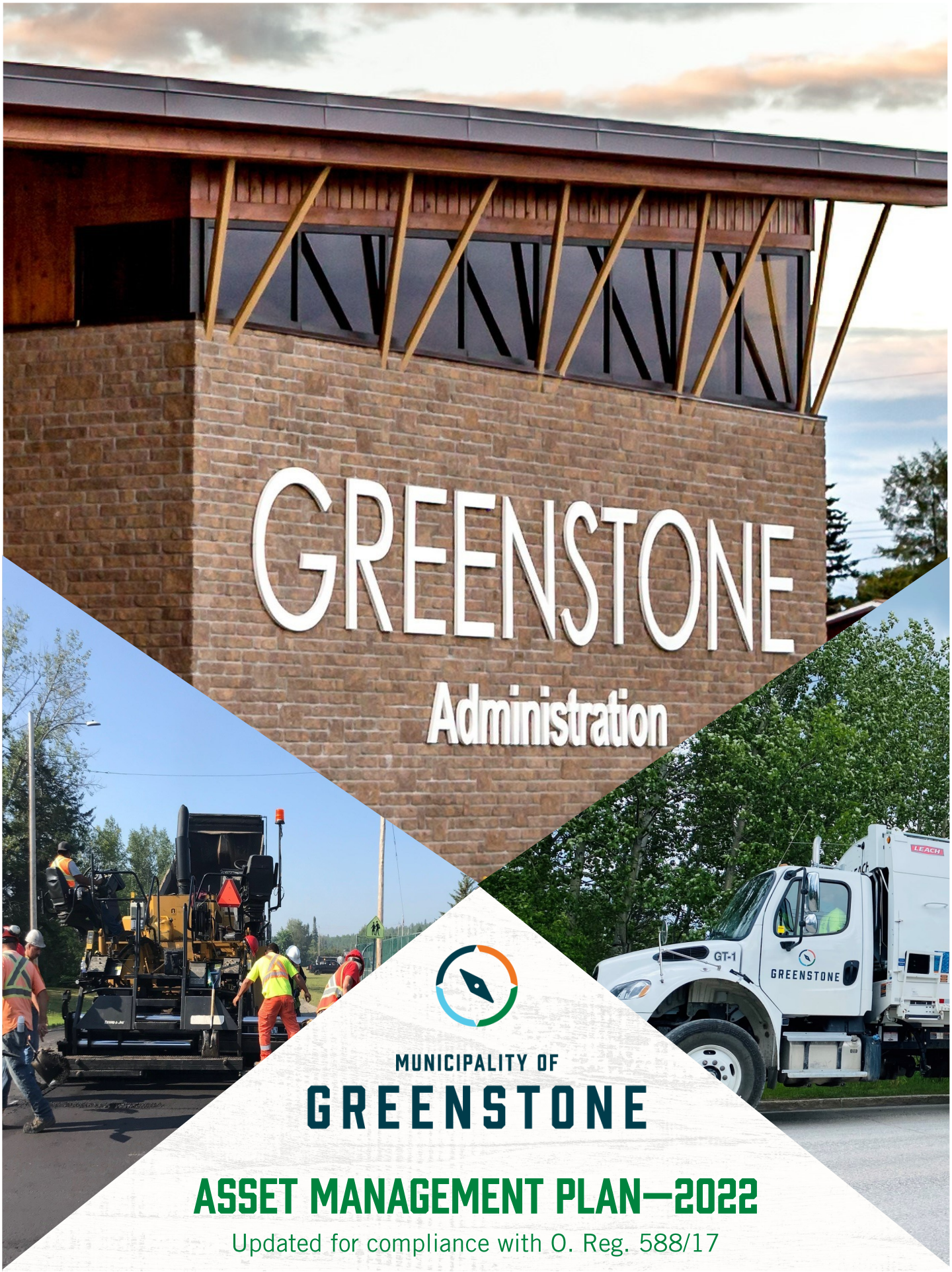


MUNICIPALITY OF

GREENSTONE

ASSET MANAGEMENT PLAN—2022

Updated for compliance with O. Reg. 588/17

Key Statistics

$292.5 million Replacement cost of asset portfolio	**$112,847** Replacement cost of infrastructure per household
0.38% Target average annual infrastructure reinvestment rate	**0.16%** Actual average annual infrastructure reinvestment rate
51% Percentage of assets in fair or better condition	**43%** Percentage of annual infrastructure funding needs currently being met
10% Portion of total infrastructure funding that comes from the Gas Tax	**79%** Portion of total infrastructure funding that comes from Taxes
$2,156 Annual infrastructure deficit per households	**15-20 years** Recommended timeframe for eliminating annual infrastructure deficit

Table of Contents

Executive Summary

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

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

This AMP includes the following asset categories:

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges	
Stormwater Network	
Buildings & Facilities	
Machinery & Equipment	
Vehicles	
Land Improvements	
Water Network	User Rates
Sanitary Sewer Network	

The overall replacement cost of the asset categories included in this AMP totals $292.5 million. 51% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 51% 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 & water and sanitary mains) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Municipality's average annual capital requirement totals $9.9 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $4.3 million towards capital projects per year. As a result, there is currently an annual funding gap of $5.6 million.

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

Funding Source	Years Until Full Funding	Total Tax/Rate Change	Average Annual Tax/Rate Change
Tax-Funded Assets	20 Years	31.4%	1.1%
Rate-Funded (Water)	15 Years	20.2%	1.1%
Rate-Funded (Sanitary)	15 Years	18.3%	0.0%

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

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

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

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

1 Introduction & 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 Municipality's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management

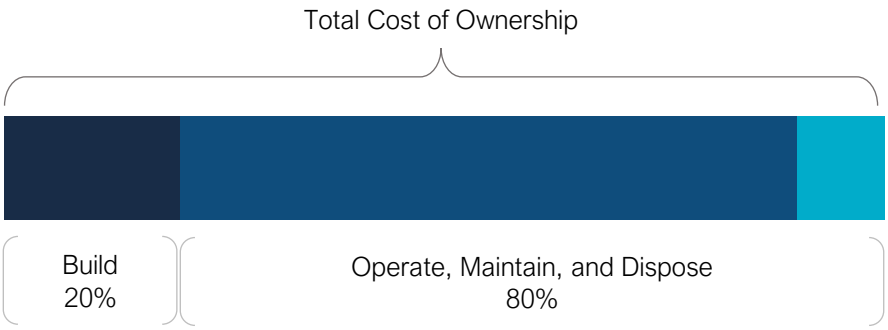
An asset management plan is a living document that should be updated regularly to inform long-term planning

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

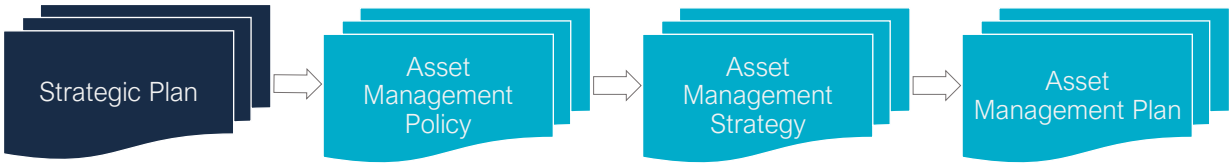
An Overview of Asset Management

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 Municipality adopted By-law 19-22 "Strategic Asset Management Policy" on May 27, 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 Municipality's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

1.1.3 Asset Management Plan

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

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

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

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.

1.1.4 Lifecycle Management Strategies

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

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

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

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

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

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

1.1.5 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.

1.1.6 Levels of Service

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

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

Community Levels of Service

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

Technical Levels of Service

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

For core asset categories (Roads, Bridges, Water, Wastewater, Stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP. For non-core asset categories, the Municipality has determined the technical metrics that will be used to determine the technical level of service provided. These metrics can be found in the Levels of Service subsection within each asset category.

Current and Proposed Levels of Service

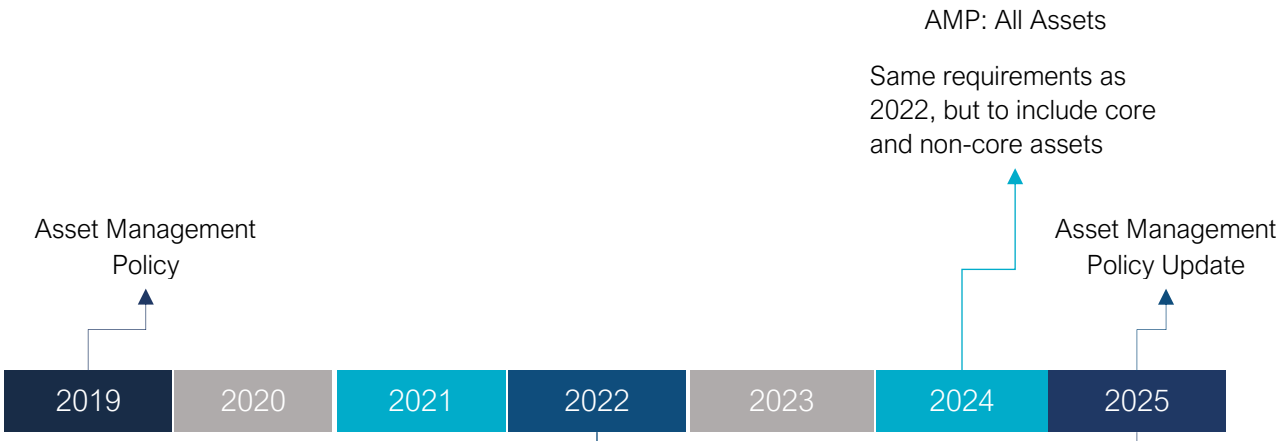
This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the Municipality plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

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

Ontario Regulation 588/17

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

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



AMP: Core Assets

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

AMP: All Assets

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

1.1.7 O. Reg. 588/17 Compliance Review

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

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

Asset Management Roadmap

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

Asset Management Maturity Assessment (Completion Date: January 8th, 2019)
The State of Maturity Report provided an audit of the existing asset management capacity and competency. It outlined strategic recommendations to improve the Municipality's asset management program.

Condition Assessment Program Development (Completion Date: January 18th, 2019)
Municipality 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: February 28, 2020)
Asset inventory data was refined continuously over the course of this project.

Risk and Criticality Model Development (Completion Date: June 21, 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: January 16, 2020)
The Municipality's lifecycle management strategies were reviewed and documented to determine current practices and identify opportunities for improvement and potential cost avoidance.

Level of Service Framework Development (Completion Date: January 16, 2020)
A framework was developed to determine the current level of service provided to the community through municipal infrastructure.

AMP & Financial Strategy
This document represents the culminating deliverable of the Asset Management Roadmap.

2 Scope and Methodology

Key Insights

This asset management plan includes 9 asset categories and is divided between tax-funded and rate-funded categories

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

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

Assets categories included in this AMP

This asset management plan for the Municipality of Greenstone is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs—requires analysis of only core assets (roads, bridges, water, wastewater, and stormwater).

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

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

Deriving Replacement Costs

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

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

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

Estimated Useful Life and Service Life Remaining

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

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

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

Reinvestment Rate

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

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

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

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

Deriving Asset Condition

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

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

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

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

3 Portfolio Overview

Key Insights

The total replacement cost of the Municipality's asset portfolio is $292.5 million

The Municipality's target re-investment rate is 0.38%, and the actual re-investment rate is 0.16%, contributing to an expanding infrastructure deficit

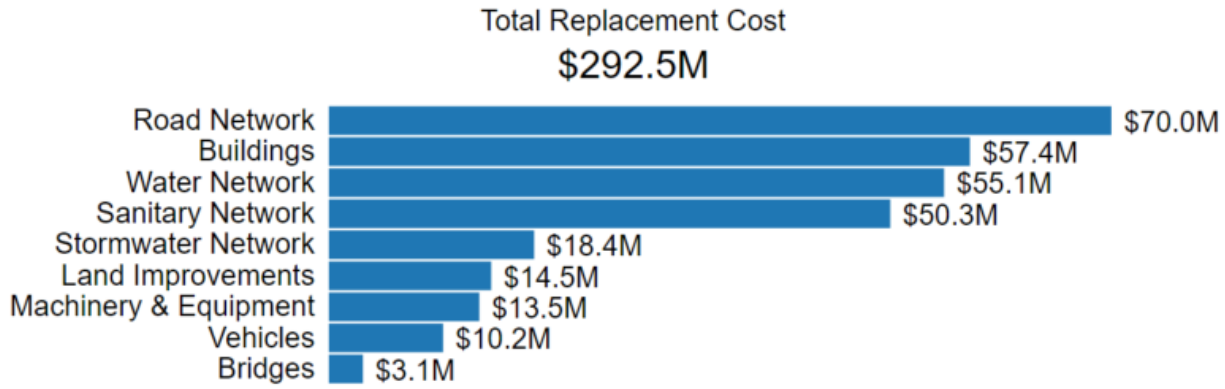
51% of all assets are in fair or better condition

44% of assets are projected to require replacement in the next 10 years

Average annual capital requirements total $9.9 million per year across all assets

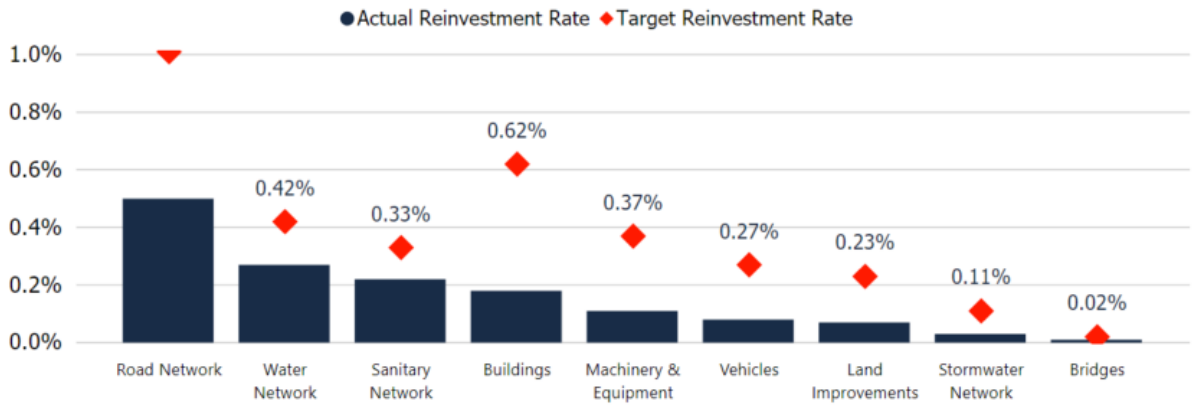
Total Replacement Cost of Asset Portfolio

The asset categories analysed in this AMP have a total replacement cost of $292.5 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.



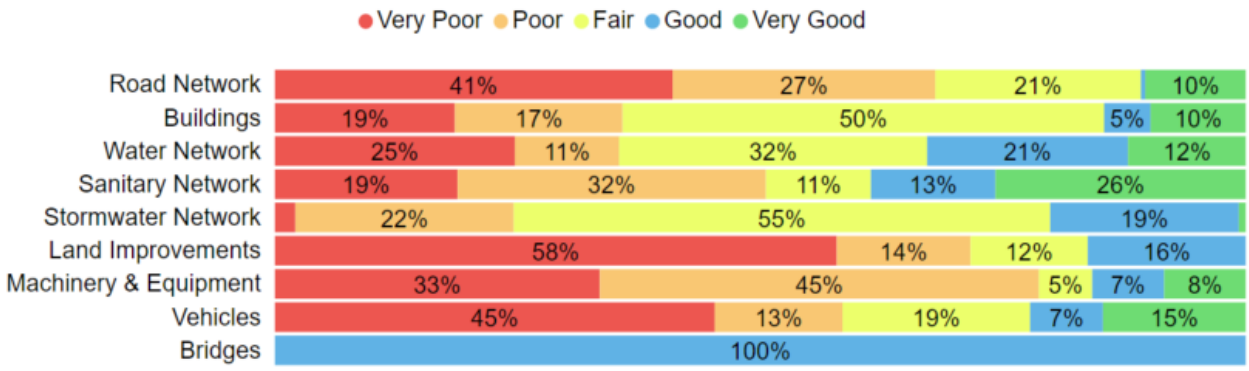
Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Municipality should be allocating approximately $5.6 million annually, for a target reinvestment rate of 0.38%. Actual annual spending on infrastructure totals approximately $4.3 million, for an actual reinvestment rate of 0.16%.



Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 51% of assets in Greenstone are in fair or better condition. This estimate relies on both age-based and field condition data.

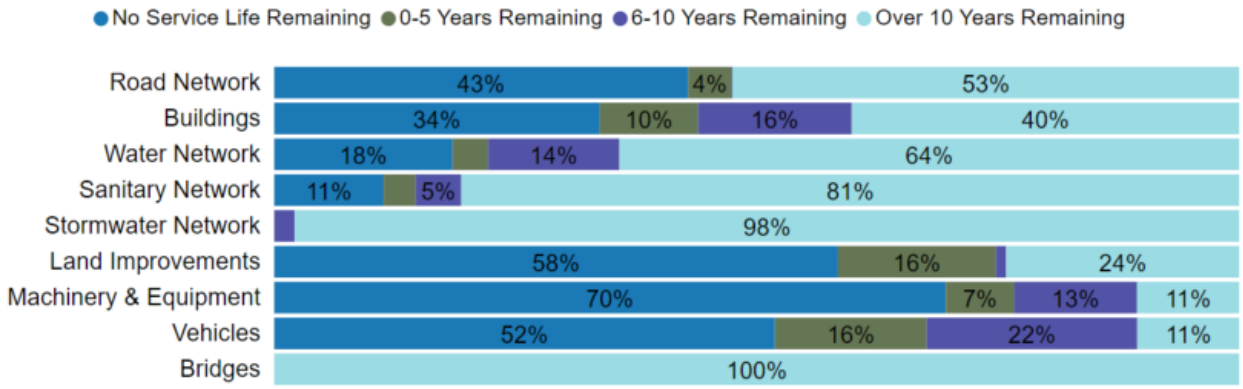


This AMP relies on assessed condition data for 51% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table 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	Roads	89%	2015 Road Needs Study Staff Assessments
Bridges	Bridges	100%	2018 OSIM Report
Stormwater Network	All	0%	N/A
Buildings & Facilities	All	93%	Staff Assessments
Machinery & Equipment	All	92%	Staff Assessments
Vehicles	All	80%	Staff Assessments
Land Improvements	All	16%	Staff Assessments
Water Network	All	10%	Staff Assessments
Sanitary Sewer Network	All	5%	Staff Assessments

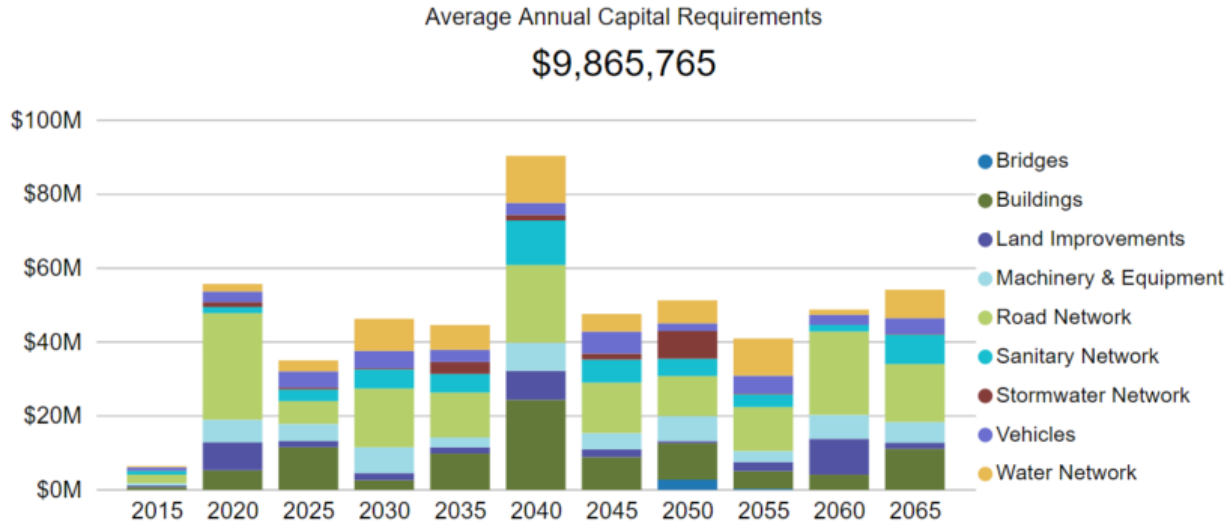
Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 51% of the Municipality's assets will require replacement within the next 10 years. Capital requirements over the next 10 years are identified in Appendix A.



Forecasted Capital Requirements

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



4 Analysis of Tax-funded Assets

Key Insights

Tax-funded assets are valued at $187 million

47% 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 $7.7 million

Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

Road Network

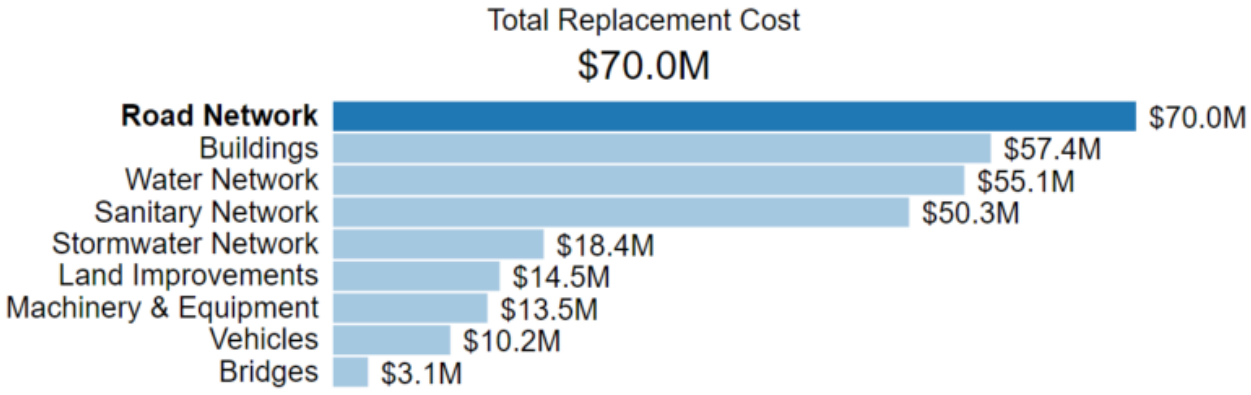
The Road Network is a critical component of the provision of safe and efficient transportation services and represents the highest value asset category in the Municipality's asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including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

The Municipality'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.

4.1.1 Asset Inventory & Replacement Cost

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

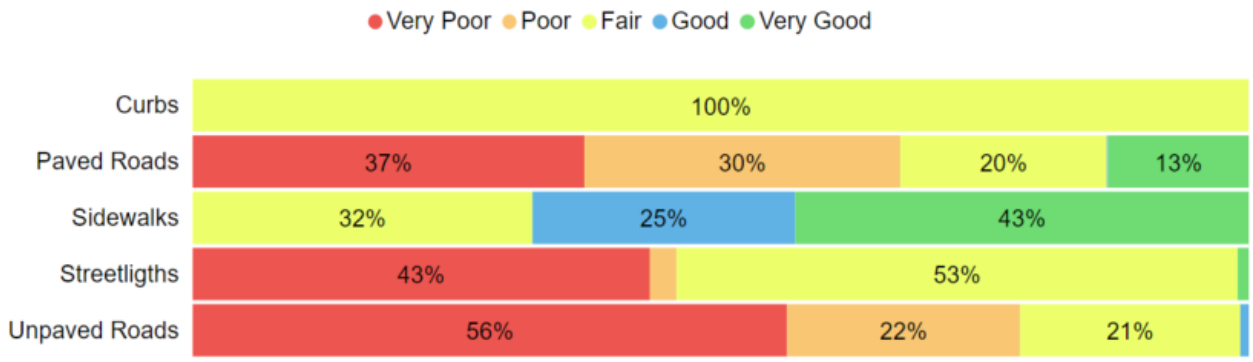
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Curbs	486	CPI Tables	$92,802.00
Paved Roads	78,780 m	Unit/Cost	$52,237,821.00
Sidewalks	2406	CPI Tables	$589,616.00
Streetligths	807	CPI Tables	$2,371,143.00
Unpaved Roads	52297 m	Unit/Cost	$14,746,670.00
			$70,038,052



4.1.2 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Curbs	52%	Fair	Age-based
Paved Roads	40%	Fair	86% Assessed
Sidewalks	75%	Good	3% Assessed
Streetligths	31%	Poor	81% Assessed
Unpaved Roads	25%	Poor	100% Assessed
	37%	**Fair**	**88% Assessed**



Current Approach to Condition Assessment

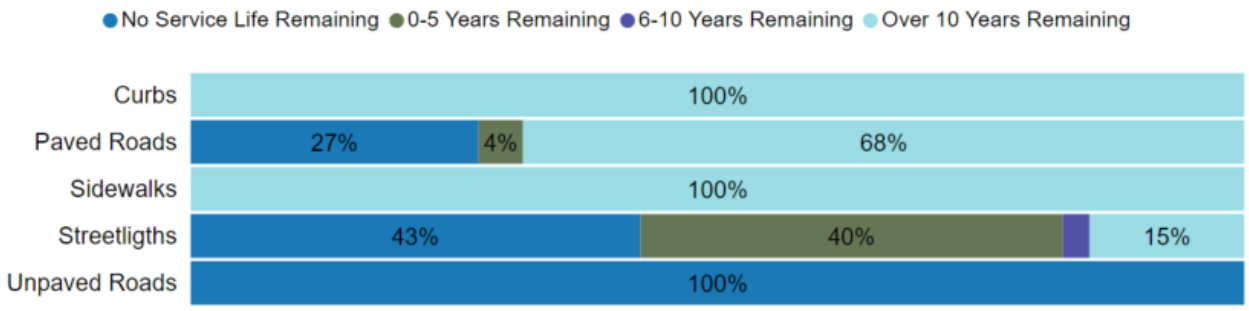
Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- A Road Needs Study was completed in 2015 that included a detailed assessment of the condition of each road segment. The Road Needs Study is reviewed every five years and additional roads are assessed as needed.
- Sidewalks and regulatory signs are assessed during regular deficiency testing in compliance with Minimum Maintenance Standards.
- Streetlights, upgraded recently to LED, and other right-of-way assets are visually inspected by Public Works staff on a regular basis.

