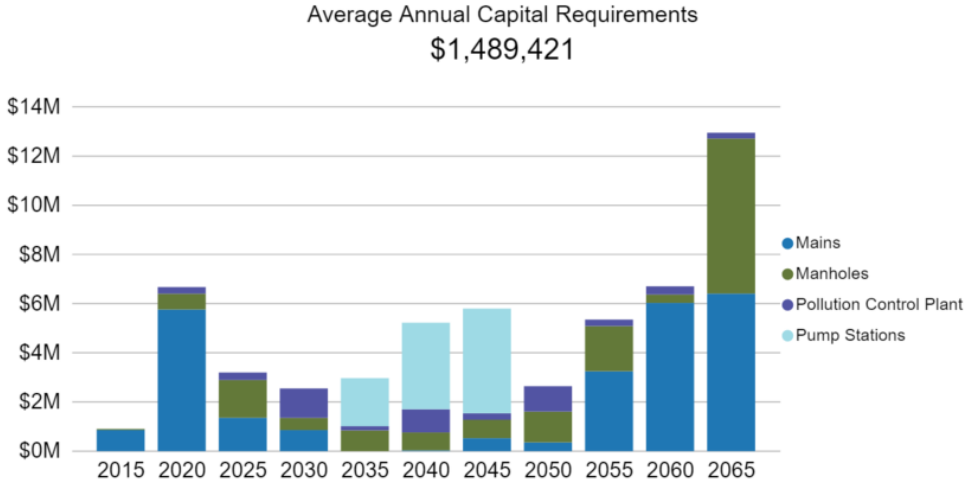
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset’s characteristics, location, utilization, maintenance history and environment. The following lifecycle strategy has been developed as a proactive approach to managing the lifecycle of sanitary mains.

Sanitary Mains		
Event Name	Event Class	Event Trigger
Cleaning/Flushing	Maintenance	Every 4 Years
CCTV Inspections	Maintenance	Every 10 Years
Smoke Testing	Maintenance	Every 15 Years
Trenchless Re-lining ⁸	Rehabilitation	40%-60% Condition
Full Reconstruction	Replacement	N/A



Forecasted Capital Requirements

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



⁸ Viability and costing will vary depending on the bury depth of the pipe (pipes 4” deep and more)

1.23.5 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.

Consequence	5 Severe	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	4 Major	0 Assets \$0.00	4 Assets \$2,535,873.06	0 Assets \$0.00	0 Assets \$0.00	0 Assets \$0.00
	3 Moderate	0 Assets \$0.00	3 Assets \$337,978.76	3 Assets \$2,238,767.00	0 Assets \$0.00	0 Assets \$0.00
	2 Minor	48 Assets \$4,034,385.63	8 Assets \$1,004,789.13	0 Assets \$0.00	19 Assets \$2,251,267.20	6 Assets \$5,856,174.00
	1 Insignificant	951 Assets \$26,465,680.41	1,251 Assets \$25,767,094.96	551 Assets \$9,858,752.69	726 Assets \$19,332,785.85	1,132 Assets \$8,557,259.24
		1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
		Probability				

Critical Assets

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

1.23.6 Levels of Service

The following tables identify the City’s current level of service for Wastewater 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 City 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 Wastewater 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 City 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 City 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, manholes, private services 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 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 Wastewater Network.

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties connected to the municipal wastewater system	95%
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	0
Reliability	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	TBD
Reliability	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0 ⁹
Performance	% of the wastewater system that is in good or very good condition	41
Performance	% of the wastewater system that is in poor or very poor condition	40
Performance	Capital re-investment rate	0.3%

⁹ All effluent water regulated limits were met in 2019 according to 2019 OCWA Annual Performance Report

1.23.7 Recommendations

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water network assets.

Risk Management Strategies

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

Lifecycle Management Strategies

- Evaluate the efficacy of the City's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Levels of Service

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

Impacts of Growth

Key Insights

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

1.24 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 City to plan for new infrastructure more effectively, 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.

1.24.1 Stratford Official Plan (July 2016)

The City adopted its Official Plan on January 1993, and Official Plan Amendment 21 was approved by the Ministry of Municipal Affairs on July 2016. The Official Plan is a planning document for the purpose of guiding the future development of the City of Stratford, and establishes the goals and objectives established to manage the effects on the social, economic, and natural environment of the City.

The Official Plan is based on a population which is forecast to grow from 31,465 in 2016 to 33,600 in 2033. As well, the City will work to maintain and improve its 2011 employment activity rate of 65% and high live-work ratio during the planning period. The City’s housing mix target for 2033 is 53% low density, 17% medium density and 30% high density.

Growth projections were also provided by the City as part of the 2017 DC Growth Plan (Watson and Associates Economists Ltd., 2017). The table below summarizes the residential and employment growth projections utilizing 2017 as the base year.

Year	Residential Population	Employment Population	Growth
2017	31,820	19,850	-
2037	34,747	22,129	5,206

1.24.2 Water Infrastructure Evaluation and Needs Assessment (September 2018)

The water infrastructure assessment identifies that residential and employment growth is anticipated within the City, especially within the southern industrial area, downtown core and along existing employment areas. The assessment also relies on the Official Plan’s land use and intensification growth locations

1.25 Impact of Growth on Lifecycle Activities

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the City’s AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the City 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.

Financial Strategy

Key Insights

- Given the annual capital requirement of \$21.5 million, there is currently a funding gap of \$9.2 million annually
- For tax-funded assets, we recommend increasing tax revenues by 0.7% each year for the next 10 years to achieve a sustainable level of funding
- For the Water Network, we recommend increasing rate revenues by 1.4% annually for the next 15 years to achieve a sustainable level of funding

1.26 Financial Strategy Overview

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

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

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

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

Although growth or new acquisitions/assets are not factored in this AMP's financial strategy, they do have an impact on the realization of the plan, and the sustainability of the City's current infrastructure assets. The addition of new assets can influence the levels of service that the City can provide to its Public.

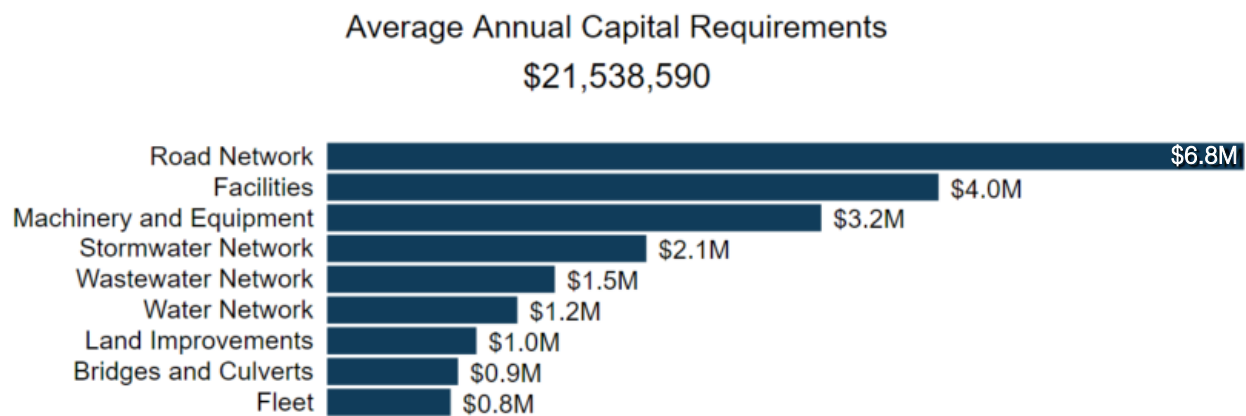
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a City's approach to the following:

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.

1.26.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the City 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 City must allocate approximately \$21.5 million annually to address capital requirements for the assets included in this AMP.



For most asset categories the annual requirement has been calculated based on a “replacement only” scenario, in which capital costs are only incurred at the construction and replacement of each asset. However, for the Road Network, Water Network, Wastewater Network and Storm Network, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the City’s roads and mains, respectively. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented.

