

Asset Management Plan

Municipality of Grey Highlands

2020

This Asset Management Program was prepared by:



Empowering your organization through advanced
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Key Statistics

Replacement cost of
asset portfolio

\$191.3 million

Replacement cost of
infrastructure per household

\$36,000 (2016)

Percentage of assets in fair or
better condition

75%

Percentage of assets with
assessed condition data

62%

Annual capital
infrastructure deficit

\$3.7 million

Recommended timeframe
for eliminating annual
infrastructure deficit

10 – 20 Years

Target reinvestment
rate

3.1%

Actual reinvestment
rate

1.2%

Table of Contents

Executive Summary	1
Scope.....	1
Findings	2
Recommendations	3
1 Introduction & Context.....	4
1.1 An Overview of Asset Management	5
1.2 Key Concepts in Asset Management	7
1.3 Ontario Regulation 588/17	10
2 Scope and Methodology	12
2.1 Asset categories included in this AMP	13
2.2 Deriving Replacement Costs	13
2.3 Estimated Useful Life	14
2.4 Reinvestment Rate.....	14
2.5 Deriving Asset Condition.....	15
3 Portfolio Overview	16
3.1 Total Replacement Cost of Asset Portfolio	17
3.2 Target vs. Actual Reinvestment Rate.....	18
3.3 Condition of Asset Portfolio.....	19
3.4 Forecasted Capital Requirements	20
4 Analysis of Tax-funded Assets.....	21
4.1 Roads	22
4.2 Bridges & Culverts	31
4.3 Stormwater Network	38
4.4 Buildings	46
4.5 Machinery & Equipment	53
4.6 Vehicles	60
4.7 Land Improvements.....	66
5 Analysis of Rate-funded Assets	72
5.1 Water Network	73
5.2 Wastewater Network.....	81
6 Impacts of Growth.....	91
6.1 Description of Growth Assumptions.....	92
7 Financial Strategy	95
7.1 Financial Strategy Overview.....	96
7.2 Funding Objective.....	98
7.3 Financial Profile: Tax Funded Assets	99
7.4 Financial Profile: Rate Funded Assets	102
7.5 Use of Debt.....	105
7.6 Use of Reserves.....	107
8 Appendices	109
Appendix A: 10-Year Capital Requirements.....	110
Appendix B: Level of Service Maps.....	113
Appendix C: Risk Rating Criteria.....	122
Appendix D: Condition Assessment Guidelines	125

Executive Summary

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

Scope

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

This AMP include the following asset categories:



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

Findings

The overall replacement cost of the asset categories included in this AMP totals \$191.3 million. 75% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 62% of assets. For the remainder of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads and bridges & culverts) 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 \$5.9 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately \$2.2 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of \$3.7 million.

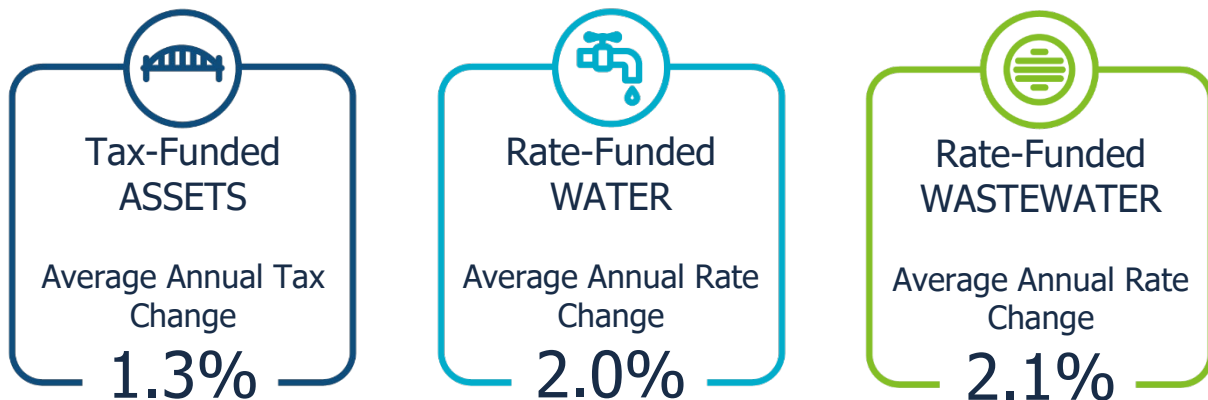
It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the Municipality. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources.

Annual Capital
Deficit Per
Household



Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to eliminate the Municipality's infrastructure deficit based on a 15-year plan for Tax-funded assets, 10-year plan for rate-funded Water assets, and 20-year plan for rate-funded Wastewater assets:



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

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

1 Introduction & Context

Key Insights

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

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

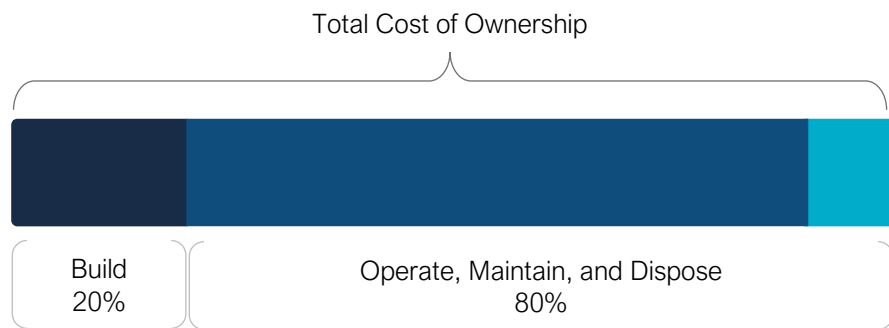
An asset management plan is a living document that should be updated regularly to inform long-term planning

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

1.1 An Overview of Asset Management

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

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



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

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

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.

Council approved the Municipality's Strategic Asset Management Policy (A09-F-07), on July 17, 2019, in accordance with Ontario Regulation 588/17.

The purpose of the policy is twofold:

Promote the strategic management of the Municipality's tangible assets; and

Guide the Municipality in ensuring that it is compliant with Ontario Regulation 588/17

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.

Asset Management Plan

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

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

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

1.2 Key Concepts in Asset Management

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

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.

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.

Levels of Service

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

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

Community Levels of Service

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

Technical Levels of Service

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

For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP.

Current and Proposed Levels of Service

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

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

1.3 Ontario Regulation 588/17

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

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

2019

Strategic Asset Management Policy

2024

Asset Management Plan for Core and Non-Core Assets

2022

Asset Management Plan for Core Assets with the following components:

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

2025

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

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

O. Reg. 588/17 Compliance Review

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

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

2 Scope and Methodology

Key Insights

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

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

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

2.1 Asset categories included in this AMP

This asset management plan for the Municipality of Grey Highlands is produced in compliance with Ontario Regulation 588/17. The July 2024 deadline under the regulation requires analysis of core assets (roads, bridges & culverts, water, wastewater, and stormwater) and non-core assets (buildings, vehicles, machinery & equipment, and land improvements).

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

2.2 Deriving Replacement Costs

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

User-Defined Cost and Cost/Unit: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience

Cost Inflation/CPI Tables: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index

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

2.3 Estimated Useful Life

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.

2.4 Reinvestment Rate

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

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

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

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

2.5 Deriving Asset Condition

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

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

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

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix 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 \$191.3 million

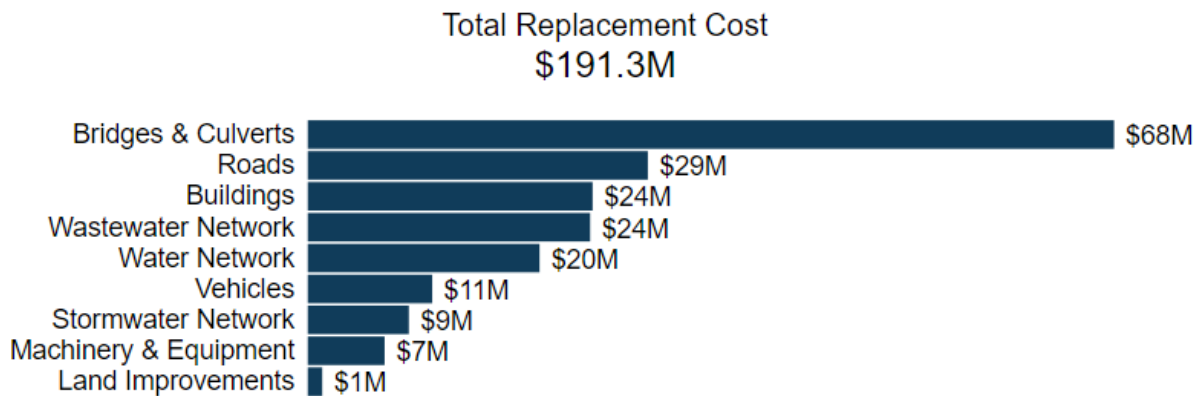
The Municipality's target re-investment rate is 3.1%, and the actual re-investment rate is 1.2%, contributing to an expanding infrastructure deficit

75% of all assets are in fair or better condition

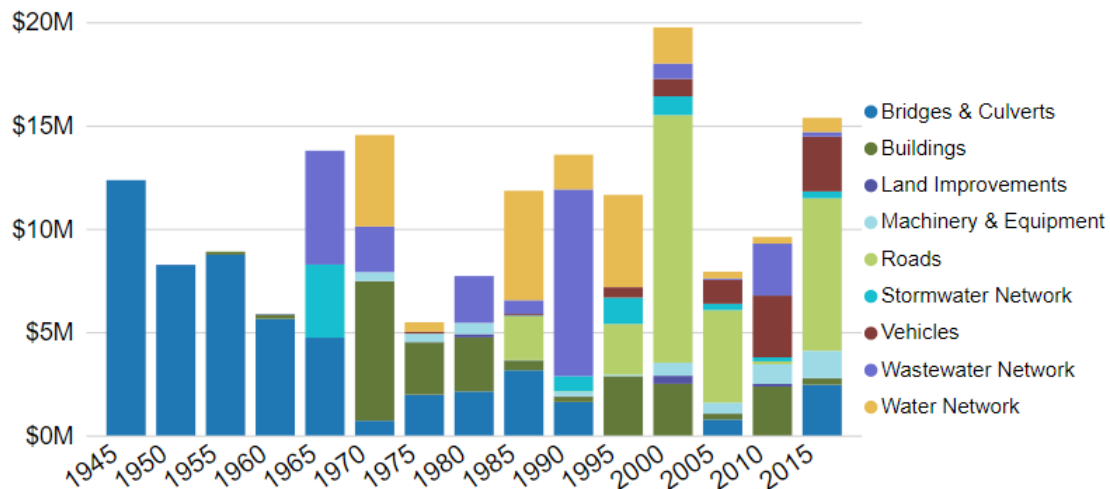
Average annual capital requirements total \$5.9 million per year across all assets

3.1 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of \$191.3 million based on inventory data from 2020. 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.



The following graph displays the total historical investment and date of acquisition per asset category.

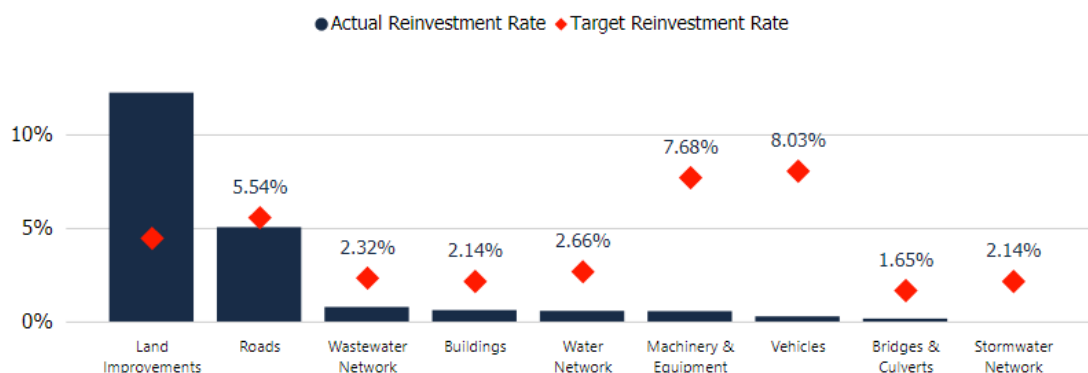


The following table identifies the methods employed to determine replacement costs across each asset category. All remaining assets have employed historical inflation, using consumer price index, to produce a replacement cost.

Asset Category	Replacement Cost Method	
	User Defined	Notes
Roads	98.7%	Data Source is from Transportation and Public Spaces Department
Bridges & Culverts	99.9%	Data source is from 2019 Bridge Inspection report (OSIMs)
Water Network	77.9%	Data Source is from Environmental Services
Wastewater Network	68.7%	Data Source is from Environmental Services
Stormwater Network	55.8%	Data Source is from Transportation and Public Spaces Department
Buildings	18.2%	Data Source, for Fire assets, is from Fire and Emergency Services Department Data Source, for Facilities and Parks, is from Parks and Recreation Department
Machinery & Equipment	23.6%	Data Source is partially complete from all Departments
Vehicles	91.1%	Data Source is largely complete from all Departments
Land Improvements	8.7%	Data Source is minimally complete for Parks and Recreation Department
Overall	78.4%	

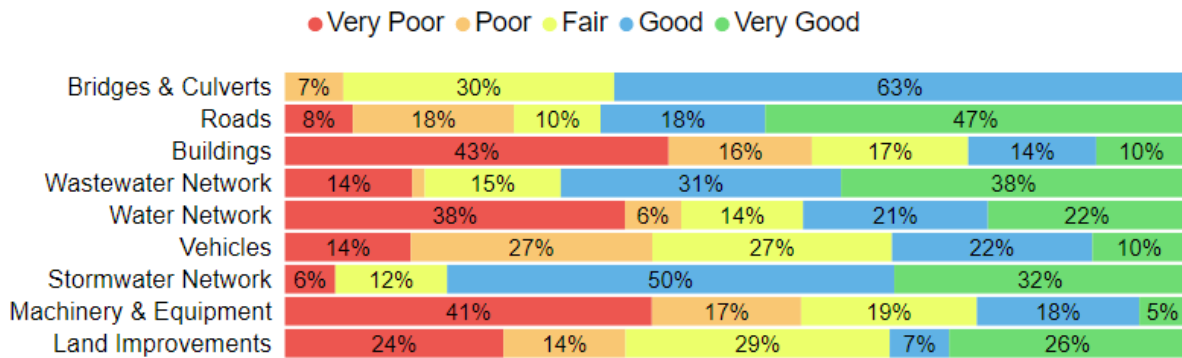
3.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Municipality should be allocating approximately \$5.9 million annually, for a target reinvestment rate of 3.1%. Actual annual spending on infrastructure totals approximately \$2.2 million, for an actual reinvestment rate of 1.2%.



3.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 76% of assets in Grey Highlands are in fair or better condition. This estimate relies on both age-based and field condition data.

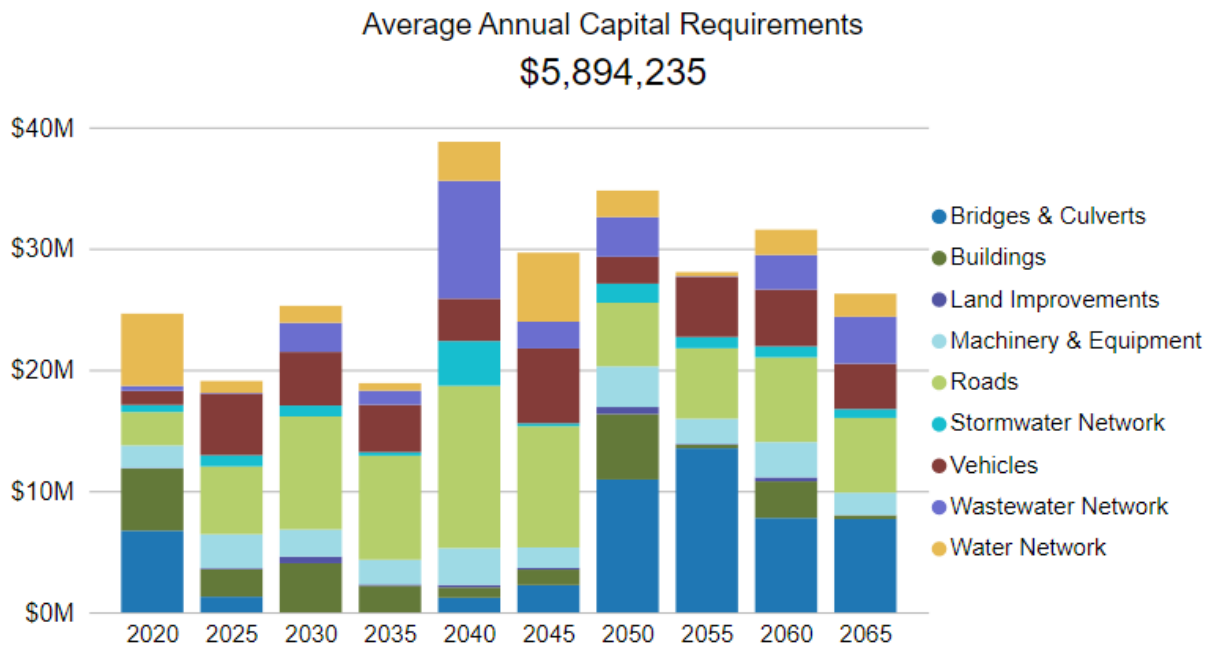


This AMP relies on assessed condition data for 62% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% Of Assets with Assessed Condition	Source of Condition Data
Road Network	Paved Roads	100%	2018 Road Needs Study
Bridges & Culverts	Bridges	100%	2019 OSIM Report
	Structural Culverts	100%	2019 OSIM Report
Stormwater Network	All	0%	N/A
Buildings	All	18%	Building Needs Assessment Report / Staff Assessments
Machinery & Equipment	All	40%	Staff Assessments
Vehicles	All	41%	Staff Assessments
Land Improvements	All	43%	Staff Assessments
Water Network	All	8%	Staff Assessments
Wastewater Network	All	19%	Staff Assessments

3.4 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 \$147.8 million

76% 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 \$4.8 million

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

4.1 Roads

The Road Network is a critical component of the provision of safe and efficient transportation services and represents one of the highest value asset categories in the Municipality's asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including sidewalks, signage, and streetlights. The Municipality also shares approximately 72 kilometres of boundary roads with other municipalities in which they are only responsible for 50% of the capital improvement costs.

The Municipality's roads and sidewalks are maintained by the Transportation and Public Spaces department, who is also responsible for winter snow clearing, ice control and snow removal operations in accordance with Minimum Maintenance Standards (O.Reg. 366/18).

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

Replacement Cost	Condition	Financial Capacity	
\$28.7 Million	Good (72%)	Annual Requirement:	\$1.6 Million
		Funding Available:	\$1.4 Million
		Annual Deficit:	\$145,000

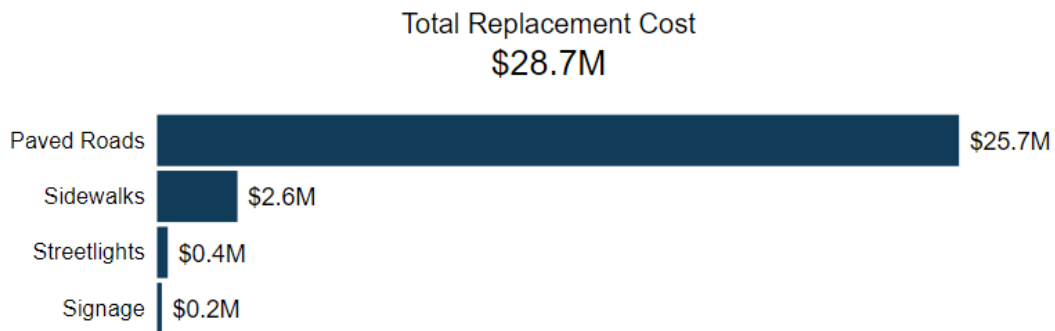
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning.

Service Attribute	Level of Service Statement
Scope	The roads network service is conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and is available under all weather conditions.
Quality	The roads network is in good condition with minimal unplanned service interruptions and road closures.