4.1.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Curbs	30 Years	15	16
Paved Roads	15-25 Years	34	-10
Sidewalks	25-30 Years	6	24
Streetligths	25 Years	34	-9
Unpaved Roads	10-15 Years	52	-37
		36	**-13**



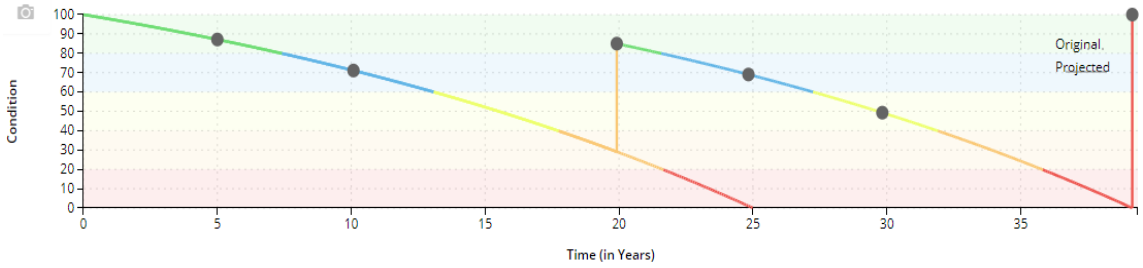
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

4.1.4 Lifecycle Management Strategy

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

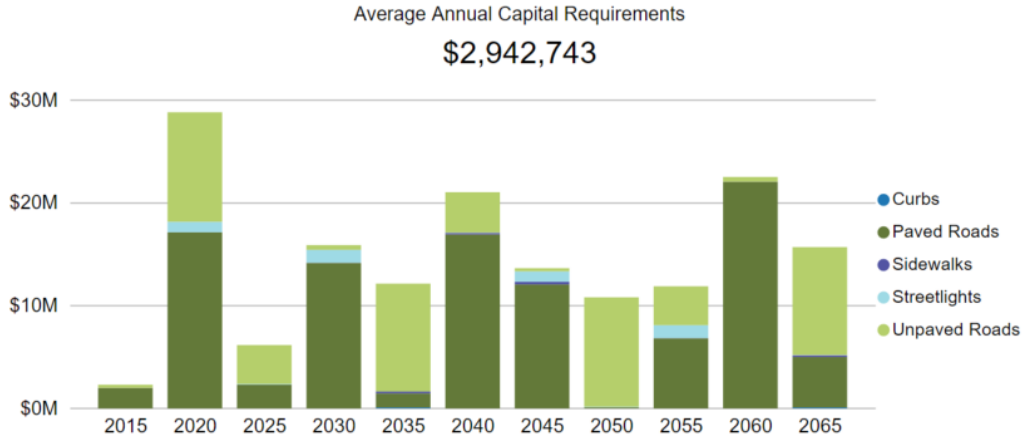
The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of paved roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Paved Roads		
Event Name	Event Class	Event Trigger
Crack Sealing	Preventative Maintenance	3-5 Years (Repeated)
Double Lift Re-surfacing	Rehabilitation	60% Condition
Full Reconstruction	Replacement	40 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 Municipality should allocate towards funding rehabilitation and replacement needs to meet future capital needs.



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

4.1.5 Risk & Criticality

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

Critical Assets

The identification of critical assets allows the Municipality 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.

4.1.6 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	Public Works staff perform visual assessments of their road segments on a regular basis using a 0-100 scale.

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
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.91
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	0.31
Quality	Average pavement condition index for paved roads in the municipality	44%
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Good
Performance	Capital reinvestment rate	0.50%

4.1.7 Recommendations

Asset Inventory

- Review road culverts and sidewalk inventory to determine whether all municipal assets within these asset segments have been accounted for.
- The sidewalk and streetlight inventory includes several pooled assets that should be broken into discrete segments to allow for detailed planning and analysis.
- Consider re-defining road segments that are too long by intersection to intersection.
- Update and link assets within the register to the GIS database for better visual mapping.

Condition Assessment Strategies

- The last comprehensive assessment of the road network was completed in 2015. Consider completing an updated assessment of all roads within the next 1-2 years.
- Add a note about a future Sidewalk inspection program

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 Municipality'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 Municipality believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

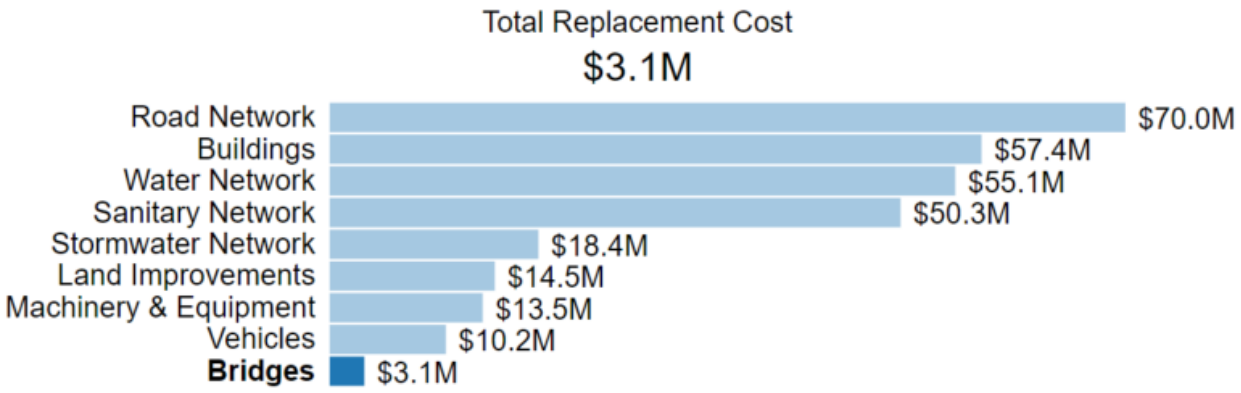
Bridges

Bridges represent a critical portion of the transportation services provided to the community. The Public Works staff is responsible for the maintenance of all bridges and located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

4.1.8 Asset Inventory & Replacement Cost

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

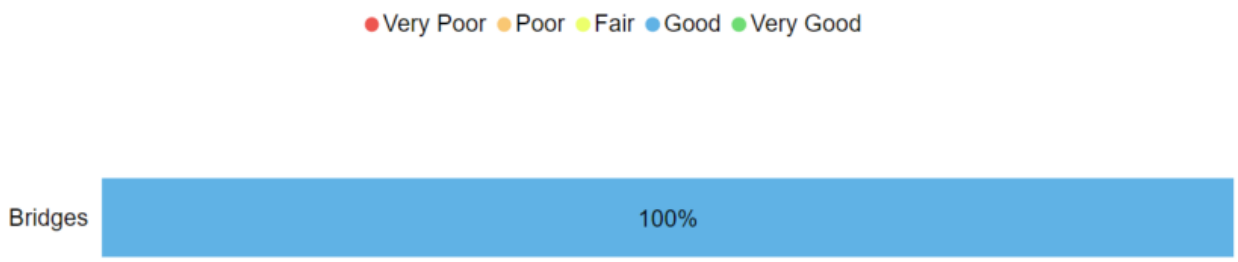
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	2	CPI Tables	$3,063,575
			$3,063,575



4.1.9 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	70%	Good	75% Assessed
	70%	**Good**	75% Assessed



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

Current Approach to Condition Assessment

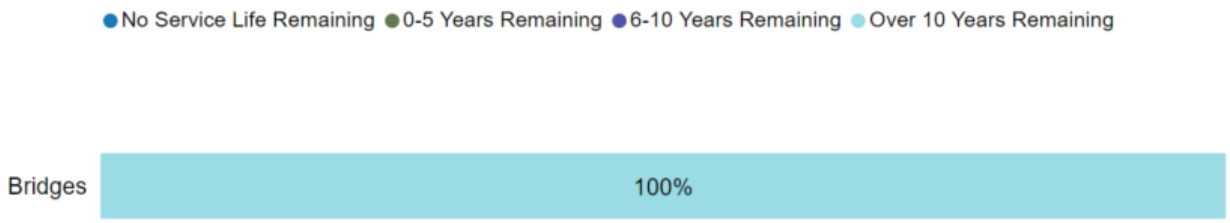
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

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

4.1.10 Estimated Useful Life & Average Age

The Estimated Useful Life for Bridges 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	45-50 Years	37.0	10.5
		37.0	**10.5**



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

4.1.11 Lifecycle Management Strategy

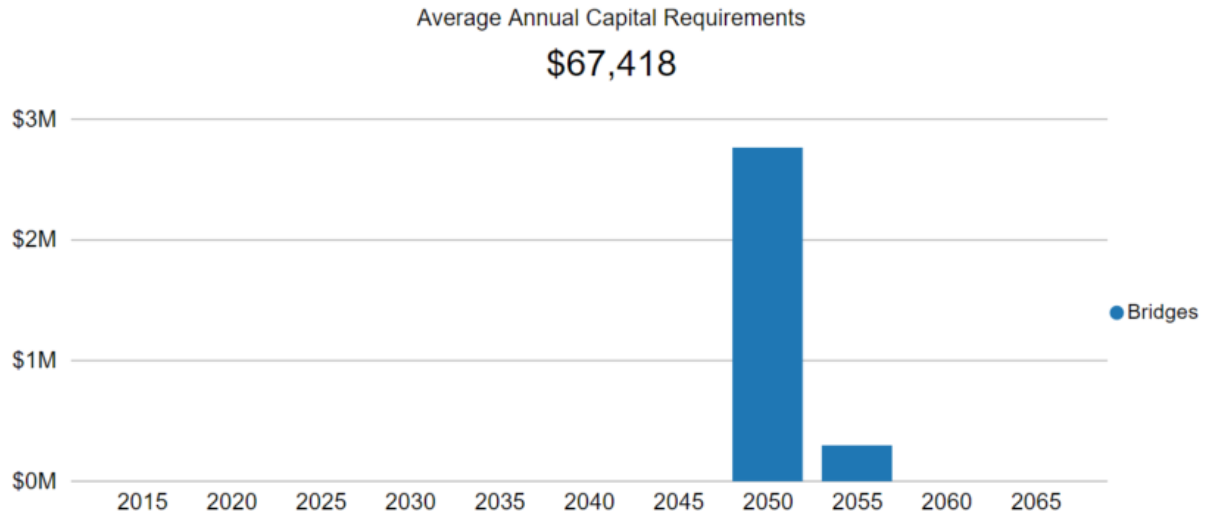
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	All lifecycle activities are driven by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIM) Staff perform regular visual inspections
Inspection	The most recent inspection report was completed in 2018 JML Engineering

Forecasted Capital Requirements

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



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

4.1.12 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 Municipality 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.

4.1.13 Levels of Service

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

Community Levels of Service

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

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

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of bridges in the Municipality with loading or dimensional restrictions	0%
Quality	Average bridge condition index value for bridges in the Municipality	77
Performance	Capital re-investment rate	0.01%

4.1.14 Recommendations

Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural upon the completion of OSIM inspections every 2 years.
- Consider breaking out bridges into main component assets (e.g. deck, abutments, beams) for more proactive lifecycle planning.

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

Levels of Service

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

Stormwater Network

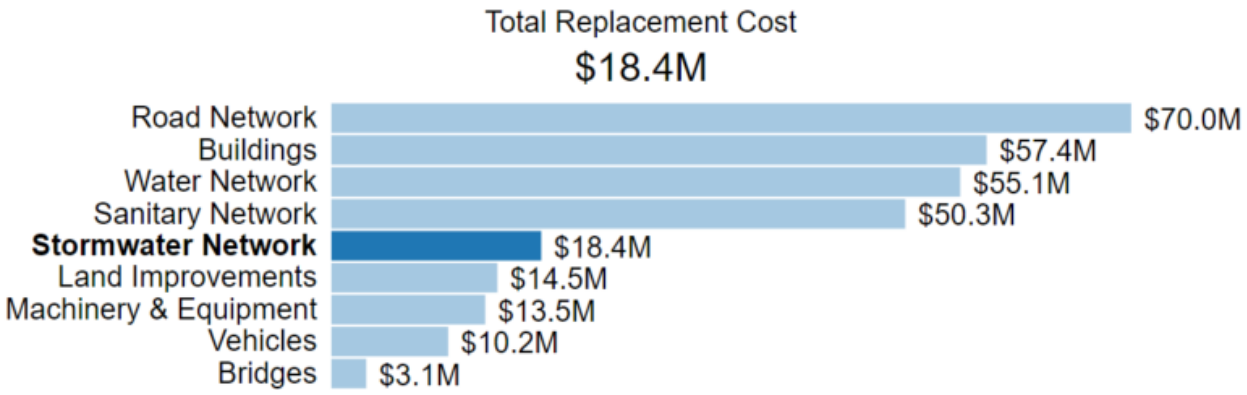
The Municipality is responsible for owning and maintaining a stormwater network of storm sewer mains, catch basins, manholes, and culverts (less than 3m diameter)

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

4.1.15 Asset Inventory & Replacement Cost

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

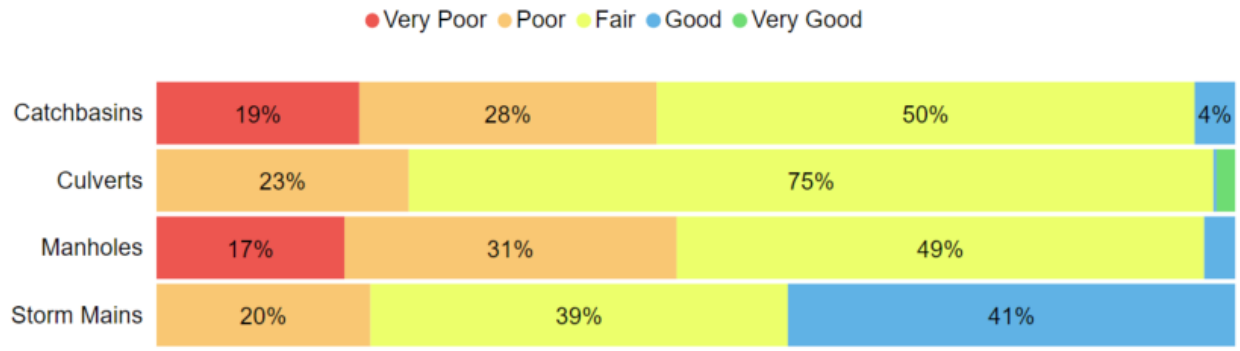
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Catchbasins	362	CPI Tables	$972,694.00
Culverts	325 m	CPI Tables	$7,836,202.00
Manholes	167	CPI Tables	$1,200,090.00
Storm Mains	15971 m	Regional Cost Estimates	$8,376,330.00
			$18,385,316



4.1.16 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
Catchbasins	38%	Poor	Age-based
Culverts	47%	Fair	Age-based
Manholes	37%	Poor	Age-based
Storm Mains	64%	Good	Age-based
	54%	**Fair**	**Age-based**



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

Current Approach to Condition Assessment

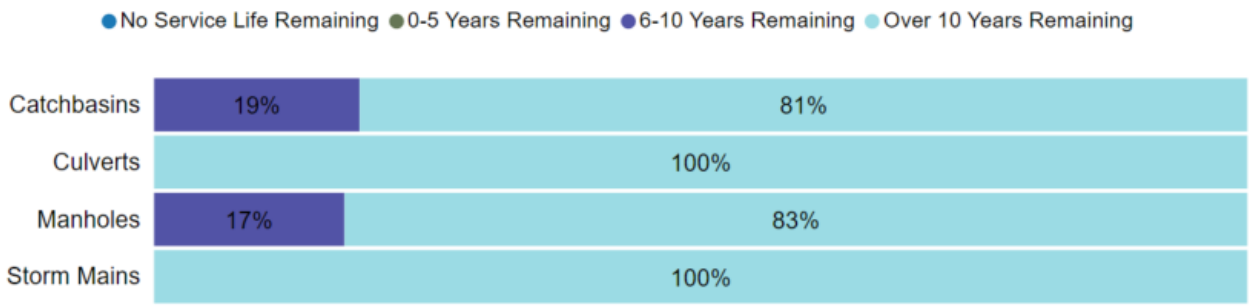
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- There are no formal condition assessment programs in place for the stormwater network; CCTV inspections are performed on a project-by-project basis.
- Culverts and other point assets are visually inspected on a regular basis by Public Works staff.

4.1.17 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)
Catchbasins	50 Years	31	19
Culverts	60 Years	33	27
Manholes	50 Years	31	19
Storm Mains	60-75 Years	32	39
		32	**38**



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

4.1.18 Lifecycle Management Strategy

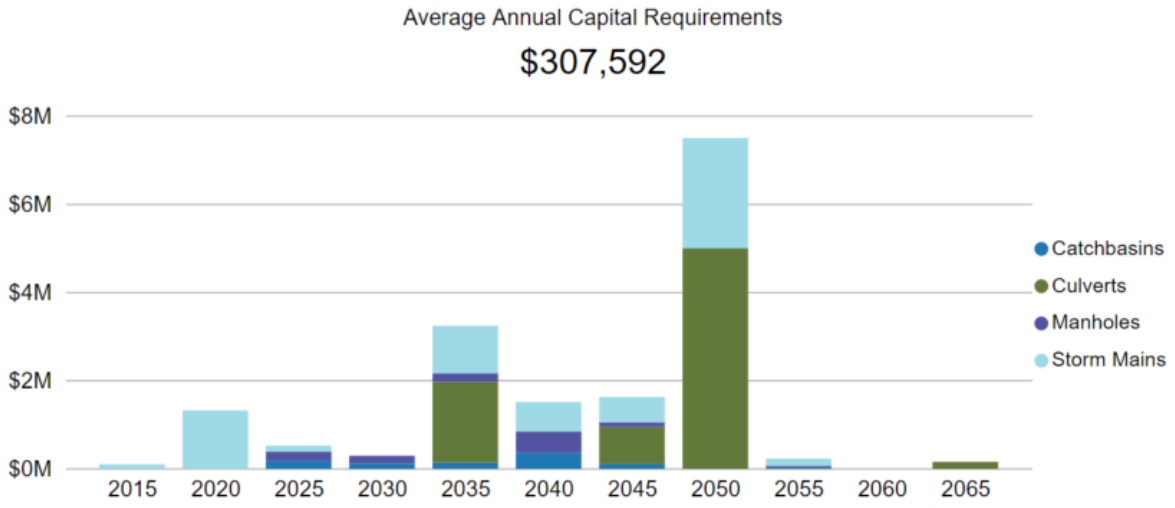
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Maintenance activities are completed to a lesser degree compared to other underground linear infrastructure
	Catchbasins are cleaned out along main roads annually, and for other roads on an as-needed basis
	CCTV inspections and cleaning is completed as budget becomes available and this information will be used to drive forward rehabilitation and replacement plans
Rehabilitation	Trenchless re-lining has the potential to reduce total lifecycle costs but would require a formal condition assessment program to determine viability
Replacement	Stormwater main replacement is done on a reactive approach based on internal staff expertise. Staff prioritize replacements based on pipe susceptibility to frost due to low bury depth and/or vermin damage

Forecasted Capital Requirements

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



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

4.1.19 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 Municipality 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.

4.1.20 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system	See Appendix B

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties in municipality resilient to a 100-year storm	TBD[1]
	% of the municipal stormwater management system resilient to a 5-year storm	95%[2]
Performance	Capital reinvestment rate	0.03%

[1] The Municipality does not currently have data available to determine this technical metric. The rate of properties that are expected to be resilient to a 100-year storm is expected to be low.
[2] This is based on the observations of municipal staff.

4.1.21 Recommendations

Asset Inventory

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

Condition Assessment Strategies

- The development of a comprehensive inventory should be accompanied by a system-wide assessment of the condition of all assets in the Stormwater Network through CCTV and/or zoom camera 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

- 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.

Buildings & Facilities

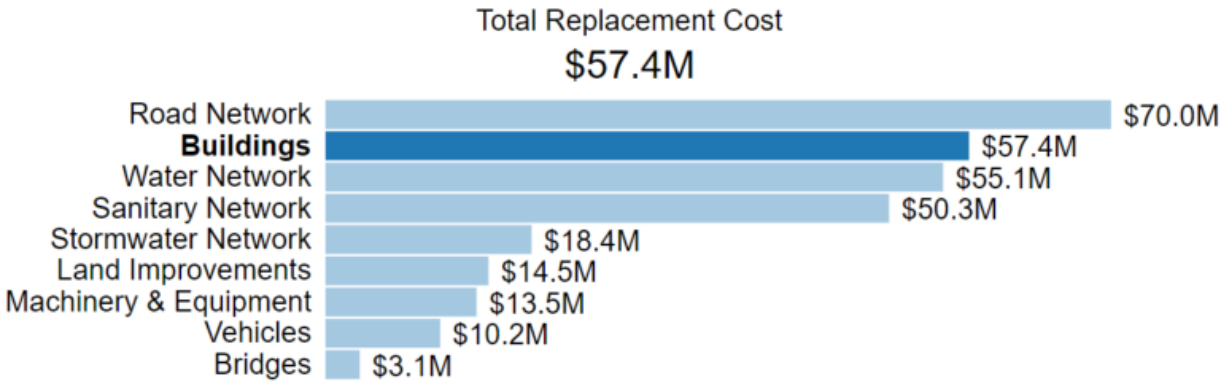
The Municipality of Greenstone owns and maintains several facilities and recreation centres that provide key services to the community. These include:

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

4.1.22 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
General Government	30	CPI Tables	$10,436,749
Health Services	8	CPI Tables	$606,863
Protection Services	21	CPI Tables	$1,985,251
Recreation and Cultural Services	112	CPI Tables	$33,238,112
Social and Family Services	27	CPI Tables	$3,419,337
Transportation Services	50	CPI Tables	$7,693,999
			$57,380,311



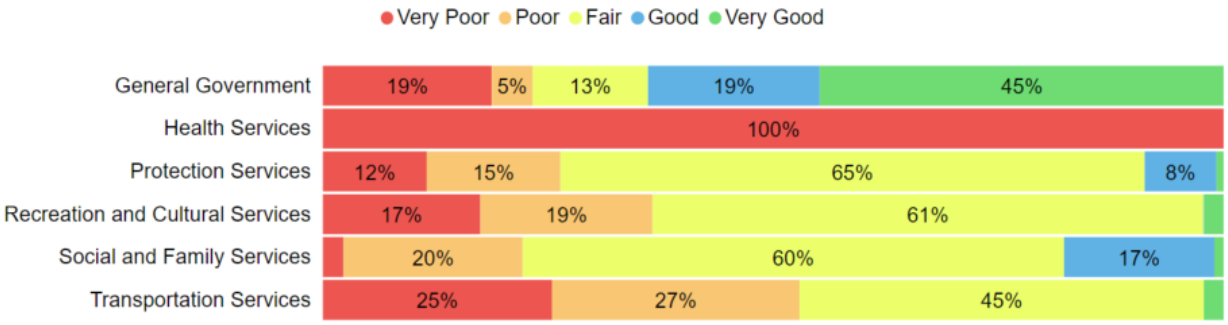
4.1.23 Asset Condition

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
General Government	61%	Good	65% Assessed
Health Services	0%	Very Poor	100% Assessed
Protection Services	38%	Poor	99% Assessed
Recreation and Cultural Services	34%	Poor	99% Assessed
Social and Family Services	43%	Fair	99% Assessed
Transportation Services	32%	Fair	99% Assessed
	39%	**Poor**	**93% Assessed**

If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Buildings & Facilities.

Current Approach to Condition Assessment



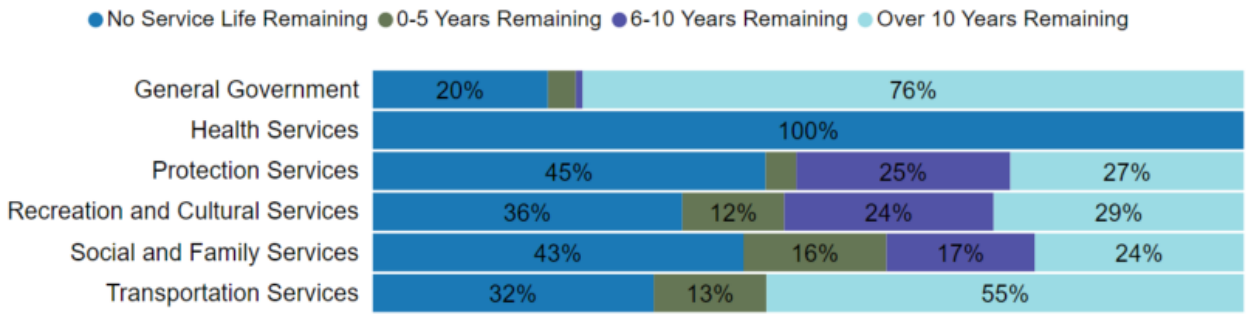
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Some formal and informal condition assessments are performed by internal staff and/or hired consultants for various buildings.
- The recreational complexes are assessed by engineering consultants that provide recommendations and lifecycle activities when funding allows.
- Staff have also developed an internal visual inspection checklist to inspect the structural integrity of their buildings; Most of the buildings have been inspected, with priority given to emergency services buildings, fire halls, and any facilities frequented by residents.