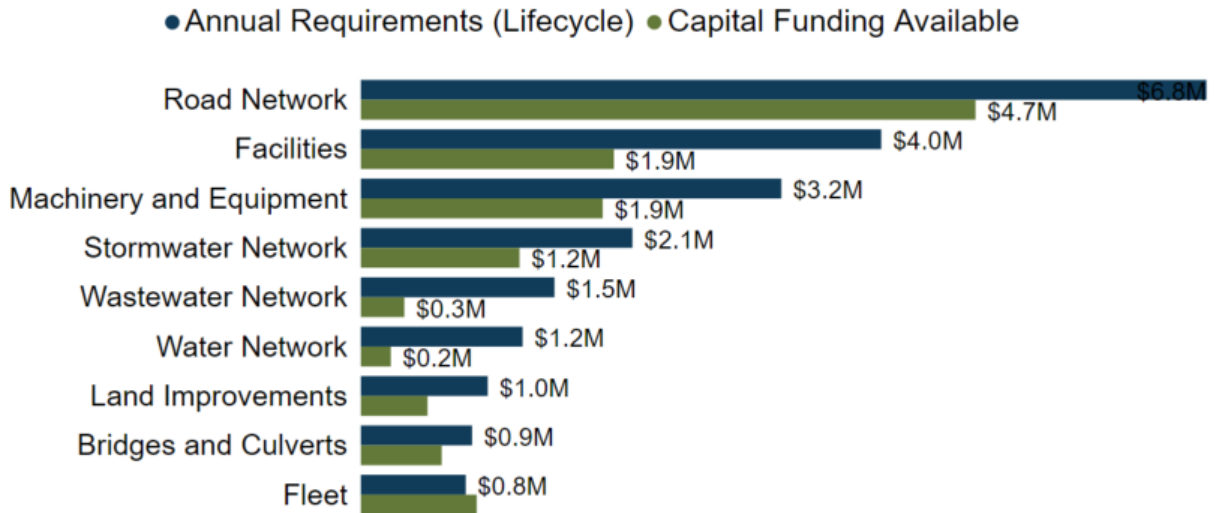
1. **Replacement Only Scenario:** Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario:** Based on the assumption that lifecycle activities are performed at strategic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

The implementation of a proactive lifecycle strategy can lead to direct cost savings as well as indirect savings. The relining of mains reduces costs related to road removal, traffic controls, and public dissatisfaction. These cost savings are incumbent on the current unit replacement costs

used and the number of rehabilitations/replacements combined together to minimize engineering and contingency costs.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the City is committing approximately \$12,348,000 towards capital projects per year from sustainable revenue sources. Given the annual capital requirement of \$21,538,589 there is currently a funding gap of \$9,190,590 annually. The annual capital funding available takes reserves and debt payments into account.



1.27 Funding Objective

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

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

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

1.28 Financial Profile: Tax Funded Assets

1.28.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Tax Funding	Gas Tax Funding	Other Funding	Total Funding Available	Annual Deficit
Road Network	6,840,000	3,066,000	1,007,000	651,000	4,724,000	2,120,000
Stormwater Network	2,088,000	897,000	324,000	0	1,221,000	867,000
Bridges & Culverts	856,000	404,000	133,000	86,000	623,000	233,000
Facilities	4,000,000	1,946,000	0	0	1,946,000	2,054,000
Machinery & Equipment	3,232,000	1,534,000	0	326,000	1,860,000	1,372,000
Land Improvements	977,000	514,000	0	0	514,000	463,000
Fleet	808,000	432,000	460,000	0	892,000	(84,110)
	18,800,000	8,793,000	1,924,000	1,063,000	11,780,000	7,025,000

The average annual investment requirement for the above categories is \$18.8 million. Annual revenue currently allocated to these assets for capital purposes is \$11.8 million leaving an annual deficit of \$7.0 million. Put differently, these infrastructure categories are currently funded at 63% of their long-term requirements.

1.28.2 Full Funding Requirements

In 2020, City of Stratford has annual tax revenues of \$62,201,000. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Road Network	2.8%
Storm Water Network	1.4%
Bridges & Culverts	0.4%
Facilities	3.5%
Machinery & Equipment	2.2%
Land Improvements	0.9%
Fleet	0.0%
	11.2%

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

- a) Stratford's debt payments for these asset categories will be decreasing by \$2,424,000 over the next 5 years and decreasing by \$2,620,000 over the next 10 years. Although not shown in the table, debt payment decreases will be \$3,659,000 and \$3,659,000 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	5 Years	10 Years	15 Years	20 Years	With Capturing Changes	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	7,020,000	7,020,000	7,020,000	7,020,000	Infrastructure Deficit	7,020,000	7,020,000	7,020,000	7,020,000
Change in Debt Costs	N/A	N/A	N/A	N/A	Change in Debt Costs	2,424,000	-2,620,000	3,659,000	-3,659,000
Resulting Infrastructure Deficit:	7,020,000	7,020,000	7,020,000	7,020,000	Resulting Infrastructure Deficit:	4,596,000	4,400,000	3,361,000	3,361,000
Tax Increase Required	11.3%	11.3%	11.3%	11.3%	Tax Increase Required	7.4%	7.1%	5.4%	5.4%
Annually:	2.3%	1.1%	0.8%	0.6%	Annually:	1.5%	0.7%	0.4%	0.3%

1.28.3 Financial Strategy Recommendations

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

- a) when realized, reallocating the debt cost reductions of \$2,620,000 to the infrastructure deficit as outlined above.
- b) increasing tax revenues by 0.7% each year for the next 10 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- c) allocating the current gas tax & other revenue as outlined previously.
- d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

- 1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. 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 commitment¹⁰.
- 2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full funding on an annual basis in 10 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of \$0 for Bridges & Culverts, \$9,222,000 for Land Improvements, \$31,573,000 for the Storm Water Network, \$38,490,000 for the Road Network, \$24,076,000 for the Facilities, \$15,000,000 for Machinery & Equipment and \$2,500,000 for Fleet.

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.

¹⁰ The City 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.

1.29 Financial Profile: Rate Funded Assets

1.29.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Rates Funding	To Operations Funding	Gas Tax & Other Funding	Total Funding Available	Annual Deficit
Water Network	1,245,000	4,634,000	-4,634,000	232,000	232,000	1,000,000
Wastewater Network	1,490,000	6,950,000	-6,950,000	336,000	336,000	1,200,000
	2,735,000	11,584,000	-11,584,000	568,000	568,000	2,200,000

The average annual investment requirement for the above categories is \$2,735,000. Annual revenue currently allocated to these assets for capital purposes is \$568,000 leaving an annual deficit of \$2,200,000. Put differently, these infrastructure categories are currently funded at 20% of their long-term requirements.

1.29.2 Full Funding Requirements

In 2020, Stratford had annual sanitary revenues of \$6,950,000 and annual water revenues of \$4,634,000. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Rate Change Required for Full Funding
Water Network	27.2%
Wastewater Network	14.9%

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:

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

- a) Debt payments for the Water Network will be decreasing by \$270,000 over the next 20 years.
- b) Debt payments for the Wastewater Network will be decreasing by \$2,252,000 over the next 20 years.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined. The following table outlines this concept and presents a number of options without considering the re-allocation of returning debt costs:

Water Network	5 Years	10 Years	15 Years	20 Years	Wastewater Network	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,262,000	1,262,000	1,262,000	1,262,000	Infrastructure Deficit	1,035,000	1,035,000	1,035,000	1,035,000
Rate Increase Required	27.2%	27.2%	27.2%	27.2%	Rate Increase Required	14.9%	14.9%	14.9%	14.9%
Annually:	5.4%	2.7%	1.8%	1.4%	Annually:	3.0%	1.5%	1.0%	0.7%

The following table includes the re-allocation of returning debt costs to capital costs:

Water Network	5 Years	10 Years	15 Years	20 Years	Wastewater Network	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,262,000	1,262,000	1,262,000	1,262,000	Infrastructure Deficit	1,035,000	1,035,000	1,035,000	1,035,000
Change in Debt Costs	-32,000	-63,000	-270,000	-270,000	Change in Debt Costs	-220,000	-717,000	-1,035,000	-1,035,000
Resulting Deficit	1,230,000	1,199,000	992,000	992,000	Resulting Deficit	815,000	318,000	0	0
Tax Increase Required	26.5%	25.9%	21.4%	21.4%	Tax Increase Required	11.7%	4.6%	0.0%	0.0%
Annually:	5.3%	2.6%	1.4%	1.1%	Annually:	2.3%	0.5%	0.0%	0.0%

1.29.3 Financial Strategy Recommendations

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

- a) when realized for water services, reallocating the debt cost reductions of \$270,000 to the infrastructure deficit as outlined above.
- b) when realized, reallocating \$1,035,000 of the debt cost reductions of \$2,252,000 to the infrastructure deficit as outlined above.
- c) increasing rate revenues by 0.0% for sanitary services and 1.4% for water services each year for the next 15 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

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

Although this option achieves full funding on an annual basis in 15 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of \$28,590,000 for the Water Network and \$26,400,000 for the Wastewater Network.