Asset Inventory & Costs

The table below includes the quantity, replacement cost method, and annual capital requirements of each asset segment in the Municipality's Roads Network inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
Gravel Roads	460,209 m	Not Planned for Replacement ¹	
Paved Roads	217,417 m	\$25,655,207	\$1,510,378
Sidewalks	19,770 m	\$2,579,438	\$60,896
Signage	3,225	\$161,250	\$10,750
Streetlights	562	\$350,555	\$11,685
Total		\$28,746,450	\$1,593,709



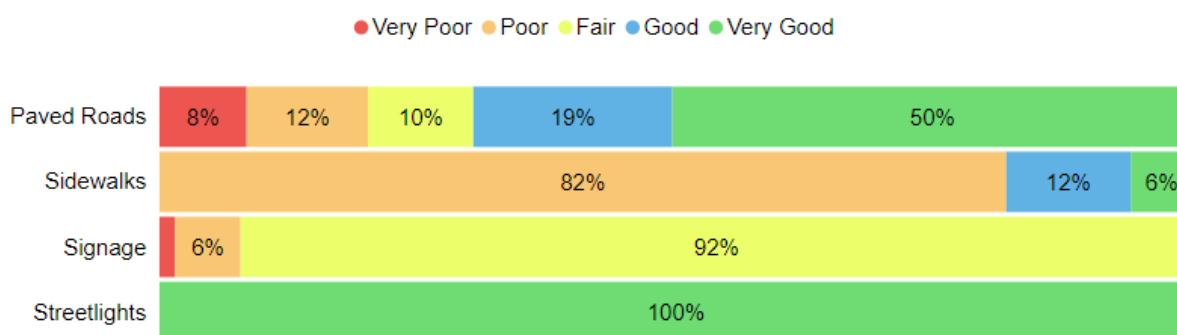
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

¹ Gravel roads undergo perpetual operating and maintenance activities. If maintained properly, they can theoretically have a limitless service life. Staff perform occasional structural repairs to the bedding.

Data Insights: Useful Life, Age & Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Paved Roads	75% (Good)	17.5	15 – 30 Years
Sidewalks	43% (Fair)	6.7	25 – 50 Years
Signage	51% (Fair)	2.5	15 Years
Streetlights	86% (Very Good)	4.1	30 Years
	72% (Good)	4.0	



To ensure that the Municipality's Roads 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 Roads.

Each asset's Estimated Useful Life should also 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.

Current Approach to Condition Assessment

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

- A Road Needs Study (RNS) was completed in June of 2018 that included a detailed assessment of the condition of each road segment as well as a recommended strategy and timeline for maintenance, repair, or replacement.
- The RNS also included assessments for other roadside assets such as sidewalks and signage.
- Staff perform regular visual inspections on their road network assets during their road patrols

In this AMP, the following rating criteria is used to determine the current condition of road segments and forecast future capital requirements:

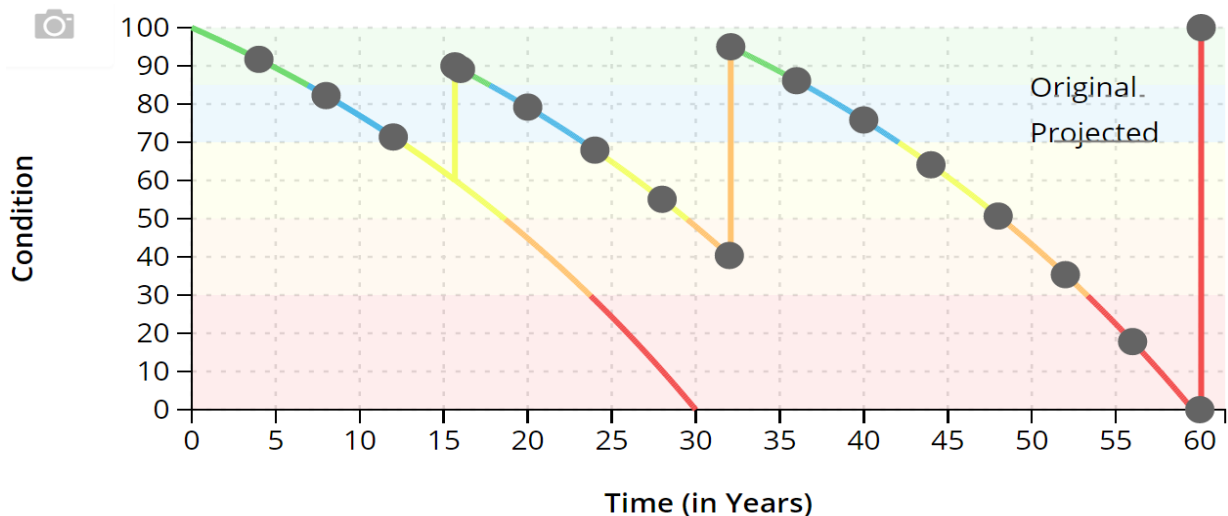
Condition	Rating
Very Good	85-100
Good	70-85
Fair	60-70
Poor	50-60
Very Poor	0-50

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 paved roads. Instead of allowing the roads to deteriorate until replacement is required, scheduled preventative maintenance and 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	4-7 Years
Microsurfacing	Preventative Maintenance	Annual
Mill & Pave/Resurfacing	Rehabilitation	40%-50% condition
Full Reconstruction	Replacement	N/A



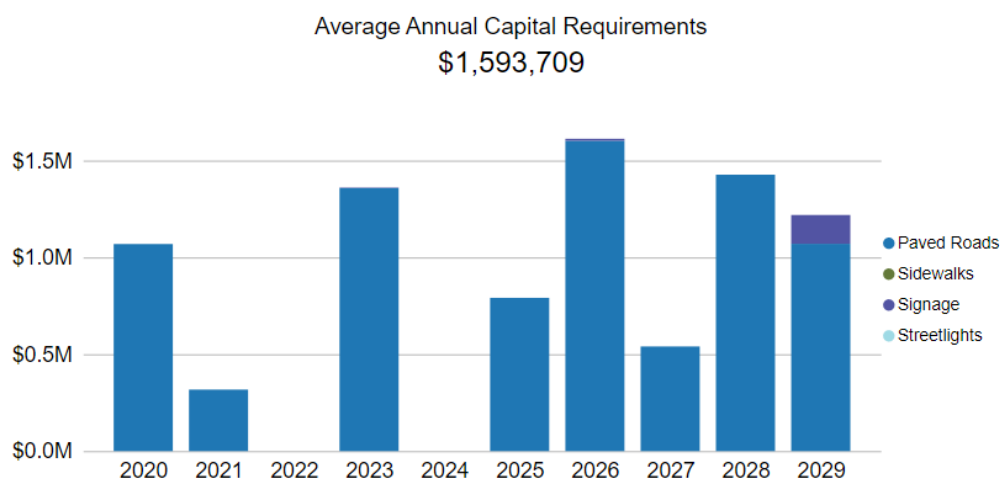
Lifecycle Strategies

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

Activity Type	Description of Current Strategy
Maintenance/ Rehabilitation	A crack sealing program is in place for asphalt roads, with a dedicated budget of approximately \$25,000/year. Micro-surfacing will be completed on an annual basis starting in 2022.
	The Municipality carries out road shouldering on an annual basis to re-gravel the shoulders and maintain the structural integrity of the road by preventing cracks originating from the sides.
	The Municipality conducts several seasonal maintenance activities. Summer maintenance activities include sidewalk repairs, grading, re-gravelling, dust control, brushing, ditching, road sign installation/maintenance, and line painting. Winter maintenance activities include snow plowing and slating.
Replacement	Road replacement prioritization is determined by condition, recommendations from RNS, criticality, coordination with underground infrastructure, and growth opportunities.
	There has been some conversion of gravel roads to paved roads in recent years and it is expected to result in additional capital requirements. These upgrades are based on traffic volumes, road performance, and cost of maintaining the road segments.

Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for paved roads, and assuming end-of-life replacement of all other assets, the following graph forecasts capital requirements for the Road Network. The annual capital requirement represents the average amount per year the Municipality should allocate towards funding rehabilitation/replacement needs to meet 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.

Risk

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	173 Assets 112,604.01 m \$13,287,272.71	46 Assets 15,477.00 m \$1,826,286.00	46 Assets 26,462.00 m \$3,122,516.00	35 Assets 33,025.00 m \$4,299,562.00	7 Assets 970.00 m \$114,460.00
	4	1 Asset 2,441.00 m \$288,038.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	13 Assets 19,588.00 unit(s), m \$2,595,623.00	0 Assets - \$0.00	1 Asset 525.00 m \$61,950.00	1 Asset 3,627.00 m \$580,320.00	0 Assets - \$0.00
	2	10 Assets 3,727.00 m \$439,786.00	6 Assets 8,497.75 m \$1,041,322.00	0 Assets - \$0.00	2 Assets 2,889.00 m \$340,902.00	0 Assets - \$0.00
	1	15 Assets 1,553.00 m, unit(s) \$236,260.00	5 Assets 1,230.20 m \$188,180.00	1 Asset 48.00 m \$5,664.00	4 Assets 1,331.00 m \$157,058.00	0 Assets - \$0.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies



Climate Change & Extreme Weather Events

An increase in the frequency and intensity of precipitation events can result in flooding of sections of the road network. As well, the drainage capacity of the road network is not sufficient to withstand heavy water flow, particularly on gravel roads. Currently, about 10% of the Municipality's roads have inadequate drainage capacity, and over 56% have partial drainage only². Further issues can arise as a result of flooding and poor drainage including accelerated deterioration caused by freeze/thaw cycles. To improve asset resiliency, Staff should identify problem areas and improve drainage through enhanced lifecycle strategies.



Lifecycle Management Strategies

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

² According to 2018 Road Needs Study assessment

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 (2020)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	The Municipality assessed the condition of their roads on a 0-100 scale. With road assets scoring below 60 considered poor, and assets scoring above 85 as excellent. See Appendix B for a breakdown of the pavement condition rating

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 (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km ²)	0 km/882 km ²
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km ²)	12 km/ 882 km ²
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km ²)	1,315 km/882 km ²
Quality	Average pavement condition index for paved roads in the municipality	75%
	Average surface condition for unpaved roads in the municipality (e.g., excellent, good, fair, poor)	Fair

Recommendations

Asset Inventory

- Review sidewalk inventory and update quantity and relevant attribute information on a regular basis. The sidewalk inventory includes several pooled assets that should be broken into discrete segments to allow for detailed planning and analysis.
- Pooled appurtenances, such as streetlights, lack asset specific attributes. Bringing greater granularity will allow for better asset management

Lifecycle Management Strategies

- Implement the recommended lifecycle management strategies for paved roads to become more proactive, 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

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

Levels of Service

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

4.2 Bridges & Culverts

Bridges & Culverts represent a critical portion of the transportation services provided to the community. The Department of Transportation and Public Spaces is responsible for the maintenance of all 73 bridges and culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions. These structural assets are assessed over a period of two years, with half of them being inspected during odd-numbered calendar years and the other half during even-numbered calendar years.

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

Replacement Cost	Condition	Financial Capacity	
\$68.1 Million	Good (62%)	Annual Requirement:	\$1.1 Million
		Funding Available:	\$106,000
		Annual Deficit:	\$1.0 Million

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

Service Attribute	Level of Service Statement
Scope	Bridges and culverts are conveniently accessible to the whole community in sufficient capacity (meets traffic demands) and are available under all weather conditions. Only 8 of the bridges & culverts in the Municipality have loading and/or dimensional restrictions.
Quality	The bridges and culverts are in good condition with minimal unplanned service interruptions and closures.

Asset Inventory & Costs

The table below includes the quantity, replacement cost method, and annual capital requirements of each asset segment in the Municipality's Bridges & Culverts inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Bridges	38	\$43,603,000	\$723,237
Culverts	35	\$24,505,980	\$401,632
		\$68,108,980	\$1,124,868

Total Replacement Cost
\$68.1M

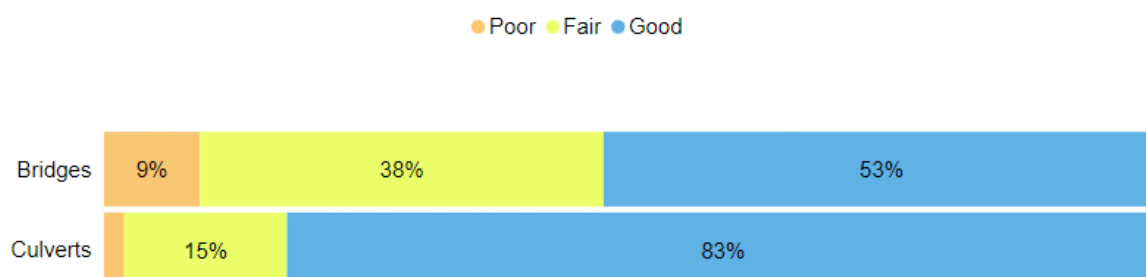


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Bridges	60% (Good)	66.3	50 – 75 Years
Culverts	66% (Good)	52.1	50 – 75 Years
	62% (Good)	59.6	



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

Current Approach to Condition Assessment

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

- Condition assessments of all structural bridges and culverts with a span greater than or equal to 3 meters are completed every year on alternating structures in accordance with the Ontario Structure Inspection Manual (OSIM). This AMP contains condition information based on the 2018-2019 OSIMs.
- Staff visually inspect bridges and culverts on a regular basis, between OSIM inspections, to ensure that the assets are structurally and functionally sound.

In this AMP, the following condition rating criteria is used to determine the current condition of bridges and culverts and forecast future capital requirements:

Condition	Rating
Good	70-100
Fair	50-70
Poor	0-50

Lifecycle Management Strategy

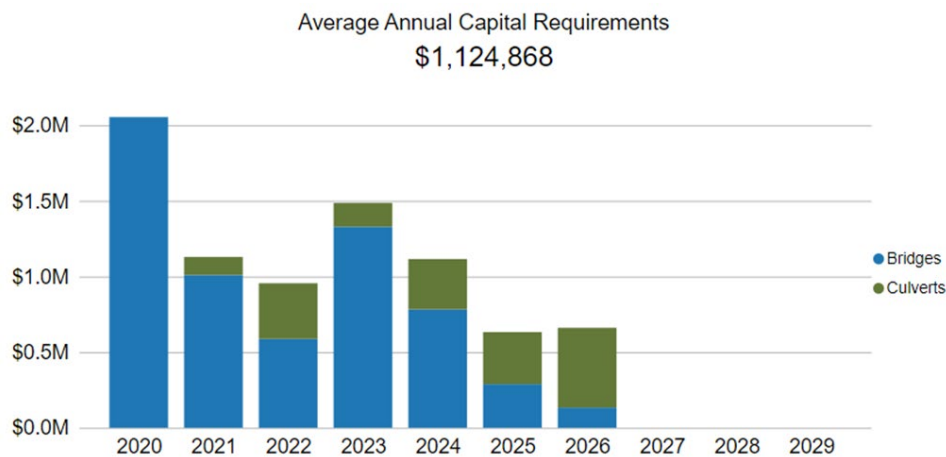
To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	Lifecycle activities are driven by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIM)

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.

Risk

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	1 Asset 25.70 m \$1,801,000.00	7 Assets 142.00 m \$11,621,500.00	3 Assets 67.80 m \$7,218,500.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	9 Assets 106.10 m \$9,816,500.00	7 Assets 90.20 m \$7,474,500.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	1 Asset 12.40 m \$654,500.00	19 Assets 180.20 m \$14,985,000.00	5 Assets 36.20 m \$3,741,000.00	5 Assets 30.80 m \$3,964,000.00	0 Assets - \$0.00
	2	1 Asset 3.60 m \$541,500.00	7 Assets 30.70 m \$3,782,500.00	4 Assets 11.90 m \$2,025,500.00	1 Asset 2.00 m \$470,000.00	0 Assets - \$0.00
	1	4 Assets 45.00 m \$12,980.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies



Climate Change & Extreme Weather Events

Flooding and extreme weather causes damage to multiple components of the Municipality's structures. The rising levels of freshwater and the increased frequency and intensity of precipitation events are likely to increase the deterioration of bridge components. Staff should identify and monitor affected bridges and culverts. Staff should prioritize infrastructure maintenance, rehabilitation, and replacement based on susceptibility to climate impacts.



Funding & Staff Capacity

The Municipality has a large inventory of structural assets which require regular maintenance and assessment. Staff capacity is sometimes insufficient to deploy optimal maintenance and rehabilitation strategies. Major capital rehabilitation projects for bridges and culverts may also be deferred depending on the availability of grant funding opportunities. A long-term capital funding strategy can reduce dependency on grant funding and help prevent deferral of necessary capital works.

Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2019/2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Structural bridges and culverts are a key component of the Municipality's transportation network, and support the movement of pedestrians, trucks, emergency vehicles, and motor vehicles in and around Grey Highlands. There are 8 structures that have loading and/or dimensional restrictions.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges	<p>Good (BCI 70-100): Generally considered to be in good-excellent condition, and repair or rehabilitation work is not usually required within the next 5 years. Routine maintenance, such as sweeping, cleaning, and washing are still recommended.</p> <p>Fair (BCI 50-70): Generally considered to be in good-fair condition. Repair or rehabilitation work recommended is ideally scheduled to be completed within the next 5 years.</p>
	Description or images of the condition of culverts and how this would affect use of the culverts	<p>Poor (BCI Less than 50): Generally considered poor with lower numbers representing structures nearing the end of their service life. The repair or rehabilitation of these structures is ideally best scheduled to be completed within approximately 1 year. However, if it is determined that the replacement of the structure would be a more viable, the structure can be identified for continued monitoring and scheduled for replacement within the short-term.</p>

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2019/2020)
Scope	% Of bridges in the Municipality with loading or dimensional restrictions	11%
Quality	Average bridge condition index value for bridges in the Municipality	60%
	Average bridge condition index value for structural culverts in the Municipality	66%

Recommendations

Data Review/Validation

- Continue to review and update inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections. Incorporate rehabilitation recommendations and strategies accordingly for a more accurate and proactive capital forecast. This will minimize the instances of hidden or unexpected failures that are typically costlier and more resource-intensive.

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

4.3 Stormwater Network

The Municipality is responsible for managing and maintaining the stormwater network, which is comprised of: mains, manholes, culverts, and storm management ponds. Staff are working towards improving the accuracy and reliability of their Stormwater Network to assist with long-term asset management planning.

The Municipality recently conducted surface drainage studies for its communities of Eugenia, Flesherton and Markdale in 2018 to analyze drainage and capacity issues within the network.

The state of the infrastructure for the stormwater network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
\$8.6 Million	Good (70%)	Annual Requirement:	\$283,265
		Funding Available:	\$0
		Annual Deficit:	\$283,265

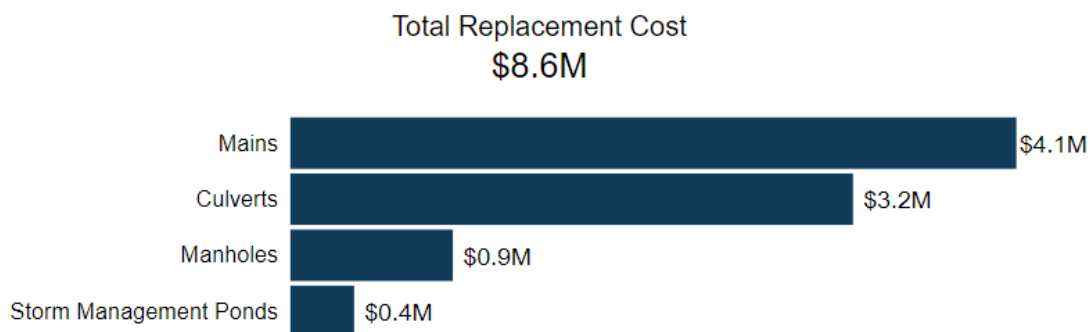
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning.

Service Attribute	Level of Service Statement
Quality/Reliability	The municipal stormwater network is accessible to the community in limited capacity during extreme weather events. The 2018 surface drainage study informs proactive efforts to improve system performance.

