Municipality of Meaford

Asset Management Plan

June 2022

Table of Contents

1.0 Executive Summary

1.1 Background

The state of the Municipality's infrastructure can be an economic development driver and is a determinant in the quality of life of our communities.

This plan is part of the implementation of the Municipality's Strategic Asset Management Policy through the commitment to proactively manage its assets to best serve the Municipality's objectives, including:

- Effectively delivering services;
- Supporting sustainability and economic development; and
- Maintaining prudent financial planning and decision making

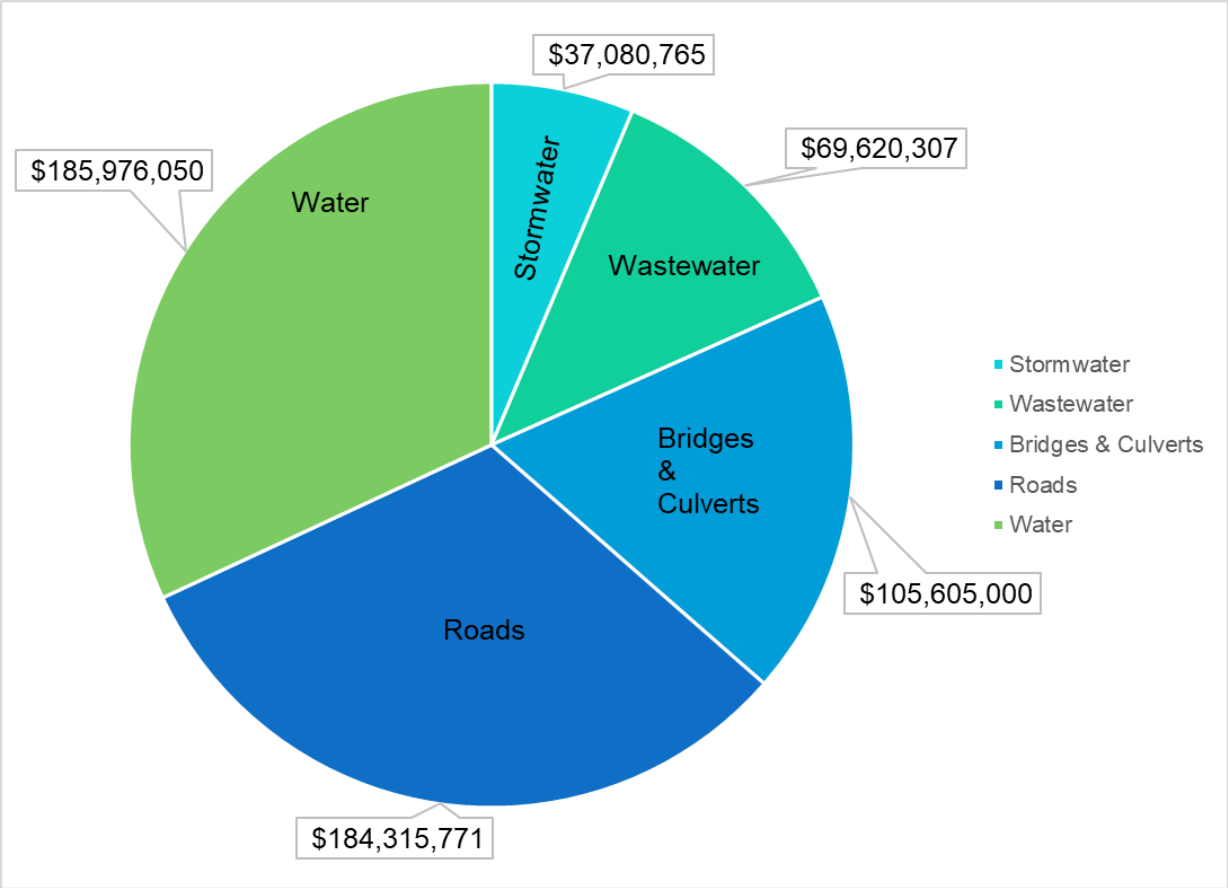
Through Ontario Regulation 588/17, the Province of Ontario is seeking to achieve standardization and consistency in the management of municipal infrastructure. To be eligible for future capital grants and funding programs, municipalities must have an Asset Management Plan (AMP) and demonstrate the particular need of a project to the social, economic or environmental priorities of the community.

The Infrastructure for Jobs and Prosperity Act, 2015 was created to establish mechanisms to encourage principled, evidence-based and strategic long-term planning. The Act sets out principles for asset management planning for the broader public sector, including municipalities. Paragraph 12(1)(d) of the Act confers regulatory authority for the government to prescribe how asset management plans should be prepared including regulations related to the "form, content and timing" of asset management plans. This regulation aims to help municipalities more clearly identify what their infrastructure needs are and establish a sustainable position for funding infrastructure.