4.1.24 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
General Government	15-50 Years	51	-25
Health Services	15-40 Years	75	-51
Protection Services	15-50 Years	40	-14
Recreation and Cultural Services	15-50 Years	41	-14
Social and Family Services	15-50 Years	29	-5
Transportation Services	10-50 Years	30	-6
		40	**-14**



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

4.1.25 Lifecycle Management Strategy

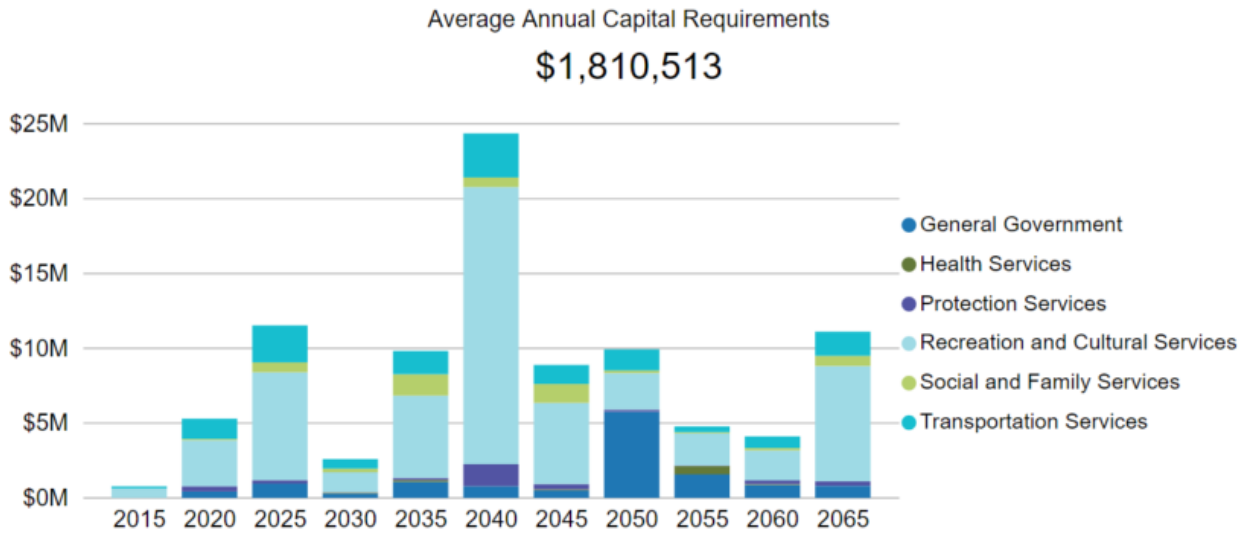
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Municipal buildings are subject to monthly inspections to identify health & safety requirements as well as structural deficiencies that require additional attention
	An electrical safety authority is employed to inspect and make the necessary recommendations for a number of the Municipality's buildings on a monthly basis
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 Municipality should allocate towards funding rehabilitation and replacement needs.



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

4.1.26 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 Municipality 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.

4.1.27 Levels of Service

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

4.1.28 Recommendations

Asset Inventory

- The Municipality's asset inventory contains a high-level breakdown of major building components (e.g. roofing, HVAC, plumbing). Staff should consider a more comprehensive component-based inventory of all facilities to allow for component-based lifecycle planning.

Condition Assessment Strategies

- The Municipality should consider contracting out a building condition assessment for all their major critical buildings (e.g. fire halls, arenas) in order to get more accurate condition and remaining life data.

Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.

Levels of Service

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

Machinery & Equipment

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

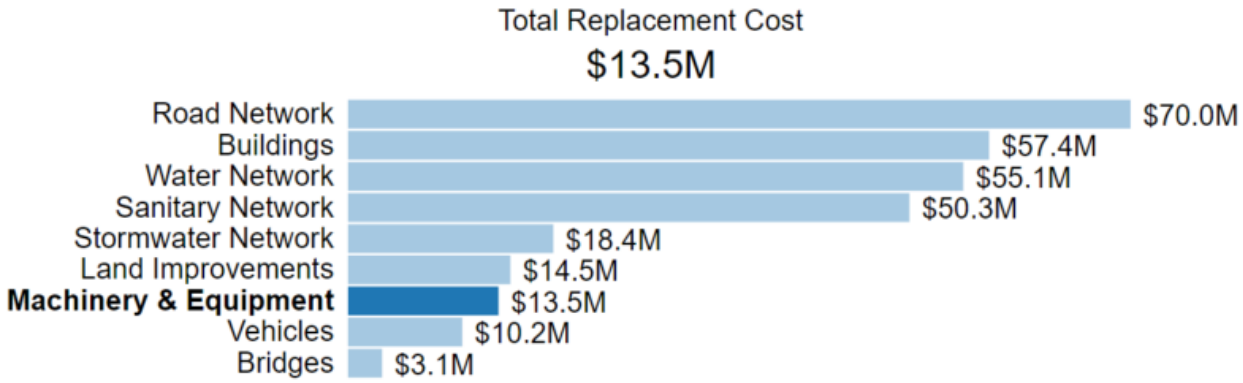
- Landscaping equipment to maintain public parks
- Fire equipment to support the delivery of emergency services
- Plows to provide winter control activities
- Library books for public loan

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

4.1.29 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Arena Equipment	24	CPI Tables	$2,889,499.00
Computer Equipment	42	CPI Tables	$460,276.00
Fire & Rescue Equipment	31	CPI Tables	$1,905,914.00
Fueling Tanks & Generators	8	CPI Tables	$625,439.00
Furniture	70	CPI Tables	$1,066,586.00
Library Equipment	16	CPI Tables	$3,185,020.00
Office Equipment	31	CPI Tables	$761,669.00
Public Works Equipment	27	CPI Tables	$2,585,722.00
			$13,480,125

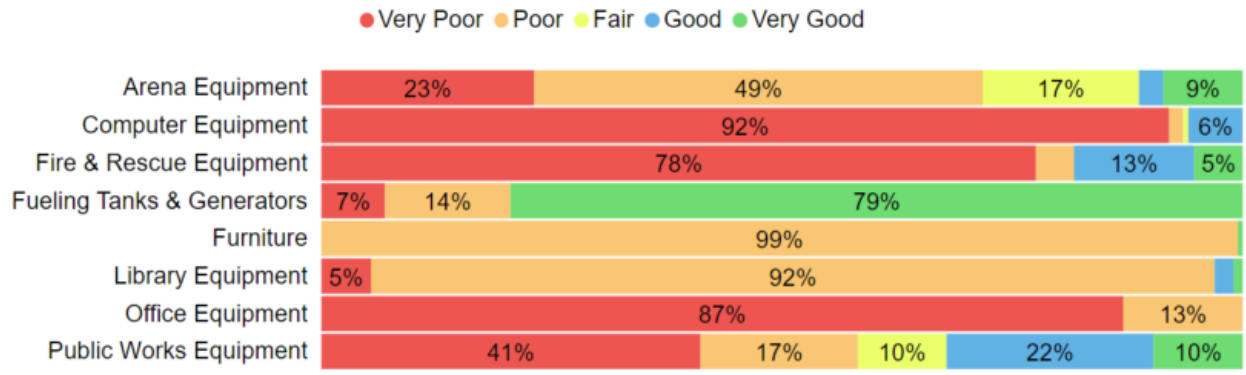


4.1.30 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Arena Equipment	34%	Poor	91% Assessed
Computer Equipment	6%	Very Poor	92% Assessed
Fire & Rescue Equipment	23%	Poor	93% Assessed
Fueling Tanks & Generators	72%	Good	100% Assessed
Furniture	30%	Poor	99% Assessed
Library Equipment	35%	Poor	97% Assessed
Office Equipment	13%	Very Poor	100% Assessed
Public Works Equipment	34%	Poor	79% Assessed
	32%	**Poor**	**92% Assessed**

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



overall condition of the Machinery & Equipment.

Current Approach to Condition Assessment

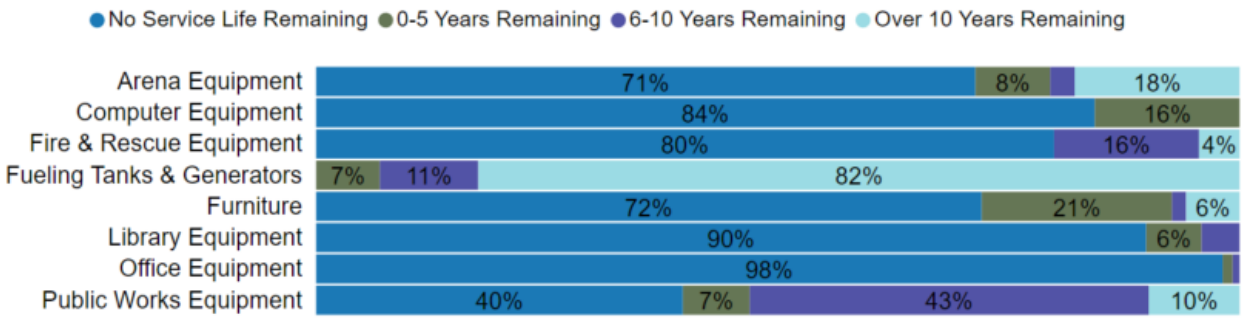
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Staff complete regular visual inspections of machinery & equipment to ensure they are in state of adequate repair
- There are no formal condition assessment programs in place, although some machinery & equipment were assigned cursory condition ratings for this AMP

4.1.31 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)
Arena Equipment	10-20 Years	21	-3
Computer Equipment	5 Years	12	-7
Fire & Rescue Equipment	10-25 Years	18	-7
Fueling Tanks & Generators	25-30 Years	15	12
Furniture	20 Years	22	-2
Library Equipment	10 Years	13	-3
Office Equipment	10 Years	19	-9
Public Works Equipment	5-25 Years	12	3
		17	**-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.

4.1.32 Lifecycle Management Strategy

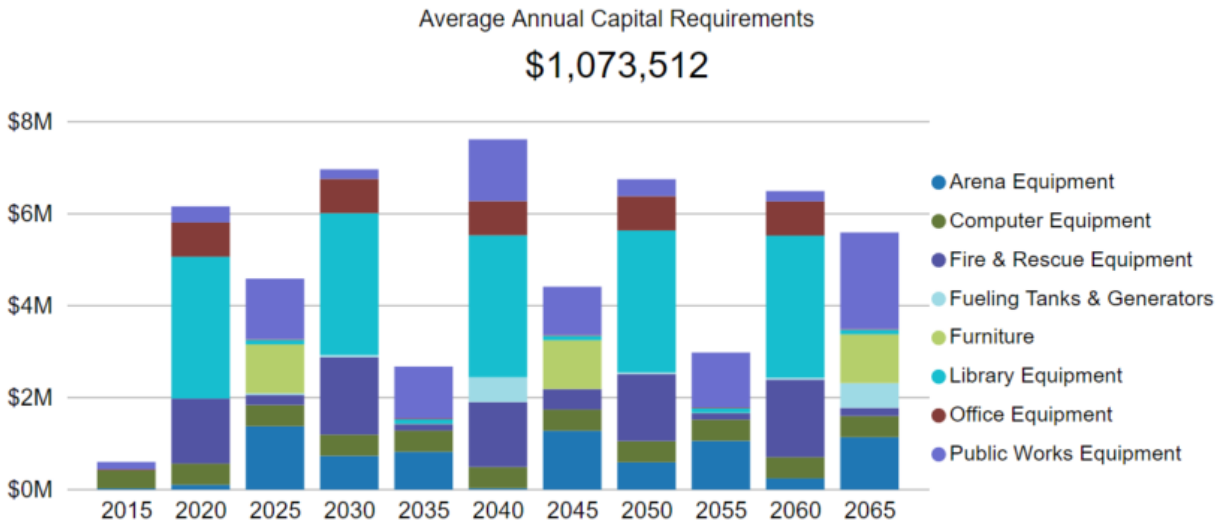
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

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

Forecasted Capital Requirements

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



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

4.1.33 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 Municipality 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.

4.1.34 Levels of Service

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

4.1.35 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

- 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 Municipality has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.

Vehicles

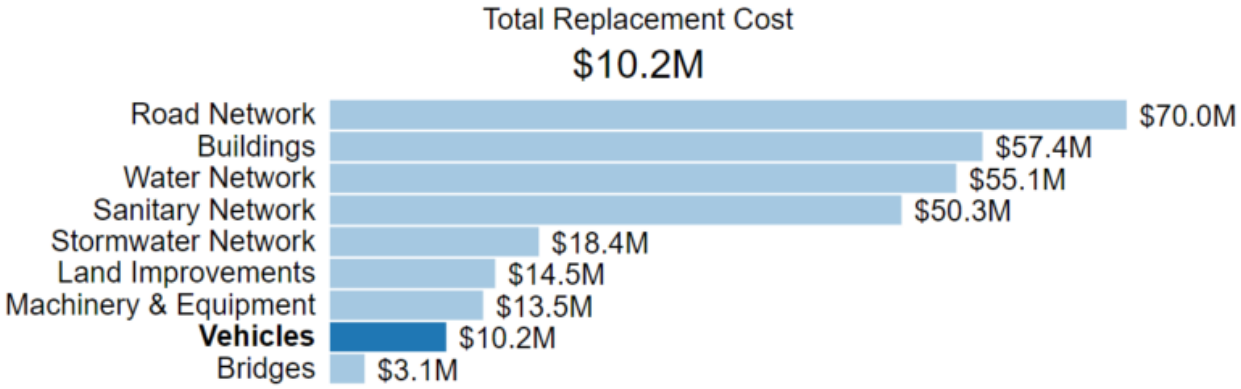
Vehicles allow staff to efficiently deliver municipal services and personnel. Municipal vehicles are used to support several service areas, including:

- tandem axle trucks for winter control activities
- 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 Recreational & Cultural Services

4.1.36 Asset Inventory & Replacement Cost

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

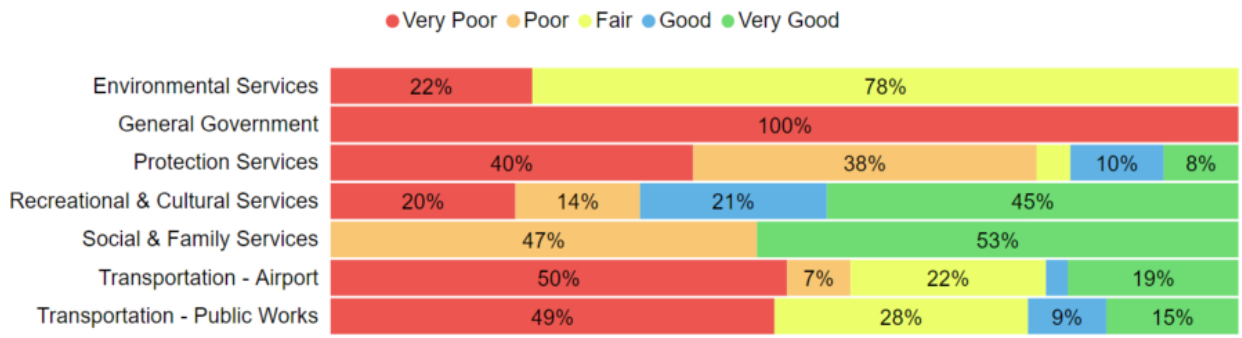
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Environmental Services	2	CPI Tables	$129,941.00
General Government	1	CPI Tables	$49,022.00
Protection Services	23	CPI Tables	$2,831,679.00
Recreational & Cultural Services	5	CPI Tables	$144,557.00
Social & Family Services	4	CPI Tables	$192,125.00
Transportation - Airport	18	CPI Tables	$2,380,634.00
Transportation - Public Works	49	CPI Tables	$4,508,488.00
			$10,236,446



4.1.37 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Environmental Services	40%	Fair	100% Assessed
General Government	0%	Very Poor	100% Assessed
Protection Services	30%	Poor	81% Assessed
Recreational & Cultural Services	61%	Good	34% Assessed
Social & Family Services	62%	Good	47% Assessed
Transportation - Airport	36%	Poor	80% Assessed
Transportation - Public Works	36%	Poor	81% Assessed
	35%	Poor	80% Assessed



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

Current Approach to Condition Assessment

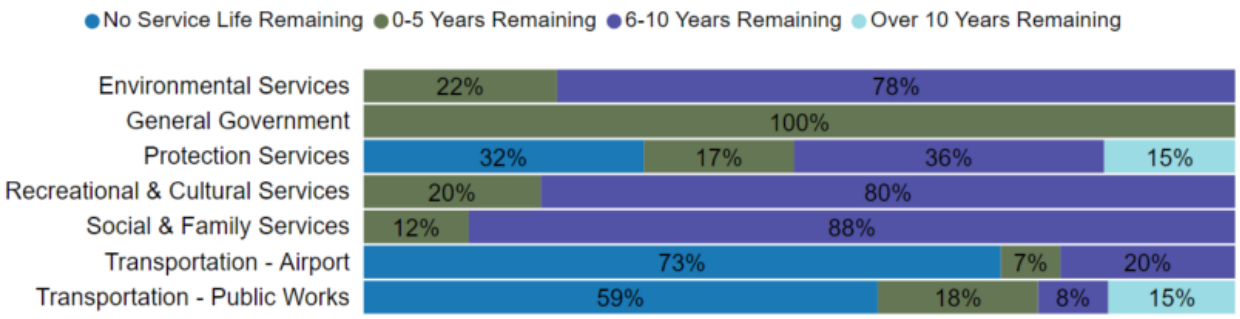
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Staff complete regular visual inspections 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

4.1.38 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Environmental Services	10-15 Years	8	4
General Government	10 Years	10	0
Protection Services	10-20 Years	12	4
Recreational & Cultural Services	10 Years	3	7
Social & Family Services	10 Years	4	6
Transportation - Airport	10-20 Years	20	-7
Transportation - Public Works	12 Years	14	-2
		13	-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.

4.1.39 Lifecycle Management Strategy

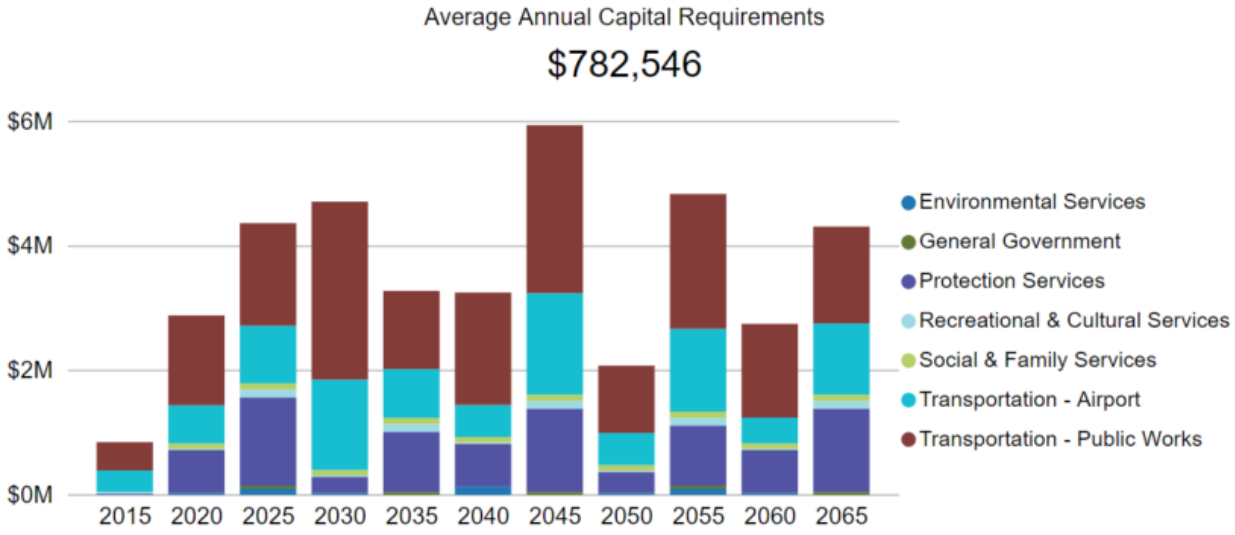
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Visual inspections completed and documented daily; fluids inspected at every fuel stop; tires inspected monthly
	Annual safety checks are performed on licensed vehicles.
Replacement	Replacement occurs when assets reach the end of their expected useful life – based on recommended manufacturer guidelines and/or staff expertise
	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 Municipality should allocate towards funding rehabilitation and replacement needs.



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

4.1.40 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 Municipality 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.

4.1.41 Levels of Service

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

4.1.42 Recommendations

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

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

Land Improvements

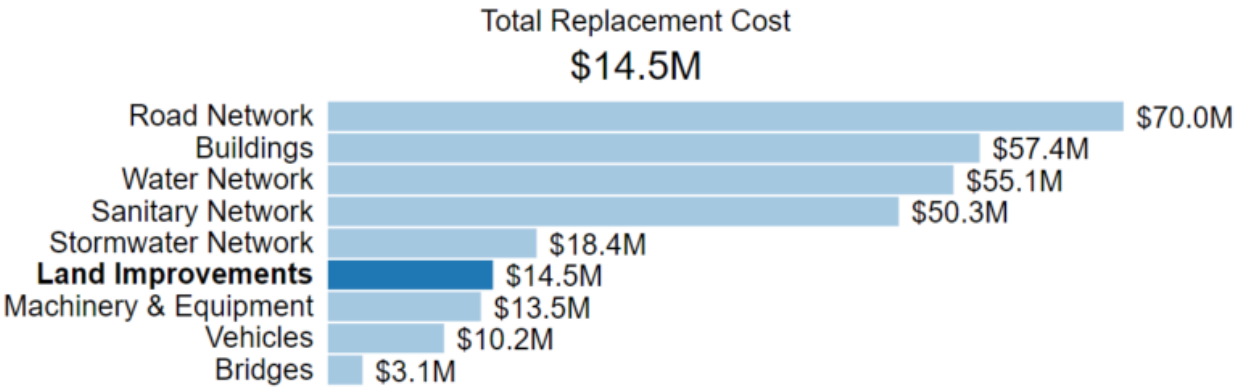
The Municipality of Greenstone owns a number of assets that are considered Land Improvements. This category includes:

- Parking lots for municipal facilities
- Playgrounds and sports fields
- Fencing and signage
- Miscellaneous landscaping and other assets

4.1.43 Asset Inventory & Replacement Cost

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

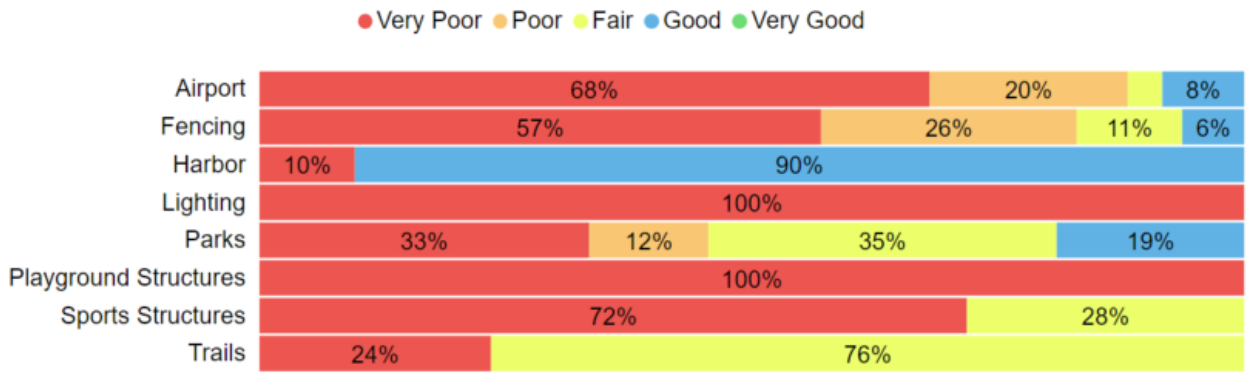
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Airport	11	CPI Tables	$9,342,895.50
Fencing	2,093	CPI Tables	$240,959.00
Harbor	26,417	CPI Tables	$1,639,687.00
Lighting	51	CPI Tables	$372,373.00
Parks	89	CPI Tables	$498,344.00
Playground Structures	14	CPI Tables	$670,839.00
Sports Structures	4	CPI Tables	$277,393.00
Trails	1,341	CPI Tables	$1,499,904.00
			$14,542,395



4.1.44 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
Airport	15%	Very Poor	20% Assessed
Fencing	19%	Very Poor	100% Assessed
Harbor	64%	Good	Age-based
Lighting	0%	Very Poor	Age-based
Parks	37%	Poor	16% Assessed
Playground Structures	18%	Very Poor	Age-based
Sports Structures	16%	Very Poor	28% Assessed
Trails	37%	Poor	Age-based
	24%	**Poor**	**16% Assessed**



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

Current Approach to Condition Assessment

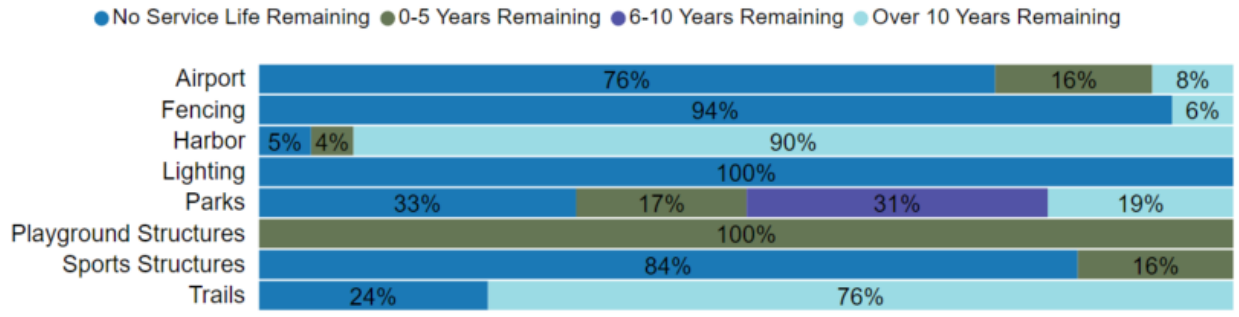
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Staff complete regular visual inspections of land improvements assets to ensure they are in state of adequate repair. Third-party contractors are hired to inspect and assess certain assets regularly to comply with health and safety regulations.
- There are no formal condition assessment programs in place for land improvements

4.1.45 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)
Airport	10-25 Years	19	2
Fencing	20 Years	21	-1
Harbor	20-50 Years	23	11
Lighting	20 Years	27	-7
Parks	15-45 Years	21	3
Playground Structures	20 Years	17	4
Sports Structures	20-25 Years	30	-8
Trails	15-30 Years	16	11
		20	**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.