Asset Inventory & Costs

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

Asset Segment ³	Quantity	Replacement Cost	Annual Capital Requirement
Culverts	990	\$3,180,036	\$106,207
Mains	8,118 m	\$4,102,915	\$54,706
Manholes	126	\$919,800	\$115,330
Storm Management Ponds	3	\$361,815	\$7,022
		\$8,564,566	\$283,265

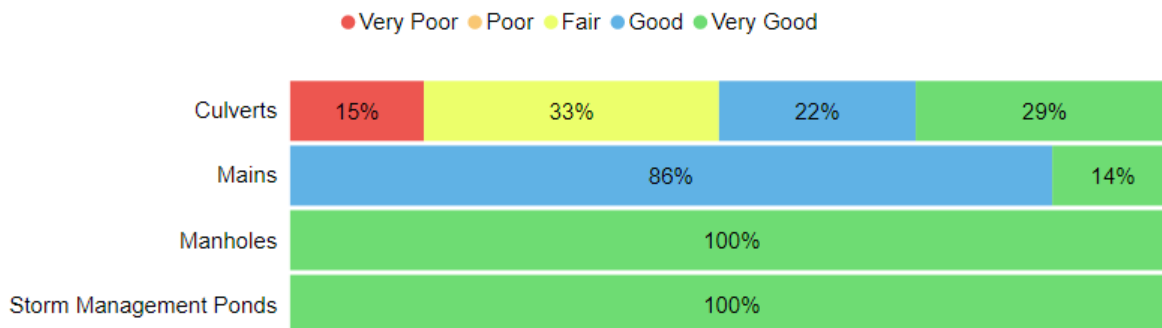


³ There are 384 catchbasins in the Municipality that have not been uploaded and incorporated into the asset management database. They will be included in the next iteration of the AMP.

Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Culverts	61% (Good)	20.9	30 – 50 Years
Mains	71% (Good)	50.4	50 – 75 Years
Manholes	86% (Very Good)	30.5	60 Years
Storm Management Ponds	96% (Very Good)	4.3	50 – 60 Years
	70% (Good)	26.5	



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

- There is no systematic, formal condition assessment program in place for the stormwater network; CCTV inspections are completed on a project-by-project basis, and in coordination with other road or sewer projects.
- Staff also rely on a variety of metrics including age, pipe material and diameter, and location to determine the projected condition of mains
- The inspection of surface drainage infrastructure was performed in 2018, as part of the Surface Drainage Study, to assess the drainage adequacy and capacity requirements of the storm network.
- Stormwater structures, such as manholes, catchbasins and outlets, were assessed and inspected in 2018 in conjunction with the road needs study assessment. They are typically assessed on an as-needed basis, however.

In this AMP the following rating criteria is used to determine the current condition of Storm Network assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Lifecycle Management Strategy

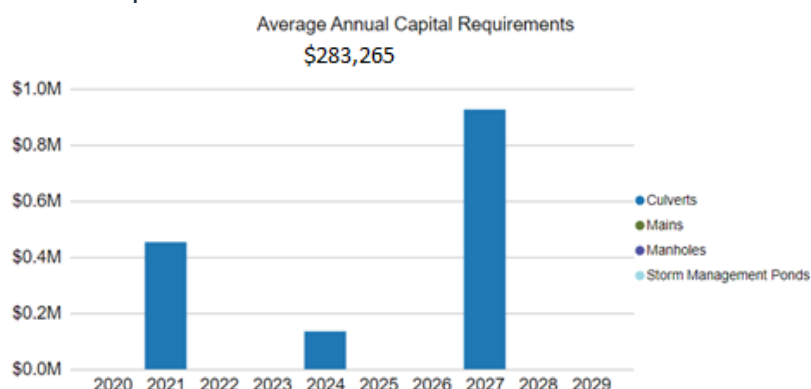
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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 annually, and are replaced in coordination with road repairs CCTV inspections are completed on an as-needed basis
Rehabilitation/Replacement	Trenchless relining has not been a viable option for the stormwater mains, and is evaluated on a case-by-case basis Stormwater management ponds may undergo restorative activities such as silt removal, deepening of the pond, or redesign. Costs are noted to vary widely depending on the extent of restoration. Regular maintenance activities such as vegetation management, debris removal, and clearing of inlet/outlet structures are performed as needed Many storm assets are replaced near their end of life; Earlier replacement is typically coordinated with other work on localized assets, and is prioritized based on complaints, criticality of assets, and existing drainage/capacity issues

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.

Risk

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	2 Assets 183.00 m, unit(s) \$114,507.00	13 Assets 982.08 m \$1,051,404.75	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	5 Assets 183.89 m \$133,320.25	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	3 Assets 235.00 m, unit(s) \$410,066.00	29 Assets 1,317.80 m \$726,880.40	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	16 Assets 922.50 unit(s), m \$364,972.00	165 Assets 4,173.03 m \$1,627,481.70	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	1	294 Assets 1,230.85 m, unit(s) \$971,003.50	220 Assets 255.14 m \$707,740.00	330 Assets 485.14 m \$1,061,610.00	0 Assets - \$0.00	150 Assets 227.60 m \$482,550.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies

Asset Data & Information



There is a lack of confidence in some of the available inventory data for stormwater assets and its completeness. Staff plan to focus on data refinement efforts to increase confidence in the accuracy and reliability of asset data and information. Staff are also seeking to optimize information gathered from CCTV inspections and hope to develop better defined strategies that will extend the network's lifecycle, increase capacity for growth, and lower total cost of ownership.



Climate Change & Extreme Weather Events

The stormwater network comprises of catchbasins, drains, and stormwater management ponds. The network was designed with some standards that do not meet the needs of new development areas, areas that lack necessary conveyance infrastructure, and drainage and capacity issues. The 2018 Surface Drainage Studies analyzed and provided mitigation strategies to improve the reliability of the Storm Network that Staff will consider in their future capital planning.

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 for stormwater sewer network (from 2019 Surface Drainage Study)

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 ⁴
	% of the municipal stormwater management system resilient to a 5-year storm	TBD ⁵

⁴ 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.

⁵ The Municipality does not currently have data available to determine this technical metric.

Recommendations

Asset Inventory

- The Municipality's Stormwater Network inventory is at a somewhat basic level of maturity, and staff are working towards refining and improving the accuracy and comprehensiveness of the network.
- Point assets such as the manholes and culverts are not fully inventoried, with some being pooled. In the case of catch basin assets, although they have been inventoried as part of the recent road needs study, they were not incorporated into the current asset management database. Staff will be working on making this information available for the next iteration of the plan.

Condition Assessment Strategies

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

Risk Management Strategies

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

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the Stormwater Network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.
- Staff should incorporate mitigation strategies, into the lifecycle models, that will aid in climate change resiliency.

Levels of Service

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

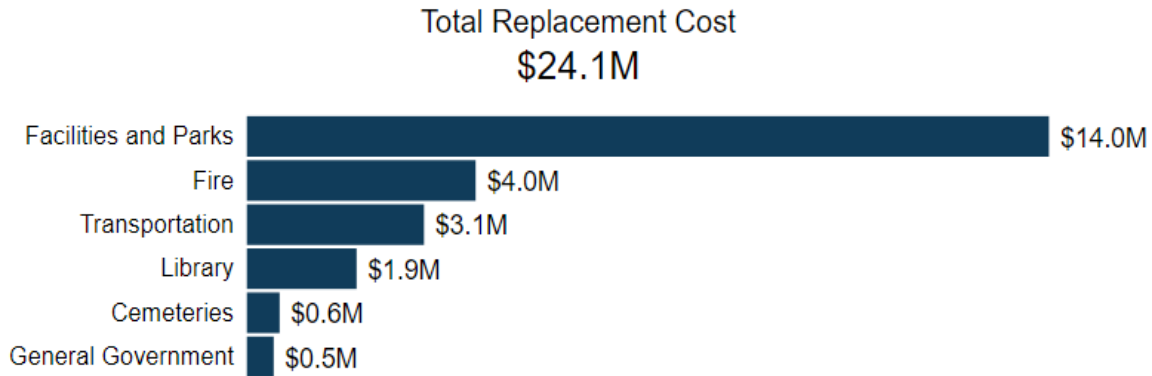
4.4 Buildings

The Municipality of Grey Highlands owns and maintains facilities and recreation centres that provide key services to the community. These include administration buildings, library, cemeteries, arenas, fire halls, and other buildings that are available for public use.

Asset Inventory & Costs

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

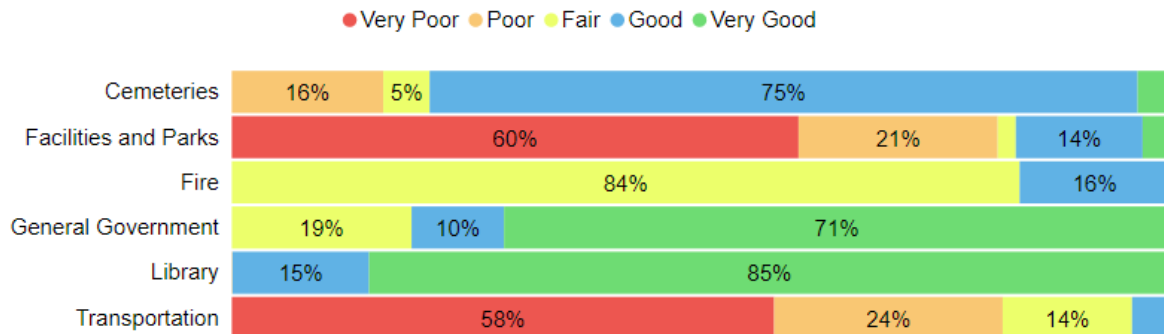
Asset Segment	Name	Quantity (Components)	Replacement Cost	Annual Capital Requirement
Cemeteries	Flesherton Memorial Park	4 (10)	\$578,268	\$11,825
	Maxwell Cemetery			
	Flesherton Cemetery			
	Markdale Cemetery			
Facilities and Parks	Badjeros, Eugenia, Feversham	13 (132)	\$14,009,010	\$295,441
	Ball Diamonds			
	Flesherton Arena			
	Kimberly Community Hall			
	Markdale, Osprey, Rocklyn			
	Recreational Centres			
	South Grey Museum			
	Stothart Hall			
	Vandeleur Park			
	Flesherton Memorial Park			
	Flesherton Kinplex			
Fire	Markdale Area Fire Hall	2 (4)	\$4,000,000	\$92,800
	Flesherton Area Fire Hall			
General Government	Municipal Office	4 (5)	\$474,551	\$13,722
	Markdale Depot – Admin Office			
	Senior Centre			
	Genoe Estate Property			
Library	Walter Harris Memorial Library	2 (7)	\$1,921,635	\$38,455
	Flesherton Library			
Transportation	Sand and Salt Shed	10 (23)	\$3,098,594	\$64,029
	McDuff Storage Shed			
	Flesherton Sand Dome			
	Markdale, Maxwell, Flesherton, Rocklyn Depots			
			\$24,082,058	\$516,272



Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Cemeteries	57% (Fair)	19	30 – 50 Years
Facilities and Parks	22% (Fair)	30	30 – 60 Years
Fire	59% (Poor)	19.6	25 – 50 Years
General Government	76% (Good)	7.3	20 – 100 Years
Library	78% (Good)	16.2	30 – 50 Years
Transportation	25% (Poor)	26.3	20 – 60 Years
	35% (Poor)	26.3	



Current Approach to Condition Assessment

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

- Monthly Health and Safety inspections are performed by third-party contractors
- Specific components such as HVAC systems, elevators, or generators are inspected in accordance with manufacturing recommendations and Building Code Act standards.
- Staff perform regular visual inspections on their building assets, with more critical assets such as municipal office and fire halls inspected more frequently.

In this AMP the following rating criteria is used to determine the current condition of Building assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Asset Management Strategies

The documentation of lifecycle management strategies, current levels of service, and risk is critical to the development of a comprehensive asset management program. These components of the asset management plan support effective short- and long-term capital planning and contribute to more proactive asset management practices, thus extending the estimated useful life of many assets and a providing a higher level of service.

Lifecycle Management Strategies

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 undertaken as a result of internal inspections, prioritizing activities related to health and safety and regulatory compliance Industry Practice: Outsource a detailed structural and functional building inspection study to obtain reliable condition data to develop a long-term maintenance and rehabilitation plan
Rehabilitation/Replacement	Assessments are completed strategically as buildings approach their end-of-life to determine whether replacement or rehabilitation is a more appropriate treatment option. Replacements are prioritized by criticality, health and safety concerns, and cost.

Risk Models

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	1 Asset 1.00 unit(s) \$1,639,930.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$1,642,516.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	1 Asset 1.00 unit(s) \$275,298.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$2,520,000.00	1 Asset 1.00 unit(s) \$1,569,641.00	0 Assets - \$0.00
	2	1 Asset 1.00 unit(s) \$250,133.00	2 Assets 2.00 unit(s) \$606,348.00	1 Asset 1.00 unit(s) \$251,458.00	1 Asset 1.00 unit(s) \$403,213.00	0 Assets - \$0.00
	1	9 Assets 2.00 unit(s) \$236,710.00	19 Assets 18.00 unit(s) \$1,172,412.00	15 Assets 15.00 unit(s) \$1,404,747.00	14 Assets 16.00 unit(s) \$1,851,818.00	31 Assets 31.00 unit(s) \$10,257,834.00
		1	2	3	4	5
		Probability				

Levels of Service

The following tables identify the Municipality's current level of service for Buildings. These metrics include the technical and community level of service metrics 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 Buildings.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of municipal buildings and the plans that are in place to maintain or improve the provided level of service	The average condition of municipal buildings is currently 35% (Poor) based on the available data; Staff undertake regular maintenance, rehabilitation, and replacement activities to ensure that municipal buildings provide the necessary level of service to the community.

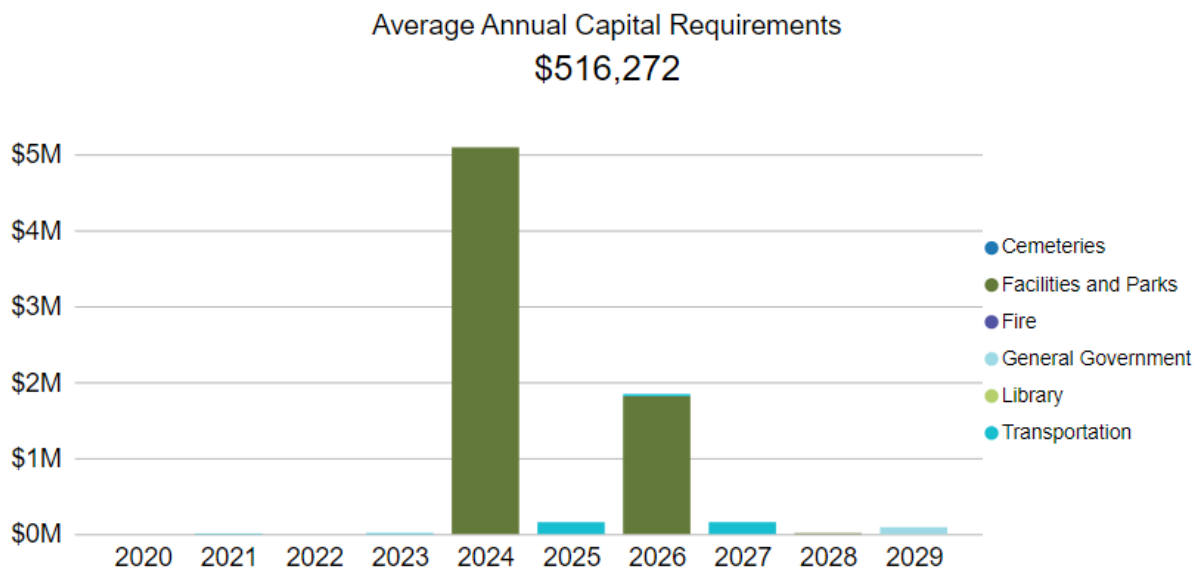
Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Quality	% of buildings that are in good or very good condition	24%
	% of buildings that are in poor or very poor condition	58%
Performance	Capital reinvestment rate	2.14%

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.

Recommendations

Asset Inventory

- Buildings consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards developing a more consistent and componentized inventory, utilizing Building Uniformat Code Classification, for more accurate capital forecasting.
- Utilize costing from insurance appraisals or building condition inspections for more accurate and reliable replacement costs. Almost 98% of the building costs in this plan are based on historical inflation using consumer price index, which typically underestimates the true cost of replacing these assets.

Condition Assessment Strategies

- The Municipality should implement regular condition assessments for all critical facilities to better inform short- and long-term capital requirements. Third-party building condition inspections should be performed on the critical and high-priority buildings every 5-10 years, whereas smaller and non-Public facing structures can be assessed internally by staff as needed. 84% of the building assets were based on an age-based condition proxy.

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

4.5 Machinery & Equipment

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:

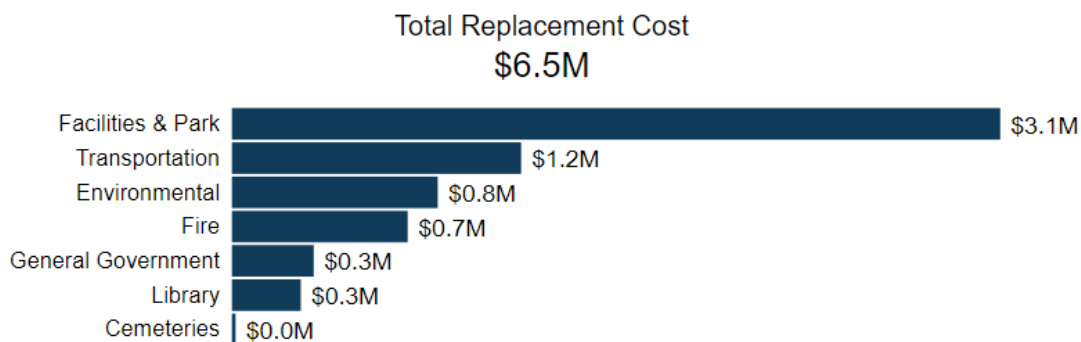
- Landscaping equipment to maintain public parks
- Machinery to maintain recreational facilities
- Equipment for public use within recreation centers
- Administrative computers and other hardware
- Fire equipment to support the delivery of emergency services

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

Asset Inventory & Costs

The table below includes the quantity, replacement cost method, and annual capital requirements of each asset segment in the Municipality's Machinery & Equipment inventory.

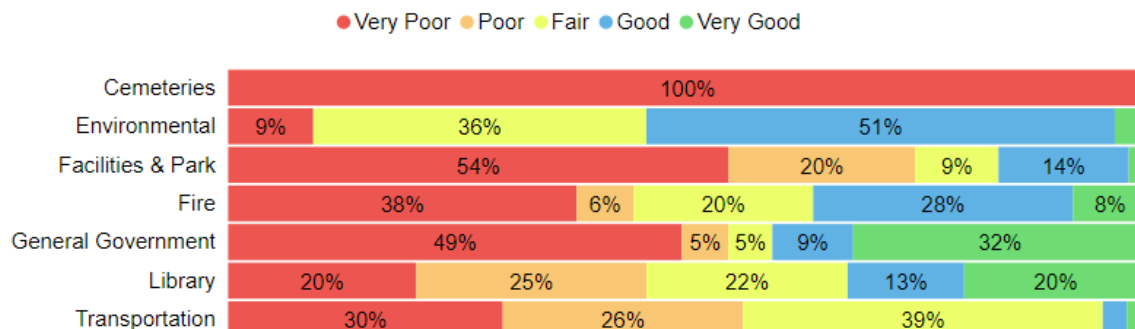
Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Cemeteries	1	\$16,227	\$1,623
Environmental	50	\$842,344	\$77,401
Facilities & Park	665	\$3,140,469	\$144,499
Fire	166	\$719,412	\$72,210
General Government	15	\$335,705	\$56,760
Library	12	\$282,696	\$35,693
Transportation	58	\$1,182,983	\$112,572
		\$6,519,836	\$500,758



Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Cemeteries	0% (Very Poor)	19.5	10
Environmental	57% (Fair)	4.5	5 – 25 Years
Facilities & Park	25% (Poor)	19.2	20 – 50 Years
Fire	42% (Fair)	8.7	5 – 50 Years
General Government	44% (Fair)	5.9	5 – 15 Years
Library	46% (Fair)	10.2	10 – 50 Years
Transportation	34% (Poor)	21.6	5 – 25 Years
	34% (Poor)	15.3	



Current Approach to Condition Assessment

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

- 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 of the machinery & equipment (mostly Fire and Transportation assets) were assigned cursory condition ratings for this AMP by Staff.

- Fire equipment is inspected annually in accordance with the National Fire Protection Association (NFPA) requirements.