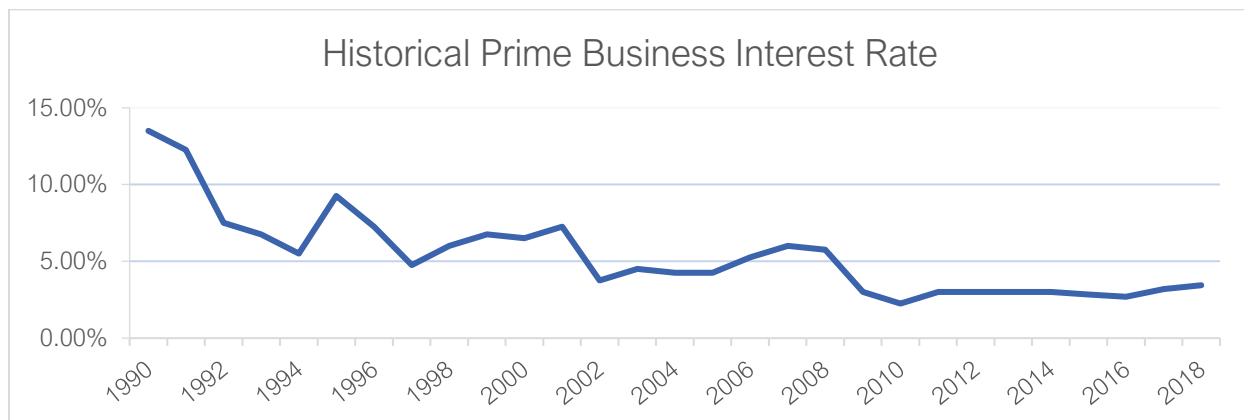
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

1.30 Use of Debt

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

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

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



¹¹ Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

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

The following tables outline how Stratford has historically used debt for investing in the asset categories as listed. There is currently \$45,298,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of \$6,181,000, well within its provincially prescribed maximum of \$23,925,000.

Asset Category	Current Debt Outstanding	2015 Debt	2016 Debt	2017 Debt	2018 Debt	2019 Debt
Road Network	720,000	0	0	0	0	0
Storm Water Network	4,963,000	1,311,000	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Buildings & Facilities	13,748,000	0	0	0	0	2,751,000
Machinery & Equipment	0	0	0	0	0	0
Land Improvements	1,473,000	0	0	0	0	0
Fleet	1,027,000	0	0	0	0	0
Total Tax Funded:	21,931,000	1,311,000	0	0	0	2,751,000
Water Network	2,567,000	0	0	0	0	2,751,000
Wastewater Network	20,800,000	0	0	0	0	611,000
Total Rate Funded:	23,367,000	0	0	0	0	3,362,000

Asset Category	2020 P+I	2021 P+I	2022 P+I	2023 P+I	2024 P+I	2025 P+I	2030 P+I
Road Network	168,000	163,000	158,000	153,000	148,000	0	0
Storm Water Network	1,222,000	1,097,000	1,065,000	1,032,000	999,000	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Facilities	1,821,000	1,770,000	1,717,000	1,665,000	1,616,000	1,140,000	956,000
Machinery & Equipment	0	0	0	0	0	0	0
Land Improvements	340,000	330,000	321,000	311,000	302,000	0	0
Fleet	108,000	105,000	103,000	100,000	98,000	95,000	83,000
Total Tax Funded:	3,659,000	3,465,000	3,364,000	3,261,000	3,163,000	1,235,000	1,039,000
Water Network	270,000	263,000	257,000	251,000	245,000	238,000	207,000
Wastewater Network	2,252,000	2,208,000	2,164,000	2,120,000	2,078,000	2,032,000	1,535,000
Total Rate Funded:	2,522,000	2,471,000	2,421,000	2,371,000	2,323,000	2,270,000	1,742,000

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

1.31 Use of Reserves

1.31.1 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 the City.

Asset Category	Balance at December 31, 2019
Road Network	607,000
Storm Water Network	1,674,000
Bridges & Culverts	607,000
Facilities	10,334,000
Machinery & Equipment	3,408,000
Land Improvements	6,823,000
Fleet	3,239,000
Total Tax Funded:	26,692,000
Water Network	4,022,000
Wastewater Network	607,000
Total Rate Funded:	4,629,000

There is considerable debate in the municipal sector as to the appropriate level of reserves that a City 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 Stratford'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.

1.31.2 Recommendation

In 2024, Ontario Regulation 588/17 will require Stratford 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.

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 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.

Bridges & Culverts

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Structural Culverts	\$0	\$386,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$0	\$386,500	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Road Network

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Paved Roads	\$-	\$5,907,249	\$8,670,683	\$9,524,750	\$8,798,360	\$5,532,220	\$3,906,286	\$5,440,937	\$4,470,329	\$4,282,371	\$1,502,918
Sidewalks	\$26,340,591	\$185,162	\$654,903	\$319,215	\$249,280	\$374,264	\$695,736	\$573,089	\$487,850	\$854,721	\$934,087
Streetlights	\$7,747,090	\$262,497	\$133,134	\$76,911	\$244,174	\$227,873	\$290,358	\$623,900	\$267,932	\$231,918	\$83,313
Traffic Systems	\$4,402,667	\$87,705	\$179,086	\$21,060	\$23,287	\$6,886	\$124,644	\$168,470	\$10,758	\$61,103	\$14,780
	\$38,490,348	\$6,442,613	\$9,637,806	\$9,941,937	\$9,315,101	\$6,141,243	\$5,017,025	\$6,806,396	\$5,236,869	\$5,430,113	\$2,535,098

Stormwater Network

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Catch Basins	\$142,071	\$87,724	\$84,275	\$182,142	\$117,810	\$306,306	\$249,084	\$286,110	\$87,516	\$20,196	\$63,954
Culverts	\$1,140,524	\$0	\$5,684	\$3,925	\$71,646	\$0	\$50,641	\$0	\$98,150	\$0	\$0
Mains	\$11,708,911	\$474,988	\$74,248	\$1,355,005	\$1,945,129	\$0	\$0	\$0	\$0	\$0	\$0
Manholes	\$5,399,560	\$88,809	\$36,160	\$101,290	\$130,212	\$226,338	\$146,707	\$177,692	\$687,230	\$282,322	\$195,372
Municipal Drains	\$1,487,917	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other	\$6,596,909	\$0	\$0	\$21,043	\$0	\$42,076	\$0	\$0	\$0	\$21,038	\$42,076
Pump Stations	\$961,564	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$27,437,456	\$651,521	\$200,367	\$1,663,405	\$2,264,797	\$574,720	\$446,432	\$463,802	\$872,896	\$323,556	\$301,402