4.1.46 Lifecycle Management Strategy

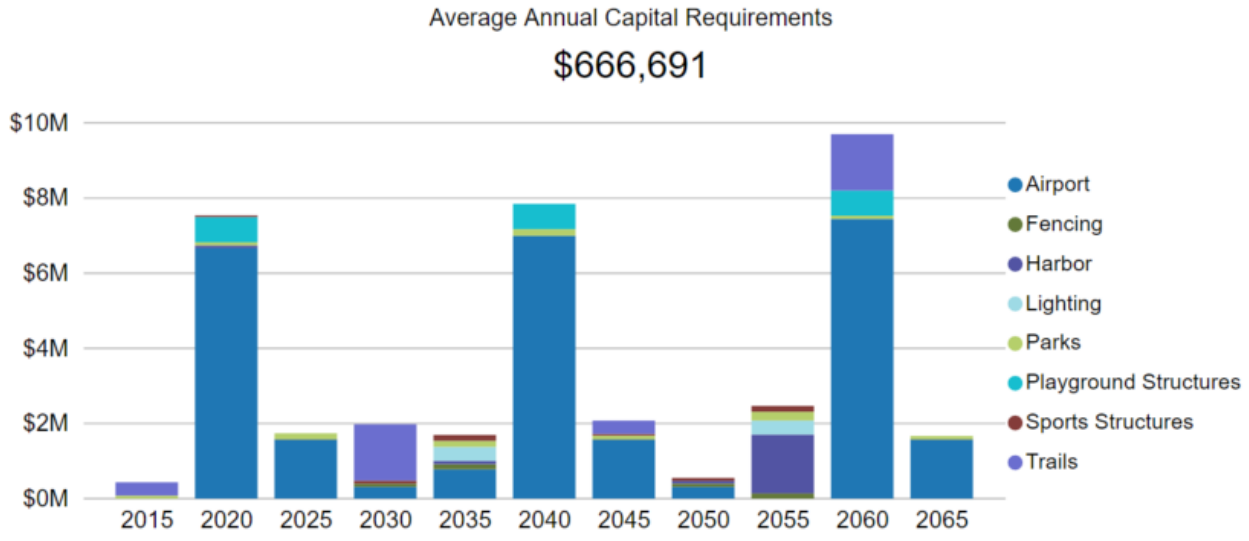
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenanace, Rehabilitation & Replacement	Parks are assessed on an annual and/or biannual basis by a third party Health and Safety inspector – these assessments generate deficiency listings and condition ratings that are updated into an external database.
	Playgrounds are inspected internally on a monthly basis and by CSA standards on an annual basis by contracted playground inspectors.
	Throughout the growing season staff also conduct regular landscaping and grass maintenance, which helps them identify issues and deficiencies on an ongoing basis

Forecasted Capital Requirements

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



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

4.1.47 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 Municipality 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.

4.1.48 Levels of Service

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

4.1.49 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.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

Risk Management Strategies

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

Levels of Service

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

5 Analysis of Rate-funded Assets

Key Insights

Rate-funded assets are valued at $105 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 $2.2 million

Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

Water Network

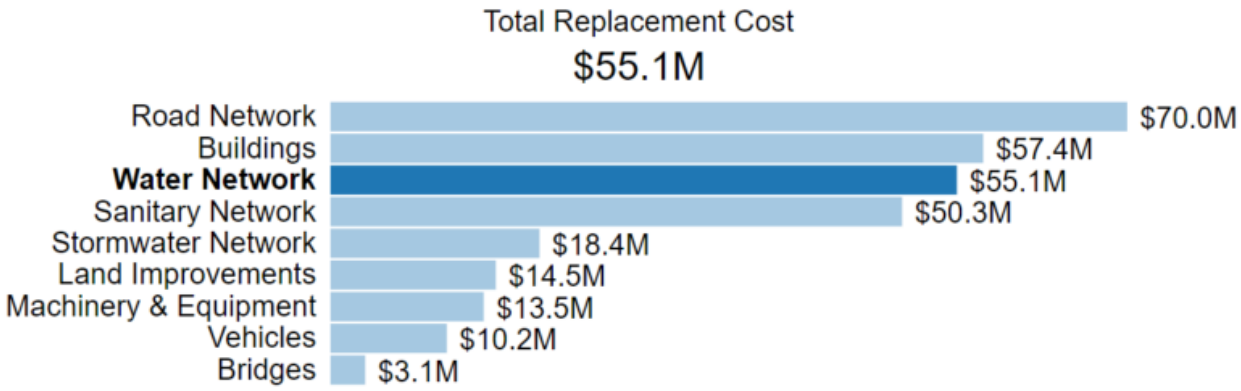
The water services provided by the Municipality are overseen by the Environmental Services department and Ontario Clean Water Agency (OCWA). The department is responsible for the following:

- Water Treatment Plant/Distribution System
- Pump stations
- Water towers and wells
- Hydrants and valves

5.1.1 Asset Inventory & Replacement Cost

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

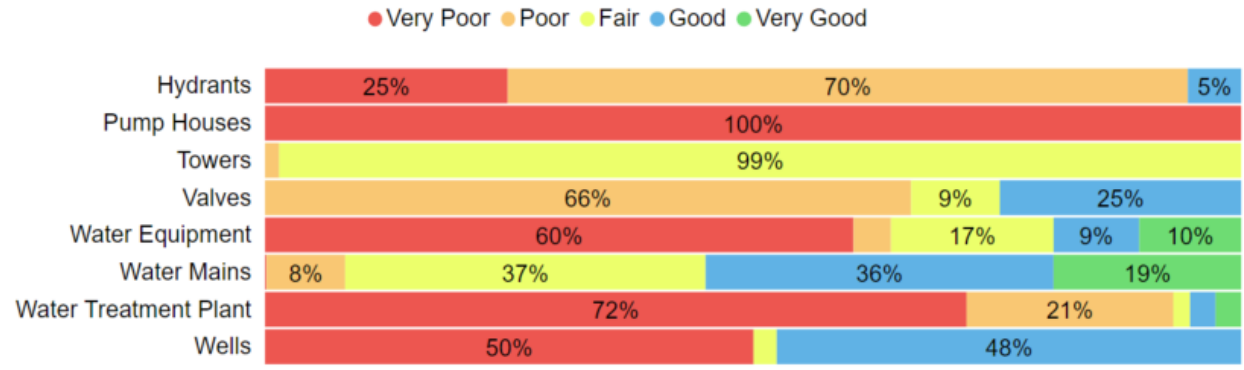
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Hydrants	297	CPI Tables	$1,311,376.00
Pump Houses	5	CPI Tables	$187,673.00
Towers	6	CPI Tables	$5,322,783.00
Valves	70	CPI Tables	$544,894.00
Water Equipment	175	90% CPI Tables, 10% User-defined	$10,634,354.00
Water Mains	53,474 m	Regional Cost Estimates	$27,717,108.00
Water Treatment Plant	37	CPI Tables	$9,053,487.00
Wells	15	CPI Tables	$297,410.00
			$55,069,085



5.1.2 Asset Condition

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

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Hydrants	24%	Poor	Age-based
Pump Houses	0%	Very Poor	Age-based
Towers	48%	Fair	100% Assessed
Valves	46%	Fair	66% Assessed
Water Equipment	25%	Poor	Age-based
Water Mains	57%	Fair	Age-based
Water Treatment Plant	14%	Very Poor	Age-based
Wells	39%	Poor	Age-based
	42%	**Fair**	**10% Assessed**



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

Current Approach to Condition Assessment

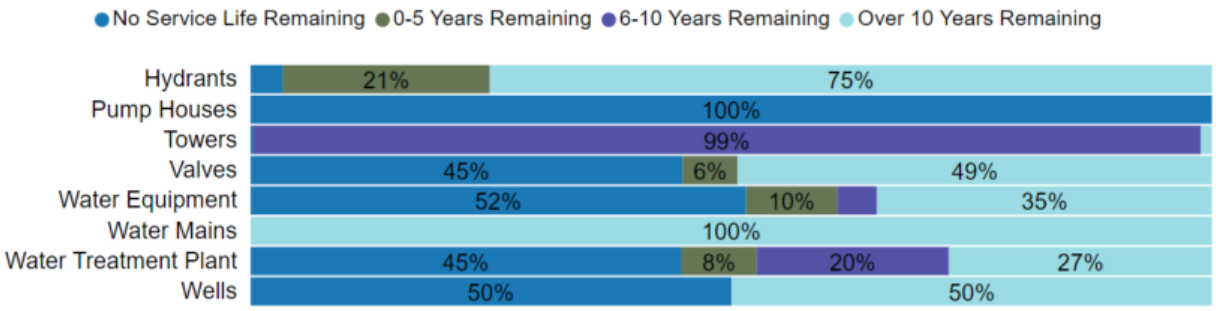
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- Staff primarily rely on the age and material of water mains to determine the projected condition of water mains
- There are no formal condition assessment programs in place for the Water Network
- The water treatment plants, and water towers are assessed regularly by OCWA staff due to health and safety compliance.

5.1.3 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Hydrants	60 Years	52	9
Pump Houses	20-40 Years	65	-38
Towers	20-60 Years	43	-1
Valves	25-75 Years	31	-1
Water Equipment	10-40 Years	26	0
Water Mains	75 Years	51	24
Water Treatment Plant	20-60 Years	32	-1
Wells	30 Years	33	-3
		42	**12**



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

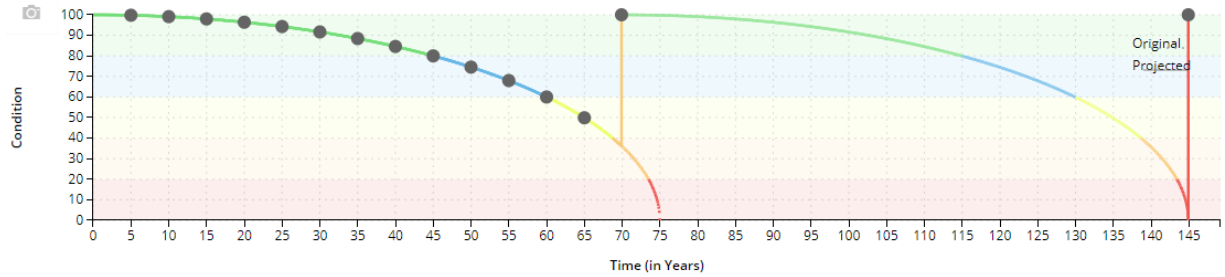
5.1.4 Lifecycle Management Strategy

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

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

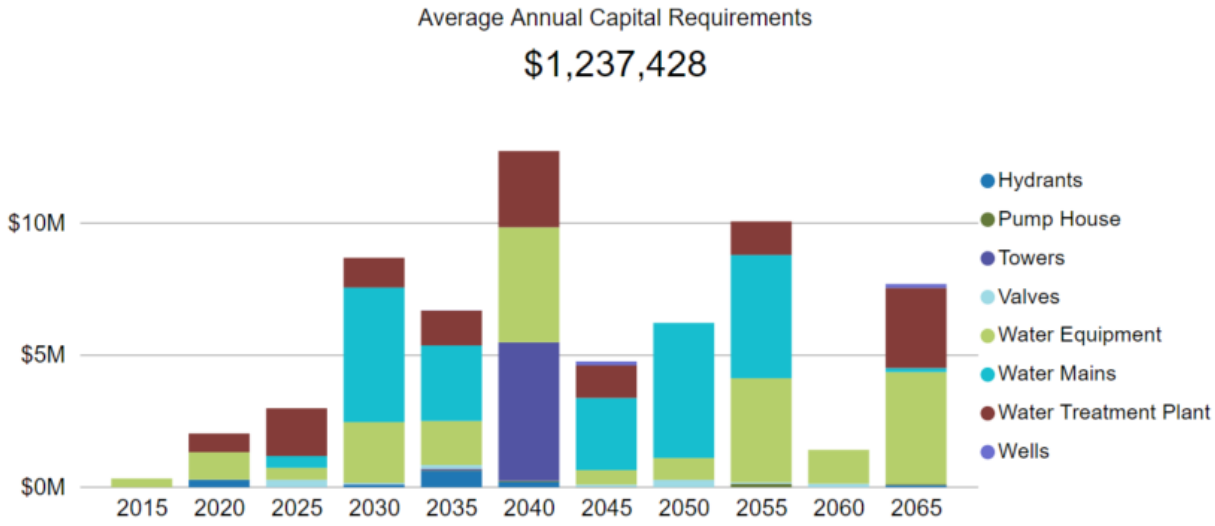
Activity Type	Description of Current Strategy
Maintenance	Main flushing and valve exercising is completed on the water network annually
Rehabilitation	The Municipality has implemented a water relining program that identifies viable watermains to be relined annually.
Replacement	Replacement activities are identified based on an analysis of the main break rate as well as any issues identified during regular maintenance activities

Water Mains		
Event Name	Event Class	Event Trigger
Flushing / Valve-Exercising	Preventative Maintenance	Annually
Trenchless Re-lining	Rehabilitation	70 Years
Full Reconstruction	Replacement	N/A



Forecasted Capital Requirements

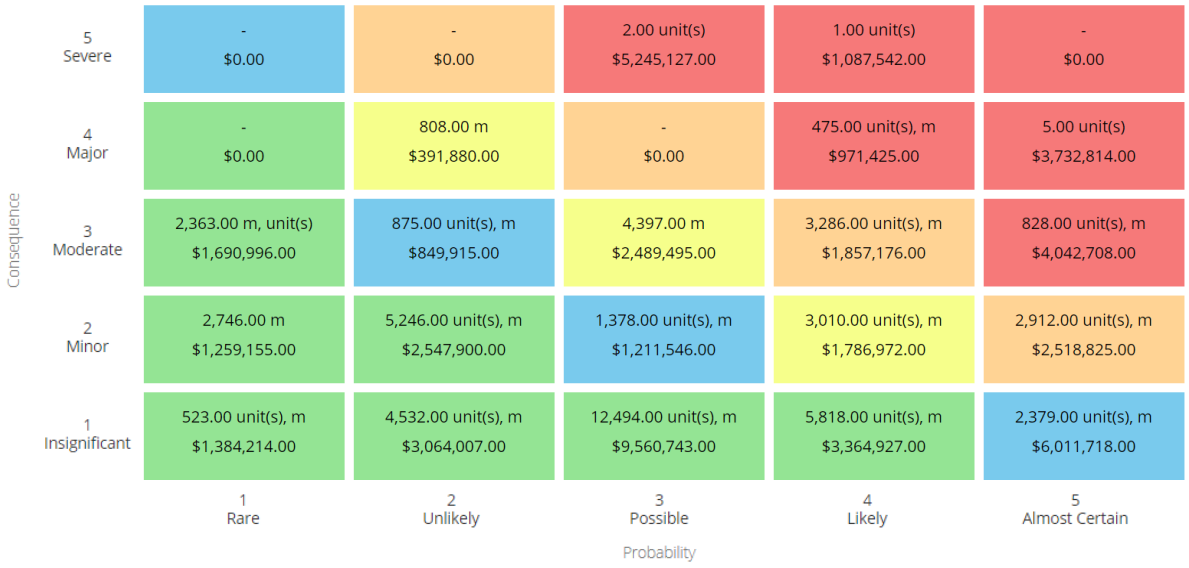
The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs.



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

5.1.5 Risk & Criticality

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



Critical Assets

The identification of critical assets allows the Municipality 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.

5.1.6 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Appendix B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix B
Reliability	Description of boil water advisories and service interruptions	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	80%
	% 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	0.19
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0
Performance	Capital re-investment rate	0.27%

5.1.7 Recommendations

Asset Inventory

- Link GIS database and Maximo work order system to assets within CityWide AM for more accurate representation of assets.

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.

Levels of Service

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

Sanitary Sewer Network

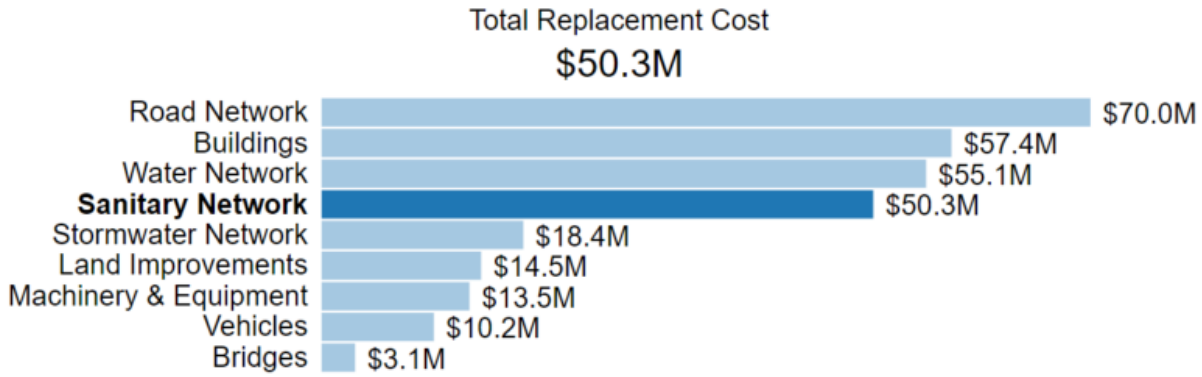
The sewer services provided by the Municipality are overseen by the Environmental Services department. The department is responsible for the following:

- The Wastewater Treatment Facilities/Collection System
- Lift stations and Valves
- Manholes

5.1.8 Asset Inventory & Replacement Cost

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

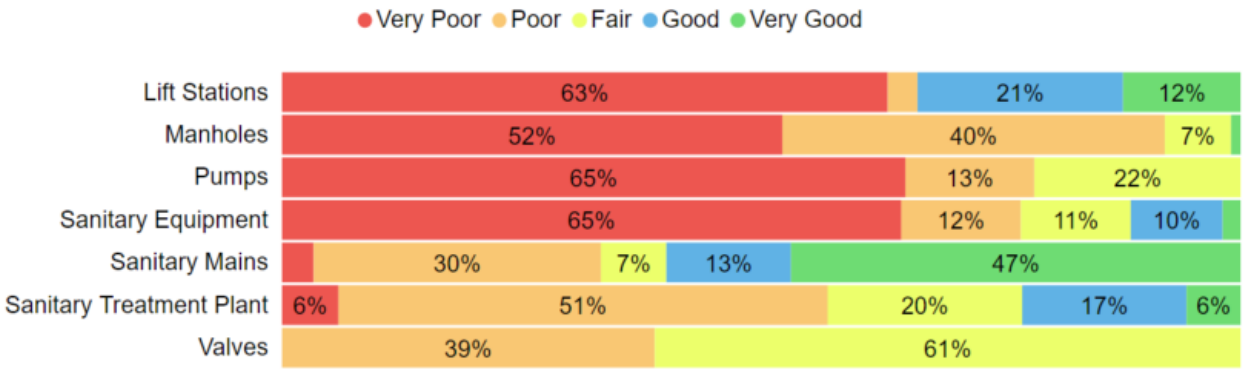
Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Lift Stations	37	CPI Tables	$1,734,242.00
Manholes	446	CPI Tables	$2,924,035.00
Pumps	34	CPI Tables	$362,780.00
Sanitary Equipment	111	CPI Tables	$7,836,716.00
Sanitary Mains	46,259 m	CPI Tables	$25,373,367.00
Sanitary Treatment Plant	54	CPI Tables	$11,816,979.00
Valves	9	CPI Tables	$207,083.00
			$50,255,202



5.1.9 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
Lift Stations	31%	Poor	3% Assessed
Manholes	21%	Poor	Age-based
Pumps	16%	Very Poor	Age-based
Sanitary Equipment	18%	Very Poor	Age-based
Sanitary Mains	62%	Good	Age-based
Sanitary Treatment Plant	45%	Fair	20% Assessed
Valves	42%	Fair	39% Assessed
	47%	Fair	5% Assessed



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

Current Approach to Condition Assessment

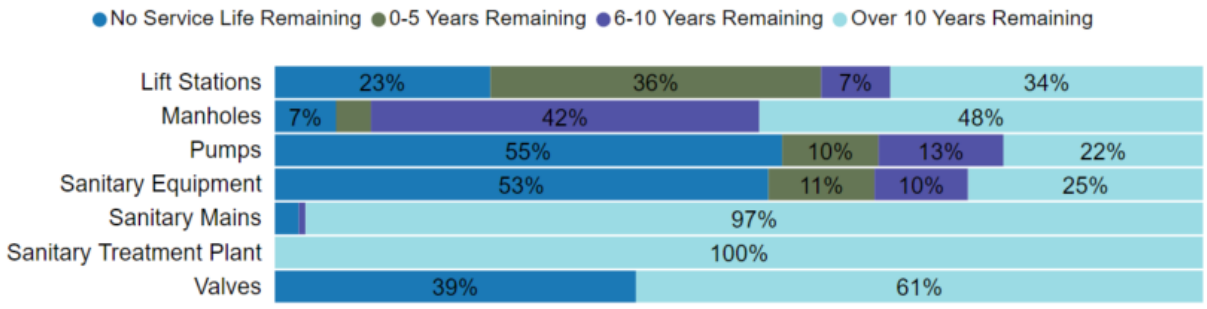
Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets more confidently. The following describes the municipality's current approach:

- CCTV inspections are completed for Sanitary Mains on an as needed-basis; with the last comprehensive inspection of the whole network in 2010.
- Above-ground sanitary assets such as manholes, pumps and valves are visually inspected on regular intervals by Municipality staff and OCWA staff.

5.1.10 Estimated Useful Life & Average Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Lift Stations	45 Years	36	9
Manholes	20-60 years	37	13
Pumps	25 years	33	-8
Sanitary Equipment	20-40 years	28	-2
Sanitary Mains	50-75 Years	43	30
Sanitary Treatment Plant	60 Years	33	27
Valves	25 years	17	8
		37	**18**

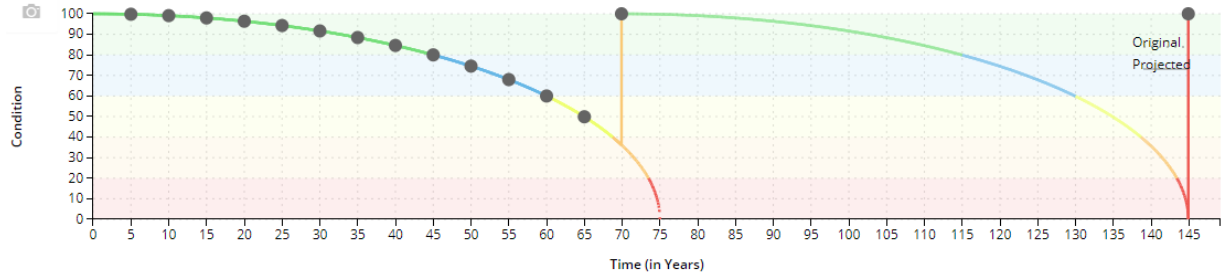


Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

5.1.11 Lifecycle Management Strategy

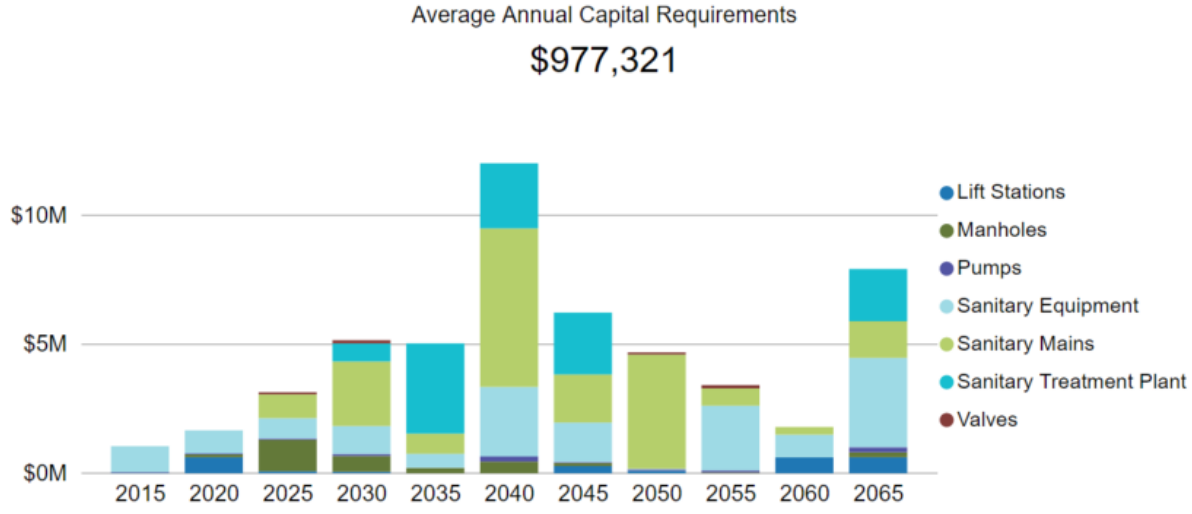
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. The following lifecycle strategy has been developed as a proactive approach to managing the lifecycle of sanitary mains. A trenchless re-lining strategy is expected to extend the service life of sanitary mains at a lower total cost of ownership.