In this AMP the following rating criteria is used to determine the current condition of Machinery & Equipment assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Asset Management Strategies

The documentation of lifecycle management strategies, current levels of service, and risk is critical to the development of a comprehensive asset management program. These components of the asset management plan support effective short- and long-term capital planning and contribute to more proactive asset management practices, thus extending the estimated useful life of many assets and a providing a higher level of service.

Lifecycle Management Strategies

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 vary by department and type of asset in question. Some assets are replaced at end-of-life with no maintenance whereas more critical assets, such as Fire equipment, are inspected and maintained more stringently.
	Machinery & Equipment are maintained according to manufacturer recommendations and supplemented by Staff expertise.
Rehabilitation/Replacement	The replacement and rehabilitation of machinery & equipment is based on the number and type of deficiencies identified by operators, the criticality of the asset, and the levels of service Staff try to maintain.

Risk Models

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$275,852.00	2 Assets 2.00 unit(s) \$675,853.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	1 Asset 1.00 unit(s) \$169,848.00	2 Assets 2.00 unit(s) \$401,815.00
	1	25 Assets 73.00 unit(s) \$339,716.00	42 Assets 512.00 unit(s) \$898,440.00	39 Assets 74.00 unit(s) \$594,770.00	45 Assets 88.00 unit(s) \$909,273.00	113 Assets 214.00 unit(s) \$2,254,269.00
		1	2	3	4	5
		Probability				

Levels of Service

The following tables identify the Municipality's current level of service for Machinery & Equipment. These metrics include the technical and community level of service metrics 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 Machinery & Equipment.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of machinery & equipment and the plans that are in place to maintain or improve the provided level of service	Machinery & Equipment is managed proactively, as it is informed by regular Staff inspections, with 43% of assets in very good-fair condition.

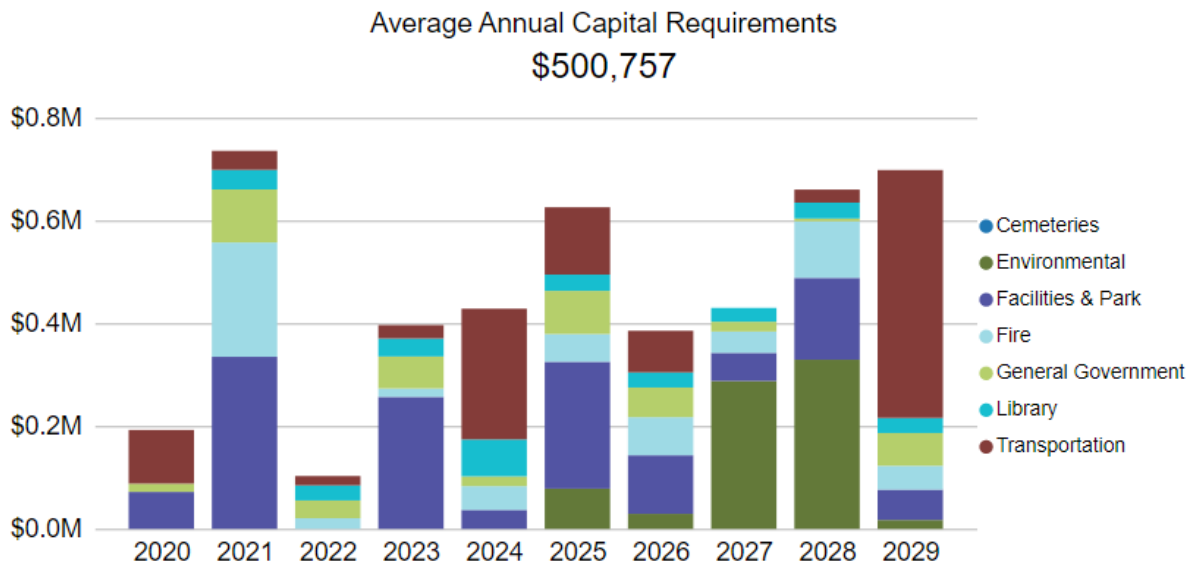
Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Quality	% of machinery & equipment that are in good or very good condition	23%
	% of machinery & equipment that are in poor or very poor condition	57%
Performance	Capital reinvestment rate	7.68%

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.

Recommendations

Replacement Costs

- Replacement costs should be updated according to the best available information on the cost to replace the asset, factoring in additional costs such as warranties.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment, and update them on a regular basis (i.e., annual basis) into the asset management database.
- 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 brainstorming current levels of service metrics to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.6 Vehicles

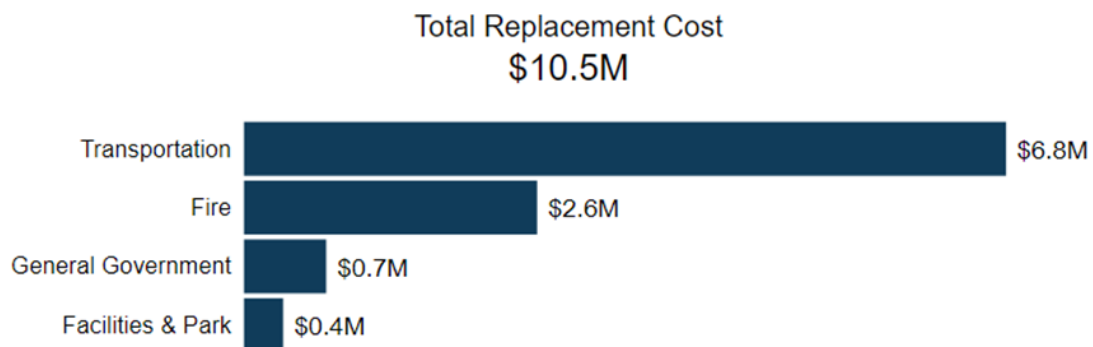
Vehicles allow staff to efficiently deliver municipal services and personnel. Municipal vehicles are used to support several service areas, including:

- Pick-up trucks and heavy machinery to support the maintenance of the transportation network and address service requests for parks and recreation
- Fire rescue vehicles to provide emergency services

Asset Inventory & Costs

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

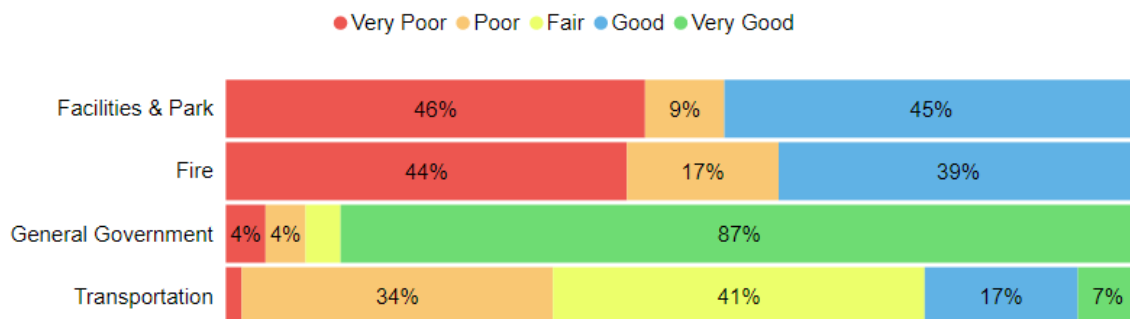
Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Facilities & Park	5	\$373,393	\$27,365
Fire	9	\$2,615,000	\$185,000
General Government	3	\$740,664	\$56,492
Transportation	23	\$6,810,462	\$577,309
		\$10,539,519	\$846,166



Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Facilities & Park	33% (Poor)	19.2	7 – 15 Years
Fire	34% (Poor)	10.4	7 – 15 Years
General Government	78% (Good)	4.8	7 Years
Transportation	50% (Fair)	7.6	7 – 15 Years
	48% (Fair)	9.2	



Current Approach to Condition Assessment

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

- Staff complete daily visual inspections and documentation of vehicles to ensure they are in state of adequate repair prior to operation
- Annual safety inspections are performed on certain vehicles in accordance with Commercial Vehicle Operator's registration (CVOR) requirements
- The mileage and performance of vehicles is used as a proxy to determine remaining useful life and relative vehicle condition
- Fire vehicles are subject to a more rigorous inspection program in accordance with the guidelines provided by the National Fire Protection Association (NFPA)

In this AMP the following rating criteria is used to determine the current condition of Vehicles assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Asset Management Strategies

The documentation of lifecycle management strategies, current levels of service, and risk is critical to the development of a comprehensive asset management program. These components of the asset management plan support effective short- and long-term capital planning and contribute to more proactive asset management practices, thus extending the estimated useful life of many assets and a providing a higher level of service.

Lifecycle Management Strategies

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	Visual inspections and servicing is completed on a regular basis. Annual preventative maintenance activities include system components check and additional detailed inspections
	Fire vehicles are subject to a more rigorous maintenance program in accordance with the guidelines provided by the National Fire Protection Association (NFPA).
Rehabilitation/Replacement	Vehicle age, mileage and annual repair costs are taken into consideration when determining appropriate rehabilitation and/or replacement options.

Risk Models

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	1 Asset - unit(s) \$647,288.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	1 Asset 1.00 unit(s) \$450,000.00	2 Assets 1.00 unit(s) \$746,000.00	3 Assets 3.00 unit(s) \$1,196,000.00	1 Asset 1.00 unit(s) \$450,000.00	0 Assets - \$0.00
	2	0 Assets - \$0.00	5 Assets 3.00 unit(s) \$1,210,107.00	5 Assets 5.00 unit(s) \$1,484,000.00	5 Assets 5.00 unit(s) \$1,867,000.00	3 Assets 3.00 unit(s) \$1,150,000.00
	1	0 Assets - \$0.00	6 Assets 3.00 unit(s) \$386,294.00	3 Assets 3.00 unit(s) \$122,470.00	6 Assets 6.00 unit(s) \$506,261.00	6 Assets 6.00 unit(s) \$324,099.00
		1	2	3	4	5
		Probability				

Levels of Service

The following tables identify the Municipality's current level of service for Vehicles. These metrics include the technical and community level of service metrics 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 Vehicles.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the MTO, CVOR, and Fire regulated vehicle inspection process	All Commercial Operator's Registration (CVOR) vehicles are inspected and maintained by a certified mechanic. Pumper trucks are tested annually for certification.

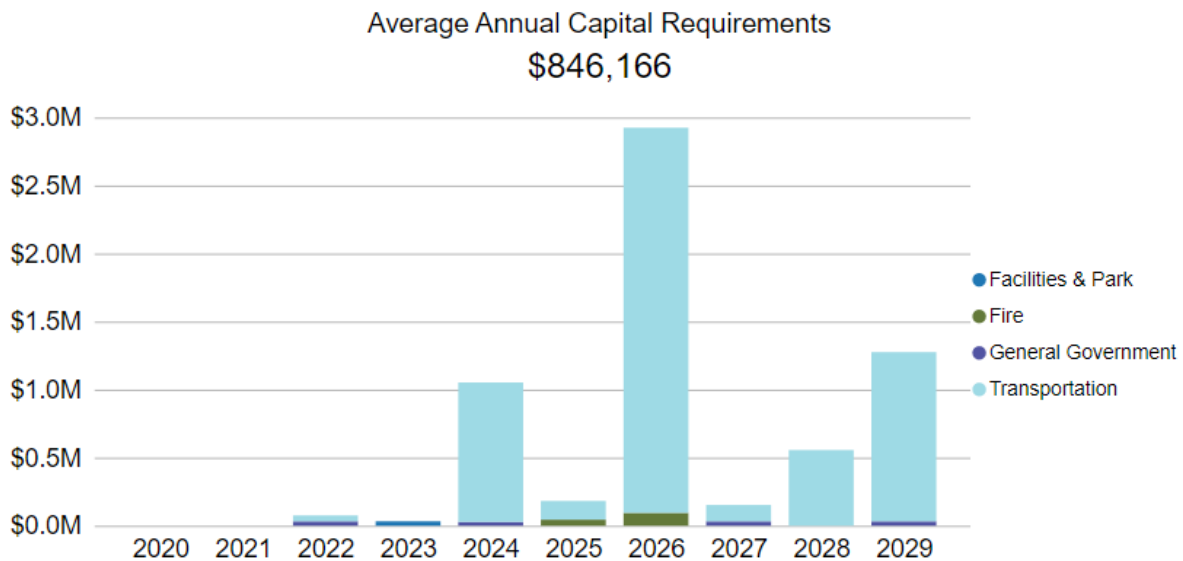
Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Quality	% of vehicles that are in good or very good condition	33%
Quality	% of vehicles that are in poor or very poor condition	41%
Performance	Capital reinvestment rate	8.03%

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.

Recommendations

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk vehicles (those that are inspected under Commercial Vehicle Operator's Registration (CVOR) requirements). Ensure condition updates are reflected in the asset management database; 80% of the vehicle assets had condition assessments applied to them.
- 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 brainstorming current levels of service metrics to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

4.7 Land Improvements

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

- Parking lots for municipal facilities
- Fencing and gates
- Trailways and playgrounds
- Landfill assets
- Miscellaneous landscaping assets

Asset Inventory & Costs

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Cemeteries	14	\$118,468	\$5,923
Environmental	4	\$69,657	\$3,483
Facilities & Parks	50	\$1,049,568	\$45,474
General Government	2	\$13,078	\$654
		\$1,250,771	\$55,534

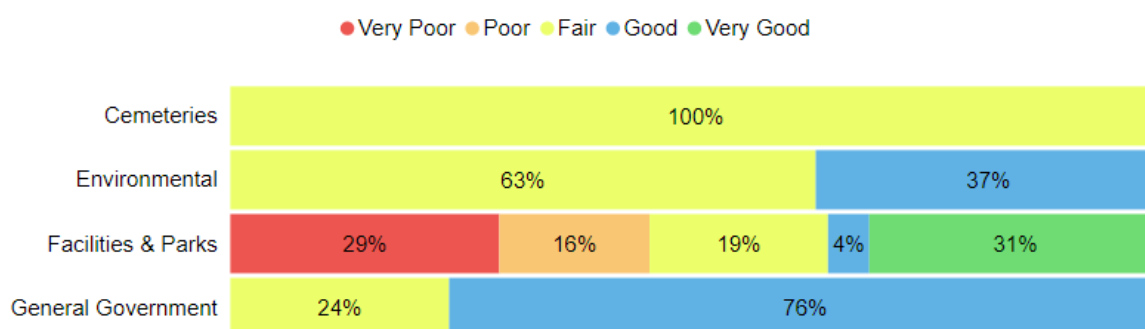
Total Replacement Cost
\$1.3M



Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Cemeteries	55% (Fair)	19.5	20 Years
Environmental	59% (Fair)	10.6	20 Years
Facilities & Parks	48% (Fair)	24.1	20 – 50 Years
General Government	67% (Good)	12.7	20 Years
	50% (Fair)	22.2	



Current Approach to Condition Assessment

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

- Staff complete regular visual inspections of land improvements assets to ensure they are in a state of adequate repair.
- There are no formal condition assessment programs in place for land improvements, however, condition assessments were collected on many land improvement segments for this AMP.
- Parks and trails are subject to regular inspections using internal resources. Playgrounds are inspected on a monthly basis in accordance with Canadian Standards Association (CSA) compliance.

In this AMP the following rating criteria is used to determine the current condition of Land Improvements assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Asset Management Strategies

The documentation of lifecycle management strategies, current levels of service, and risk is critical to the development of a comprehensive asset management program. These components of the asset management plan support effective short- and long-term capital planning and contribute to more proactive asset management practices, thus extending the estimated useful life of many assets and a providing a higher level of service.

Lifecycle Management Strategies

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/Replacement	<p>The Land Improvements asset category includes several unique asset types and lifecycle requirements are dealt with on a case-by-case basis</p> <p>More critical land improvement assets such as playgrounds, parking lots, and landfill assets are rehabilitated and replaced based on health and safety considerations, performance, public use/complaints, and cost.</p>

Risk Models

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	2	1 Asset 1.00 unit(s) \$175,116.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	1	8 Assets 4.00 unit(s) \$153,748.00	5 Assets 5.00 unit(s) \$82,446.00	42 Assets 42.00 unit(s) \$366,555.00	9 Assets 9.00 unit(s) \$169,356.00	9 Assets 9.00 unit(s) \$303,550.00
		1	2	3	4	5
		Probability				

Levels of Service

The following tables identify the Municipality's current level of service for Land Improvements. These metrics include the technical and community level of service metrics 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 Land Improvements.

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of land improvement assets and the plans that are in place to maintain or improve the provided level of service	Land Improvement assets are actively maintained with health and safety considerations at the forefront. Most assets, 36%, are in fair-good condition and are repaired/replaced as needed.

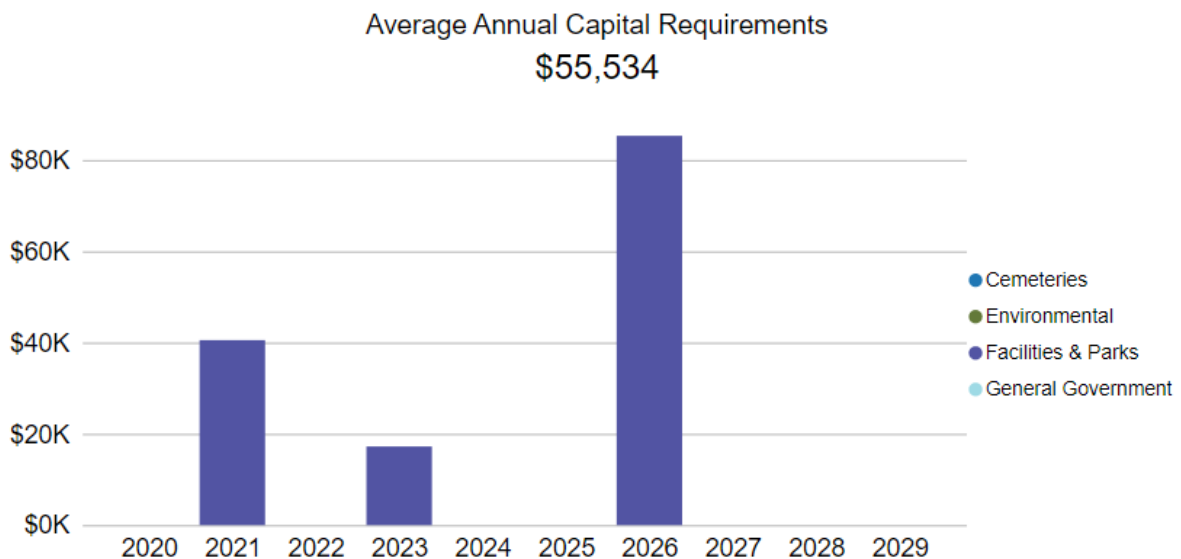
Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Quality	% of land improvements that are in good or very good condition	33%
	% of land improvements that are in poor or very poor condition	38%
Performance	Capital reinvestment rate	4.44%

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.

Recommendations

Replacement Costs

- Most 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.
- Staff should re-evaluate the capitalization threshold for these assets, and consider the benefits of pooling and amalgamating certain types of assets (ex: fencing, lights, etc) to optimize capital planning strategies and simplify the inventory.

Condition Assessment Strategies

- Most of the condition information, 71%, was from an age-based proxy; Staff should assess these assets internally, when possible, and apply a simple condition rating. For assets with required accessibility and safety inspections, such as playgrounds, these inspections should be uploaded into the asset management database as they are completed.

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 \$43.5 million

72% of rate-funded assets are in fair or better condition

The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately \$1.1 million

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

5.1 Water Network

Water assets are overseen and managed by the Environmental Services department. They include:

- Linear assets such as watermains, hydrants and valves
- Vertical assets such as water towers, wells, and pumping stations
- Pick-up trucks and equipment that is utilized by staff to manage the water network
- Three water treatment systems: Markdale, Kimberly-Amik-Talisman, and a small non-residential drinking water system located in Rocklyn.