The Municipality of Meaford owns and operates over $582 million (replacement value, not including land value) of core infrastructure that supports the needs of residents and local businesses. The Municipality's core infrastructure, in accordance with O. Reg. 588/17 includes water, stormwater, wastewater, roads, and bridge & culvert assets.

Chart 1.1.1 – Replacement Value by Asset Category

Total Replacement Value: **$582,597,893**



In addition to meeting the requirements of O. Reg. 588/17, the Municipality of Meaford's AMP for core assets establishes a strategic framework for managing these assets, aligning infrastructure with service objectives, documenting core practices and procedures, and guiding the action and investment needed to meet key business goals. The AMP aligns with and supports the Municipality's Strategic Plan, Official Plan, By-laws, Policies, Master Plans and Business Plans.

This AMP is based on current information available, with a goal to identify plans to address gaps in data and procedures and implement opportunities for improvement as the Municipality continues to develop its Asset Management program.

O. Reg. 588/17 requires the Municipality update the asset management plan at least every five years. However, the AMP is designed to be a living

document that will be reviewed annually and revised in response to changing environmental, social and economic needs within our communities and to make the necessary adjustments for asset condition and the delivery of services.

1.2 State of Infrastructure

The Municipality's asset inventory for core assets is made up of five major asset categories:

1. Road network
2. Bridges and culverts
3. Water network, including facilities
4. Wastewater network, including facilities
5. Stormwater network

In order to provide a consistent representation of asset condition, the Municipality's asset management software (Assetic) breaks out the scoring of the Municipality's assets into seven categories with 0 being new and 6 being End of Life. Table 1.2.1 shows the Assetic score in comparison to the condition rating assigned to the score.

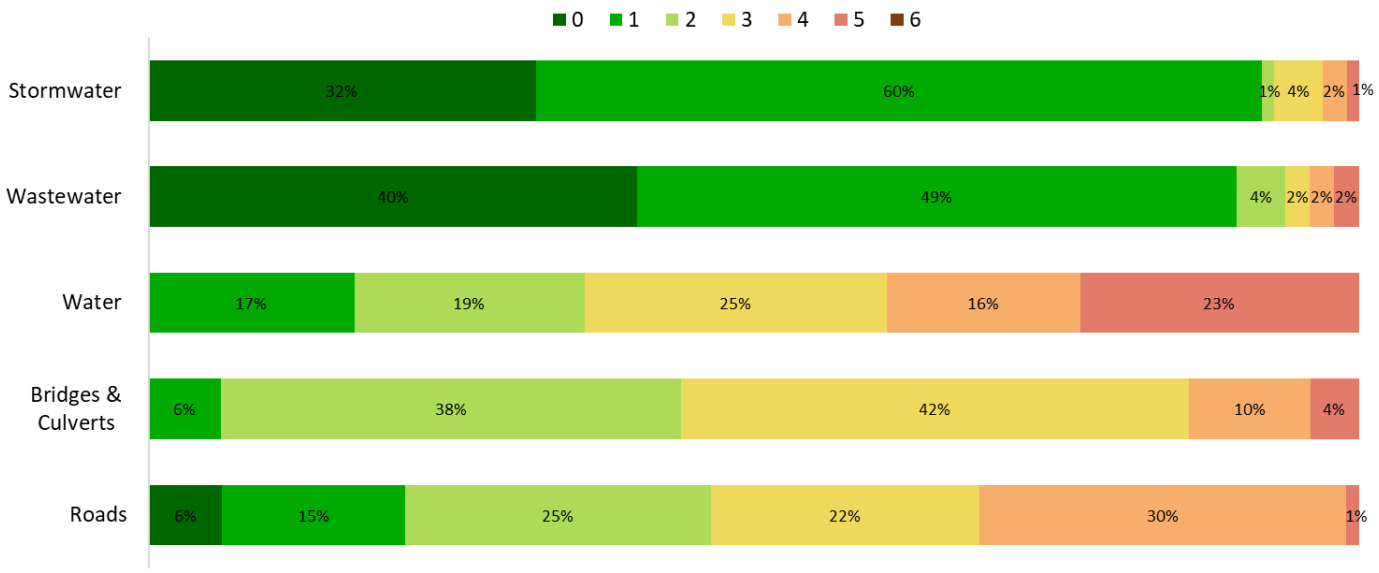
Table 1.2.1 – Condition Rating System

Assetic Score	Rating
0	New or Condition Score Above 95%
1	Very Good
2	Good
3	Fair

Assetic Score	Rating
4	Poor
5	Very Poor
6	End of Life

Chart 1.2.2 below shows the condition assessment for each asset class included in the core Asset Management Plan.