Facilities

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Community Services	\$5,167,626	\$0	\$1,426,010	\$174,143	\$348,000	\$341,620	\$219,000	\$663,130	\$45,817	\$3,316,223	\$996,755
Corporate Services	\$0	\$0	\$0	\$14,000	\$0	\$155,000	\$457,000	\$87,326	\$27,000	\$607,027	\$90,000
Emergency Services	\$0	\$0	\$0	\$26,000	\$18,000	\$85,000	\$27,200	\$96,000	\$48,000	\$831,500	\$1,055,136
Environmental Services	\$0	\$0	\$0	\$4,500	\$3,000	\$259,000	\$1,500	\$20,500	\$1,500	\$149,500	\$0
Municipal Golf Course	\$0	\$0	\$0	\$0	\$0	\$17,500	\$3,000	\$18,500	\$0	\$52,500	\$21,000
Public Library	\$0	\$0	\$121,510	\$24,000	\$140,000	\$120,780	\$1,500	\$97,000	\$18,000	\$312,120	\$25,000
Public Housing	\$17,074,994	\$0	\$1,066,445	\$9,692,010	\$3,848,700	\$49,685	\$16,029	\$6,102,294	\$2,724,078	\$4,380	\$37,156
Public Works	\$1,833,617	\$0	\$333,000	\$0	\$0	\$74,000	\$23,000	\$27,000	\$187,156	\$1,713,200	\$15,000
Social Services	\$0	\$0	\$0	\$0	\$0	\$5,315	\$0	\$0	\$0	\$0	\$0
	\$24,076,237	\$0	\$2,825,455	\$9,910,653	\$4,217,700	\$987,120	\$746,729	\$7,014,750	\$3,033,551	\$6,674,330	\$2,215,047

Machinery & Equipment

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
CAO & Mayor's Office	\$0	\$95,992	\$621	\$1,329	\$817	\$0	\$3,224	\$621	\$3,140	\$2,430	\$0
Community Services	\$830,445	\$0	\$316,230	\$420,432	\$343,422	\$104,103	\$131,794	\$312,793	\$352,487	\$766,561	\$101,233
Corporate Services	\$2,505,415	\$808,293	\$305,560	\$144,527	\$230,442	\$117,036	\$1,158,256	\$267,737	\$94,394	\$230,056	\$98,591
Emergency Services	\$3,013,899	\$383,793	\$59,387	\$270,269	\$80,744	\$271,120	\$558,569	\$272,313	\$959,642	\$253,671	\$613,983
Environmental Services	\$2,050,019	\$114,980	\$0	\$58,069	\$696,678	\$21,146	\$127,173	\$48,245	\$32,765	\$0	\$1,389,600
Municipal Golf Course	\$966,462	\$36,083	\$8,347	\$29,137	\$0	\$29,417	\$90,448	\$0	\$0	\$0	\$0
Public Library	\$3,515,380	\$12,517	\$40,233	\$30,042	\$56,065	\$18,590	\$75,381	\$141,265	\$3,526,362	\$93,088	\$25,731
Public Housing	\$0	\$0	\$0	\$109,953	\$59,472	\$21,037	\$38,336	\$31,194	\$55,552	\$50,507	\$25,448
Public Works	\$1,080,694	\$0	\$231,071	\$136,785	\$966,008	\$754,695	\$258,662	\$197,082	\$280,394	\$164,638	\$288,124
Social Services	\$981,351	\$0	\$511	\$6,391	\$0	\$3,611	\$13,970	\$18,109	\$16,989	\$16,473	\$0
	\$14,943,665	\$1,451,658	\$961,960	\$1,206,934	\$2,433,648	\$1,340,755	\$2,455,813	\$1,289,359	\$5,321,725	\$1,577,424	\$2,542,710

Fleet

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Community Services	\$180,931	\$100,707	\$33,301	\$43,919	\$0	\$0	\$51,232	\$112,301	\$289,118	\$680,397	\$728,960
Corporate Services	\$150,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Emergency Services	\$1,869,878	\$0	\$0	\$0	\$33,224	\$844,996	\$0	\$72,728	\$108,458	\$110,880	\$437,701
Environmental Services	\$72,170	\$0	\$0	\$0	\$0	\$37,738	\$0	\$115,413	\$48,067	\$0	\$45,044
Public Housing	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$94,652	\$57,863	\$0	\$0
Public Works	\$212,926	\$20,065	\$0	\$40,000	\$101,460	\$71,042	\$44,426	\$125,730	\$65,622	\$0	\$99,011
Social Services	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$34,147	\$0	\$0
	\$2,485,905	\$120,772	\$33,301	\$83,919	\$134,684	\$953,776	\$95,658	\$520,824	\$603,275	\$791,277	\$1,310,716

Land Improvements

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Community Services	\$911,237	\$0	\$116,244	\$0	\$0	\$276,275	\$0	\$1,043,305	\$0	\$399,354	\$1,001,982
Corporate Services	\$7,964,555	\$0	\$0	\$0	\$0	\$0	\$134,841	\$0	\$0	\$0	\$467,053
Municipal Golf Course	\$346,231	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$9,222,023	\$0	\$116,244	\$0	\$0	\$276,275	\$134,841	\$1,043,305	\$0	\$399,354	\$1,469,035

Water Network

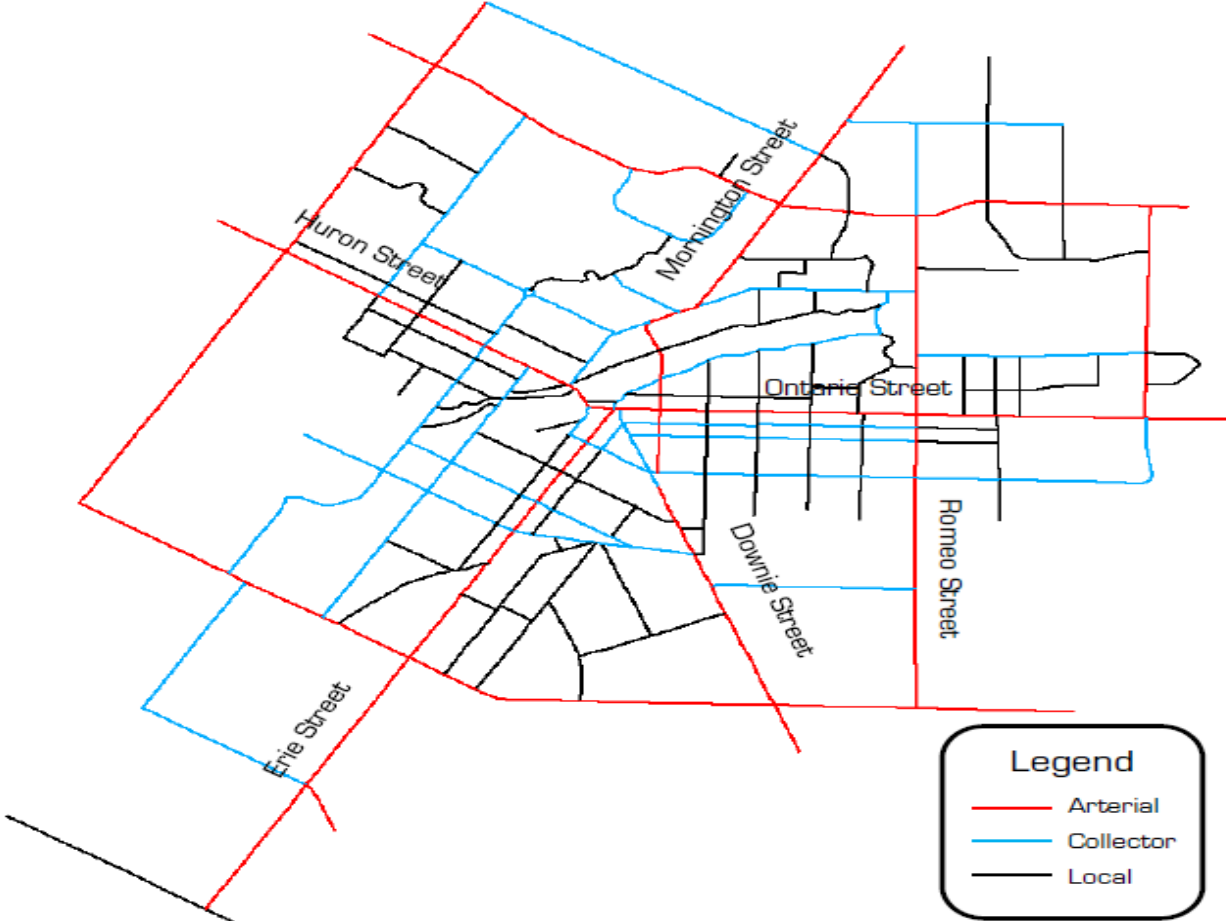
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Mains	\$11,570,377	\$857,039	\$1,453,175	\$2,431,247	\$448,643	\$457,617	\$970,263	\$377,882	\$0	\$65,311	\$54,842
Manholes	\$5,995,728	\$45,396	\$121,008	\$98,306	\$90,792	\$204,174	\$128,622	\$158,886	\$809,241	\$257,244	\$143,754
Pollution Control Plant	\$0	\$0	\$0	\$4,500	\$3,000	\$259,000	\$1,500	\$20,500	\$1,500	\$149,500	\$0
	\$17,566,105	\$902,435	\$1,574,183	\$2,534,053	\$542,435	\$920,791	\$1,100,385	\$557,268	\$810,741	\$472,055	\$198,596