Sanitary Mains		
Event Name	Event Class	Event Trigger
Flushing / Cleaning	Preventative Maintenance	Annually
CCTV Inspection	Maintenance	Every 15 years
Trenchless Re-lining	Rehabilitation	70 Years
Full Reconstruction	Replacement	N/A



Forecasted Capital Requirements

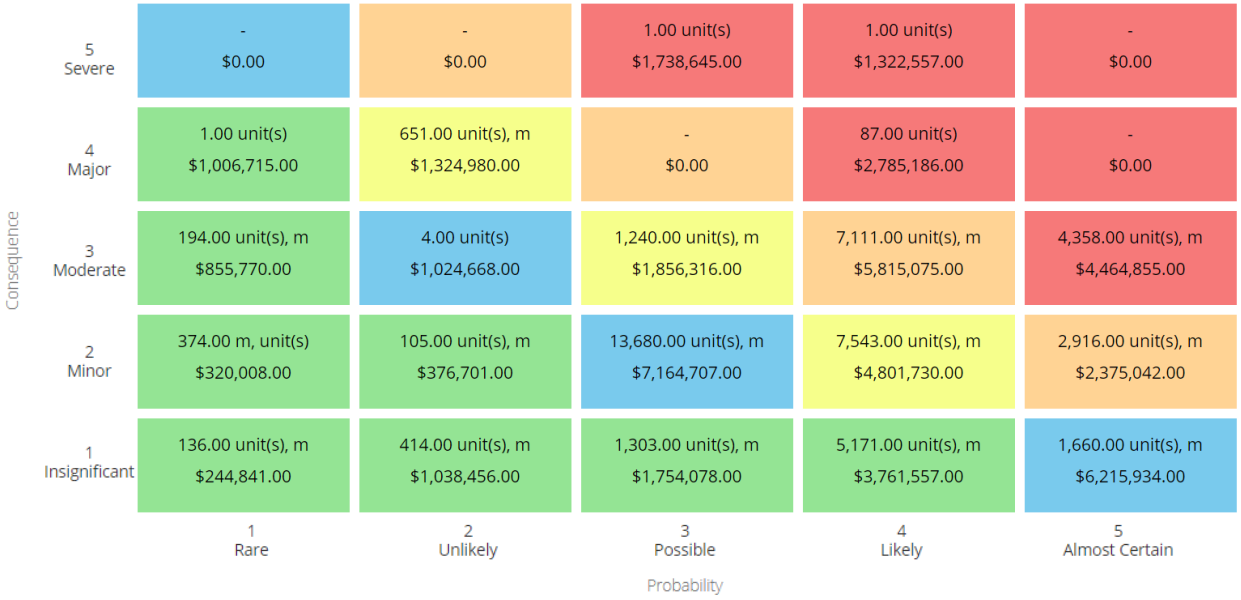
The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs.



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

5.1.12 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 Municipality 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.

5.1.13 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	See Appendix B
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	The Municipality does not own any combined sewers
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	The Municipality does not own any combined sewers
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter into sanitary sewers due to cracks in sanitary mains or through indirect connections (e.g. weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed capacity. In some cases, this can cause water and/or sewage to overflow backup into homes. the disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits directing storm water to the storm drain system can help to reduce the chance of this occurring.

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

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019)
Scope	% of properties connected to the municipal wastewater system	80%
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
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0
Performance	Capital re-investment rate	0.22%

5.1.14 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

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

Levels of Service

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

6 Impacts of Growth

Key Insights

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

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

Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Municipality to 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.

6.1.1 Greenstone Official Plan

The Municipality is in the process of updating and consolidating its Official Plan; Currently, the Municipality operates under the former municipalities' official plans: Beardmore, Geraldton, Nakina and Longlac. The proposed Official Plan will repeal all former plans and will set out goals and development opportunities within the entire Municipality.

The population within the Municipality of Greenstone has decreased in recent years, with the 25-44 age demographic showing the most negative change. This could be caused by less available employment opportunities, which can ultimately lead to a decline in demand for family housing. As well, there is a growing seniors demographic (65 years and over) that will desire and expect a different set of service levels.

The Municipality plans to continue working alongside community partners and the Public to understand and realize desired service levels for a safe, strong, and enjoyable community living experience.

Impact of Growth on Lifecycle Activities

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

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Municipality's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Municipality will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

7 Financial Strategy

Key Insights

The Municipality is committing approximately $4.3 million towards capital projects per year from sustainable revenue sources

Given the annual capital requirement of $9.9 million there is currently a funding gap of $5.6 million annually

For tax-funded assets, we recommend increasing tax revenues by 1.1% each year for the next 20 years to achieve a sustainable level of funding

For the Sanitary Network, we recommend increasing rate revenues by 1.0% annually for the next 15 years to achieve a sustainable level of funding

For the Water Network, we recommend increasing rate revenues by 1.1% annually for the next 15 years to achieve a sustainable level of funding

Financial Strategy Overview

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

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

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

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

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

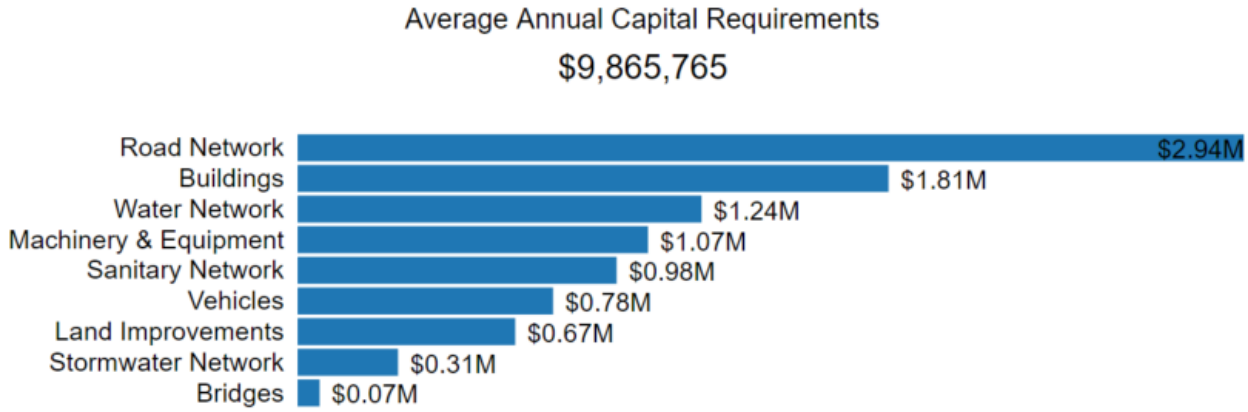
1. In order to reduce financial requirements, consideration has been given to revising service levels downward.
2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not the use of debt should be considered.

b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the Municipality should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs, and achieve long-term sustainability. In total, the Municipality must allocate approximately $9.9 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.

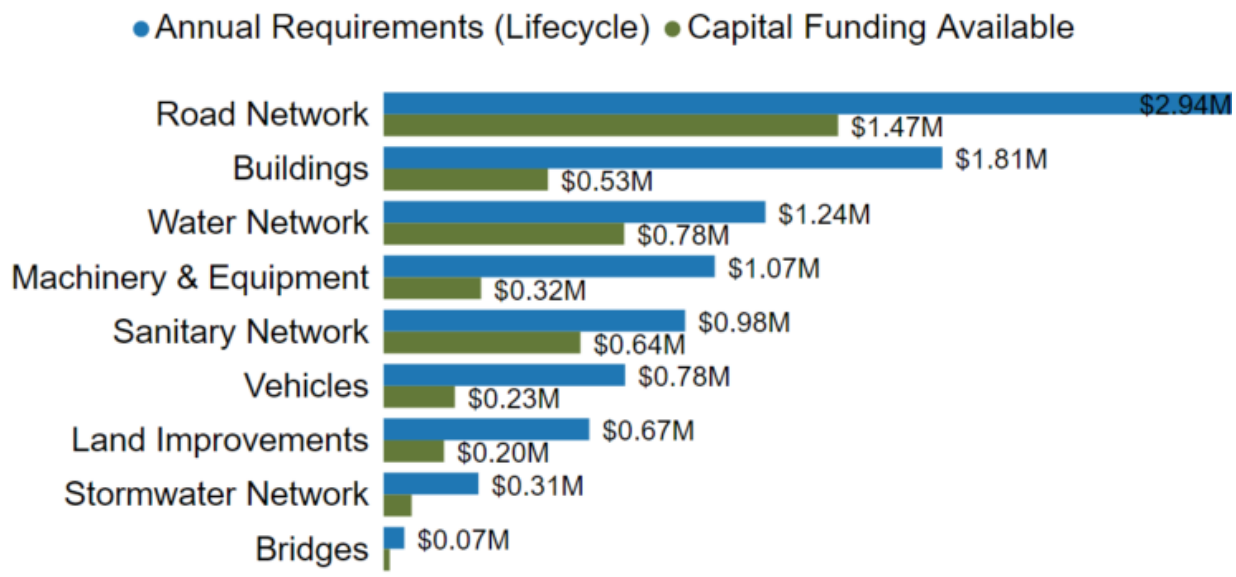
However, for the Road, Water and Sanitary Networks, lifecycle management strategies have been developed to identify capital cost savings that are realized through strategic rehabilitation and renewal. The development of these strategies allows for a comparison of potential cost avoidance if the strategies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

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

The implementation of a proactive lifecycle strategy for roads can lead to a potential annual cost avoidance.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $4.3 million towards capital projects per year. Given the annual capital requirement of $9.9 million, there is currently a funding gap of $5.6 million annually.



Funding Objective

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

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

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

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

Financial Profile: Tax Funded Assets

7.1.2 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Taxes	Gas Tax	OCIF	Total Available	
Road Network	2,943,000	866,000	281,000	326,000	1,473,000	1,470,000
Storm Water Network	308,000	91,000	0	0	91,000	217,000
Bridges & Culverts	67,000	20,000	0	0	20,000	47,000
Buildings & Facilities	1,811,000	533,000	0	0	533,000	1,278,000
Machinery & Equipment	1,074,000	316,000	0	0	316,000	758,000
Land Improvements	667,000	196,000	0	0	196,000	471,000
Vehicles	783,000	231,000	0	0	231,000	552,000
	7,653,000	**2,253,000**	**281,000**	**326,000**	**2,860,000**	**4,793,000**

The average annual investment requirement for the above categories is $7,653,000. Annual revenue currently allocated to these assets for capital purposes is $2,860,000 leaving an annual deficit of $4,793,000. Put differently, these infrastructure categories are currently funded at 37% of their long-term requirements.

7.1.3 Full Funding Requirements

In 2020, the Municipality of Greenstone has annual tax revenues of $15,259,000. 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	9.6%
Storm Water Network	1.4%
Bridges & Culverts	0.3%
Buildings & Facilities	8.4%
Machinery & Equipment	5.0%
Land Improvements	3.1%
Vehicles	3.6%
	31.4%

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

a) Greenstone's debt payments for these asset categories will be decreasing by $968,000 over the next 5 years and decreasing by $1,192,000 over the next 10 years. Although not shown in the table, debt payment decreases will be $1,407,000 and $1,407,000 over the next 15 and 20 years respectively.

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

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	4,793,000	4,793,000	4,793,000	4,793,000	4,793,000	4,793,000	4,793,000	4,793,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-968,000	-1,192,000	-1,407,000	-1,407,000
Resulting Infrastructure Deficit:	**4,793,000**	**4,793,000**	**4,793,000**	**4,793,000**	**3,825,000**	**3,601,000**	**3,386,000**	**3,386,000**
Tax Increase Required	31.4%	31.4%	31.4%	31.4%	25.1%	23.6%	22.2%	22.2%
Annually:	**6.3%**	**3.1%**	**2.1%**	**1.6%**	**5.0%**	**2.4%**	**1.5%**	**1.1%**

7.1.4 Financial Strategy Recommendations

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

a) when realized, reallocating the debt cost reductions of $1,407,000 to the infrastructure deficit as outlined above.
b) increasing tax revenues by 1.1% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax & OCIF 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 commitment[3].
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, $832,000 for Land Improvements, $0 for the Storm Water Network, $197,000 for the Road Network, $3,482,000 for the Buildings & Facilities, $2,000,000 for Machinery & Equipment and $1,082,000 for Vehicles.

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.

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

Financial Profile: Rate Funded Assets

7.1.5 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Operations	Other Funding	Total Available	
Water Network	1,237,000	2,265,000	-1,485,000	0	780,000	457,000
Sanitary Sewer Network	977,000	1,850,000	-1,212,000	0	638,000	339,000
	2,214,000	**4,115,000**	**-2,697,000**	**0**	**1,418,000**	**796,000**

The average annual investment requirement for the above categories is $2,214,000. Annual revenue currently allocated to these assets for capital purposes is $1,418,000 leaving an annual deficit of $796,000. Put differently, these infrastructure categories are currently funded at 64% of their long-term requirements.

7.1.6 Full Funding Requirements

In 2020, Greenstone had annual sanitary revenues of $1,850,000 and annual water revenues of $2,265,000. 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	20.2%
Sanitary Sewer Network	18.3%

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 $77,000 over the next 15 and 20 years.

-

b) Debt payments for the Sanitary Sewer Network will be decreasing by $577,000 over the next 15 and 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				Sanitary Sewer Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	457,000	457,000	457,000	457,000	339,000	339,000	339,000	339,000
Rate Increase Required	20.2%	20.2%	20.2%	20.2%	18.3%	18.3%	18.3%	18.3%
Annually:	**4.0%**	**2.0%**	**1.3%**	**1.0%**	**3.7%**	**1.8%**	**1.2%**	**0.9%**

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

	Water Network				Sanitary Sewer Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	457,000	457,000	457,000	457,000	339,000	339,000	339,000	339,000
Change in Debt Costs	0	0	-77,000	-77,000	0	0	-577,000	-577,000
Resulting Deficit	**457,000**	**457,000**	**380,000**	**380,000**	**339,000**	**339,000**	**-238,000**	**-238,000**
Tax Increase Required	20.2%	20.2%	16.8%	16.8%	18.3%	18.3%	-12.9%	-12.9%
Annually:	**4.0%**	**2.0%**	**1.1%**	**0.8%**	**3.7%**	**1.8%**	**-0.9%**	**-0.6%**

7.1.7 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 $77,000 to the infrastructure deficit as outlined above.
b) when realized for sanitary services, reallocating $339,000 of the debt cost reductions of $577,000 to the infrastructure deficit as outlined above.
c) increasing rate revenues by 1.0% for sanitary services and 1.1% 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 $9,587,000 for the Water Network and $4,635,000 for the Sanitary Sewer Network.

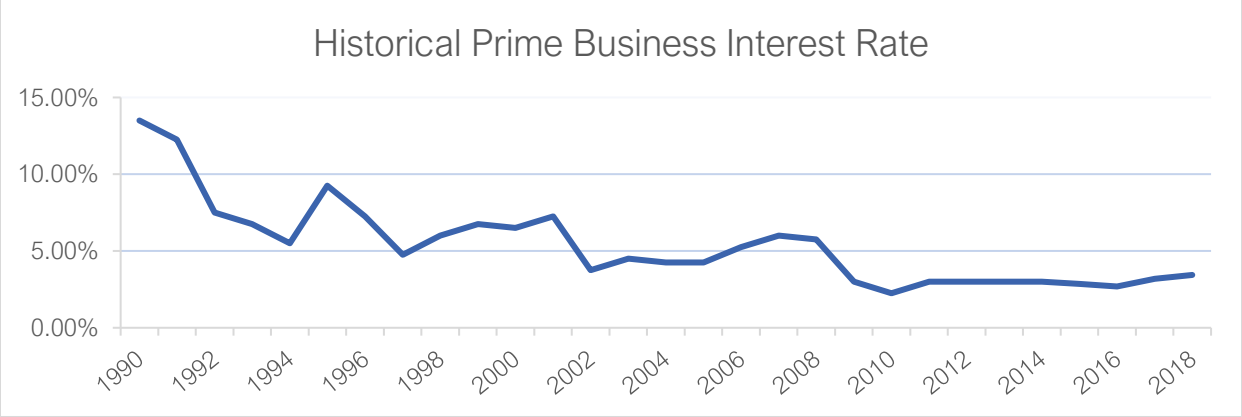
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

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%[4] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

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

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



[4] 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 Greenstone has historically used debt for investing in the asset categories as listed. There is currently $12,957,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $2,061,000, well within its provincially prescribed maximum of $5,959,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2015	2016	2017	2018	2019
Road Network	594,000	0	0	0	0	0
Storm Water Network	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Buildings & Facilities	2,785,000	0	3,200,000	0	0	0
Machinery & Equipment	3,353,000	0	1,992,000	0	0	0
Land Improvements	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Total Tax Funded:	6,732,000	**0**	**5,192,000**	**0**	**0**	**0**
Water Network	747,000	0	0	0	0	0
Sanitary Sewer Network	5,478,000	0	0	0	0	0
Total Rate Funded:	**6,225,000**	**0**	**0**	**0**	**0**	**0**

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2020	2021	2022	2023	2024	2025	2030
Road Network	134,000	134,000	134,000	134,000	134,000	0	0
Storm Water Network	0	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Buildings & Facilities	215,000	215,000	215,000	215,000	215,000	215,000	215,000
Machinery & Equipment	1,058,000	873,000	597,000	388,000	224,000	224,000	0
Land Improvements	0	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0	0
Total Tax Funded:	**1,407,000**	**1,222,000**	**946,000**	**737,000**	**573,000**	**439,000**	**215,000**
Water Network	77,000	77,000	77,000	77,000	77,000	77,000	77,000
Sanitary Sewer Network	577,000	577,000	577,000	577,000	577,000	577,000	577,000
Total Rate Funded:	**654,000**	**654,000**	**654,000**	**654,000**	**654,000**	**654,000**	**654,000**

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

Use of Reserves

7.1.8 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 Municipality.

Asset Category	Balance at December 31, 2019
Road Network	0
Storm Network	0
Bridges & Culverts	0
Buildings & Facilities	0
Machinery & Equipment	0
Land Improvements	0
Vehicles	0
Total Tax Funded:	**0**
Water Network	0
Sanitary Network	0
Total Rate Funded:	**0**

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

- breadth of services provided
- age and condition of infrastructure
- use and level of debt
- economic conditions and outlook
- internal reserve and debt policies.

There are no reserves available for use by applicable asset categories during the phase-in period to full funding. However, Greenstone's judicious use of debt in the past, allows the scenarios to assume that, if required, available debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

7.1.9 Recommendation

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

8 Appendices

Key Insights

Appendix A identifies projected 10-year capital requirements for each asset category

Appendix B includes several maps that have been used to visualize the current level of service

Appendix C identifies the criteria used to calculate risk for each asset category

Appendix A: 10-Year Capital Requirements

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

Road Network											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Paved Roads	$104,000	$1,260,320	$3,577,436	$4,923,198	$3,407,080	$1,025,583	$4,217,639	$3,847,450	$1,238,025	$45,238	$658,024
Streetlights	$0	$0	$53,222	$0	$0	$0	$972,767	$0	$0	$0	$0
Unpaved Roads	$93,420	$209,750	$556,200	$642,570	$5,662,720	$2,261,290	$1,538,800	$438,570	$1,893,800	$1,003,460	$322,160
	$197,420	**$1,470,070**	**$4,186,858**	**$5,565,768**	**$9,069,800**	**$3,286,873**	**$6,729,206**	**$4,286,020**	**$3,131,825**	**$1,048,698**	**$980,184**

Stormwater Network											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Catchbasins	$0	$0	$0	$0	$0	$0	$0	$49,889	$26,748	$0	$0
Manholes	$0	$0	$0	$0	$0	$0	$0	$79,598	$51,945	$0	$0
Storm Mains	$0	$87,570	$0	$20,790	$891,135	$50,715	$363,825	$124,425	$12,915	$0	$0
	$0	**$87,570**	**$0**	**$20,790**	**$891,135**	**$50,715**	**$363,825**	**$253,912**	**$91,608**	**$0**	**$0**

Buildings & Facilities											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
General Government	$1,041,942	$0	$0	$229,366	$19,651	$178,843	$0	$0	$630,599	$0	$332,018
Health Services	$606,863	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Protection Services	$0	$0	$0	$229,045	$0	$115,134	$0	$0	$179,620	$38,293	$0
Recreation and Cultural Services	$1,658,552	$637,490	$0	$857,682	$0	$2,225,279	$0	$0	$5,491,227	$1,565,205	$161,991
Social and Family Services	$78,956	$0	$0	$0	$0	$89,426	$0	$0	$590,427	$72,525	$0
Transportation Services	$96,115	$133,654	$0	$370,556	$336,725	$645,113	$0	$0	$1,184,926	$0	$1,286,361
	$3,482,428	**$771,144**	**$0**	**$1,686,649**	**$356,376**	**$3,253,795**	**$0**	**$0**	**$8,076,799**	**$1,676,023**	**$1,780,370**

Machinery & Equipment											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Arena Equipment	$609,725	$27,403	$0	$31,104	$0	$74,561	$0	$0	$1,018,203	$0	$313,100
Computer Equipment	$402,146	$0	$0	$28,321	$2,551	$27,258	$402,146	$0	$28,321	$2,551	$27,258
Fire & Rescue Equipment	$63,605	$0	$0	$1,414,201	$0	$0	$0	$0	$62,021	$0	$95,261
Fueling Tanks & Generators	$43,318	$0	$0	$0	$0	$0	$0	$0	$0	$0	$37,211
Furniture	$0	$0	$0	$0	$0	$0	$0	$0	$1,060,836	$0	$0
Library Equipment	$0	$0	$0	$172,157	$0	$2,915,137	$0	$0	$32,071	$33,856	$31,799
Office Equipment	$16,808	$0	$0	$646,058	$0	$98,803	$0	$0	$0	$0	$0
Public Works Equipment	$864,138	$163,081	$37,152	$0	$0	$149,669	$163,081	$0	$342,349	$758,660	$52,445
	$1,999,740	**$190,484**	**$37,152**	**$2,291,841**	**$2,551**	**$3,265,428**	**$565,227**	**$0**	**$2,543,801**	**$795,067**	**$557,074**