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

Replacement Cost	Condition	Financial Capacity	
\$19.6 Million	Fair (45%)	Annual Requirement:	\$521,000
		Funding Available:	\$111,000
		Annual Deficit:	\$410,000

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

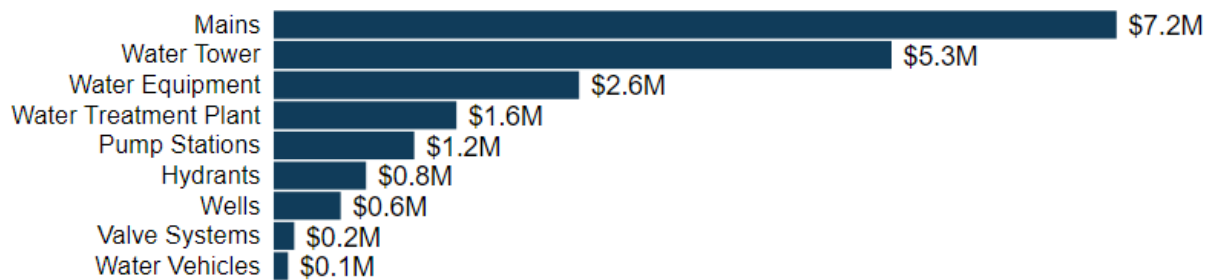
Service Attribute	Level of Service Statement
Scope	The municipal water is minimally accessible to 20% of the community in sufficient capacity (does not exceed maximum use).
Quality/Reliability	The water network is in fair condition with marginal unplanned service interruptions due to main breaks and boil water advisories.

Asset Inventory & Costs

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

Asset Segment	Quantity	Replacement Cost	Capital Annual Requirement
Hydrants	76	\$794,088	\$15,882
Mains	18,621 m	\$7,229,747	\$96,397
Pump Stations	5	\$1,207,047	\$24,918
Valve Systems	40	\$178,231	\$6,655
Water Equipment	268	\$2,620,978	\$192,755
Water Tower	1	\$5,300,000	\$106,000
Water Treatment Plant	2	\$1,569,030	\$31,618
Water Vehicles	2	\$125,000	\$17,857
Wells	4	\$576,298	\$28,815
		\$19,600,419	\$520,896

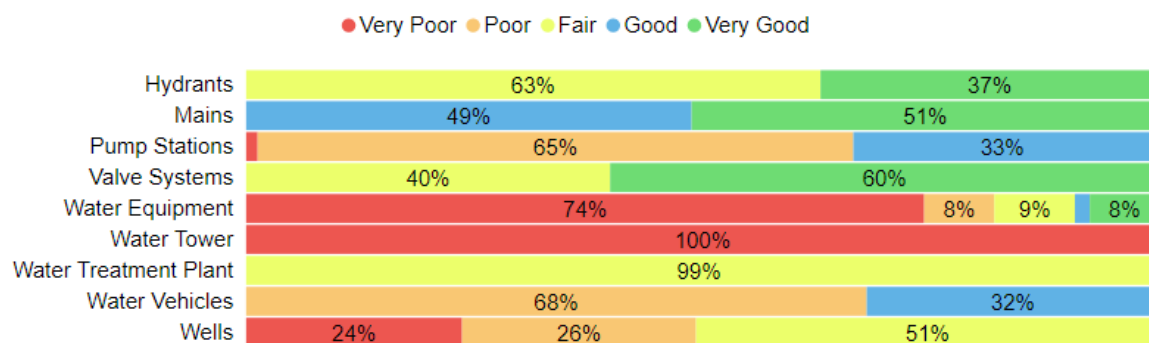
Total Replacement Cost
\$19.6M



Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Hydrants	60% (Fair)	34.2	50 Years
Mains	85% (Very Good)	35.7	75 Years
Pump Stations	47% (Fair)	26.5	20 – 50 Years
Valve Systems	79% (Good)	12.1	20 – 30 Years
Water Equipment	17% (Very Poor)	19.1	10 – 40 Years
Water Tower ⁶	0% (Very Poor)	34.5	50 Years
Water Treatment Plant	55% (Fair)	16.4	20 – 50 Years
Water Vehicles	44% (Fair)	4.8	7 Years
Wells	33% (Poor)	26.3	20 Years
	45% (Fair)	28	



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 network.

⁶ Staff have scheduled the reconstruction of the water tower in 2021, which will bring the condition back to 100% (Very Good).

Current Approach to Condition Assessment

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

- Staff perform visual inspections on water assets on a regular basis. Staff primarily rely on the age, pipe material and diameter, soil corrosivity, and number of main breaks to determine the projected condition of water mains.
- Health and Safety inspections are conducted on a monthly basis, by third-party contractors, for water buildings and structures.
- Wells, both above and below grade components, are inspected on an annual basis in accordance with Ministry of Environment, Conservation and Parks (MECP) requirements
- Hydrants and other point assets are inspected on an annual basis.
- Water vehicles are inspected and serviced in accordance with Commercial Vehicle Operators Registration (CVOR) requirements.

In this AMP the following rating criteria is used to determine the current condition of Water Network assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

Lifecycle Management Strategy

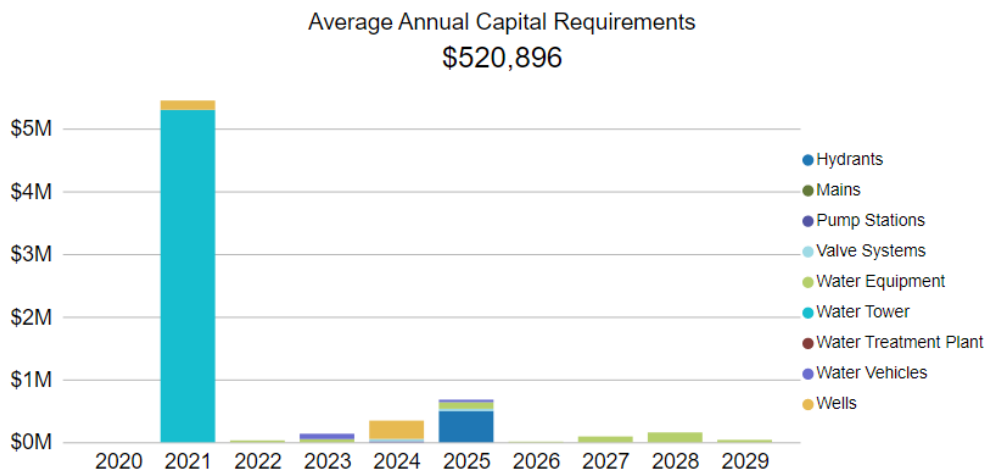
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	<p>Hydrant flushing and valve exercising are completed on an annual basis.</p> <p>Periodic pressure testing is performed to identify deficiencies and potential leaks</p> <p>A Water/Wastewater Master Plan is typically developed every 10 years, with the last one developed in 2017. The Master Plan provides a capital planning framework for future and existing projects and developments to achieve the Municipality's desired level of service.</p>
Rehabilitation /Replacement	<p>Rehabilitation and replacement strategies consider the criticality and location of assets, growth opportunities, capacity issues, and coordination with other right-of-way projects.</p> <p>Staff have prioritized the replacement of cast iron pipes and all 4-inch diameter pipes to build a more reliable and efficient network. Trenchless relining is considered when road reconstruction is not an optimal option.</p>

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.

Risk

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	4 Assets 257.70 m \$264,930.00	6 Assets 487.50 m \$258,375.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	1 Asset 281.00 m \$148,930.00	1 Asset 147.50 m \$78,175.00	1 Asset 1.00 unit(s) \$1,347,400.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	33 Assets 4,595.90 m \$1,746,442.00	19 Assets 1,605.50 m, unit(s) \$973,664.45	0 Assets - \$0.00	0 Assets - \$0.00	2 Assets 2.00 unit(s) \$5,792,095.00
	2	28 Assets 4,119.73 m \$1,539,497.40	46 Assets 6,982.60 m \$2,540,188.00	2 Assets 2.00 unit(s) \$273,000.00	1 Asset 1.00 unit(s) \$136,500.00	2 Assets 3.00 unit(s) \$270,924.00
	1	56 Assets 194.00 unit(s) \$575,041.67	10 Assets 158.00 m, unit(s) \$137,406.00	70 Assets 70.00 unit(s) \$761,398.57	12 Assets 12.00 unit(s) \$1,001,525.90	67 Assets 97.00 unit(s) \$1,220,409.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies

Growth



The Municipality is expected to experience moderate growth. Population and employment growth will increase the demand on municipal services, and thus impact the expected lifecycle of certain assets. As the population continues to grow, the Municipality must prioritize expanding its capacity to serve a larger population, and resolve existing water issues in certain areas (i.e., karstic environments). Staff are working towards amending redundancies in the network and developing a comprehensive long-term capital plan with considerations for growth.

Assessed Condition Data



Water network assets such as mains are difficult to directly visually inspect. In contrast to storm and sanitary mains that can be directly inspected using CCTV camera, watermain condition assessments rely on a proxy of age, pipe material, diameter size, number of main breaks, and soil type to approximate when they need to be replaced. Staff should continue to refine their available attribute information for watermain in order to develop reliable forecasts.

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 (2020)
Scope	Description, which may include maps, of the user groups/areas of the municipality that are connected to the municipal water system	The Municipality of Grey Highlands owns and operates water distribution systems that service Markdale and Kimberley-Amik-Talisman areas. Staff also own and maintain a small non-residential drinking water system in Rocklyn area. See Appendix B for water distribution maps.
	Description, which may include maps, of the user groups/areas of the municipality that have fire flow	See Appendix B for a map of areas of the municipality that have fire flow. Staff have an annual flushing and replacement program to ensure that hydrants are replaced and maintained appropriately.
Reliability	Description of boil water advisories and service interruptions	The Municipality has not experienced a boil water advisory since 2009. Staff maintain the system in accordance with the Safe Drinking Water Act, 2002.

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 (2020)
Scope	% of properties connected to the municipal water system	20%
	% of properties where fire flow is available	TBD
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0

Recommendations

Asset Inventory

- There are a number of pooled watermain assets that require further segmentation and length measurements to allow for asset-specific lifecycle planning and costing.

Condition Assessment Strategies

- Staff were able to provide condition rating information for over 40% of the water network assets; with a 100% of the water treatment plants having assessed condition. Staff should continue to update and refine their condition assessment strategies to ensure that capital forecasts are based on the true performance of assets in the field.

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.

5.2 Wastewater Network

The sewage collection system and treatment is overseen by the Environmental Services department. The system includes linear infrastructure, pumping stations, wet wells, 3 treatment plants in Markdale, Flesherton and Amik-Talisman, and lagoons.

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

Replacement Cost	Condition	Financial Capacity	
\$23.9 Million	Good (65%)	Annual Requirement:	\$553,000
		Funding Available:	\$185,000
		Annual Deficit:	\$368,000

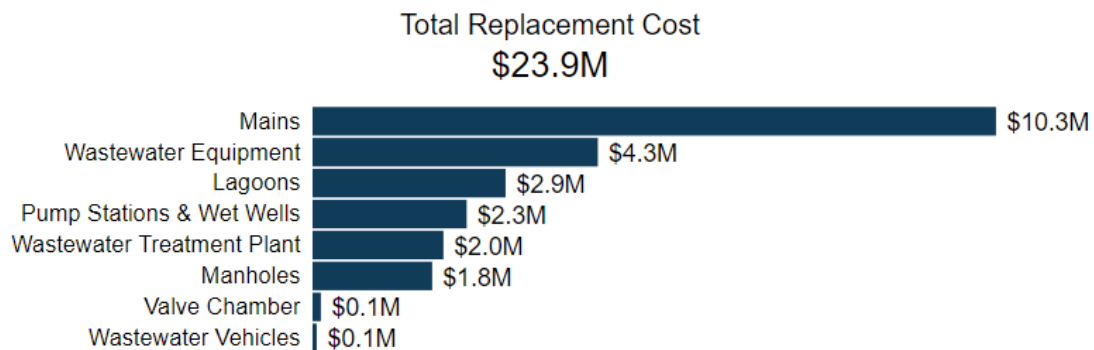
The following core values and level of service statements are a key driving force behind the Municipality's asset management planning.

Service Attribute	Level of Service Statement
Quality/Reliability	The sewer network is in in good condition with minimal unplanned service interruptions due to backups and/or effluent violations.

Asset Inventory & Costs

The table below includes the quantity, replacement cost method, and annual capital requirements of each asset segment in the Municipality's Wastewater Network inventory.

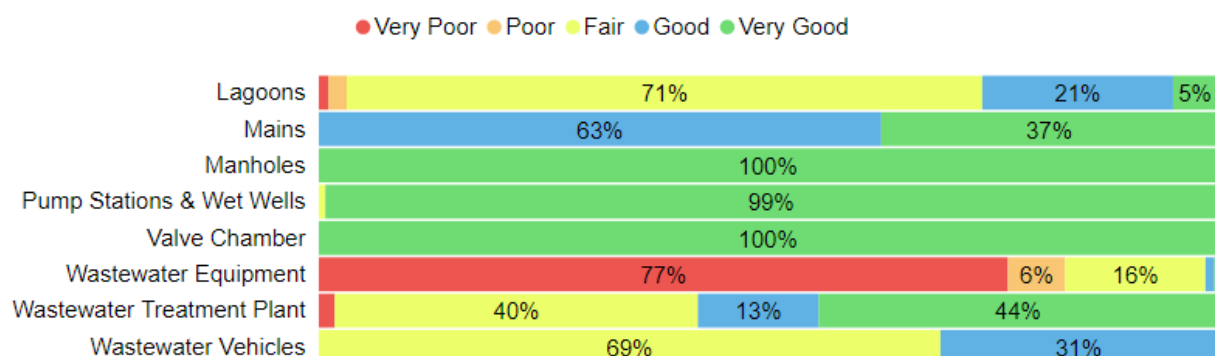
Asset Segment	Quantity	Replacement Cost	Annual Capital Requirement
Lagoons	8	\$2,918,758	\$31,062
Mains	23,526 m	\$10,329,134	\$137,722
Manholes	248	\$1,809,702	\$22,621
Pump Stations & Wet Wells	7	\$2,330,639	\$74,129
Valve Chambers	2	\$127,970	\$4,266
Wastewater Equipment	156	\$4,312,832	\$236,421
Wastewater Treatment Plants	16	\$1,979,692	\$42,297
Wastewater Vehicles	2	\$65,000	\$4,250
		\$23,873,727	\$552,768



Data Insights: Useful Life, Age, Condition

The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Age (Years)	Estimated Useful Life (Years)
Lagoons	57% (Fair)	33.5	20 – 100 Years
Mains	79% (Good)	37.9	75 Years
Manholes	89% (Very Good)	35.2	80 Years
Pump Stations & Wet Wells	89% (Very Good)	18.6	20 – 50 Years
Valve Chamber	95% (Very Good)	9.5	30 Years
Wastewater Equipment	11% (Very Poor)	27.0	10 – 50 Years
Wastewater Treatment Plant	65% (Good)	26.6	20 – 50 Years
Wastewater Vehicles	60% (Good)	19.6	15 Years
65% (Good)		34.3	



To ensure that the Municipality's Wastewater 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 Wastewater Network.

Current Approach to Condition Assessment

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

- CCTV inspections are completed on a project-by-project basis.
- Staff perform regular visual inspections on assets, with more critical high-risk assets being inspected more often.
- Health and Safety inspections are performed monthly by third-party contractors.

In this AMP the following rating criteria is used to determine the current condition of wastewater assets and forecast future capital requirements:

Condition	Rating
Very Good	80-100
Good	60-80
Fair	40-60
Poor	20-40
Very Poor	0-20

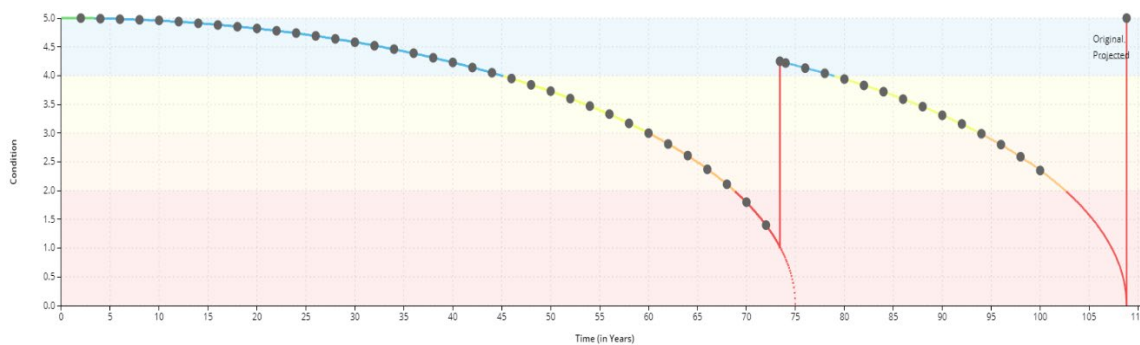
Lifecycle Management Strategy

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.

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

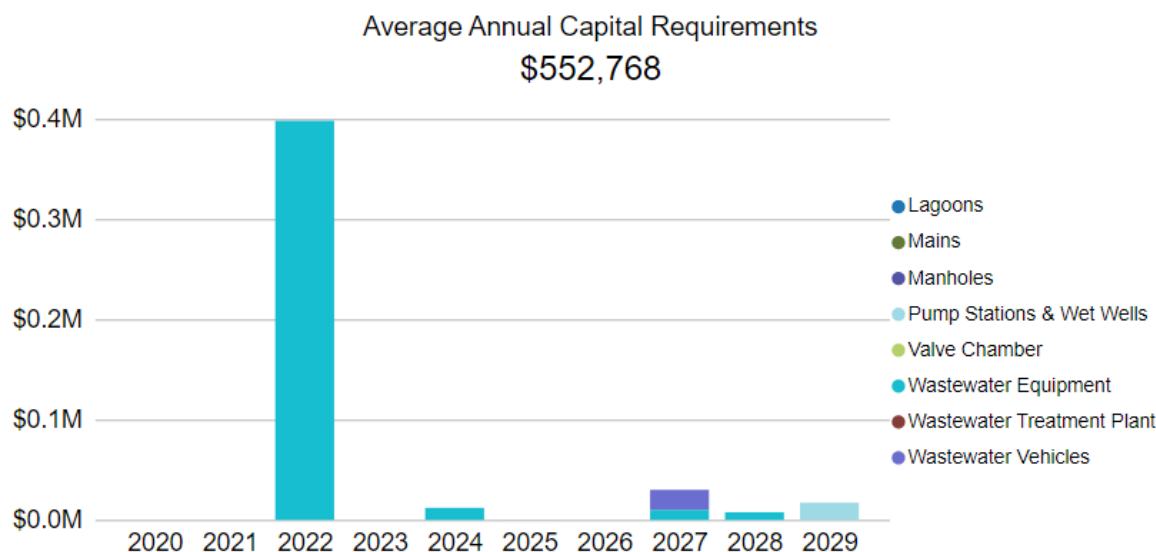
Activity Type	Description of Current Strategy
Maintenance	Building and pumping station components are maintained and repaired as needed.
	Wet wells are inspected monthly and cleaned out on a bi-weekly to quarterly basis, as required.
	Lagoons are cleaned out annually, and sludge levels are monitored.
	Valve chambers are inspected and maintained as needed
	Spray fields are sprayed from May to September
Rehabilitation /Replacement	In the absence of mid-lifecycle rehabilitative events, most assets are maintained with the goal of full replacement once they reach their end-of-life.
	The following lifecycle strategy for sanitary mains is dependent on the pipe material and size, bury depth, location, and criticality of pipe. Staff analyze these various attributes to determine which sanitary mains are viable candidates for relining.

Sanitary Mains		
Event Name	Event Class	Event Trigger
CCTV Inspection	Maintenance/Inspection	Every 15 Years
Trenchless Re-lining	Rehabilitation	40% condition
Full Reconstruction	Replacement	End-of-Life



Forecasted Capital Requirements

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

Risk

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 2020 inventory data. See Appendix C for the criteria used to determine the risk rating of each asset.

Consequence	5	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	4	1 Asset 262.80 m \$110,376.00	1 Asset 440.00 m \$255,200.00	0 Assets - \$0.00	0 Assets - \$0.00	0 Assets - \$0.00
	3	50 Assets 4,243.58 m, unit(s) \$2,580,020.72	52 Assets 10,345.34 m \$4,519,977.20	2 Assets 2.00 unit(s) \$1,138,044.00	0 Assets - \$0.00	3 Assets 6.00 unit(s) \$1,731,215.00
	2	69 Assets 4,170.37 m, unit(s) \$2,585,734.36	49 Assets 4,038.80 m \$1,696,296.00	3 Assets 3.00 unit(s) \$1,078,079.00	0 Assets - \$0.00	0 Assets - \$0.00
	1	264 Assets 289.10 m, unit(s) \$3,540,063.06	7 Assets 6.00 unit(s) \$943,853.00	13 Assets 13.00 unit(s) \$1,352,473.00	8 Assets 22.00 unit(s) \$314,846.00	81 Assets 123.00 unit(s) \$1,441,290.00
		1	2	3	4	5
		Probability				

Risks to Current Asset Management Strategies



Infrastructure Design & Capacity

Staff have noted that it is challenging to manage the sanitary network effectively with many illegal sump pump connections. These connections can cause an increased number of backups and flooding during extreme weather events, and impact the capacity of the network and treatment plants.