Wastewater Network

Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Hydrants	\$1,741,042	\$19,780	\$34,601	\$29,646	\$14,820	\$39,544	\$34,594	\$49,420	\$158,176	\$49,390	\$34,601
Mains	\$2,985,435	\$241,402	\$1,068,144	\$797,234	\$1,129,899	\$763,236	\$1,278,075	\$331,871	\$839,218	\$132,082	\$17,159
Pump Houses	\$2,261,590	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$750,000
Reservoir and Wells	\$5,978,140	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Valve Systems	\$2,833,755	\$7,014	\$11,670	\$23,580	\$91,440	\$25,800	\$63,600	\$23,409	\$116,032	\$69,690	\$43,358
	\$15,799,962	\$268,196	\$1,114,415	\$850,460	\$1,236,159	\$828,580	\$1,376,269	\$404,700	\$1,113,426	\$251,162	\$845,118

Appendix B: Level of Service Maps

Road Network Map – Broken by Road Class¹²



¹² As of 2010 Master Transportation Plan



Cobourg St - Poor Road Condition



Douro St - Fair Road Condition



Player St - Very Poor Road Condition



Brett Street - Very Good Road Condition

Images of Bridge in Good Condition

Romeo Street Bridge

Inspected: November 2019



Looking North



East Elevation

Images of Culvert in Good Condition

Delamere Avenue Culvert

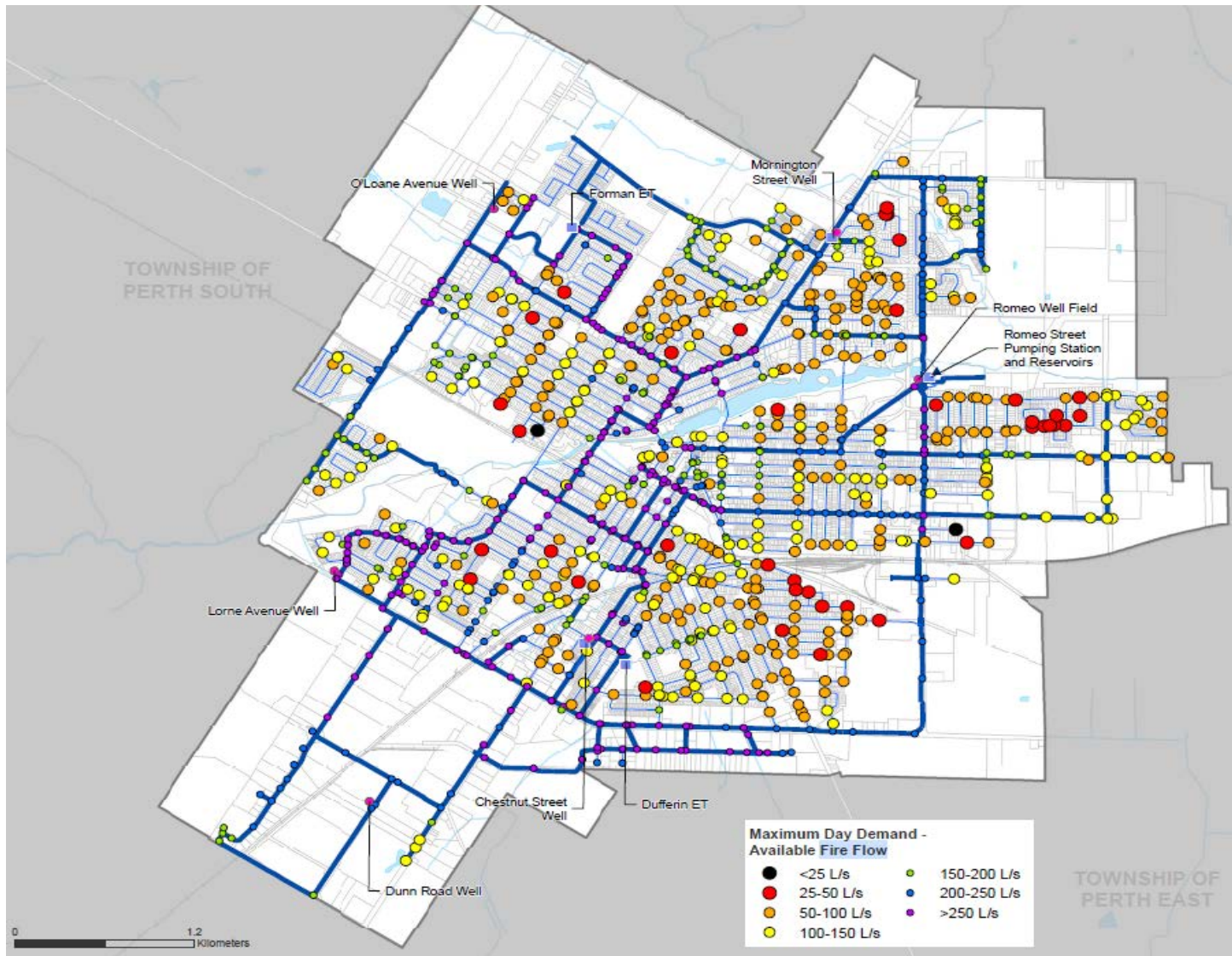
Inspected: November 2019



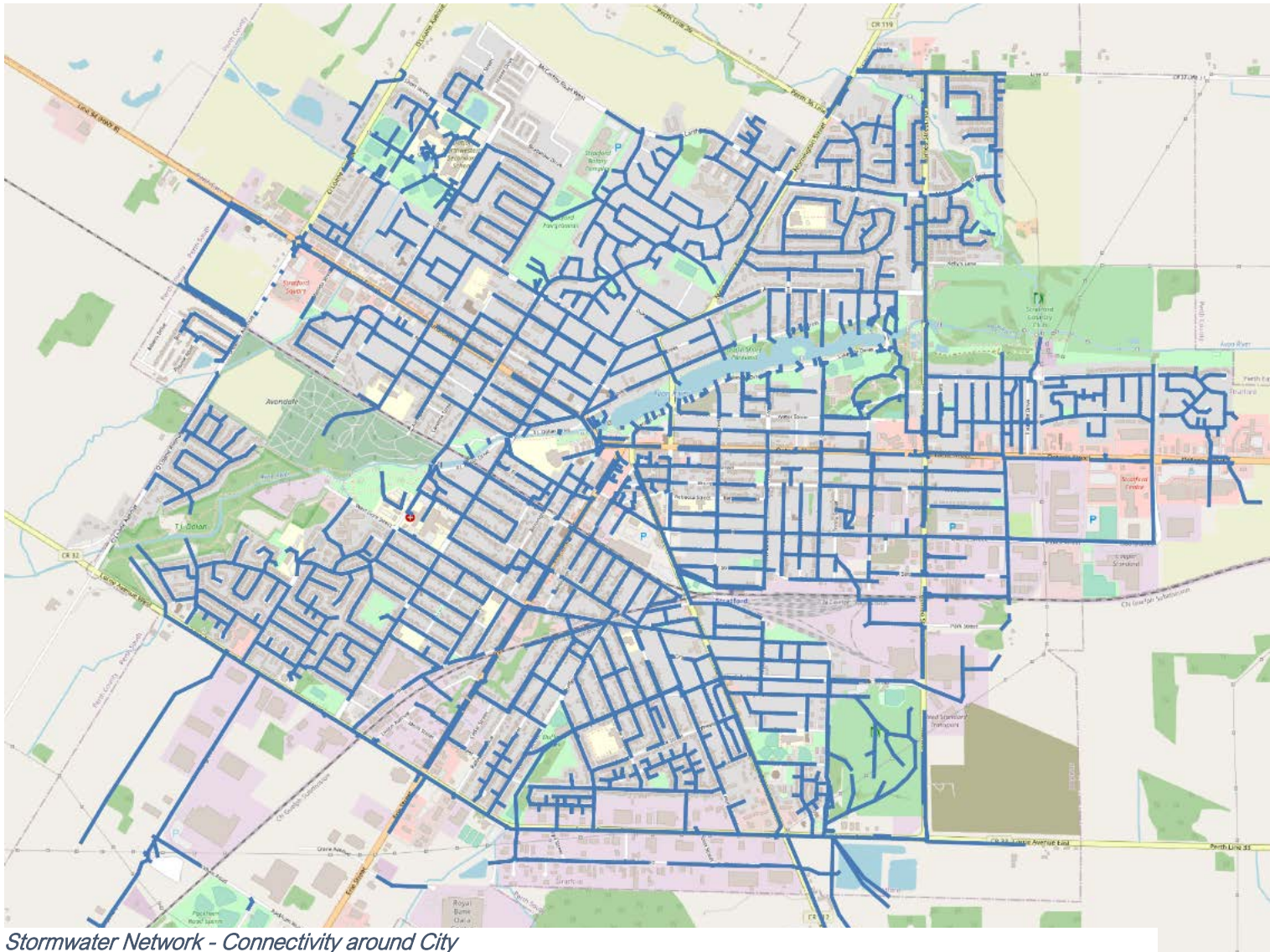
Scour at NE Corner



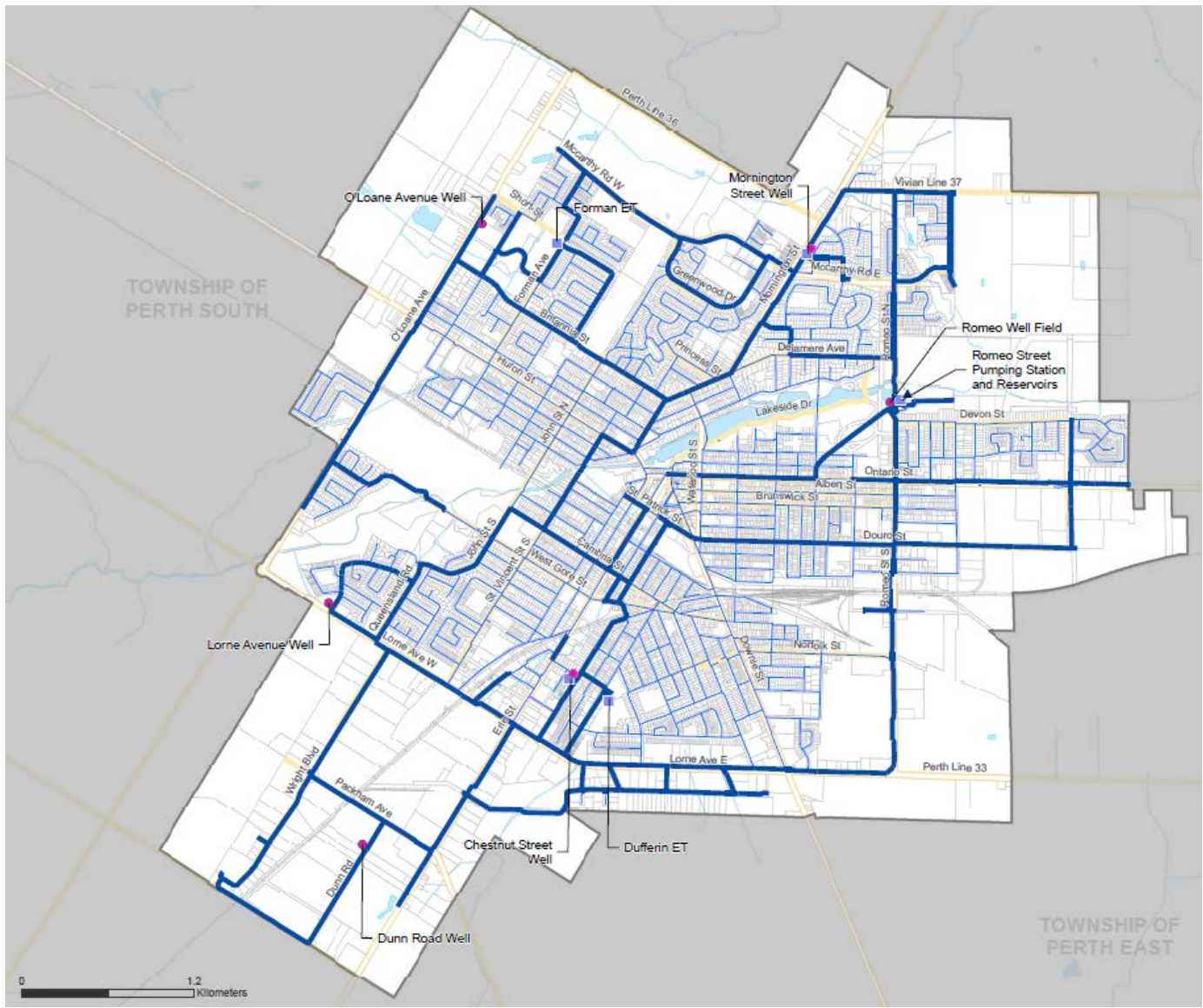
South Retaining Wall at West End



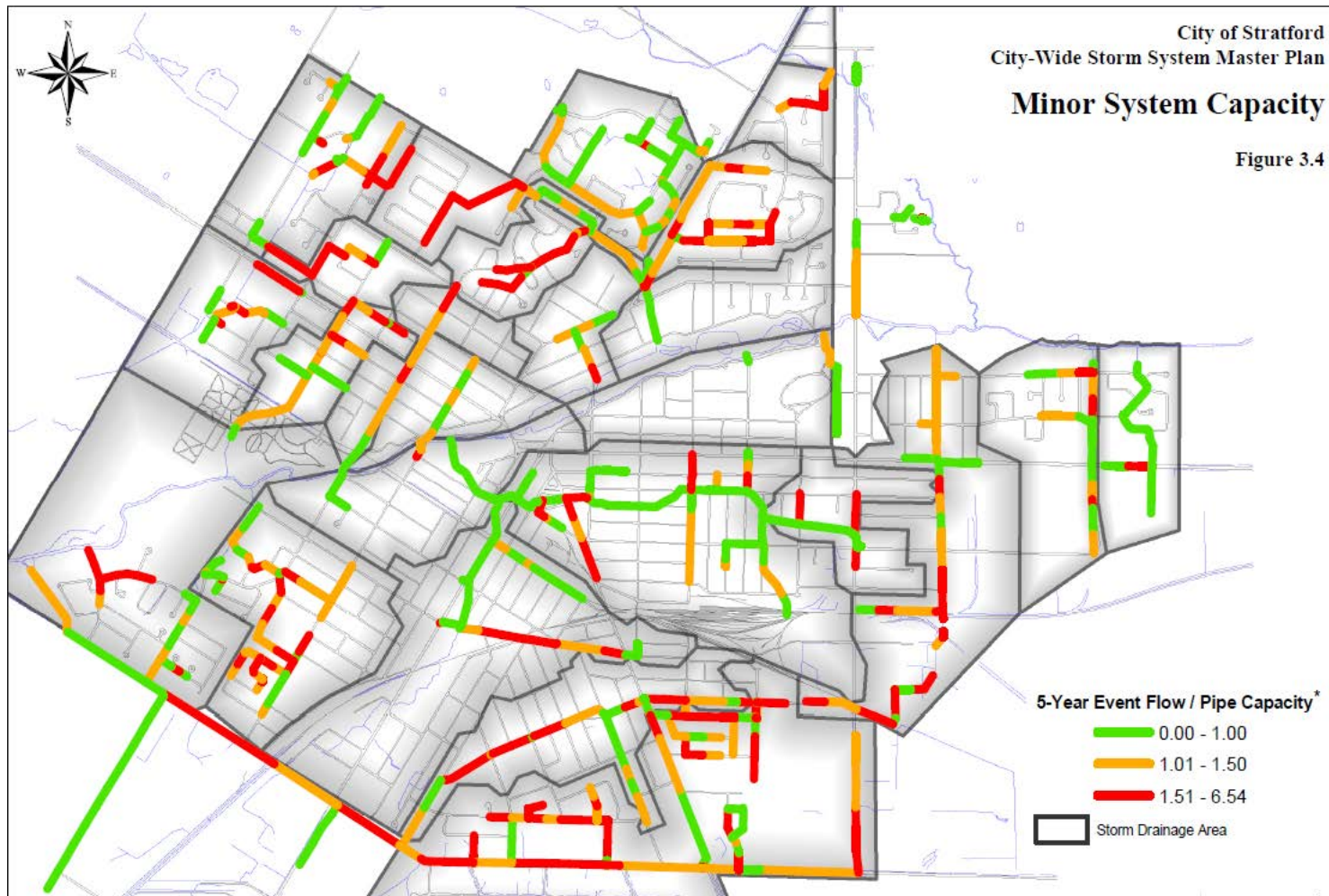
Water Network - Fire Flow Connectivity



Stormwater Network - Connectivity around City



Water Network – Connectivity around the City



5-Year Storm Preparedness Map



Wastewater Network - Connectivity

Appendix C : Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Value/Range	Probability of Failure Score
Road Network (Roads)	Condition	80-100	1
Road Network (Roads)	Condition	60-79	2
Road Network (Roads)	Condition	40-59	3
Road Network (Roads)	Condition	20-39	4
Road Network (Roads)	Condition	0-19	5
Road Network (Roads)	ADT	0-400	1
Road Network (Roads)	ADT	400-1000	2
Road Network (Roads)	ADT	1000-2000	3
Road Network (Roads)	ADT	2000-8000	4
Road Network (Roads)	ADT	8000+	5
Bridges & Culverts	Condition	80-100	1
Bridges & Culverts	Condition	60-79	2
Bridges & Culverts	Condition	40-59	3
Bridges & Culverts	Condition	20-39	4
Bridges & Culverts	Condition	0-19	5
Bridges & Culverts	Material	Steel	1
Bridges & Culverts	Material	Precast Concrete	3
Bridges & Culverts	Material	Corrugated Steel Pipe	4
Bridges & Culverts	Material	Wood	5
Wastewater Network (Mains)	Condition	5	1