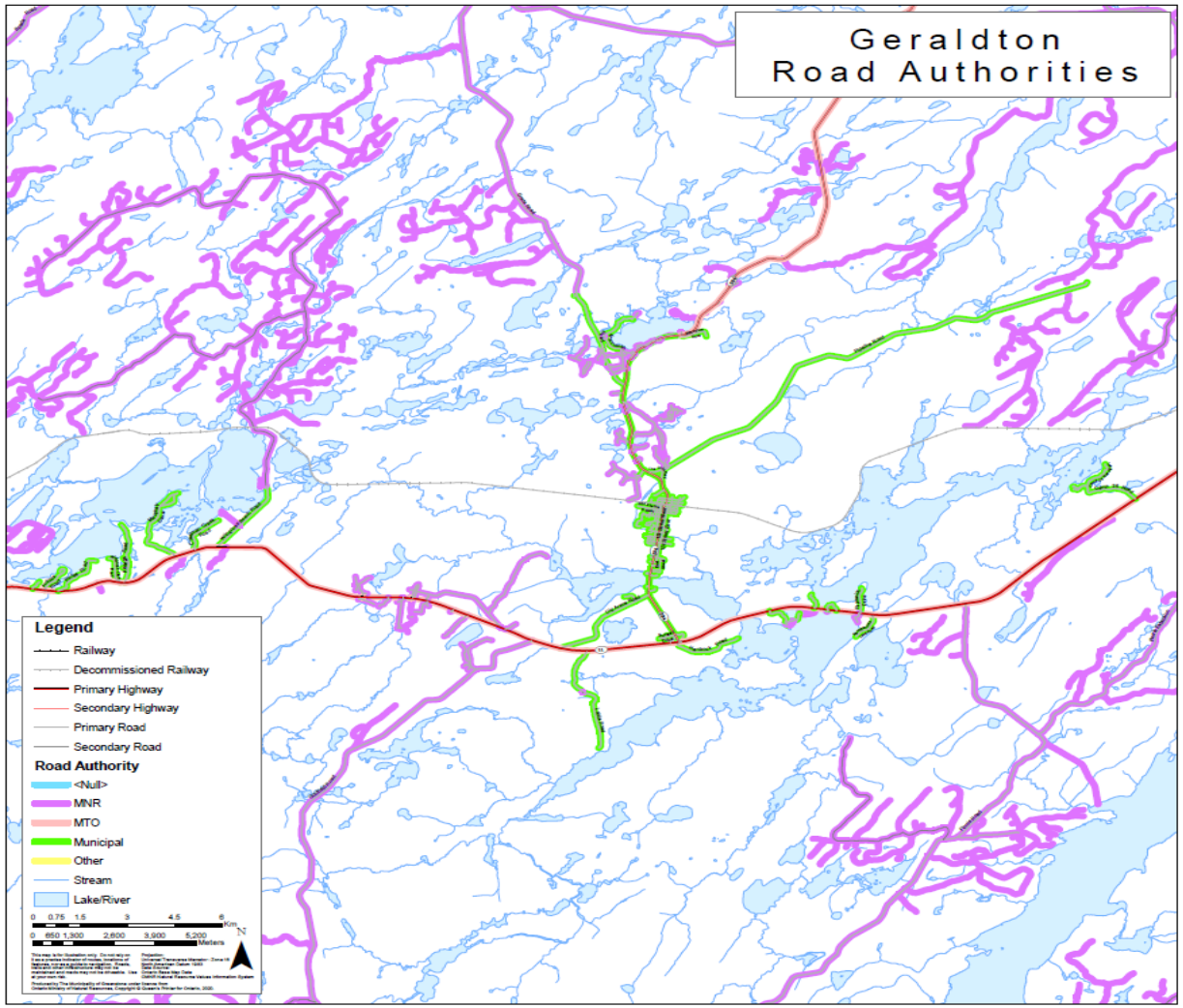
Vehicles											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Environmental Services	$0	$0	$0	$28,856	$0	$0	$0	$0	$0	$101,085	$0
General Government	$49,022	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Protection Services	$438,082	$0	$0	$692,199	$0	$0	$0	$0	$1,035,779	$245,907	$116,465
Recreational & Cultural Services	$29,421	$0	$0	$0	$0	$19,823	$0	$0	$0	$29,754	$34,300
Social & Family Services	$0	$0	$0	$0	$0	$90,192	$0	$0	$0	$0	$101,933
Transportation - Airport	$258,809	$347,202	$0	$0	$590,120	$21,858	$0	$277,848	$172,422	$29,754	$0
Transportation - Public Works	$306,644	$453,405	$0	$0	$1,443,386	$0	$0	$1,258,258	$0	$0	$248,644
	$1,081,978	**$800,607**	**$0**	**$721,055**	**$2,033,506**	**$131,873**	**$0**	**$1,536,106**	**$1,208,201**	**$406,500**	**$501,342**

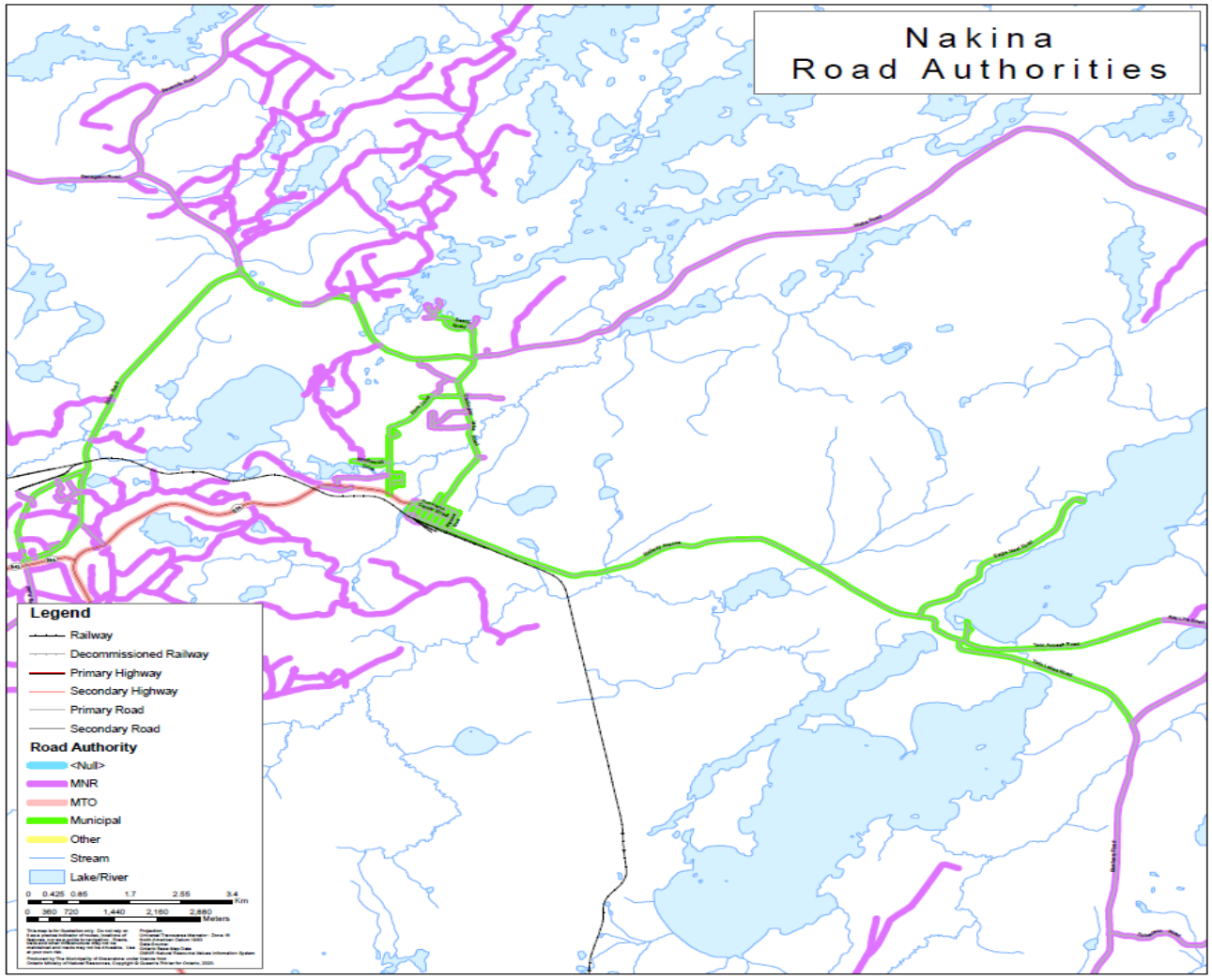
Land Improvements											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Airport	$0	$0	$5,489,476	$0	$1,177,845	$0	$0	$0	$0	$1,568,435	$0
Fencing	$137,413	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Harbor	$87,935	$0	$0	$0	$71,272	$0	$0	$0	$0	$0	$0
Lighting	$372,373	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Parks	$79,807	$0	$19,122	$0	$0	$67,985	$0	$0	$93,722	$0	$60,275
Playground Structures	$0	$0	$0	$0	$0	$670,839	$0	$0	$0	$0	$0
Sports Structures	$154,908	$0	$44,351	$0	$0	$0	$0	$0	$0	$0	$0
Trails	$0	$352,730	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$832,436	**$352,730**	**$5,552,949**	**$0**	**$1,249,117**	**$738,824**	**$0**	**$0**	**$93,722**	**$1,568,435**	**$60,275**

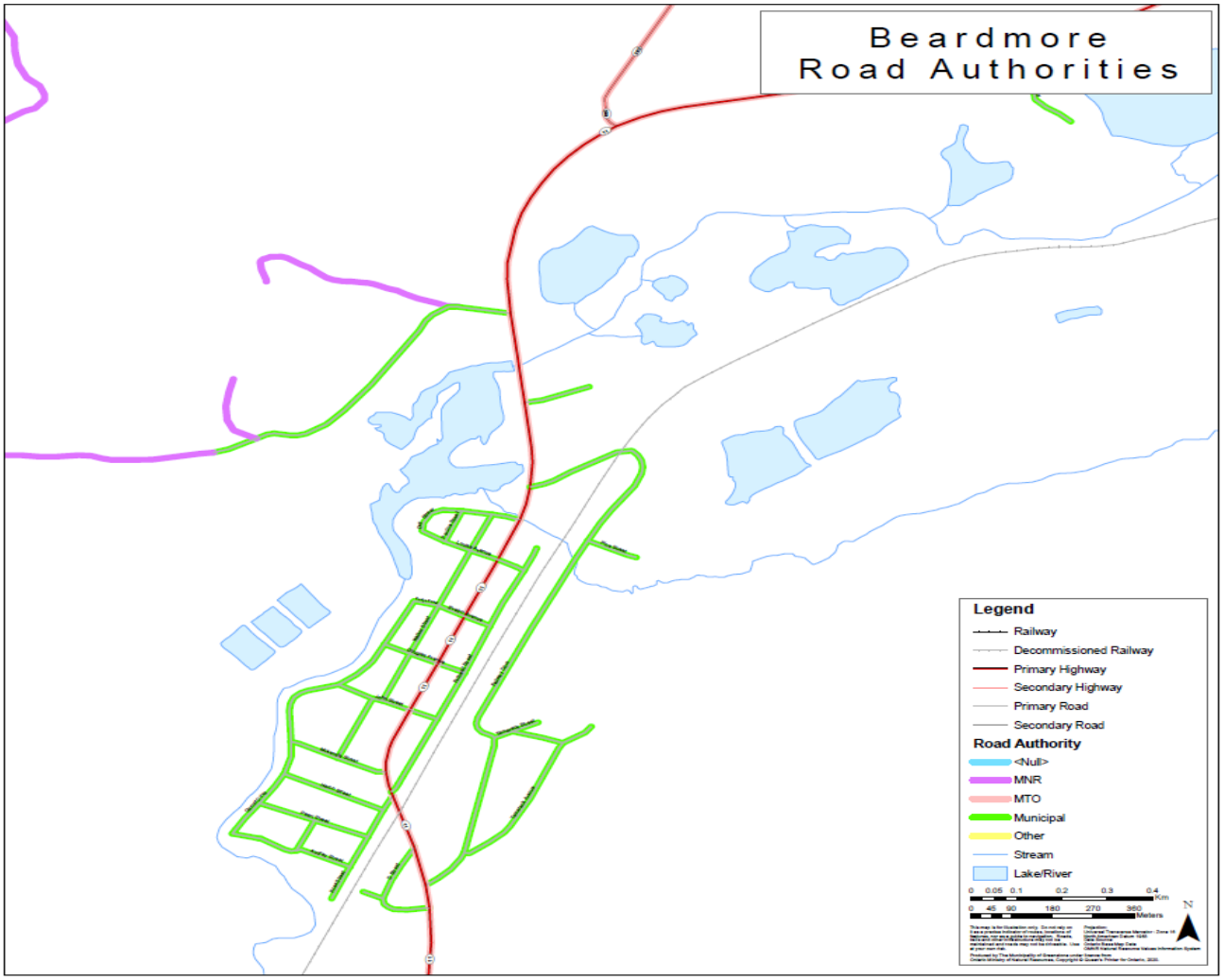
Water Network											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Hydrants	$44,374	$0	$277,420	$0	$0	$4,294	$0	$0	$0	$0	$0
Pump House	$187,673	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Towers	$0	$0	$0	$0	$0	$0	$0	$2,817	$0	$0	$805
Water Equipment	$5,149,734	$329,847	$926,401	$0	$16,739	$15,389	$69,459	$43,143	$10,980	$263,837	$147,182
Water Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$447,300
Water Treatment Plant	$4,056,523	$0	$0	$0	$708,153	$0	$0	$891,056	$0	$70,764	$0
Wells	$148,805	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$9,587,109	**$329,847**	**$1,203,821**	**$0**	**$724,892**	**$19,683**	**$69,459**	**$937,016**	**$10,980**	**$334,601**	**$595,287**

Sanitary Sewer Network											
Asset Segment	Backlog	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Lift Stations	$402,823	$0	$0	$0	$128,353	$0	$489,327	$0	$75,029	$0	$0
Manholes	$193,116	$0	$0	$0	$48,174	$0	$61,613	$822,510	$0	$0	$0
Pumps	$175,722	$22,490	$17,075	$0	$0	$20,582	$0	$0	$0	$0	$48,788
Sanitary Equipment	$3,202,911	$963,548	$13,971	$852,729	$28,114	$0	$0	$0	$435,354	$329,195	$25,611
Sanitary Mains	$660,800	$0	$0	$0	$0	$0	$0	$0	$181,440	$0	$740,880
	$4,635,372	**$986,038**	**$31,046**	**$852,729**	**$204,641**	**$20,582**	**$550,940**	**$822,510**	**$691,823**	**$329,195**	**$815,279**

Appendix B: Level of Service Maps




Nakina
Road Authorities
Legend
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Road Authority
<Null>
MNR
MTO
Municipal
Other
Stream
Lake/River
0 0.425 0.85 1.7 2.55 3.4
Km
0 360 720 1,440 2,160 2,880
Meters


Beardmore
Road Authorities
Legend
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Road Authority
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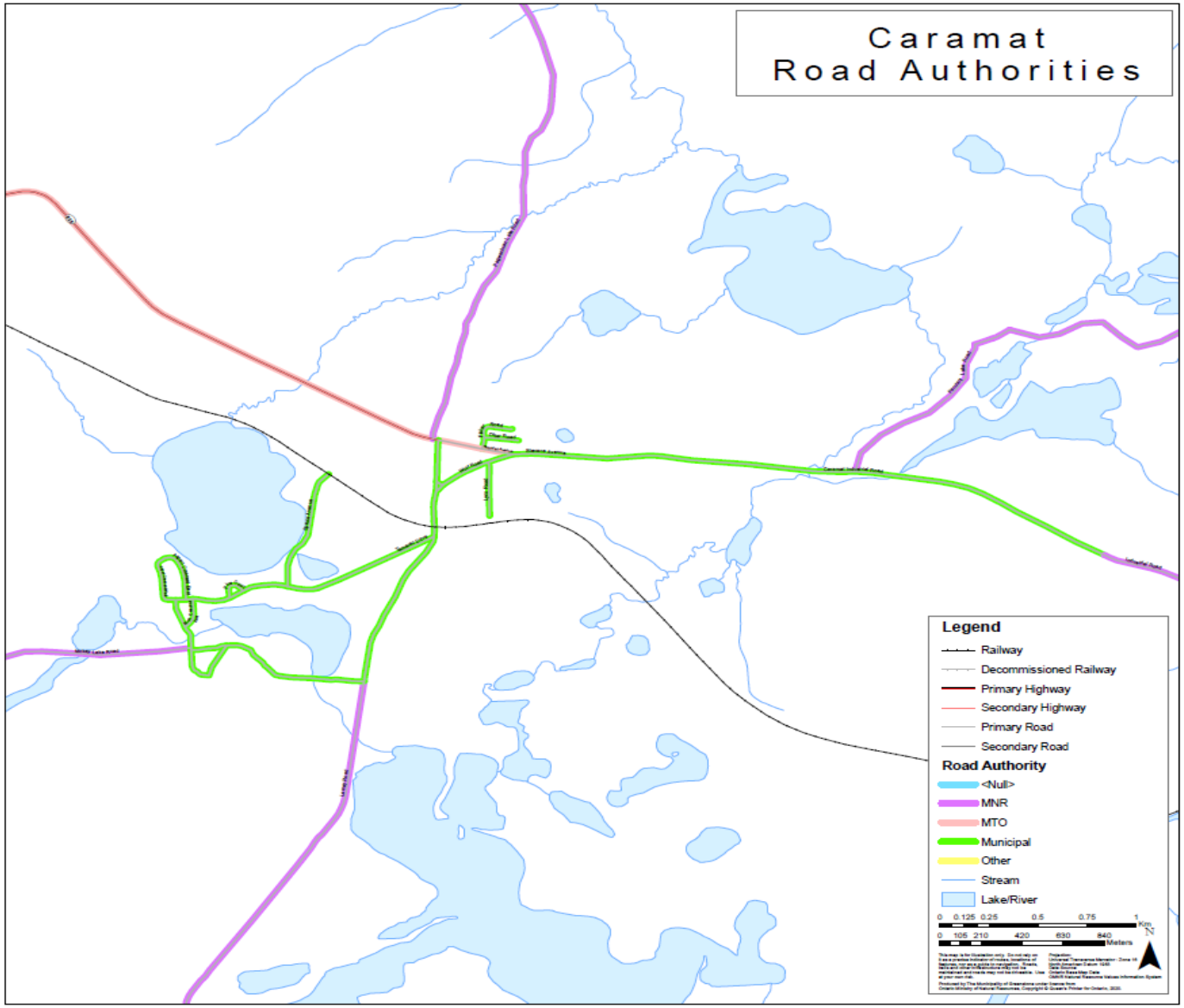
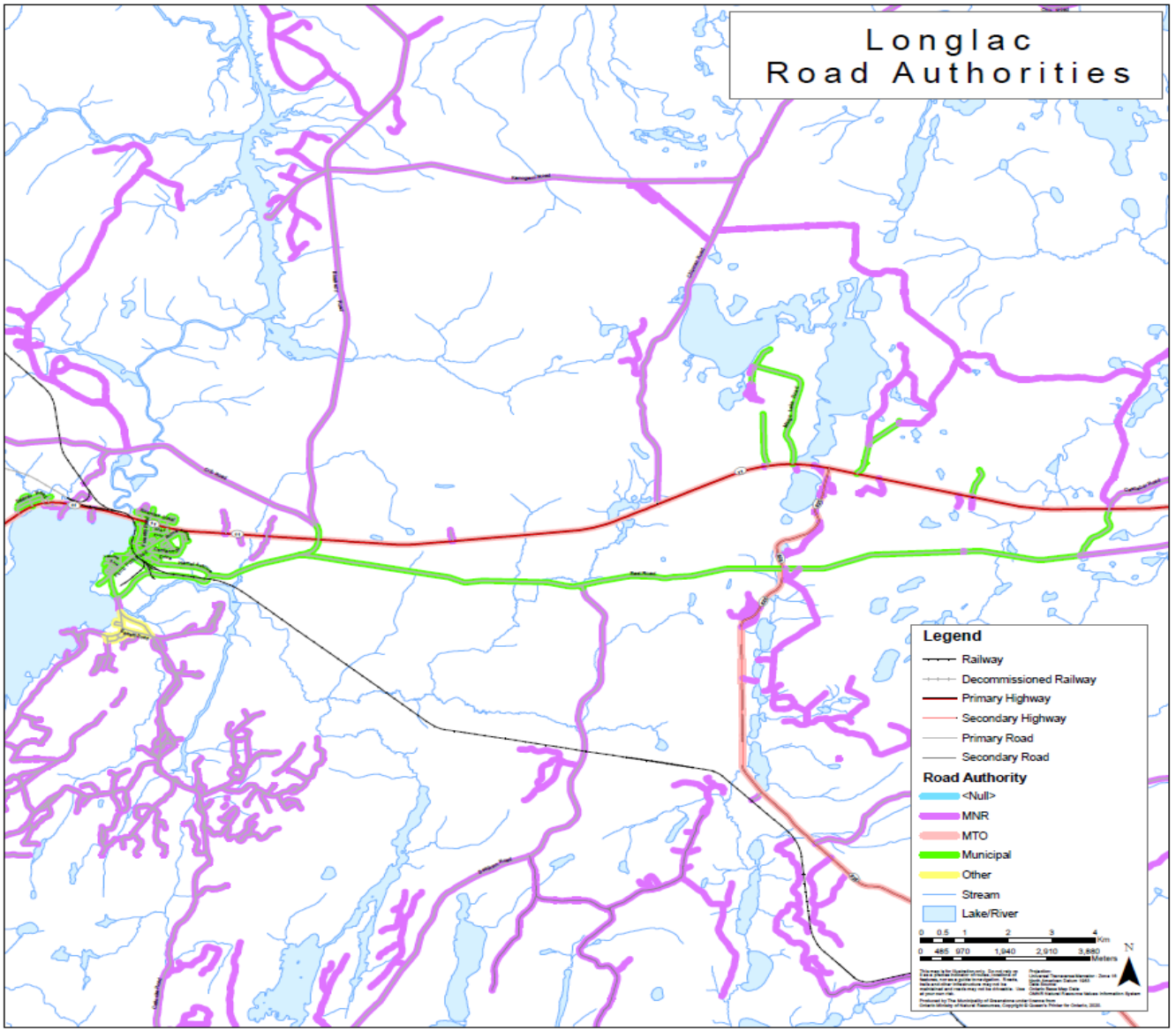
MNR
MTO
Municipal
Other
Stream
Lake/River
N


Caramat
Road Authorities
Legend
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Road Authority
<Null>
MNR
MTO
Municipal
Other
Stream
Lake/River
0 0.125 0.25 0.5 0.75 1 Km
0 105 210 420 630 840 Meters
N


Longlac
Road Authorities
Legend
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Road Authority
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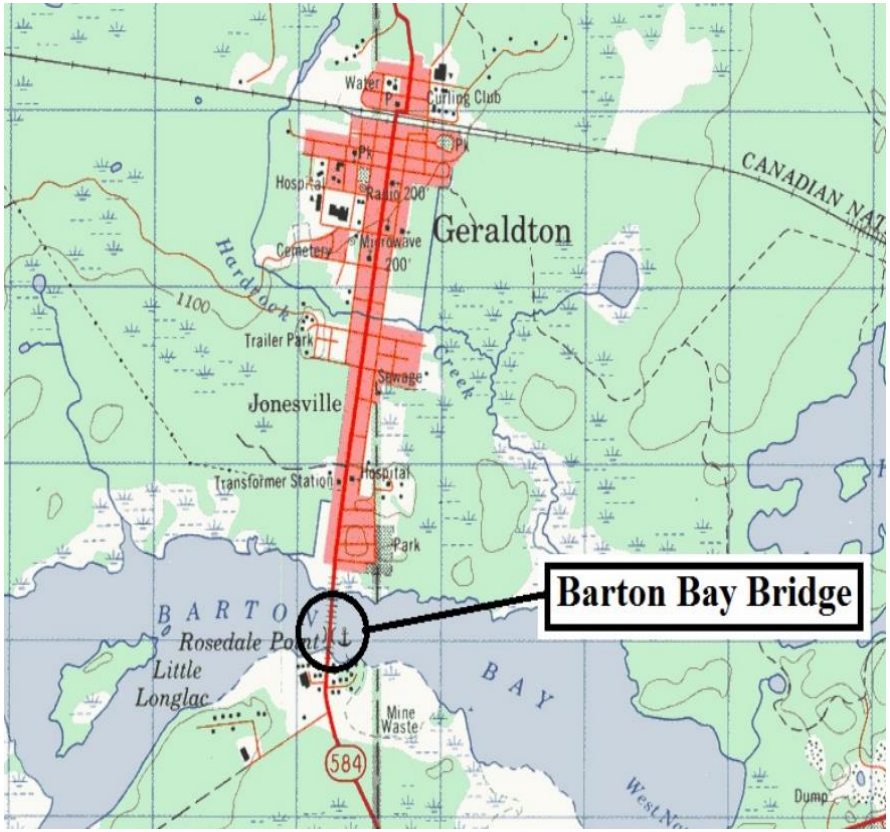
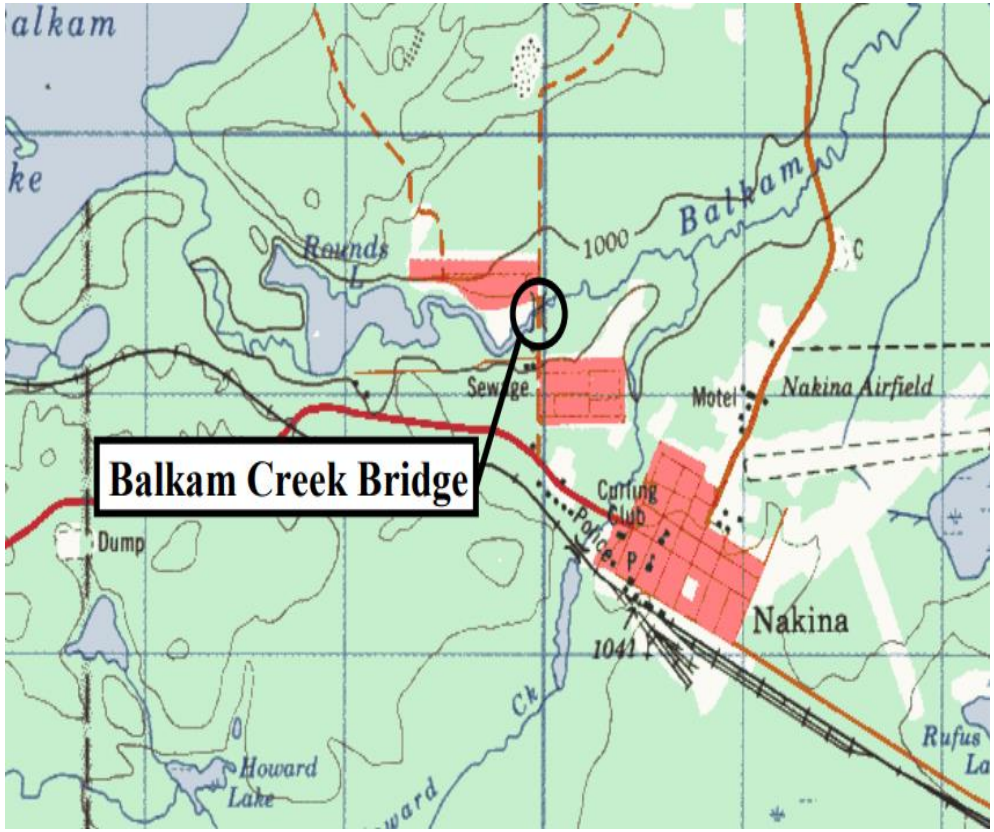
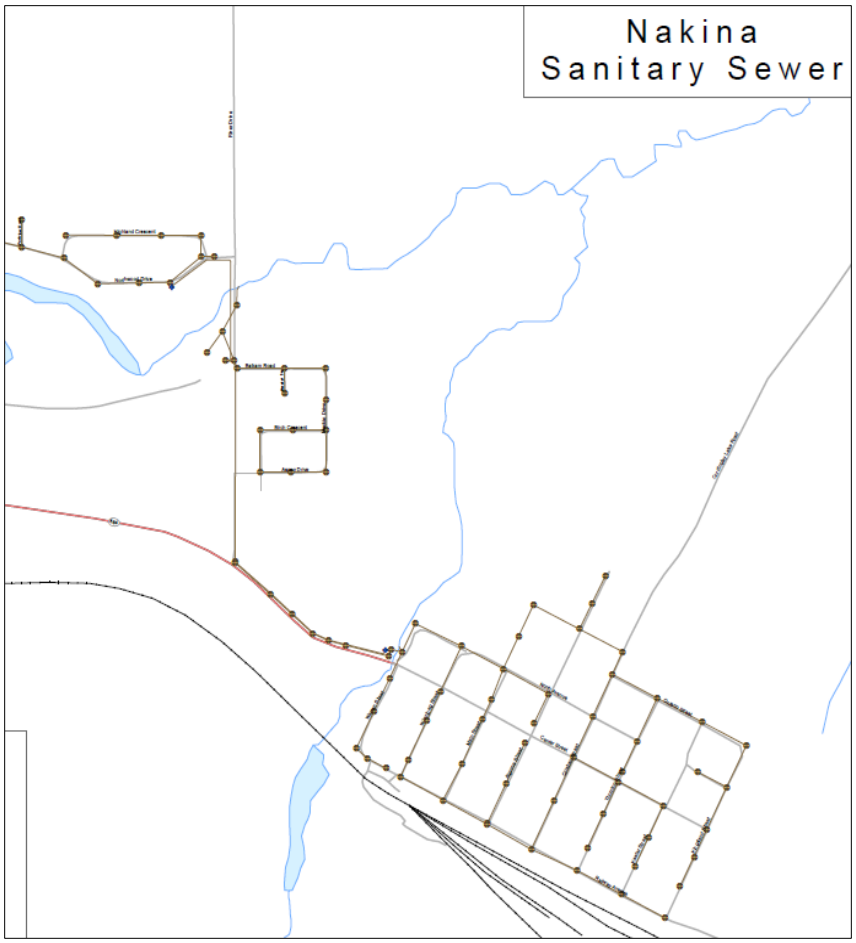
MTO
Municipal
Other
Stream
Lake/River
N