Asset Data & Information

Staff plan to prioritize data refinement efforts to increase confidence in the accuracy and reliability of asset data. Staff hope to improve the accuracy of condition data by advancing their CCTV inspection program and utilizing the information to provide a condition rating for underground assets. As well, Staff should consider componentizing the treatment plants in more detail and assessing/uploading the condition of these assets in order to increase confidence in the development of data-driven strategies to address infrastructure needs.

Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	The Municipality of Grey Highlands owns and operates sanitary sewer systems that service Markdale, Flesherton and Amik-Talisman areas. See Appendix B for wastewater distribution maps.
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	Not Applicable. No combined sewers present.
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	Not Applicable. No combined sewers present.
	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 sanitary sewers due to cracks in sanitary mains, manholes, private services or through indirect connections (e.g., weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed capacity. In some cases, this can cause water and/or sewage to backup into homes.

Service Attribute	Qualitative Description	Current LOS (2020)
	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 as outlined in their Development Standards Policy A09-T-05. 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	The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants. Municipal staff adhere to the Design Guidelines for Sewage Works (MOECC, 2008); the effluent is discharged with established minimum requirements for critical parameters such as the organic loading rate, hydraulic retention time, CBOD5, pH levels, and phosphorus and sulfur levels. The treated effluent seeps into the groundwater table and eventually combines with the Rocky Saugeen River.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal wastewater system	TBD
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	Not Applicable. No combined sewers present.
	# 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

Recommendations

Asset Inventory

- Staff would benefit from componentizing the treatment plants and vertical structures into their major components, utilizing the Uniformat Code Classification, to aid in producing a more proactive capital planning process.

Condition Assessment Strategies

- A building condition assessment should be performed on a regular basis (every 5-10 years) on the applicable buildings in order to collect reliable condition/performance information, and any recommended strategies to extend the life of the 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 viable sanitary mains at a lower total cost of ownership. Staff should identify these assets and assign the appropriate lifecycle strategy in order to project capital requirements.

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 effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure

Moderate population and employment growth is expected

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

6.1 Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Municipality to effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

Grey Highlands Official Plan (2017)

Grey Highland's Official Plan was approved by the municipality on December 14th, 2015. It was then approved by the County of Grey on September 22, 2017. The Official Plan is intended to:

- function as a road map;
- be a tool to manage growth;
- protect environmental resources; and
- be a blueprint for economic development.

The Municipality of Grey Highland's Official Plan, in conjunction with its Strategic Plan, helps to promote the municipality's overall vision to be a healthy and vibrant rural "community of communities", by celebrating its diverse and creative culture and promoting its agricultural base, natural heritage, and environment.

Grey Highland's historical and projected growth indicators can be seen below:

	2006	2011	2016	2021	2026
Permanent Population Growth	9,800	10,700	11,500	12,400	12,900
Employment Growth Projections and Allocations	3,900	4,200	4,400	4,600	4,600
Household Growth Projections and Allocations	3,700	4,200	4,600	5,000	5,300

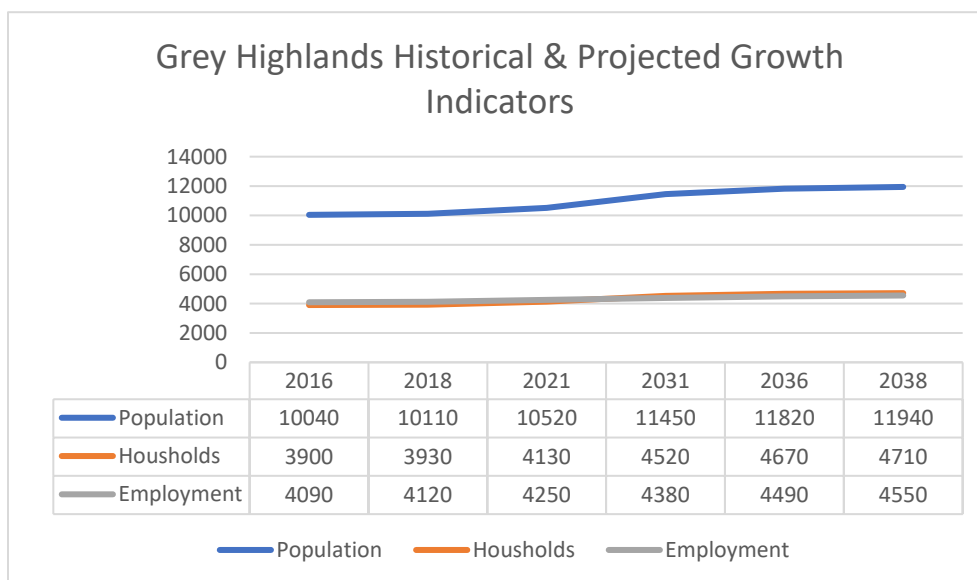
Both Grey Highland's population and household growth are projected to grow by 24% and 30%, respectively, from 2006 to 2026. Employment growth is projected to grow by 15% during the same time period.

Grey County Official Plan (October 2018)

The County's Official Plan, titled *Recolour Grey*, was adopted by Grey County Council on October 25th, 2018. It was then approved by the Province June 6th, 2019. The Official Plan serves to:

- layout the goals, objectives, and policies to manage land usage and to monitor the effects on its cultural, social, economic, and natural environment within each community; and
- to be a guide for infrastructure planning to support and accommodate forecasted population and economic growth consistent with the Growth Management Strategy.

The Official Plan's historical and projected growth indicators can be seen below:



From 2016-2038, Grey Highland’s compounded annual growth rate for population, households, and employment, will increase by 0.8%, 0.9%, 0.5%, respectively. To accommodate the municipality’s growth, the County Official Plan has set a minimum intensification rate of 10% in primary settlement areas, and 5% in secondary settlement areas. This is on average with the other municipalities, cities, and townships in Grey County.

Municipality	Primary Settlement Area	Secondary Settlement Area
Chatsworth	N/A	5%
Georgian Bluffs	10%	5%
Grey Highlands	10%	5%
Hanover	15%	N/A
Meaford	10%	5%
Owen Sound	15%	N/A
Southgate	10%	5%
The Blue Mountains	10%	5%
West Grey	10%	5%

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 \$2.2 million towards capital projects per year from sustainable revenue sources

Given the annual capital requirement of \$5.9 million, there is currently a funding gap of \$3.7 million annually

For tax-funded assets, we recommend increasing tax revenues by 1.3% each year for the next 15 years to achieve a sustainable level of funding

For the Water Network, we recommend increasing rate revenues by 2.0% annually for the next 10 years to achieve a sustainable level of funding

For the Wastewater Network, we recommend increasing rate revenues by 2.1% annually for the next 20 years to achieve a sustainable level of funding

7.1 Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with a long-term financial plan (LTFP). The development of a comprehensive financial plan will allow the Municipality of Grey Highlands 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.

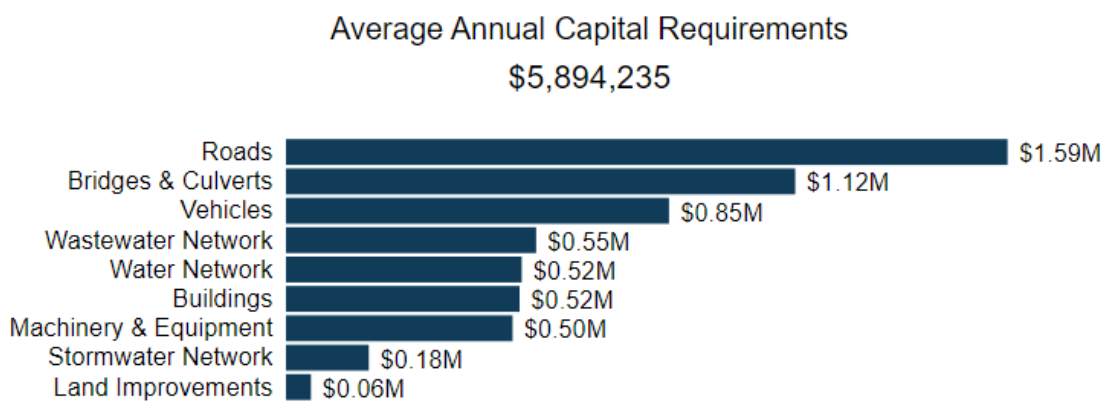
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Municipality's approach to the following:

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.

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 \$5.9 million annually to address capital requirements for the assets included in this AMP.



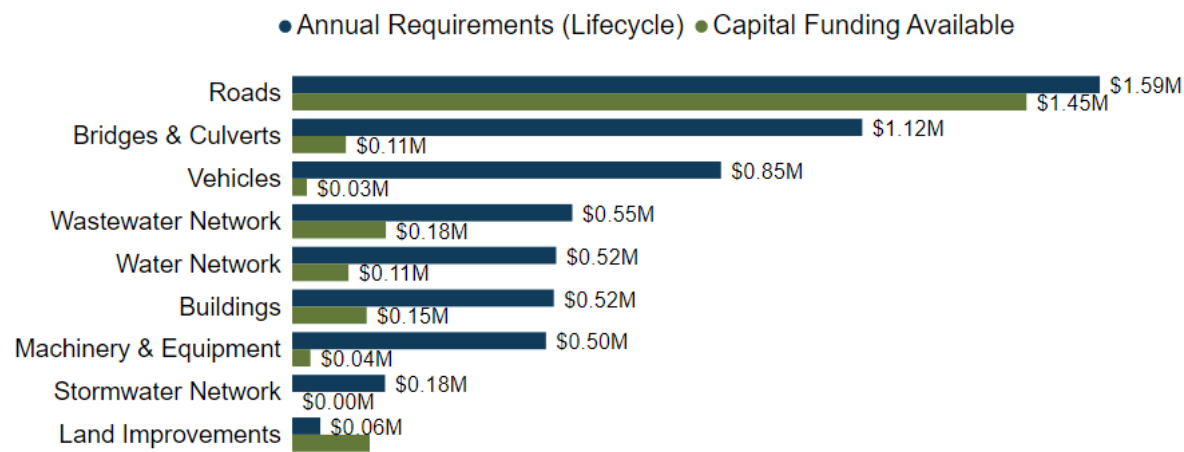
For most asset categories the annual requirement has been calculated based on a “replacement only” scenario, in which capital costs are only incurred at the construction and replacement of each asset. However, for the Road Network and Bridges and Culverts, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Municipality’s assets. The development of these strategies allows for a comparison of potential cost avoidance of implementing these strategies.

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

The implementation of a proactive lifecycle strategy can lead to direct and indirect cost savings. Potential cost savings are influenced by current rehabilitation and reconstruction costs, the coordination of multiple projects, and the criticality of the assets and projects. Beyond cost savings, having proactive lifecycle strategies can also decrease the number of complaints received, lower health and safety hazards, and maintain the desired level of service that the Municipality wants to achieve.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately \$2,220,000 towards capital projects per year. Given the annual capital requirement of \$5,894,000 there is currently a funding gap of \$3,678,000 annually.



7.2 Funding Objective

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

- Tax Funded Assets:** Road Network, Stormwater Network, Bridges & Culverts, Buildings, Machinery & Equipment, Land Improvements and Vehicles
- Rate-Funded Assets:** Water Network, Wastewater Network

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

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

7.3 Financial Profile: Tax Funded Assets

Current Funding Position

The following tables show, by asset category, Grey Highlands's average annual asset capital expenditure (CapEx) requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Avg. Annual Requirement	Annual Funding Available					Annual Deficit
		Taxes	Gas Tax	OCIF	Reserve allocated to Capital	Total Available	
Bridges & Culverts	1,125,000	50,000	3,000	22,000	31,000	106,000	1,019,000
Buildings	516,000	92,000			55,000	147,000	369,000
Land Improvements	56,000	95,000			58,000	153,000	-97,000
Machinery & Equipment	501,000	23,000			13,000	36,000	465,000
Road	1,594,000	461,000	294,000	414,000	280,000	1,449,000	145,000
Stormwater Network	183,000				0	0	183,000
Vehicles	846,000	18,000			11,000	29,000	817,000
	4,821,000	739,000	297,000	436,000	448,000	1,920,000	2,901,000

The average annual CapEx requirement for the above categories is \$4.8 million. Annual revenue currently allocated to these assets for capital purposes is \$1.9 million leaving an annual deficit of \$2.9 million. Put differently, these infrastructure categories are currently funded at 40% of their long-term requirements.

Full Funding Requirements

In 2020, Municipality of Grey Highlands has annual tax revenues of \$11.8 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Bridges & Culverts	8.7%
Buildings	3.1%
Land Improvements	-0.8%
Machinery & Equipment	4.0%
Roads	1.2%
Stormwater Network	1.6%
Vehicles	7.0%
	24.8%

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

- a) Grey Highlands's formula based OCIF grant is scheduled to decrease from \$446,000 in 2019 to \$436,000 in 2020.
- b) Grey Highlands's debt payments for these asset categories will be decreasing by \$757,000 over the next 5 years and by \$113,000 over the next 10 years.
- c) Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents several options:

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	2,901,000	2,901,000	2,901,000	2,901,000	2,901,000	2,901,000	2,901,000	2,901,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-17,000	-436,000	-549,000	-549,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	0	0	0	0
Resulting Infrastructure Deficit:	2,901,000	2,901,000	2,901,000	2,901,000	2,884,000	2,465,000	2,352,000	2,352,000
Tax Increase Required	24.7%	24.7%	24.7%	24.7%	24.5%	21.0%	20.0%	20.0%
Annually:	4.9%	2.5%	1.6%	1.2%	4.9%	2.1%	1.3%	1.0%

Financial Strategy Recommendations

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

- a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
- b) increasing tax revenue by 1.3% each year for the next 15 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- c) allocating the current gas tax and OCIF revenue as outlined previously.
- d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
- e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
- f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

- 1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included any applicable OCIF formula-based funding since this funding is a multi-year commitment⁷.
- 2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full CapEx funding on an annual basis in 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 \$0 for the Road Network, \$0 for Bridges & Culverts, \$1,652,000 for the Buildings, \$246,000 for Land Improvements, \$1,187,000 for Machinery & Equipment, \$29,000 for Stormwater Network and \$824,000 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.

⁷ 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. This review may impact its availability.

7.4 Financial Profile: Rate Funded Assets

Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	Gas Tax	OCIF	Total Available	
Water Network	521,000	185,000	0	0	185,000	336,000
Wastewater Network	553,000	111,000	0	0	111,000	442,000
	1,074,000	296,000	0	0	296,000	778,000

The average annual CapEx requirement for the above categories is \$1.1 million. Annual revenue currently allocated to these assets for capital purposes is \$296k leaving an annual deficit of \$778k. Put differently, these infrastructure categories are currently funded at 28% of their long-term requirements.

Full Funding Requirements

In 2020, Grey Highlands had annual water revenues of \$969k and annual wastewater revenues of \$919k. 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	34.7%
Wastewater Network	48.1%

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

	Water Network				Wastewater Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	336,059	336,059	336,059	336,059	441,916	441,916	441,916	441,916
Less: decrease in debt payment	-81,000	-146,000	-146,000	-146,000	-49,000	-62,000	-62,000	-62,000
Resulting Infrastructure Deficit:	255,059	190,059	190,059	190,059	392,916	379,916	379,916	379,916
Rate Increase Required	26.3%	19.6%	19.6%	19.6%	42.8%	41.3%	41.3%	41.3%
Annually:	5.3%	2.0%	1.3%	1.0%	8.6%	4.1%	2.8%	2.1%

Financial Strategy Recommendations

Considering the above information, we recommend the 10-year option for the Water Network, and the 20-year option for the Wastewater Network. This involves full CapEx funding being achieved over 20 years by:

- a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
- b) increasing rate revenues by 2.0% for the Water Network each year for the next 10 years and 2.1% for the Wastewater Network each year for the next 20 years
- c) These rate revenue increases are solely for the purpose of phasing in full funding to the respective asset categories covered in this 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 strategy achieves full CapEx funding for rate-funded assets over 20 years, the recommendation does require prioritizing capital projects to fit the annual funding available. Current data shows a pent-up investment demand of \$1,900,000 for the Water Network and \$2,967,000 for the Wastewater Network.

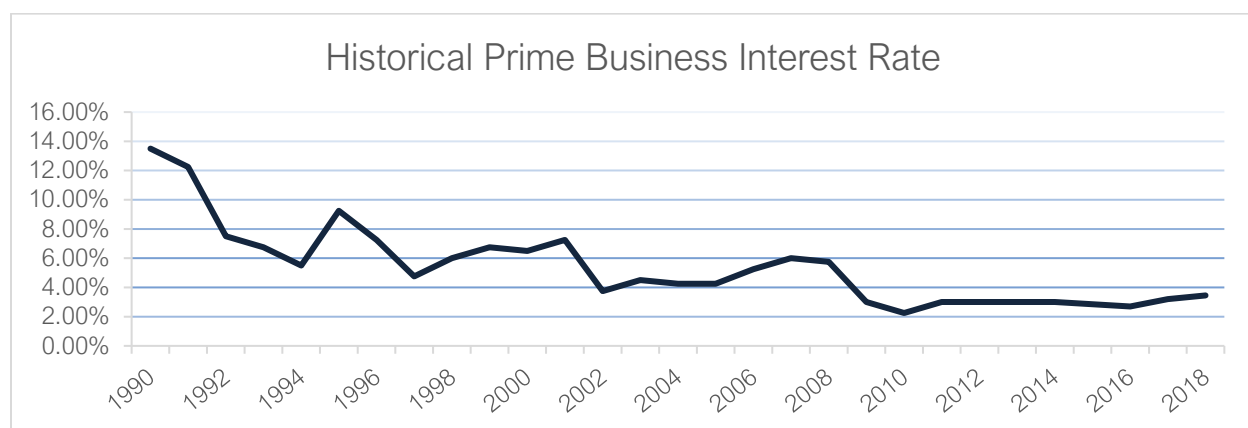
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

7.5 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a \$1M project financed at 3.0%⁸ 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:



⁸ 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 Grey Highlands has historically used debt for investing in the asset categories as listed. There is currently \$5,108,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of \$757,000, well within its provincially prescribed maximum of \$3,228,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2016	2017	2018	2019	2020
Bridges & Culverts	355,000	431,000	0	0	0	132,000
Buildings	287,000	0	0	0	0	38,000
Land Improvements	0	0	0	0	0	113,000
Machinery & Equipment	1,272,000	0	806,000	0	635,000	529,000
Roads	321,000	0	372,000	0	85,000	153,000
Stormwater Network	0	0	0	0	0	0
Vehicles	791,000	845,000	0	0	227,000	0
Total Tax Funded:	3,026,000	1,276,000	1,178,000	0	947,000	965,000
Water Network	1,870,000	265,000	275,000	0	0	1,200,000
Wastewater Network	212,000	116,000	0	0	0	0
Total Rate Funded:	5,108,000	1,657,000	1,453,000	0	947,000	2,165,000

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2020	2021	2022	2023	2024	2025	2030
Bridges & Culverts	55,000	54,000	53,000	52,000	51,000	50,000	0
Buildings	120,000	120,000	120,000	60,000	0	0	0
Land Improvements	0	0	0	0	0	0	0
Machinery & Equipment	273,000	336,000	334,000	332,000	330,000	328,000	61,000
Roads	58,000	111,000	111,000	111,000	111,000	111,000	52,000
Stormwater Network	0	0	0	0	0	0	0
Vehicles	43,000	43,000	43,000	43,000	43,000	43,000	0
Total Tax Funded:	549,000	664,000	661,000	598,000	535,000	532,000	113,000
Water Network	146,000	155,000	176,000	144,000	123,000	65,000	0
Wastewater Network	62,000	62,000	62,000	61,000	14,000	13,000	0
Total Rate Funded:	208,000	217,000	238,000	205,000	137,000	78,000	113,000

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

7.6 Use of Reserves

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 Grey Highlands.