Wastewater Network (Mains)	Condition	4	2
Wastewater Network (Mains)	Condition	3	3
Wastewater Network (Mains)	Condition	2	4
Wastewater Network (Mains)	Condition	1	5
Wastewater Network (Mains)	Pipe Material	PVC, Precast Concrete after 1970	1
Wastewater Network (Mains)	Pipe Material	CIPP	2
Wastewater Network (Mains)	Pipe Material	Asbestos Cement, Transite	3

Asset Category	Risk Criteria	Value/Range	Probability of Failure Score
Wastewater Network (Mains)	Pipe Material	CT, VT, GT, Brick, Precast Concrete prior to 1970	4
Wastewater Network (Mains)	Slope Percentage	2.0+	1
Wastewater Network (Mains)	Slope Percentage	1.0-2.0	2
Wastewater Network (Mains)	Slope Percentage	0.4-1.0	3
Wastewater Network (Mains)	Slope Percentage	0.2-0.4	4
Wastewater Network (Mains)	Slope Percentage	<0.2	5
Water Network (Mains)	Breaks/Segment	0-2	1
Water Network (Mains)	Breaks/Segment	2-4	2
Water Network (Mains)	Breaks/Segment	4-6	3
Water Network (Mains)	Breaks/Segment	6-8	4
Water Network (Mains)	Breaks/Segment	8+	5
Water Network (Mains)	Pipe Material	HDPE, PVC	4
Water Network (Mains)	Pipe Material	Steel	4
Water Network (Mains)	Pipe Material	Ductile Iron	3
Water Network (Mains)	Pipe Material	Cast Iron	3
Water Network (Mains)	Pipe Material	Riveted Steel	3
Stormwater Network (Mains)	Condition	5	1
Stormwater Network (Mains)	Condition	4	2
Stormwater Network (Mains)	Condition	3	3
Stormwater Network (Mains)	Condition	2	4
Stormwater Network (Mains)	Condition	1	5
Stormwater Network (Mains)	Pipe Material	PVC, Ribbed PVC, HDPE, Concrete after 1970, PIP	1
Stormwater Network (Mains)	Pipe Material	CIPP	2
Stormwater Network (Mains)	Pipe Material	Asbestos Cement, Transite, CSP	3
Stormwater Network (Mains)	Pipe Material	Precast Concrete prior 1970, CT, GT, Vitrified Clay	4
Buildings & Facilities Machinery & Equipment Fleet	Condition	80-100	1
Buildings & Facilities Machinery & Equipment Fleet	Condition	60-79	2

Asset Category	Risk Criteria	Value/Range	Probability of Failure Score
Land Improvements			
Buildings & Facilities Machinery & Equipment Fleet	Condition	40-59	3
Land Improvements			
Buildings & Facilities Machinery & Equipment Fleet	Condition	20-39	4
Land Improvements			
Buildings & Facilities Machinery & Equipment Fleet	Condition	0-19	5
Land Improvements			

Consequence of Failure

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Roads)	Replacement Cost	\$0-\$10,000	1
Road Network (Roads)	Replacement Cost	\$10,000-\$20,000	2
Road Network (Roads)	Replacement Cost	\$20,000-\$50,000	3
Road Network (Roads)	Replacement Cost	\$50,000-\$100,000	4