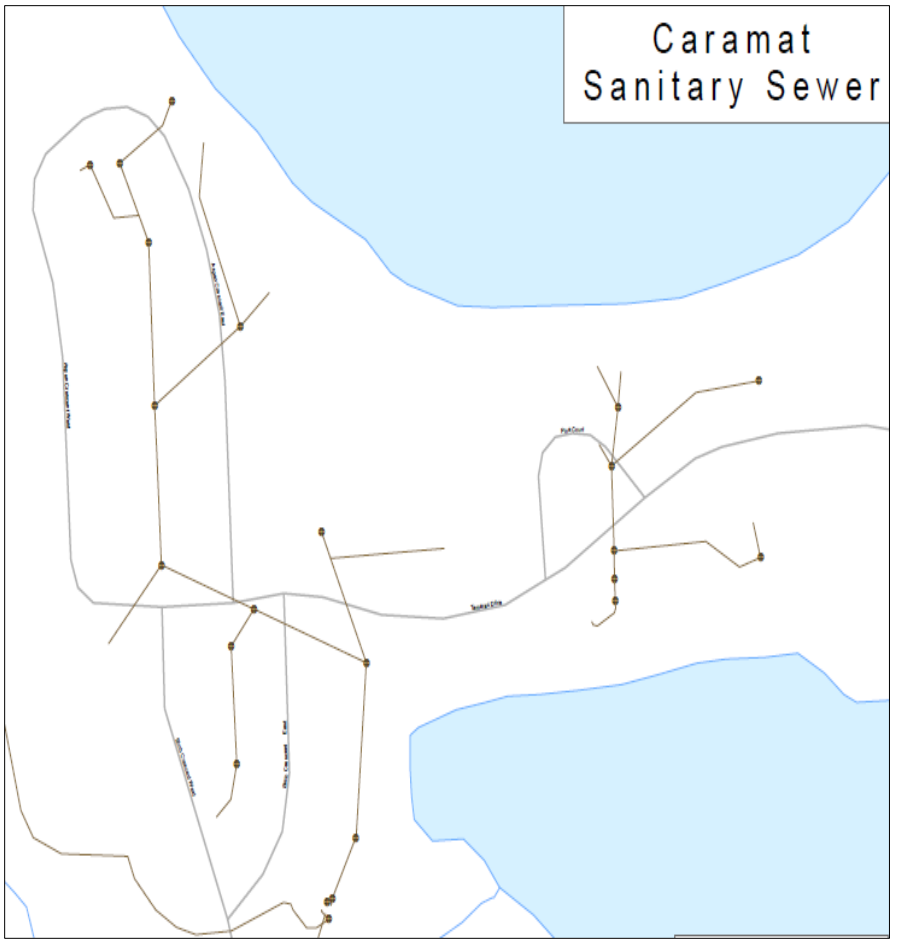


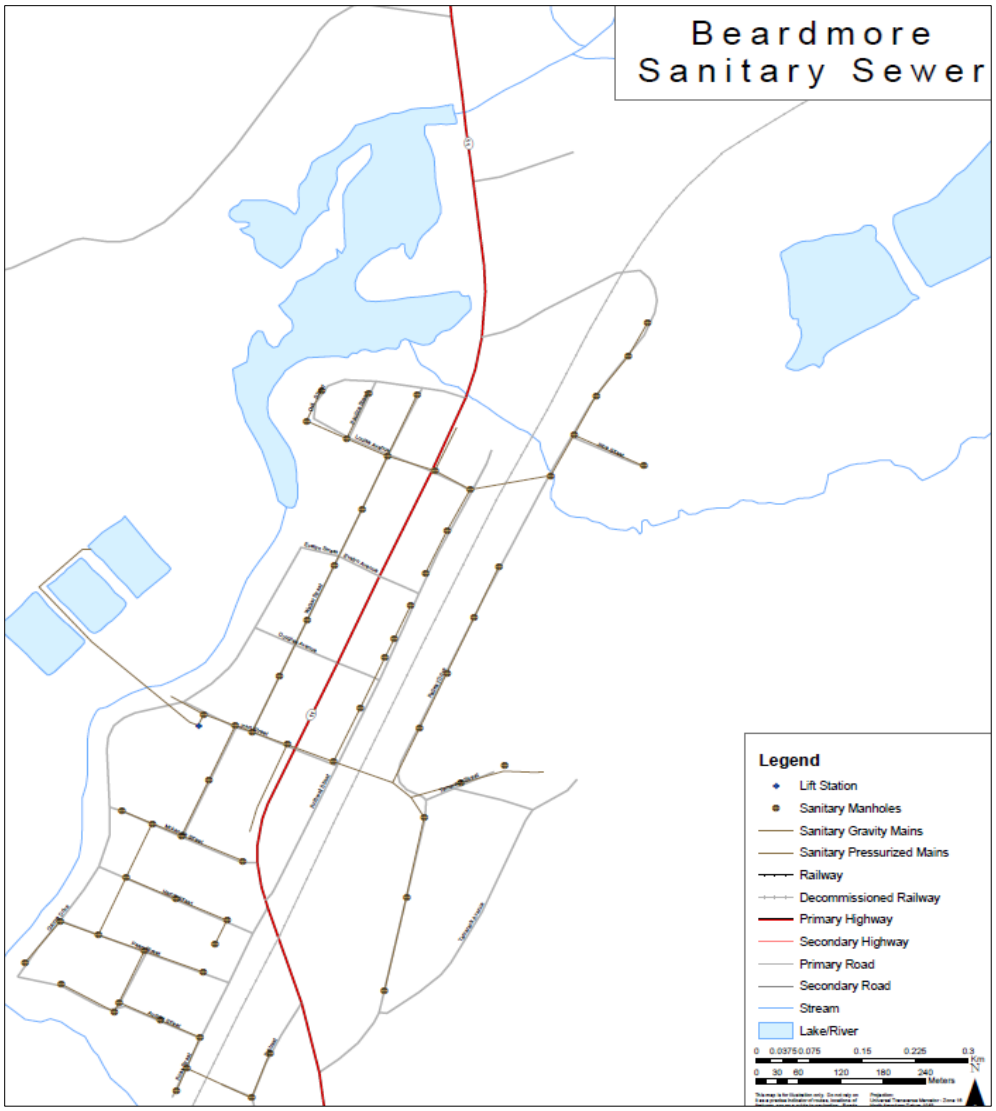
Barton Bay Bridge, Good Condition, Inspected 2017

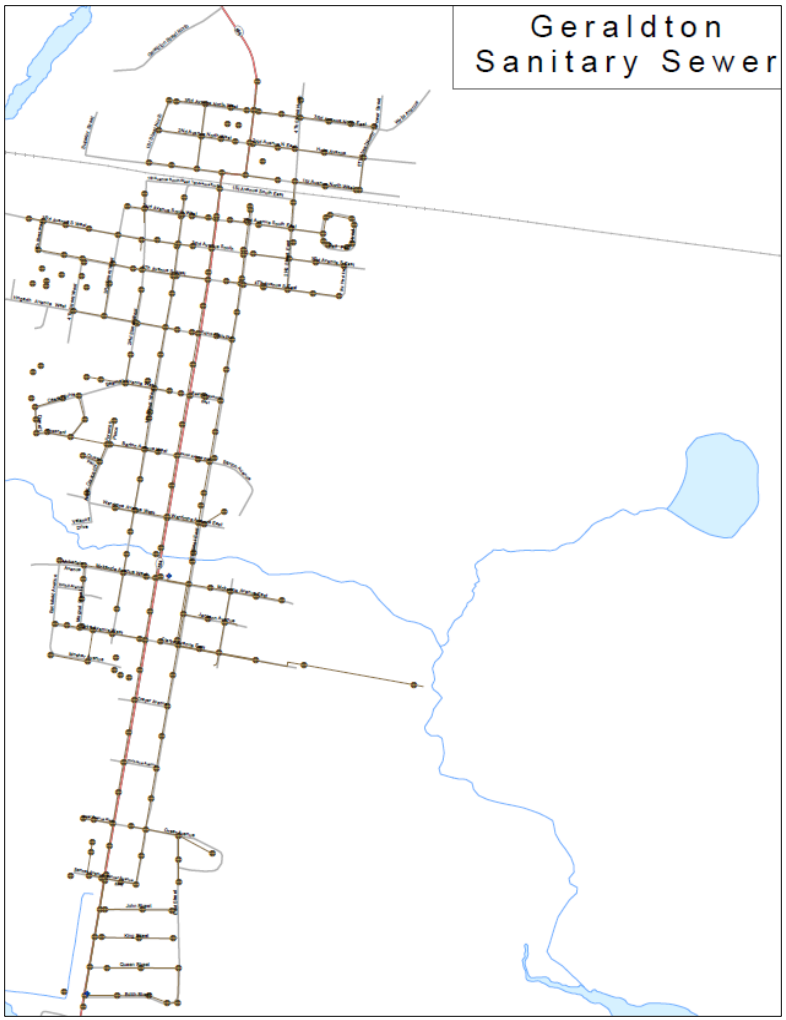


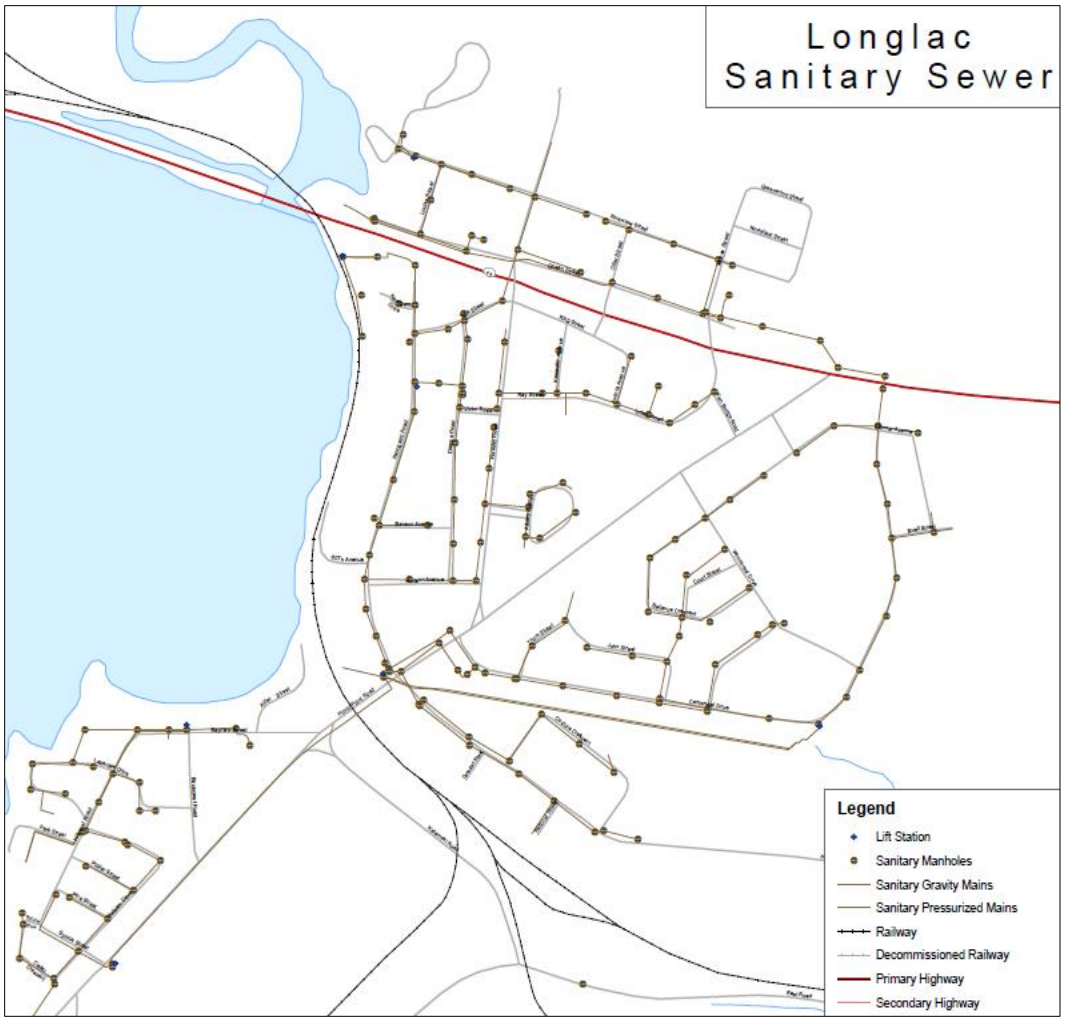
Balkam Creek Bridge, Very Good Condition, Inspected 2018

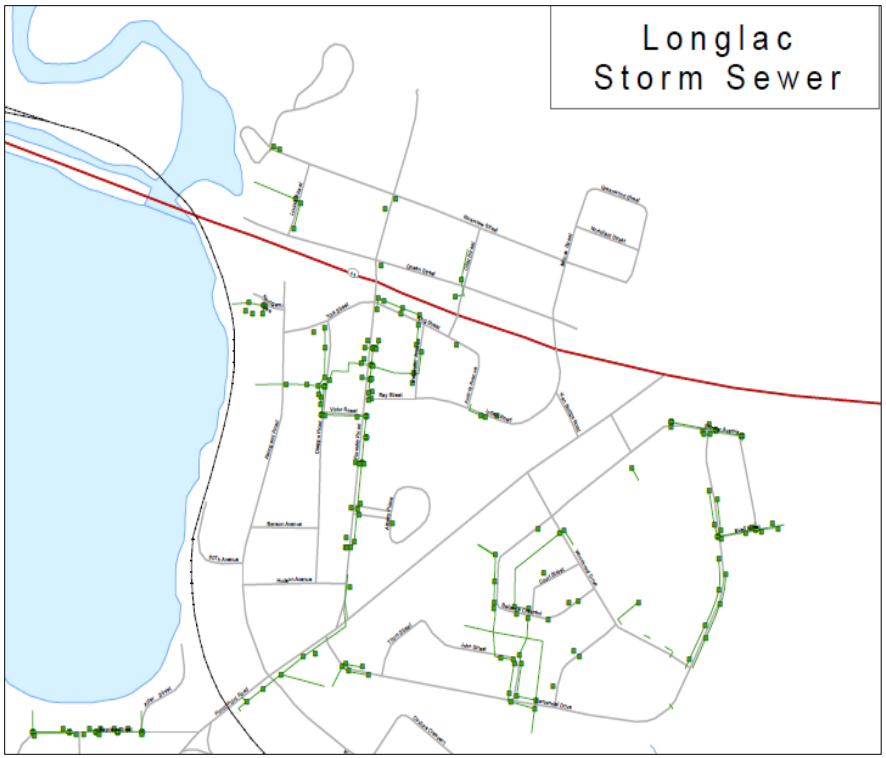

Nakina
Sanitary Sewer

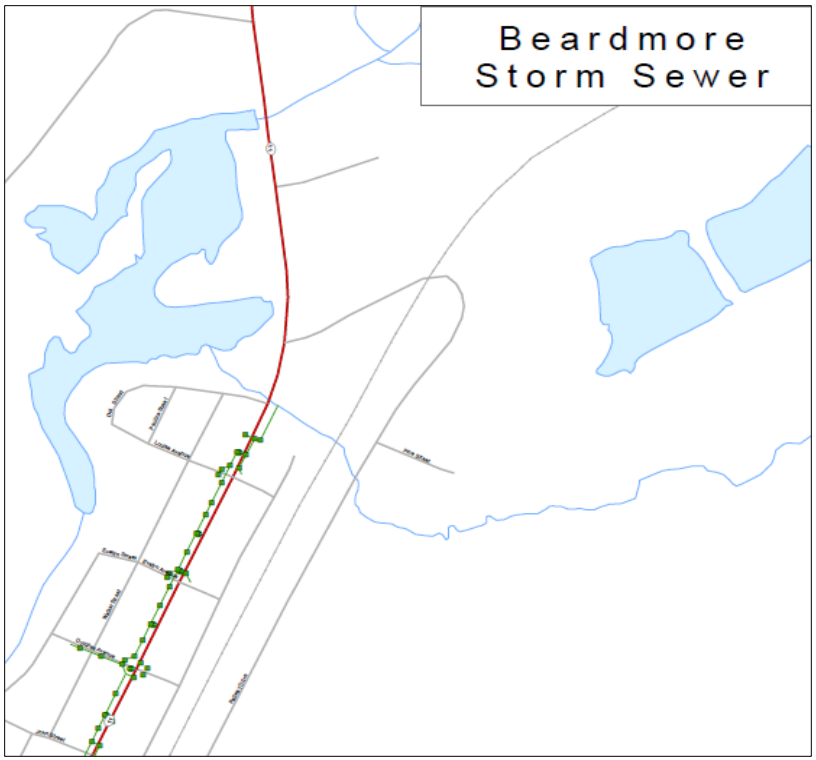

Caramat
Sanitary Sewer

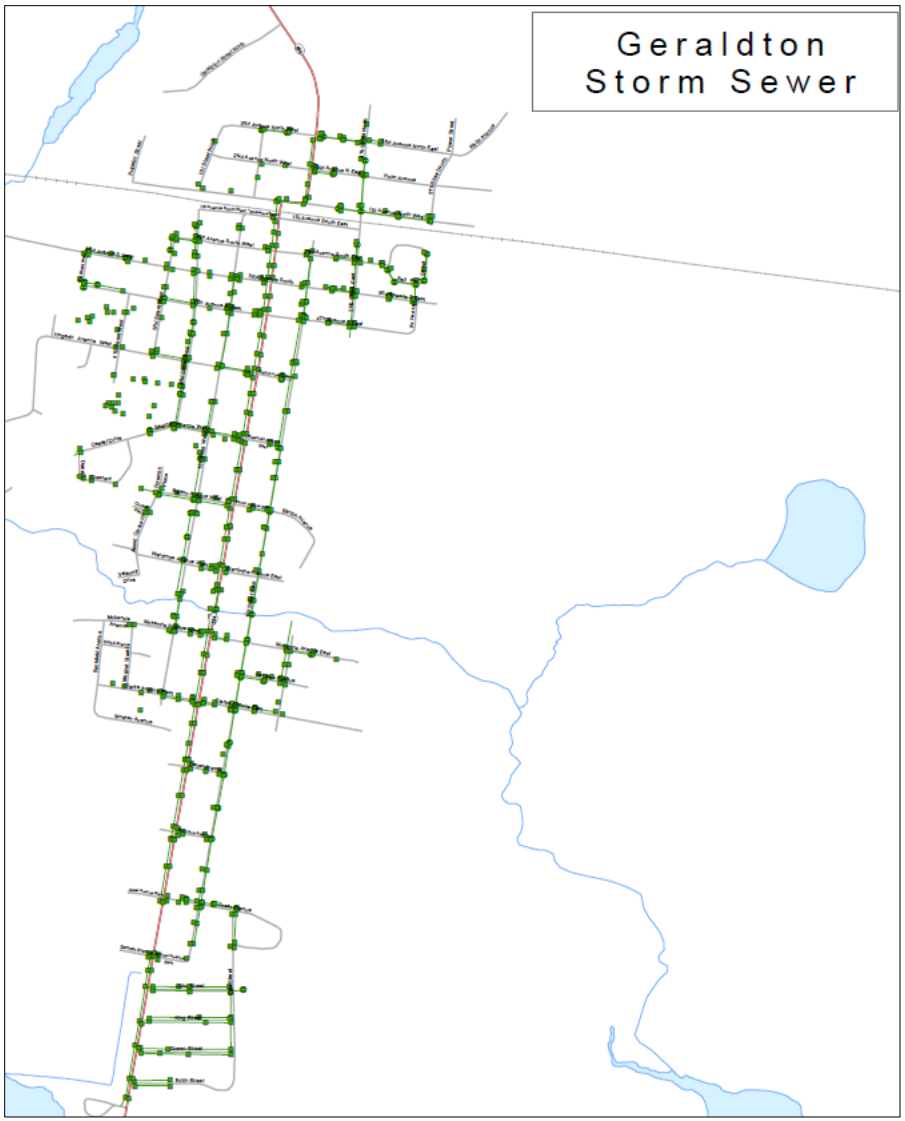

Beardmore
Sanitary Sewer
Legend
Lift Station
Sanitary Manholes
Sanitary Gravity Mains
Sanitary Pressurized Mains
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Stream
Lake/River
0 0.0375 0.075 0.15 0.225 0.3
Km
0 30 60 120 180 240
Meters