Asset Category	Balance at December 31, 2020
Bridges & Culverts	477,000
Buildings	861,000
Land Improvements	467,000
Machinery & Equipment	1,254,000
Roads	1,027,000
Stormwater Network	402,000
Vehicles	773,000
Total Tax Funded:	5,261,000
Water Network	423,000
Wastewater Network	694,000
Total Rate Funded:	1,117,000

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

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

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Grey Highlands's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

Recommendation

In 2025, Ontario Regulation 588/17 will require Grey Highlands 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 & tables that have been used to visualize the current level of service

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

Appendix D provides additional guidance on the development of a condition assessment program

Appendix A: 10-Year Capital Requirements

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

Roads

	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Paved Roads	\$0	\$1,069,351	\$317,665	\$0	\$1,358,511	\$0	\$791,470	\$1,602,545	\$540,313	\$1,427,341	\$1,070,681
Signage	\$0	\$0	\$0	\$0	\$2,500	\$0	\$0	\$10,200	\$0	\$0	\$148,550
Total:	\$0	\$1,069,351	\$317,665	\$0	\$1,361,011	\$0	\$791,470	\$1,612,745	\$540,313	\$1,427,341	\$1,219,231

Bridges & Culverts

	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges	\$0	\$2,054,000	\$1,010,500	\$588,000	\$1,329,500	\$783,000	\$289,200	\$133,675	\$0	\$0	\$0
Culverts	\$0	\$0	\$119,000	\$368,000	\$157,000	\$333,000	\$344,000	\$527,500	\$0	\$0	\$0
Total:	\$0	\$2,054,000	\$1,129,500	\$956,000	\$1,486,500	\$1,116,000	\$633,200	\$661,175	\$0	\$0	\$0

Stormwater Network

	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Culverts	\$28,953	\$0	\$453,597	\$0	\$0	\$135,114	\$0	\$0	\$926,496	\$0	\$0
Total:	\$28,953	\$0	\$453,597	\$0	\$0	\$135,114	\$0	\$0	\$926,496	\$0	\$0

Buildings											
	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Facilities and Parks	\$1,547,451	\$0	\$0	\$0	\$0	\$5,092,336	\$0	\$1,816,197	\$0	\$12,286	\$0
General Government	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$91,060
Transportation	\$104,928	\$0	\$7,582	\$0	\$12,294	\$0	\$156,622	\$28,432	\$157,144	\$0	\$0
Total:	\$1,652,379	\$0	\$7,582	\$0	\$12,294	\$5,092,336	\$156,622	\$1,844,629	\$157,144	\$12,286	\$91,060

Land Improvements											
	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Cemeteries	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Environmental	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Facilities & Parks	\$234,104	\$-	\$35,144	\$-	\$14,929	\$-	\$-	\$73,944	\$-	\$-	\$-
General Government	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Total:	\$234,104	\$-	\$35,144	\$-	\$14,929	\$-	\$-	\$73,944	\$-	\$-	\$-

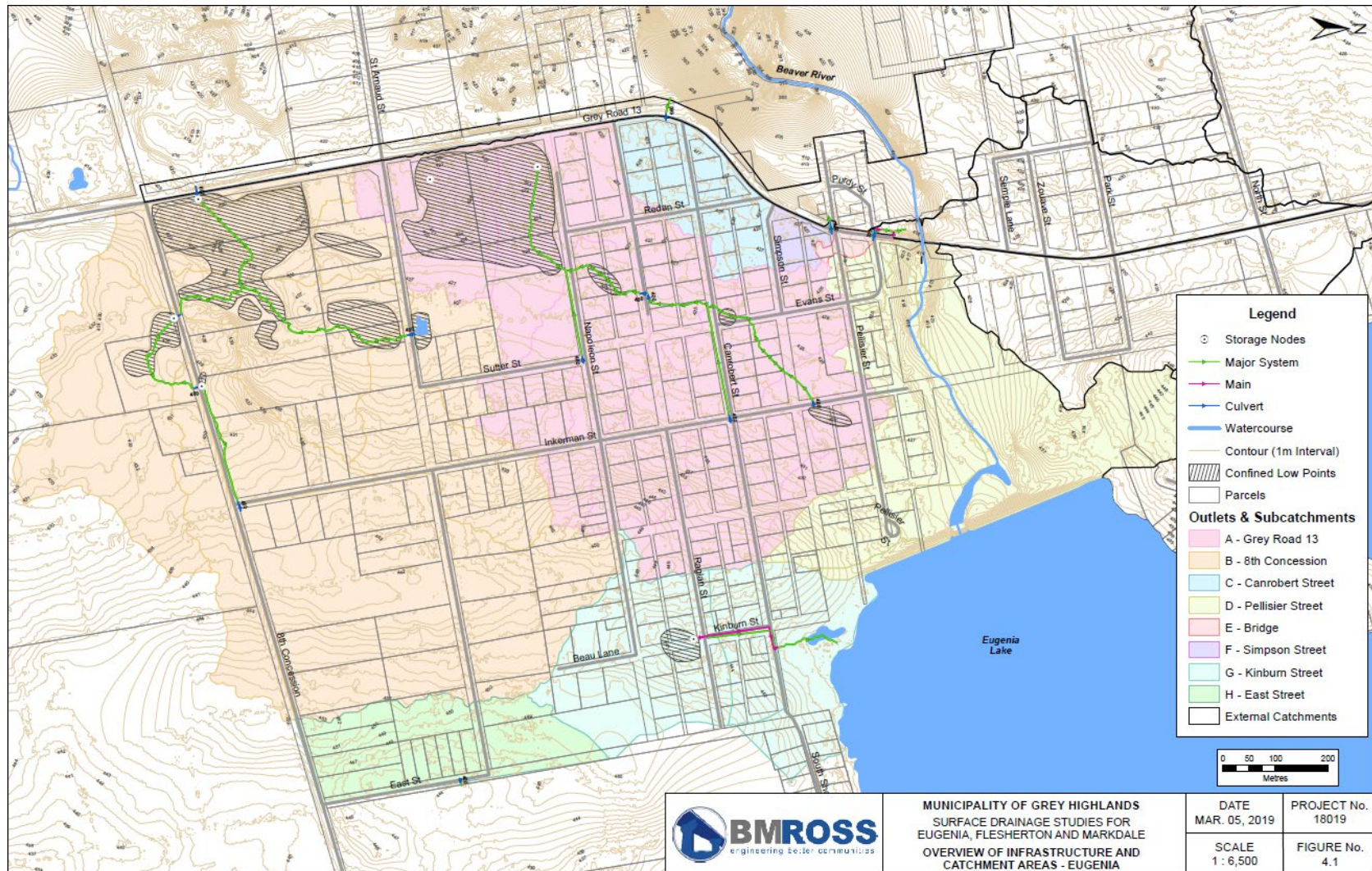
Machinery & Equipment											
	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Cemeteries	\$16,227	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Environmental	\$78,312	\$0	\$0	\$0	\$0	\$0	\$78,312	\$29,319	\$288,056	\$329,334	\$17,452
Facilities & Park	\$859,870	\$71,989	\$335,024	\$0	\$256,997	\$37,029	\$247,083	\$113,982	\$54,656	\$159,257	\$59,109
Fire	\$29,530	\$0	\$222,617	\$20,886	\$16,454	\$46,226	\$53,972	\$74,237	\$41,491	\$110,328	\$46,326
General Government	\$23,049	\$16,276	\$103,187	\$34,540	\$62,187	\$19,051	\$84,071	\$57,725	\$19,134	\$5,359	\$63,814
Library	\$16,157	\$0	\$38,124	\$29,354	\$35,077	\$71,888	\$31,604	\$29,397	\$26,868	\$30,879	\$29,354
Transportation	\$163,510	\$104,382	\$37,000	\$18,144	\$25,950	\$254,460	\$131,102	\$81,039	\$0	\$25,369	\$482,494
Total:	\$1,186,655	\$192,647	\$735,952	\$102,924	\$396,665	\$428,654	\$626,144	\$385,699	\$430,205	\$660,526	\$698,549

Vehicles											
	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Facilities & Park	\$171,646	\$0	\$0	\$0	\$32,453	\$0	\$0	\$0	\$0	\$0	\$0
Fire	\$500,000	\$0	\$0	\$0	\$0	\$0	\$45,000	\$95,000	\$0	\$0	\$0
General Government	\$32,453	\$0	\$0	\$32,453	\$0	\$28,470	\$0	\$0	\$32,453	\$0	\$32,453
Transportation	\$120,000	\$0	\$0	\$43,271	\$0	\$1,024,084	\$137,000	\$2,830,000	\$120,000	\$556,107	\$1,243,271
Total:	\$824,099	\$0	\$0	\$75,724	\$32,453	\$1,052,554	\$182,000	\$2,925,000	\$152,453	\$556,107	\$1,275,724

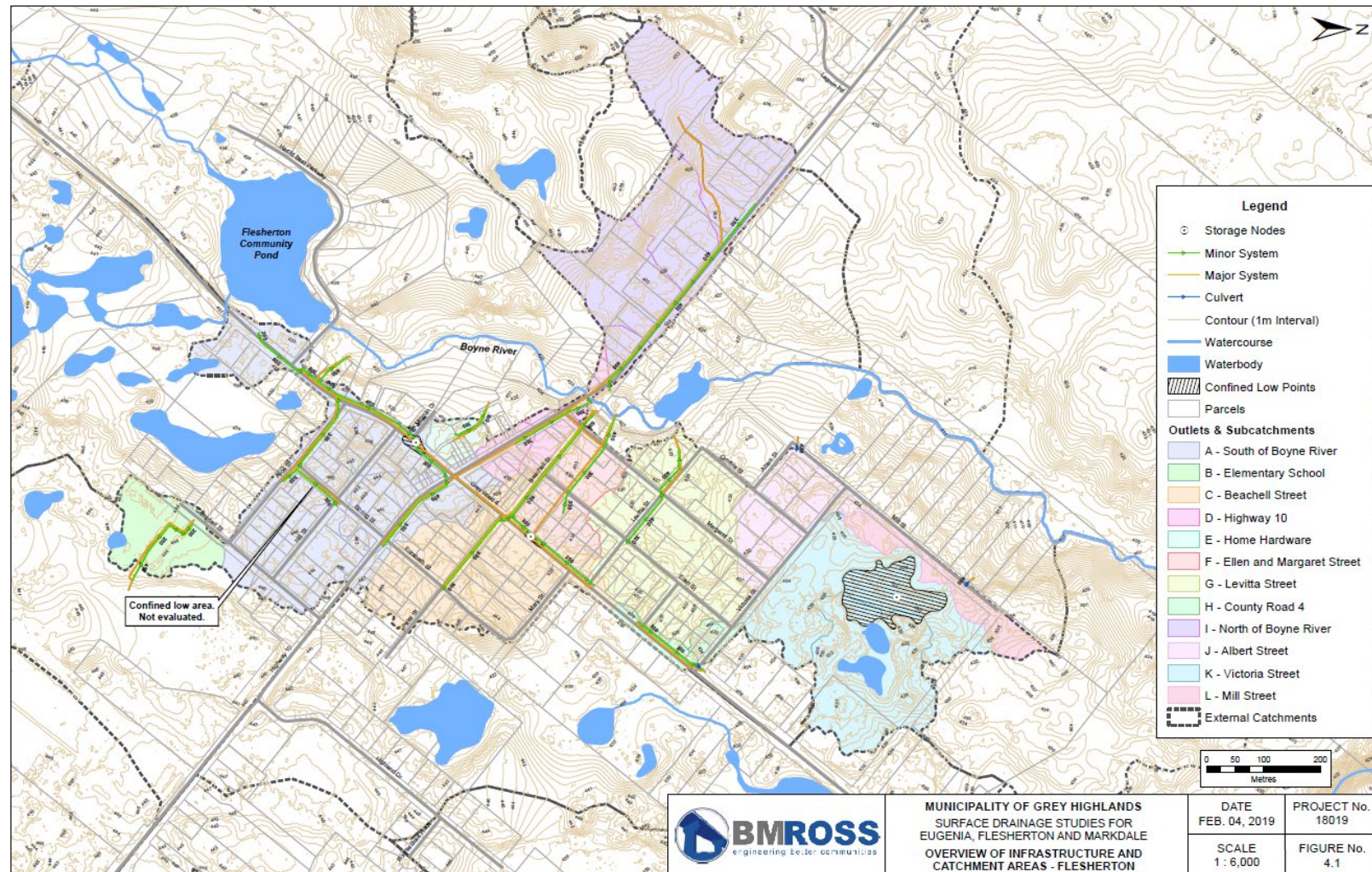
Water Network											
	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Hydrants	\$0	\$0	\$0	\$0	\$0	\$0	\$499,800	\$0	\$0	\$0	\$0
Pump Stations	\$0	\$0	\$0	\$0	\$0	\$15,690	\$0	\$0	\$0	\$0	\$0
Valve Systems	\$0	\$0	\$0	\$0	\$0	\$37,092	\$34,030	\$0	\$0	\$0	\$0
Water Equipment	\$1,763,472	\$8	\$0	\$29,205	\$50,069	\$0	\$104,423	\$10,000	\$91,657	\$156,231	\$37,253
Water Tower	\$0	\$0	\$5,300,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Water Vehicles	\$0	\$0	\$0	\$0	\$85,000	\$0	\$40,000	\$0	\$0	\$0	\$0
Wells	\$136,500	\$0	\$147,662	\$0	\$0	\$292,136	\$0	\$0	\$0	\$0	\$0
Total:	\$1,899,972	\$8	\$5,447,662	\$29,205	\$135,069	\$344,918	\$678,253	\$10,000	\$91,657	\$156,231	\$37,253

Wastewater Network											
	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Lagoons	\$32,114	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pump Stations & Wet Wells	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$17,206
Wastewater Equipment	\$2,899,461	\$0	\$0	\$398,263	\$0	\$12,059	\$53	\$0	\$10,055	\$7,684	\$0
Wastewater Treatment Plant	\$35,570	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Wastewater Vehicles	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,000	\$0	\$0
Total:	\$2,967,145	\$0	\$0	\$398,263	\$0	\$12,059	\$53	\$0	\$30,055	\$7,684	\$17,206