Road Network (Roads)	Replacement Cost	\$500,000+	5
Road Network (Roads)	Design Class	Rural Road	1
Road Network (Roads)	Design Class	Local Residential	2
Road Network (Roads)	Design Class	Collector Residential	3
Road Network (Roads)	Design Class	Local Commercial Industrial	3
Road Network (Roads)	Design Class	Collector Commercial Industrial	4
Road Network (Roads)	Design Class	Arterial	5
Road Network (Roads)	Critical Path	Low	2
Road Network (Roads)	Critical Path	Medium (Bus Route)	3
Road Network (Roads)	Critical Path	High (Truck Route, Connecting Link)	5
Road Network (Roads)	No# Lanes	4-5	3

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Roads)	No# Lanes	2-3	4
Road Network (Roads)	No# Lanes	1	5
Bridges & Culverts	Replacement Cost	\$0-\$50,000	1
Bridges & Culverts	Replacement Cost	\$50,000-\$350,000	2
Bridges & Culverts	Replacement Cost	\$350,000-\$1,000,000	3
Bridges & Culverts	Replacement Cost	\$1,000,000-\$2,000,000	4
Bridges & Culverts	Replacement Cost	\$2,000,000+	5
Bridges & Culverts	Detour Distance (km)	1 - 2	1
Bridges & Culverts	Detour Distance (km)	2 - 5	2
Bridges & Culverts	Detour Distance (km)	5 - 8	3
Bridges & Culverts	Detour Distance (km)	8 - 10	4
Bridges & Culverts	Detour Distance (km)	10+	5
Stormwater Network (Mains)	Replacement Cost	\$0-\$50,000	1
Stormwater Network (Mains)	Replacement Cost	\$50,000-\$150,000	2
Stormwater Network (Mains)	Replacement Cost	\$150,000-\$250,000	3
Stormwater Network (Mains)	Replacement Cost	\$250,000-\$500,000	4
Stormwater Network (Mains)	Replacement Cost	\$500,000+	5
Stormwater Network (Mains)	Pipe Diameter (mm)	50-100	1
Stormwater Network (Mains)	Pipe Diameter (mm)	100-250	2
Stormwater Network (Mains)	Pipe Diameter (mm)	250-450	3
Stormwater Network (Mains)	Pipe Diameter (mm)	500-700	4
Stormwater Network (Mains)	Pipe Diameter (mm)	700+	5
Stormwater Network (Mains)	Population Affected	0-5 persons	1
Stormwater Network (Mains)	Population Affected	5-20 persons	2
Stormwater Network (Mains)	Population Affected	20-50 persons	3
Stormwater Network (Mains)	Population Affected	50-100 persons	4
Stormwater Network (Mains)	Population Affected	100+ persons	5
Stormwater Network (Mains)	Proximity to Critical Services	Rural	1
Stormwater Network (Mains)	Proximity to Critical Services	Commercial/Residential	2
Stormwater Network (Mains)	Proximity to Critical Services	Schools	3
Stormwater Network (Mains)	Proximity to Critical Services	Pump Stations	4
Stormwater Network (Mains)	Proximity to Critical Services	Hospitals/Care Facilities	5