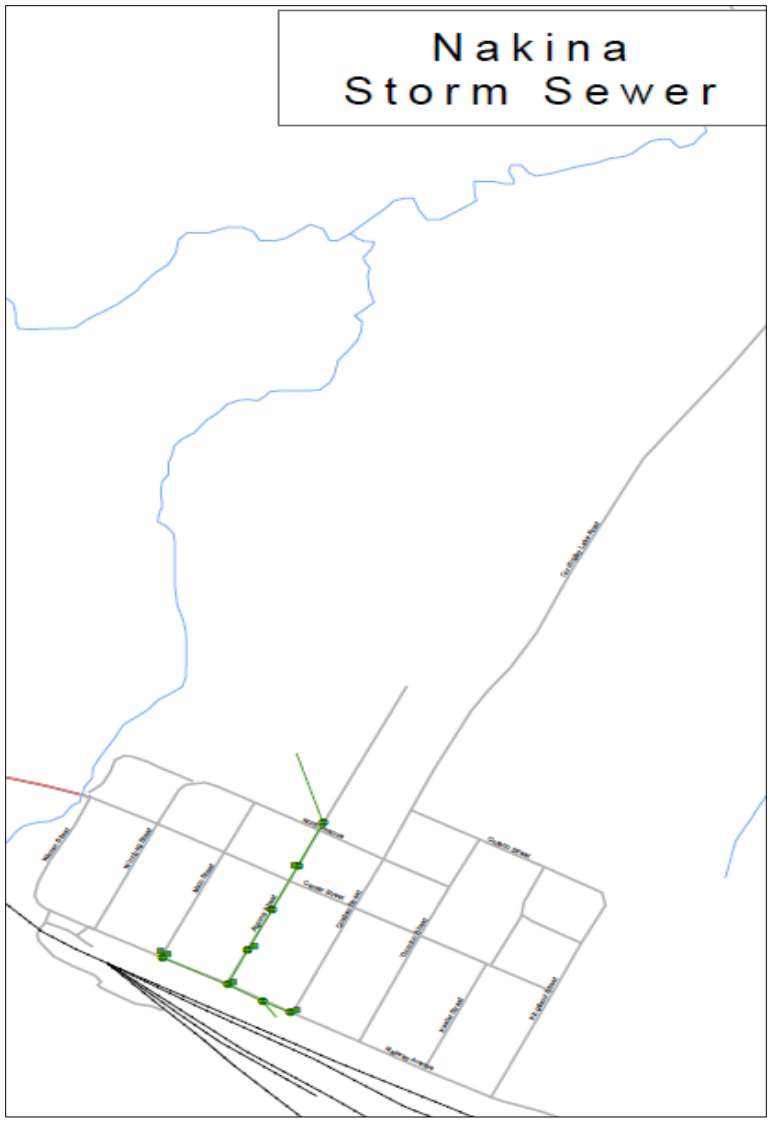

Geraldton
Sanitary Sewer

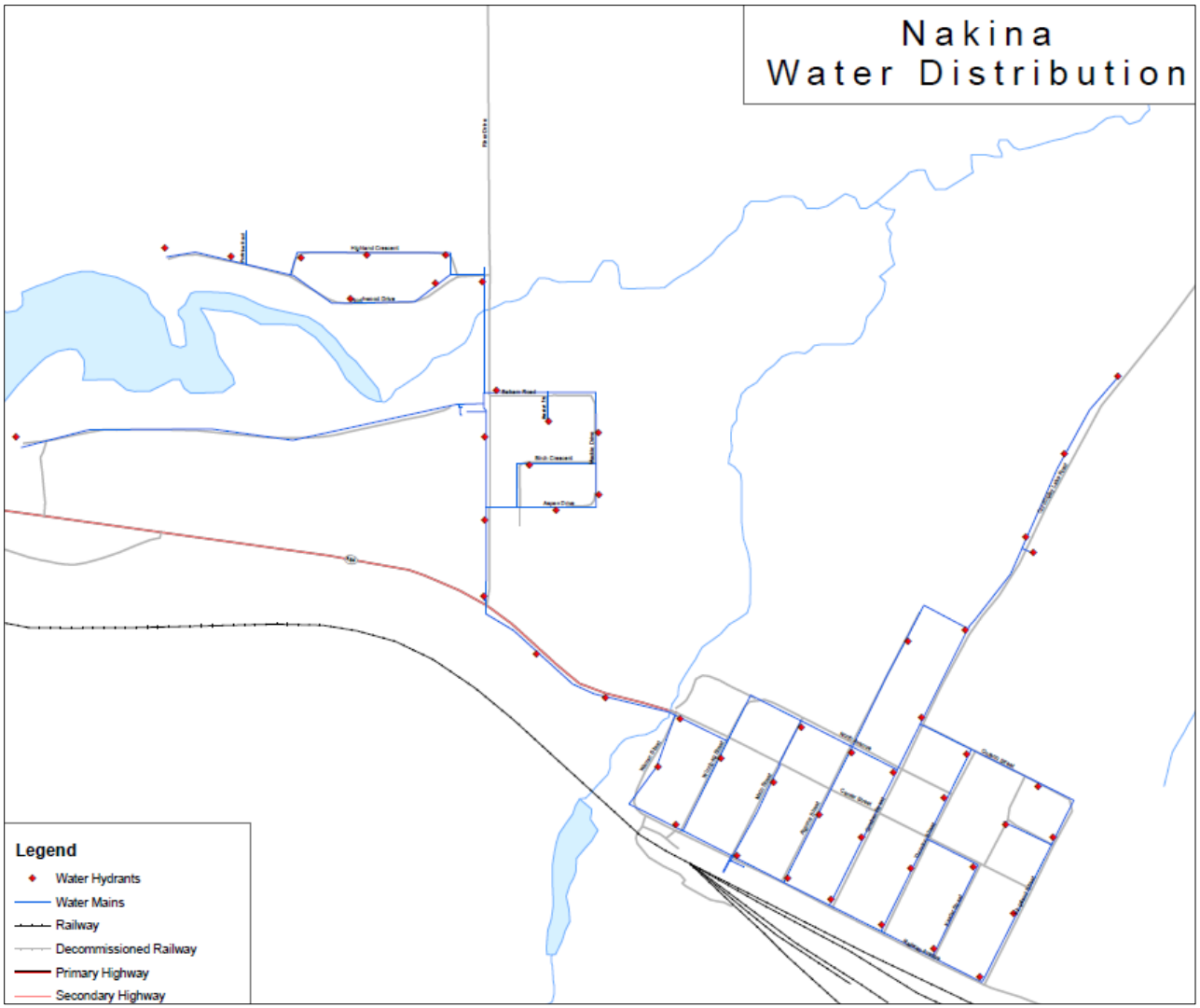

Longlac
Sanitary Sewer
Legend
Lift Station
Sanitary Manholes
Sanitary Gravity Mains
Sanitary Pressurized Mains
Railway
Decommissioned Railway
Primary Highway
Secondary Highway

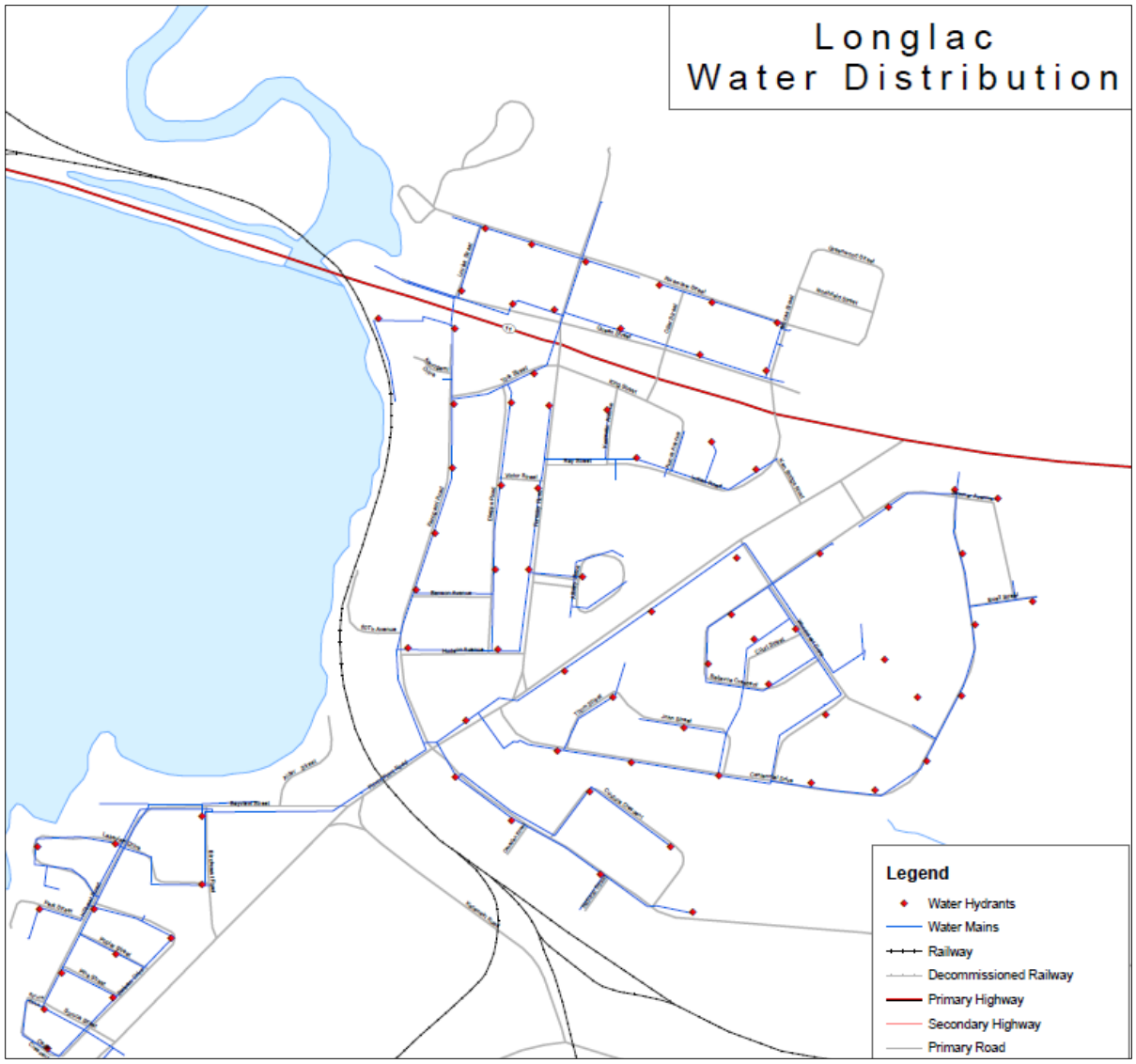

Longlac
Storm Sewer

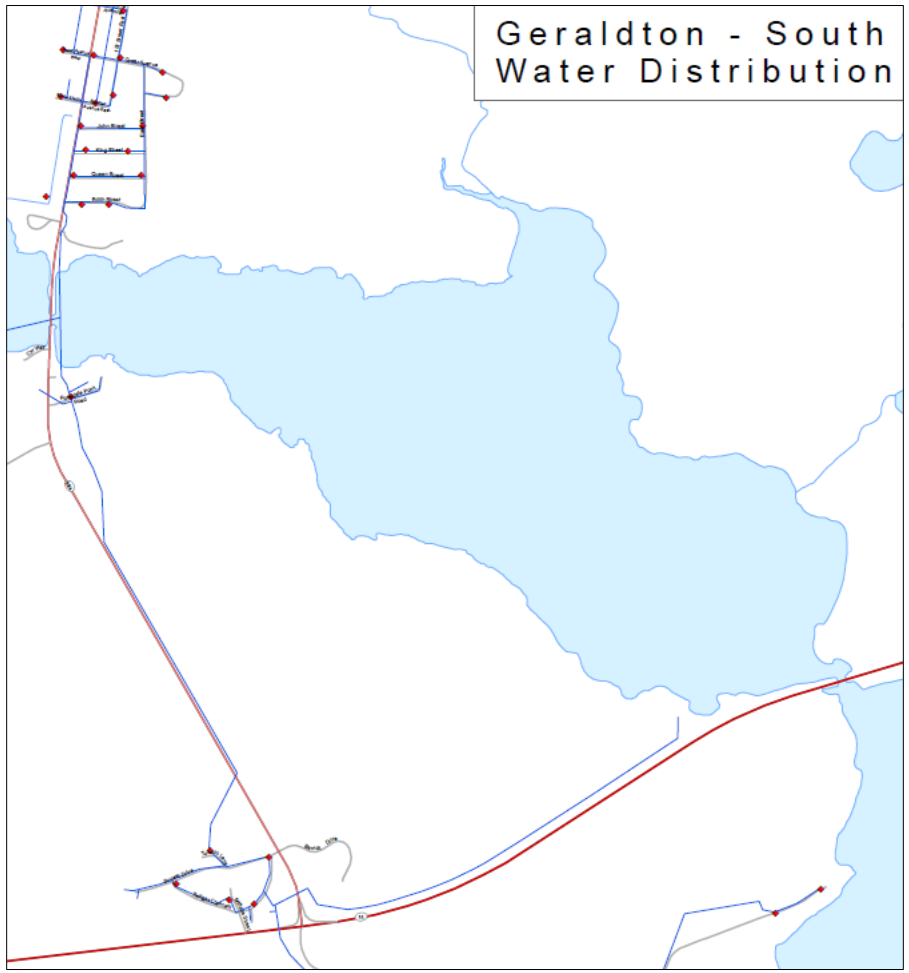

Beardmore
Storm Sewer

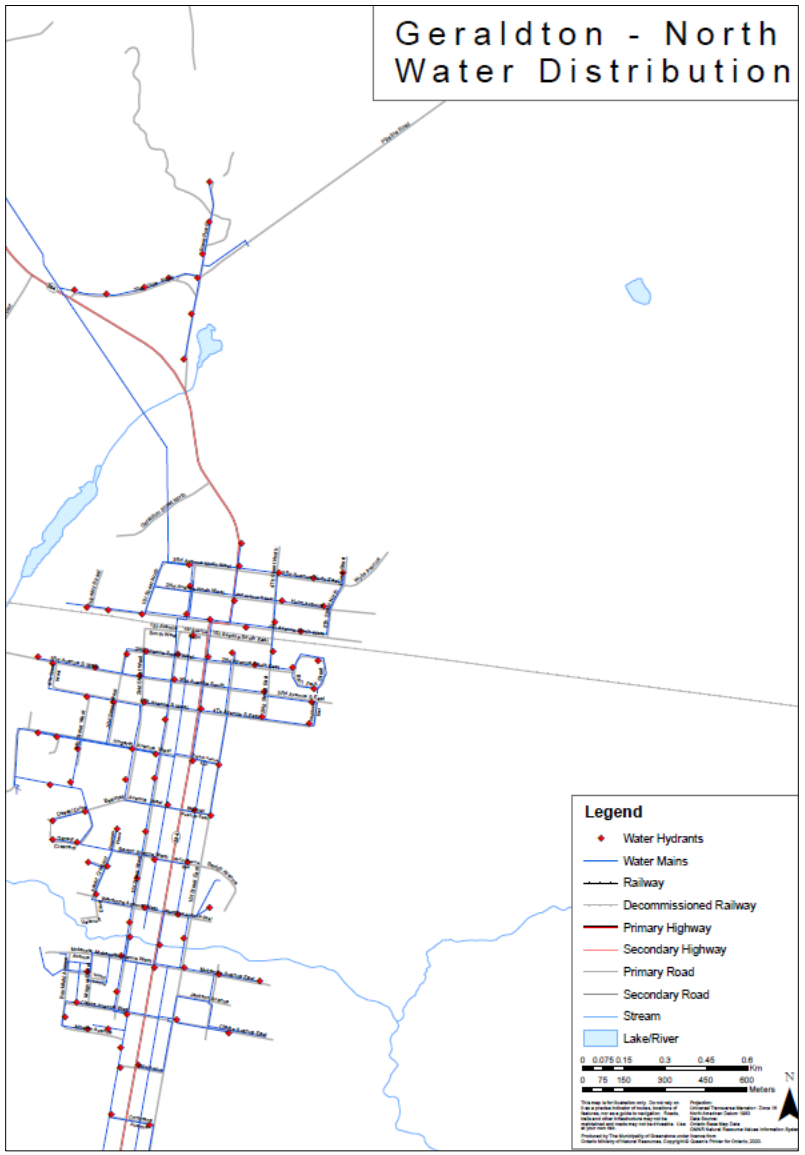

Geraldton
Storm Sewer

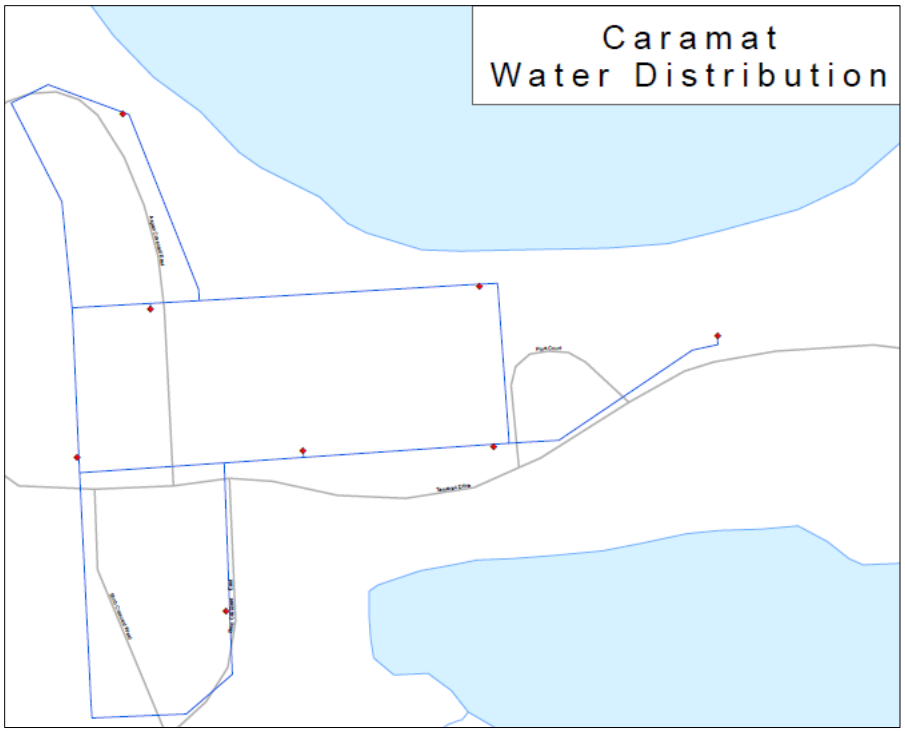

Nakina
Storm Sewer

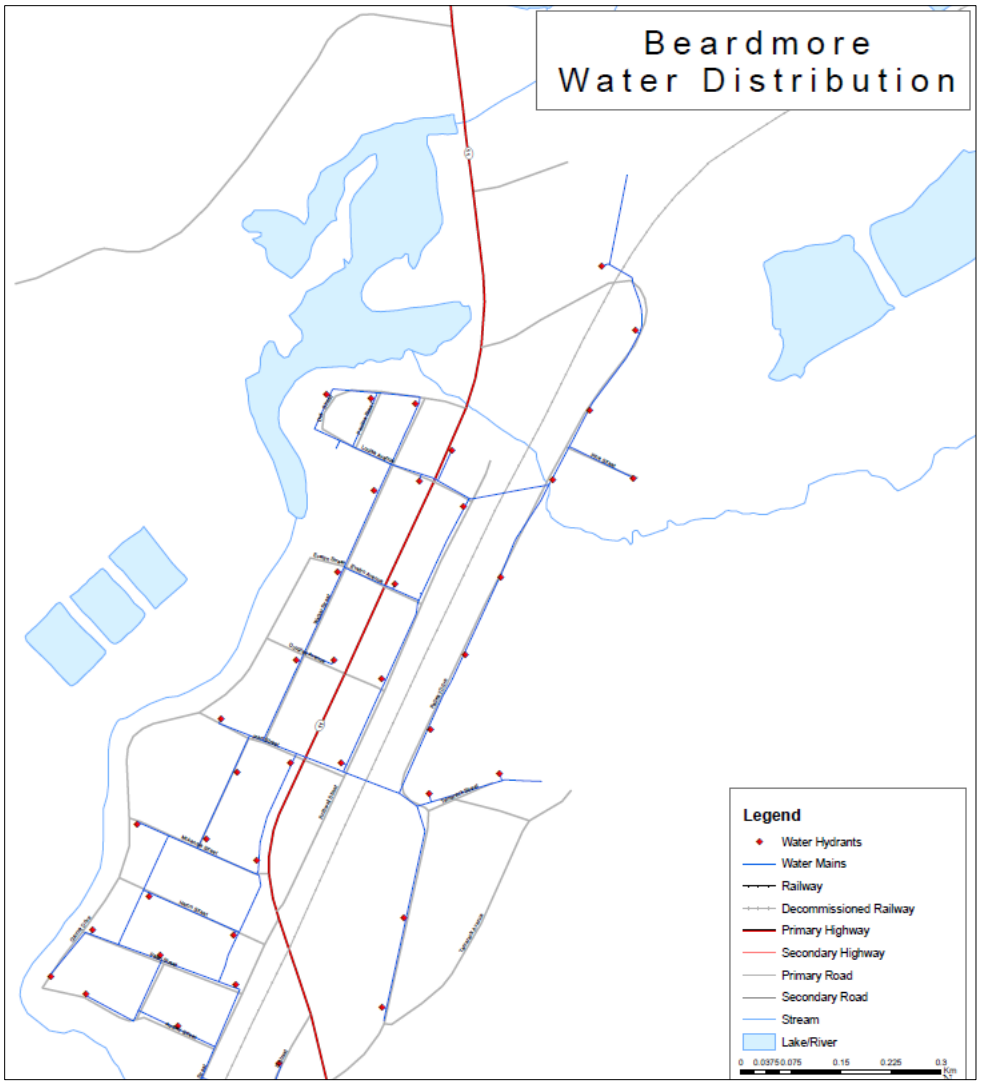

Nakina
Water Distribution
Legend
Water Hydrants
Water Mains
Railway
Decommissioned Railway
Primary Highway
Secondary Highway


Longlac
Water Distribution
Legend
Water Hydrants
Water Mains
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road


Geraldton - South
Water Distribution


Geraldton - North
Water Distribution
Legend
Water Hydrants
Water Mains
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Stream
Lake/River


Caramat
Water Distribution


Beardmore
Water Distribution
Legend
Water Hydrants
Water Mains
Railway
Decommissioned Railway
Primary Highway
Secondary Highway
Primary Road
Secondary Road
Stream
Lake/River

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
		60-79	2
		40-59	3
		20-39	4
		0-19	5
	ADT	0 - 100	1
		100 - 300	2
		300 - 750	3
		750 - 2000	4
		2000+	5
	Surface Material	Gravel	2
		Chip and Seal	3
		Asphalt	4
Bridges Stormwater Network Buildings & Facilities Machinery & Equipment Vehicles Land Improvements	Condition	80-100	1
		60-79	2
		40-59	3
		20-39	4
		0-19	5
Sanitary Sewer Network (Mains)	Condition	5	1
		4	2
		3	3
		2	4
		1	5
Water Network (Mains)	Remaining Service Life (Years)	45+	1
		25 - 45	2
		10 - 25	3
		5 - 10	4
		0-5	5
	Pipe Material	PVC, Steel	2
		AC, Galvanized Iron, Ductile Iron, Copper	3
		Clay, Cast Iron	4

Consequence of Failure

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
Road Network (Roads)	Replacement Cost	$0-$25,000	1
		$25,000-$100,000	2
		$100,000-$500,000	3
		$500,000-$1,000,000	4
		$1,000,000+	5
	ADT	0-99	1
		100-299	2
		300-399	3
		400-699	4
		700+	5
	Roadside Environment	Rural	2
		Semi Urban	3
		Urban	5
Bridges	Replacement Cost	$0-$50,000	1
		$50,000-$350,000	2
		$350,000-$1,000,000	3
		$1,000,000-$2,000,000	4
		$2,000,000+	5
	Detour Length (km)	0 - 1	1
		3-5	2
		5-10	3
		10-50	4
		50+	5
Stormwater Network	Replacement Cost	$0-$50,000	1
		$50,000-$150,000	2
		$150,000-$250,000	3
		$250,000-$500,000	4
		$500,000+	5
	Diameter (mm)	200 and less	1
		250	2
		300 - 400	3
		400 - 750	4
		800+	5
Buildings & Facilities	Replacement Cost	$0-$200,000	1

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
		$200,000-$900,000	2
		$900,000-$1,750,000	3
		$1,750,000-$4,000,000	4
		$4,000,000+	5
	Facility Type	Storage	1
		Community Hall, Tourist Information Centre	2
		Family Resource Centre, Social & Family Services	2
		Library, Museum, Daycare, Churches	3
		Recreation Centre	4
		Municipal Administration, Public Works	4
		Post Office, Seniors Centre	4
		Fire Hall, Airport, Health Centre	5
Machinery & Equipment	Replacement Cost	$0-$50,000	1
		$50,000-$100,000	2
		$100,000-$200,000	3
		$200,000-$500,000	4
		$500,000+	5
	Equipment Type	Furniture	1
		Various/Miscellaneous	2
		Office Equipment	2
		Computer Systems and Equipment	3
		Library & Recreation Equipment	3
		Public Works Machinery and Equipment	4
		Fueling Tanks and Generators	4
		Fire Person Protection and Rescue Equipment	5
Vehicles	Replacement Cost	$0-$25,000	1
		$25,000-$50,000	2
		$50,000-$150,000	3
		$150,000-$300,000	4
		$300,000+	5
	Vehicles Type	Light Duty – Vans/General Vehicles	1
		Medium Duty - Pick-up Trucks/Attachments	3

Asset Category	Risk Criteria	Value/Range	Consequence of Failure Score
		Heavy Duty - Construction/Fire/Garbage	5
Land Improvements	Replacement Cost	$0-$25,000	1
		$25,000-$50,000	2
		$50,000-$100,000	3
		$100,000-$150,000	4
		$150,000+	5
	Park Type	Trails, Parking Lot	2
		High Hill Harbor, Beach, Parks, Cemetery	3
		Waterfront Access Point, Ball Diamond, Playgrounds	4
Water Network (Water Mains)	Replacement Cost	$0-$25,000	1
		$25,000-$50,000	2
		$50,000-$100,000	3
		$100,000-$150,000	4
		$150,000+	5
	Pipe Material (mm)	40-75	1
		100	2
		150-200	3
		250-300	4
		300+	5
Sanitary Sewer Network (Sanitary Mains)	Pipe Diameter (mm)	0-100	1
		100-250	2
		250-375	3
		375-450	4
		450+	5
	Segment	Sanitary Sewer Mains	3
		Sanitary Force Mains	5
	Replacement Cost	$0-$25,000	1
		$25,000-$50,000	2
		$50,000-$100,000	3
		$100,000-$150,000	4
		$150,000+	5