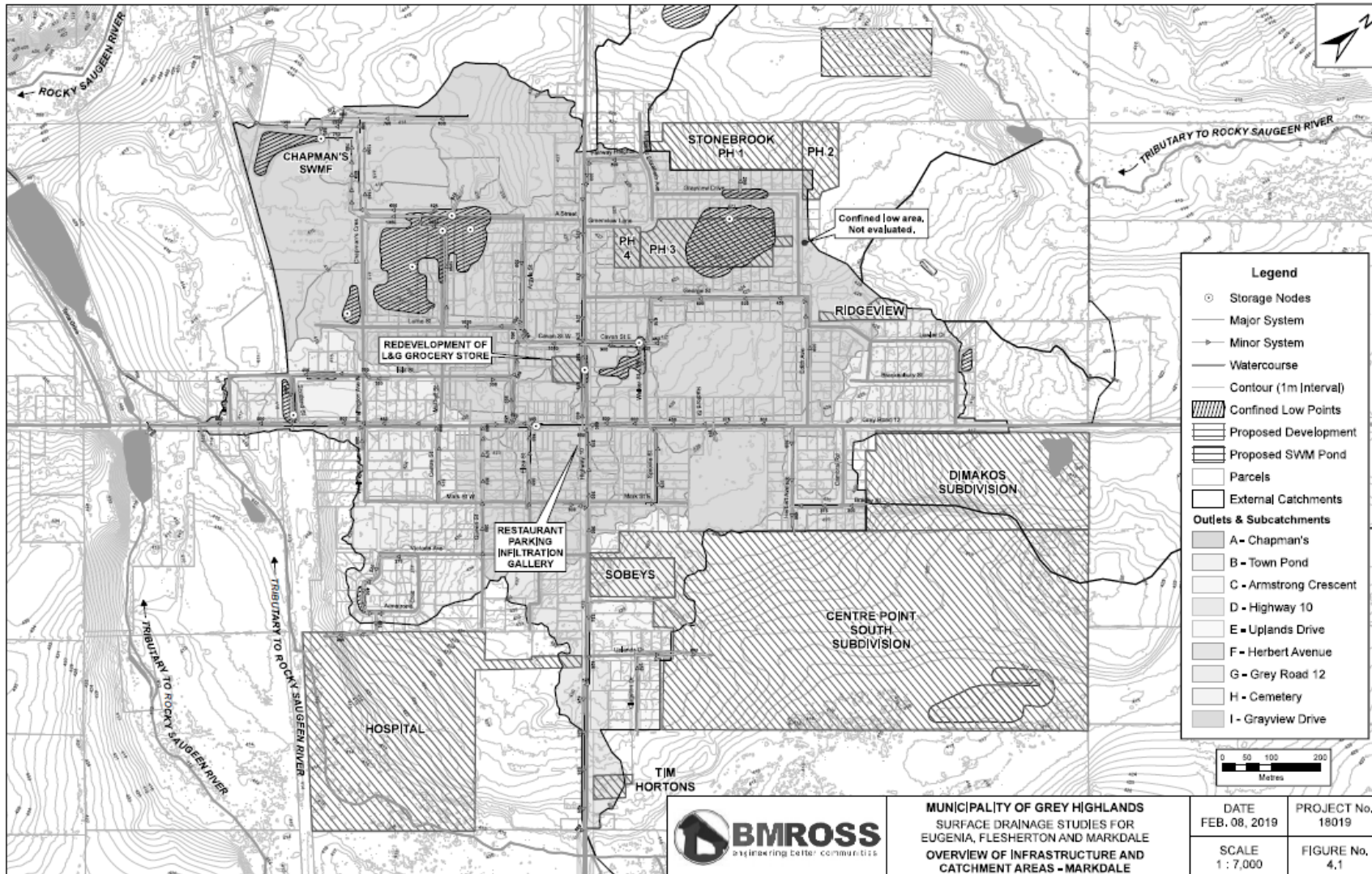
Stormwater Maps – Eugenia



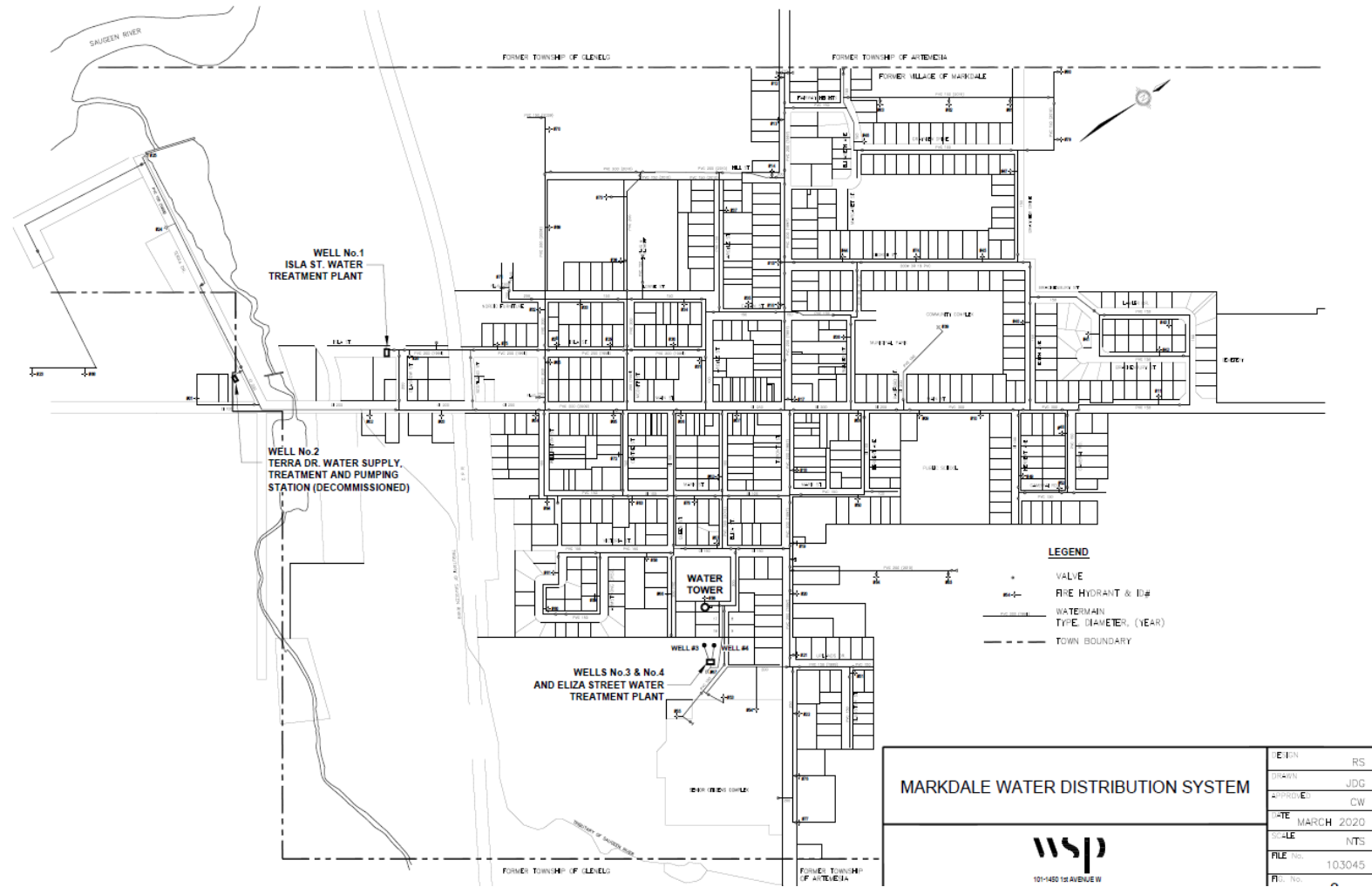
Stormwater Map – Flesherton



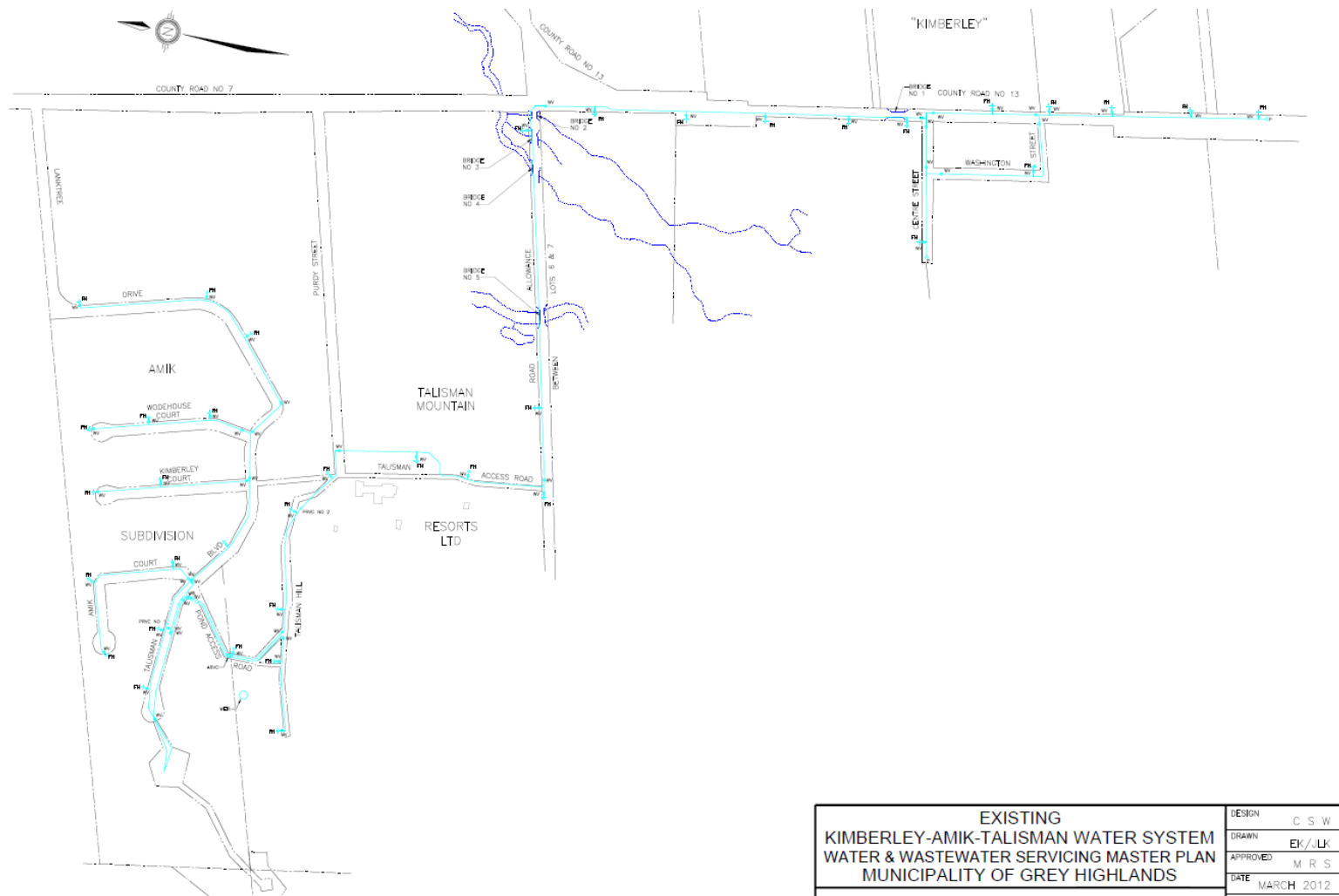
Stormwater Map - Markdale



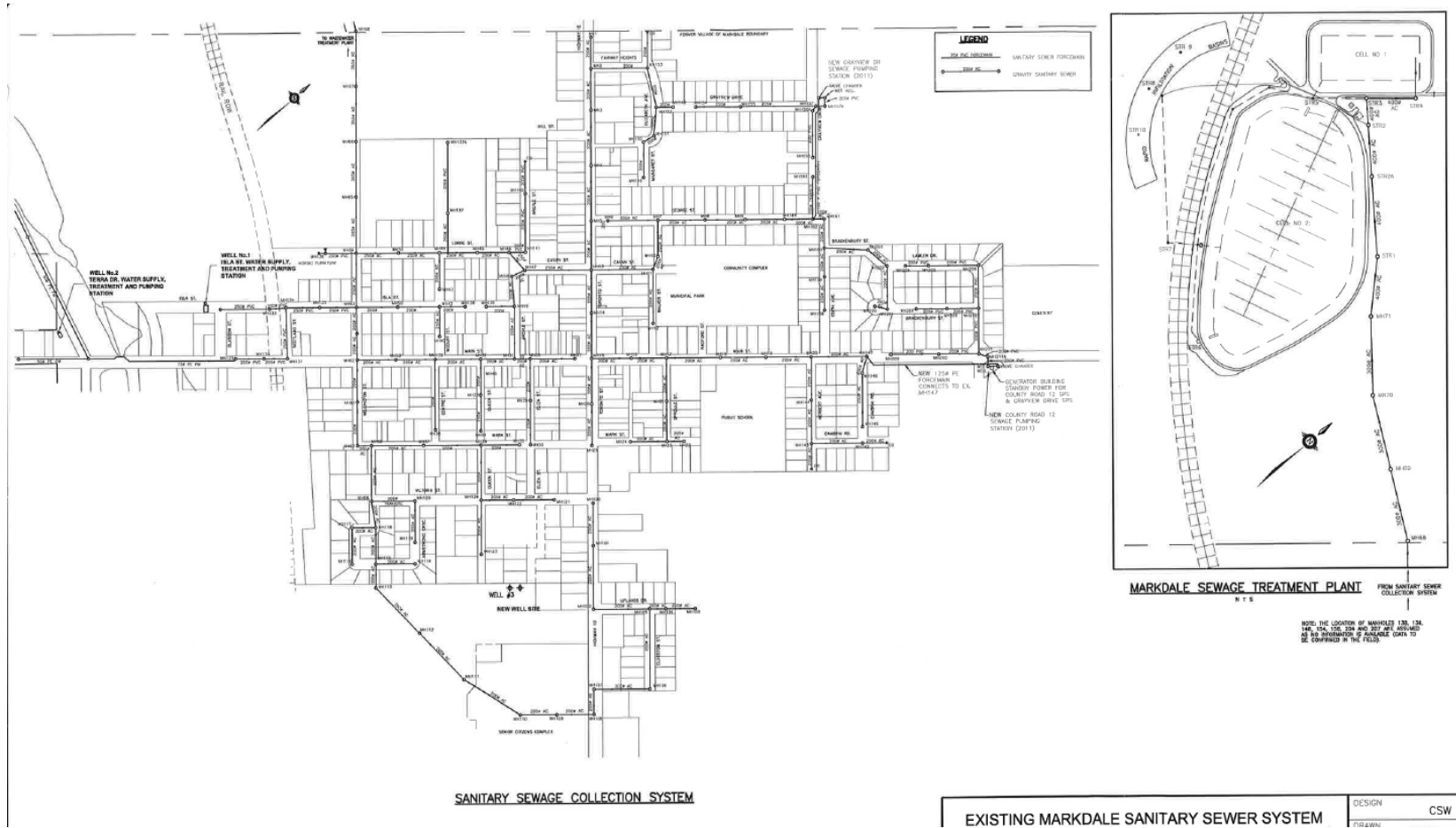
Water Network Map – Markdale



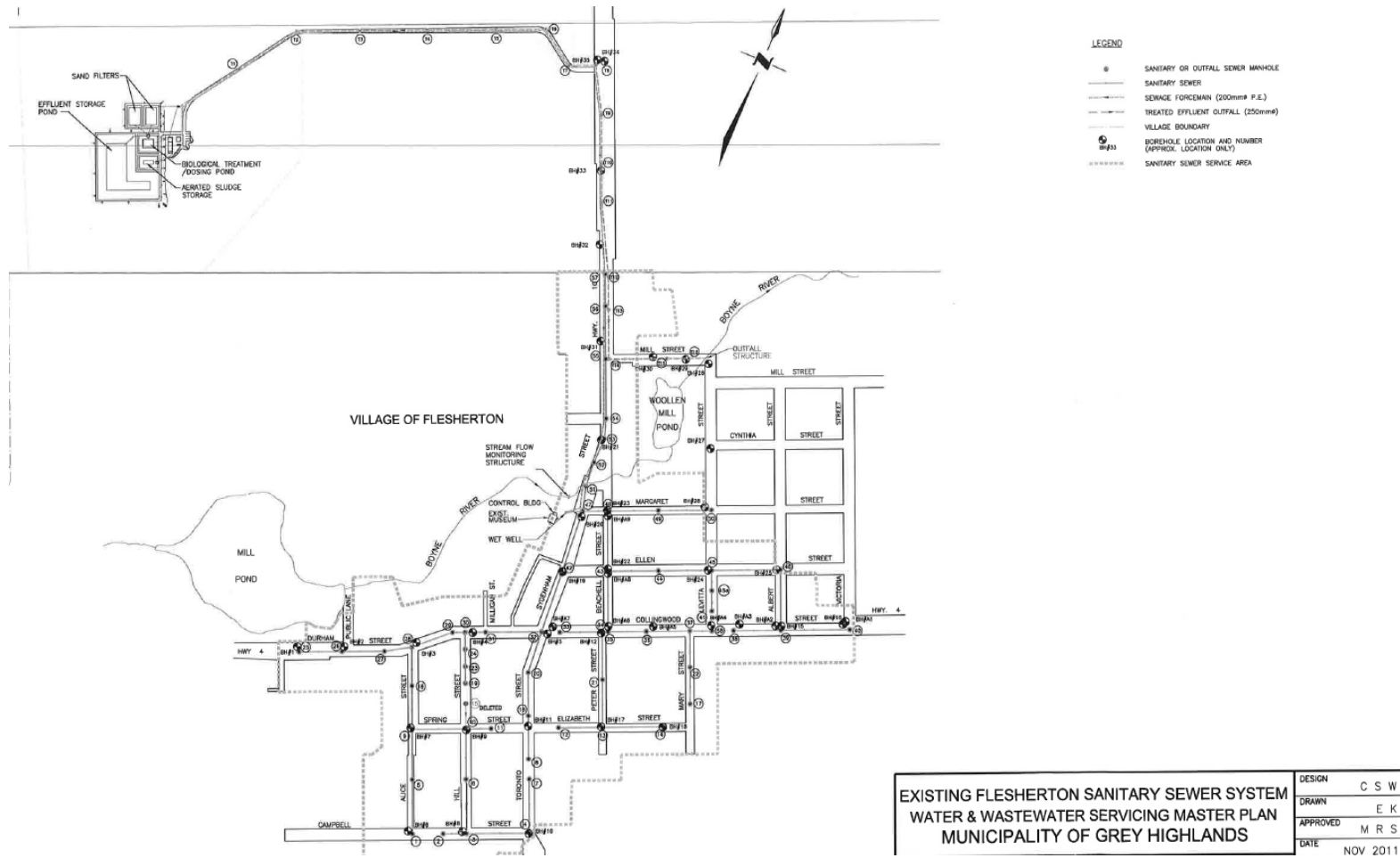
Water Network Map – Kimberley-Amik-Talisman



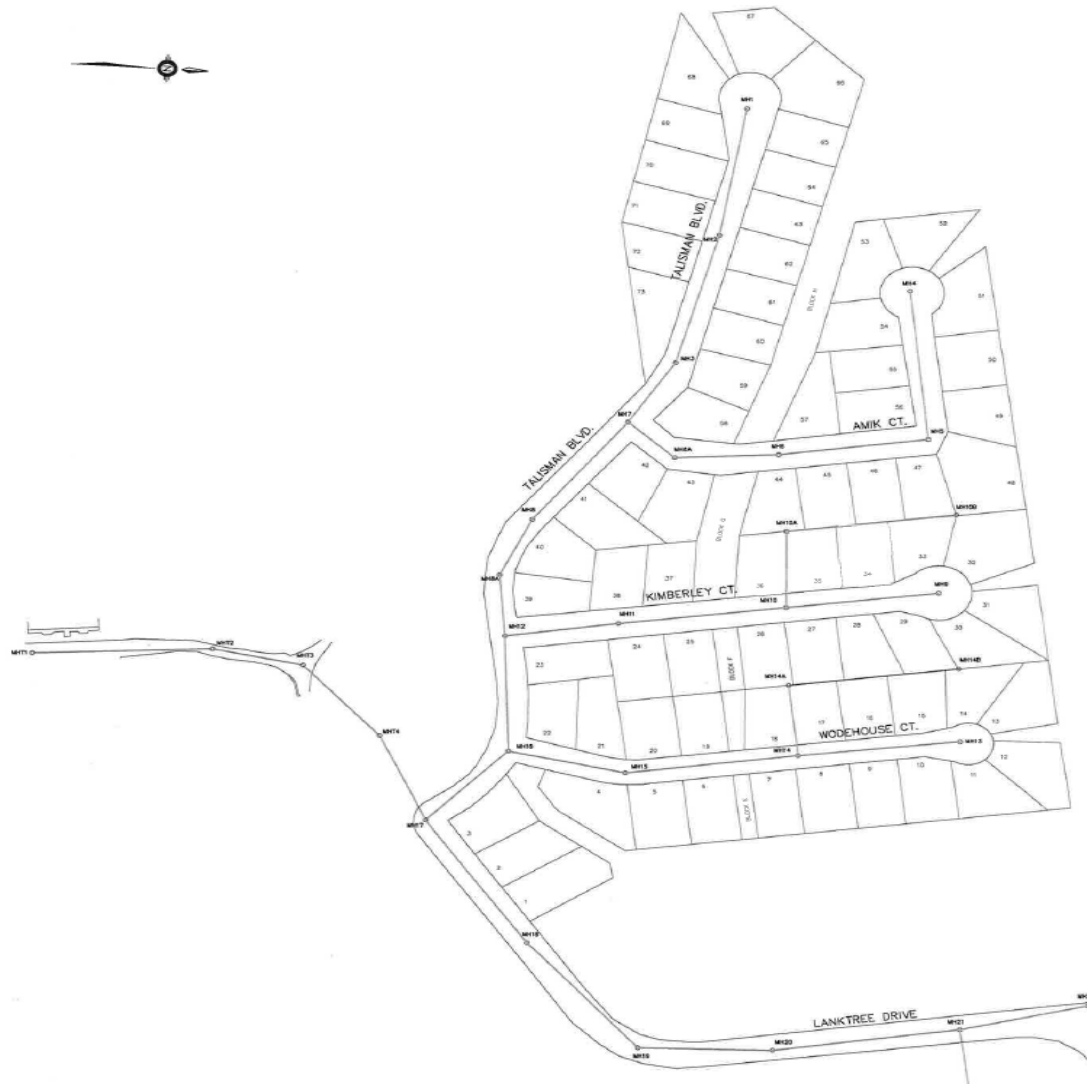
Sanitary Network Map – Markdale



Sanitary Network Map - Flesherton



Sanitary Network Map – Amik-Talisman



Appendix C: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Roads	Condition	70%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Drainage	30%	Adequate	1
			Partially Adequate	3
			Inadequate	4
Bridges & Culverts	Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Surface Type	20%	Concrete	2
			Steel	2
			CSP	3
Stormwater Network	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
Water Network	Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
	Asset Material	20%	PVC	2
			Ductile Iron	3
			Cast Iron	4
Wastewater Network	Condition	80%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5
		20%	PVC, PE	2

	Asset Material Code		AC	3
			Ductile Iron	4
Non-Core Assets	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Consequence of Failure Score
Roads	Economic (50%)	Replacement Cost	\$0 - \$10 000	1
			\$10,000 - \$25,000	2
			\$25,000 - \$50,000	3
			\$50,000 - \$250,000	4
			\$250,000 - \$500,000	5
	Operational (30%)	Annual Daily Traffic Count	0-49	1
			50-199	2
			200-499	3
			500-999	4
			1000+	5
	Strategic (20%)	Connecting Link	No	2
			Yes	4
Bridges & Culverts	Economic (70%)	Replacement Cost	\$0 - \$500,000	1
			\$500,000 - \$600,000	2
			\$600,000 - \$800,000	3
			\$800,000 - \$1,000,000	4
			\$1,000,000 - \$4,000,000	5
	Social (30%)	Detour Distance (m) (50%)	0-2	1
			3-4	2
			5-6	3
			7-8	4
			9-10	5
		User Type (50%)	Bicycle Use	2
			Bus Routes	4
			Heavy Transport	5
Stormwater Network	Economic (70%)	Replacement Cost	\$0 - \$5 000	1
			\$5,000 - \$10,000	2
			\$10,000 - \$25,000	3
			\$25,000 - \$50,000	4
			\$50,000 - \$165,000	5
	Operational (30%)	Pipe Diameter (mm) (60%)	0-300	1
			300-500	2
			600-800	3

			800-1400	4
			1400+	5
		Easement Status (40%)	No Easement Required	1
			Private Property with Easement	3
			Private Property without Easement	4
Water Network	Economic (70%)	Replacement Cost	\$0 - \$5,000	1
			\$5,000 - \$20,000	2
			\$20,000 - \$50,000	3
			\$50,000 - \$100,000	4
			\$100,000 - \$150,000	5
	Operational (30%)	Pipe Diameter (mm) (60%)	0-100	1
			100-150	2
			150-200	3
			200-250	4
			250-300	5
		Easement Status (40%)	No Easement Required	1
			Private Property with Easement	3
			Private Property without Easement	4
Wastewater Network	Economic (50%)	Replacement Cost	\$0 - \$5,000	1
			\$5,000 - \$10,000	2
			\$10,000 - \$50,000	3
			\$50,000 - \$100,000	4
			\$100,000 - \$350,000	5
	Operational (20%)	Pipe Diameter (mm) (60%)	0-100	1
			100-200	2
			200-300	3
			300-400	4
			400-500	5
		Easement Status (40%)	No Easement Required	1
			Private Property with Easement	3
			Private Property without Easement	4
	Health and Safety (30%)	Main Type	Gravity Sewer	2
			Outfall Sewer	3
			Forcemain	4
Non-Core Assets	Economic (100%)	Replacement Cost	\$0 - \$20,000	1
			\$20,000 - \$50,000	2
			\$50,000 - \$100,000	3
			\$100,000 - \$500,000	4
			\$500,000 - \$1,000,000	5

Appendix D: Condition Assessment Guidelines

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

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the Municipality's condition assessment strategy should outline several key considerations, including:

The role of asset condition data in decision-making

Guidelines for the collection of asset condition data

A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the Municipality's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the Municipality can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the Municipality can develop long-term financial strategies with higher accuracy and reliability.

Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that

can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.

There are many options available to the Municipality to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the Municipality should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

1. **Relevance:** every data item must have a direct influence on the output that is required
2. **Appropriateness:** the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
3. **Reliability:** the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
4. **Affordability:** the data should be affordable to collect and maintain

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