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Buildings & Facilities	Replacement Cost	\$0 - \$100,000	1
Buildings & Facilities	Replacement Cost	\$100,000 - \$500,000	2
Buildings & Facilities	Replacement Cost	\$500,000 - \$2,000,000	3
Buildings & Facilities	Replacement Cost	\$2,000,000 - \$10,000,000	4
Buildings & Facilities	Replacement Cost	\$10,000,000+	5
Buildings & Facilities	Facility Type	Cemetery	1
Buildings & Facilities	Facility Type	Storage	1
Buildings & Facilities	Facility Type	Art Gallery	1
Buildings & Facilities	Facility Type	Market Square	1
Buildings & Facilities	Facility Type	Library	3
Buildings & Facilities	Facility Type	Day Care	3
Buildings & Facilities	Facility Type	Municipal Office/Admin of Justice	3
Buildings & Facilities	Facility Type	Community Halls/Complex	3
Buildings & Facilities	Facility Type	Recreation Arenas	4
Buildings & Facilities	Facility Type	Housing	4
Buildings & Facilities	Facility Type	Public Works/Operations	4
Buildings & Facilities	Facility Type	Fire/Police Station	5
Buildings & Facilities	Population Affected	0-5 persons	1
Buildings & Facilities	Population Affected	5-20 persons	2
Buildings & Facilities	Population Affected	20-50 persons	3
Buildings & Facilities	Population Affected	50-100 persons	4
Buildings & Facilities	Population Affected	100+ persons	5
Machinery & Equipment	Equipment Type	Cemetery	1
Machinery & Equipment	Equipment Type	Administration & Finance	1
Machinery & Equipment	Equipment Type	Airport	2
Machinery & Equipment	Equipment Type	Social Services	2
Machinery & Equipment	Equipment Type	Maintenance	3
Machinery & Equipment	Equipment Type	Transit	3
Machinery & Equipment	Equipment Type	Recreation	3
Machinery & Equipment	Equipment Type	IT	4
Machinery & Equipment	Equipment Type	Library	4
Machinery & Equipment	Equipment Type	Operations	4

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Machinery & Equipment	Equipment Type	Fire & Rescue, Police	5
Fleet	Replacement Cost	\$0-\$25,000	1
Fleet	Replacement Cost	\$25,000-\$50,000	2
Fleet	Replacement Cost	\$50,000-\$150,000	3
Fleet	Replacement Cost	\$150,000-\$300,000	4
Fleet	Replacement Cost	\$300,000+	5
Fleet	Vehicles Type	Off Road (ATV)	1
Fleet	Vehicles Type	Small Equipment	1
Fleet	Vehicles Type	Light Duty Vehicle	1
Fleet	Vehicles Type	Medium Duty Vehicle	2
Fleet	Vehicles Type	Light Duty Machinery	2
Fleet	Vehicles Type	Heavy Duty Vehicle	3
Fleet	Vehicles Type	Attachment	3
Fleet	Vehicles Type	Medium Duty Machinery	4
Fleet	Vehicles Type	Heavy Machinery	5
Land Improvements	Replacement Cost	\$0-\$25,000	1
Land Improvements	Replacement Cost	\$25,000-\$50,000	2
Land Improvements	Replacement Cost	\$50,000-\$100,000	3
Land Improvements	Replacement Cost	\$100,000-\$150,000	4
Land Improvements	Replacement Cost	\$150,000+	5
Land Improvements	Land Improvement Type	Naturalized	1
Land Improvements	Land Improvement Type	Trails	2
Land Improvements	Land Improvement Type	Parkette	2
Land Improvements	Land Improvement Type	Parking Lots	2
Land Improvements	Land Improvement Type	Airport	3
Land Improvements	Land Improvement Type	Municipal Golf Course	3
Land Improvements	Land Improvement Type	Neighborhood Park	3
Land Improvements	Land Improvement Type	Special Use Park	4
Land Improvements	Land Improvement Type	Community Park	5
Water Network (Mains)	Pipe Diameter (mm)	25-50	1
Water Network (Mains)	Pipe Diameter (mm)	100-150	2
Water Network (Mains)	Pipe Diameter (mm)	200-300	3

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Water Network (Mains)	Pipe Diameter (mm)	300+	5
Water Network (Mains)	Replacement Cost	\$0-\$25,000	1
Water Network (Mains)	Replacement Cost	\$25,000-\$50,000	2
Water Network (Mains)	Replacement Cost	\$50,000-\$100,000	3
Water Network (Mains)	Replacement Cost	\$100,000-\$150,000	4
Water Network (Mains)	Replacement Cost	\$150,000+	5
Water Network (Mains)	Proximity to Critical Services	Rural	1
Water Network (Mains)	Proximity to Critical Services	Commercial/Residential	2
Water Network (Mains)	Proximity to Critical Services	Schools	3
Water Network (Mains)	Proximity to Critical Services	Major Commercial/Industrial	4
Water Network (Mains)	Proximity to Critical Services	Hospitals/Care Facilities	5
Water Network (Mains)	Proximity to Critical Services	Railway	5
Water Network (Mains)	Proximity to Critical Services	Towers/Wells	5
Wastewater Network (Sanitary Mains)	Replacement Cost	\$0-\$25,000	1
Wastewater Network (Sanitary Mains)	Replacement Cost	\$25,000-\$50,000	2
Wastewater Network (Sanitary Mains)	Replacement Cost	\$50,000-\$100,000	3
Wastewater Network (Sanitary Mains)	Replacement Cost	\$100,000-\$150,000	4
Wastewater Network (Sanitary Mains)	Replacement Cost	\$150,000+	5
Wastewater Network (Sanitary Mains)	Pipe Diameter (mm)	50-100	1
Wastewater Network (Sanitary Mains)	Pipe Diameter (mm)	100-250	2
Wastewater Network (Sanitary Mains)	Pipe Diameter (mm)	250-450	3
Wastewater Network (Sanitary Mains)	Pipe Diameter (mm)	500-700	4
Wastewater Network (Sanitary Mains)	Pipe Diameter (mm)	700+	5

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Wastewater Network (Sanitary Mains)	Population Affected	0-5 persons	1
Wastewater Network (Sanitary Mains)	Population Affected	5-20 persons	2
Wastewater Network (Sanitary Mains)	Population Affected	20-50 persons	3
Wastewater Network (Sanitary Mains)	Population Affected	50-100 persons	4
Wastewater Network (Sanitary Mains)	Population Affected	100+ persons	5
Wastewater Network (Sanitary Mains)	Proximity to Critical Services	Rural	1
Wastewater Network (Sanitary Mains)	Proximity to Critical Services	Commercial/Residential	2
Wastewater Network (Sanitary Mains)	Proximity to Critical Services	Schools	3
Wastewater Network (Sanitary Mains)	Proximity to Critical Services	Pump Stations	4
Wastewater Network (Sanitary Mains)	Proximity to Critical Services	Hospitals/Care Facilities	5
Wastewater Network (Sanitary Mains)	Easement	No Easement Required	1
Wastewater Network (Sanitary Mains)	Easement	Private Property with Easement	3
Wastewater Network (Sanitary Mains)	Easement	Private Property with no Easement	4