Chart 1.2.2 – Consolidated Asset Condition Assessment



While 62% of the Municipality's core assets are considered in Good or Very Good condition, focus should be placed on the 18% of the core assets that are in Poor or Very Poor condition as these assets are not meeting the Municipality's desired levels of service. A more detailed analysis of the scoring systems and other factors around the condition of a specific asset class are included in the asset specific appendices attached to this report.

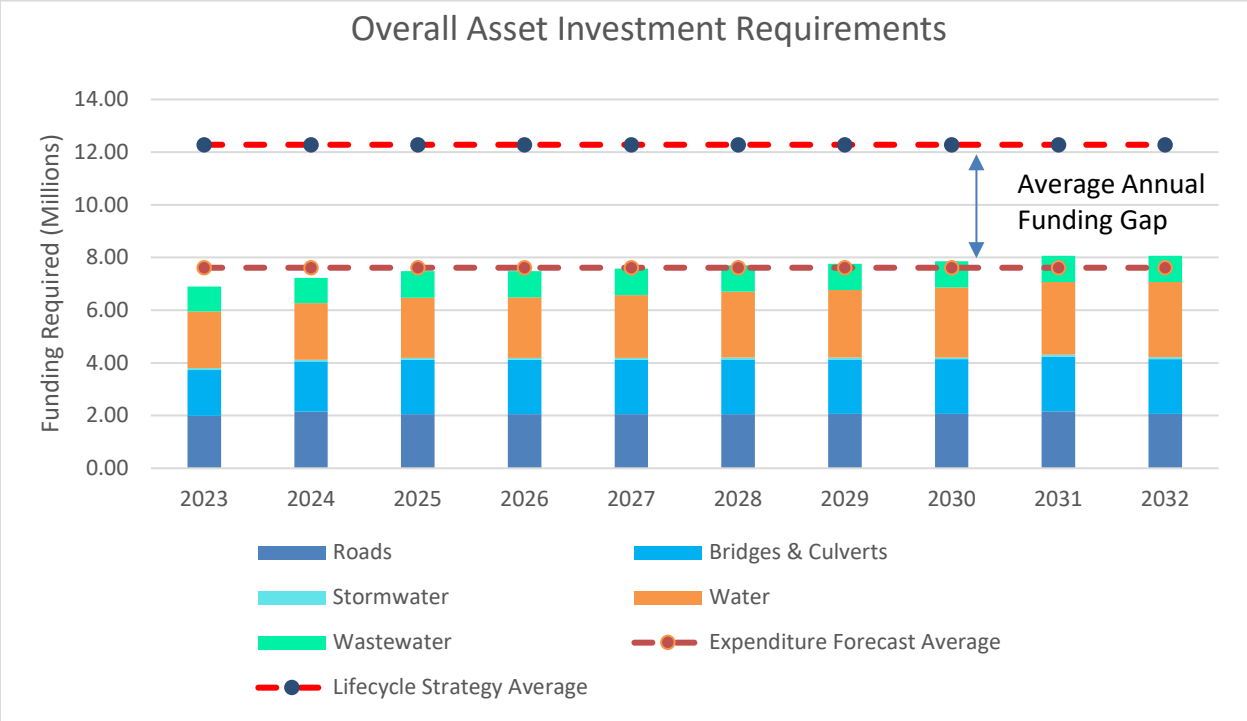
1.3 Financial Strategy

Based on the asset management strategies identified in the appendices to this plan, the financial requirements over the next 10 years are determined in today's dollars and summarized for all asset categories in Chart 1.3.1. These estimates assume that all work is able to be completed as indicated and does not take into account future changes due to environmental factors, new maintenance techniques, and additional growth. These estimates use a whole building approach and do not include assets that the Municipality has not yet assumed.

The average annual current investment of $7.61 Million is comprised of funding sources including tax levy, user fees, and grants for the road network only. As identified in the asset report cards, these numbers do not include operating costs that have not been allocated to a maintenance program. Based on replacement values in today's dollars and the completion of current lifecycle strategies, the average annual investment requirement is $12.28 Million, resulting in an average annual funding gap of $4.67 Million. The funding gap will have to be reduced using reserves and reserve funds, debt, grants, etc. unless the Municipality wishes to lower its current levels of service. An example of this will be the future use of the Ontario Community Infrastructure Fund (OCIF) formula-based funding, currently projected at approximately $900,000 until 2026, that has been used for asset replacement for multiple asset classes since 2016.

The investment requirements for each of the asset categories are set out in detail in the appendices to this plan.

Chart 1.3.1 – Overall Capital Investment Requirements



In response to the capital investment requirements on an asset category basis, the following provides a summary of some recommendations formulated to ensure sustainable management of the Municipality's core infrastructure. More detailed recommendations are provided within each infrastructure category report card.

Table 1.3.1 – Recommendations

Asset Category	Recommendations
Road Network	1% Tax Levy Increase until 2025 CCBF Funding until 2025
Bridge and Culverts	1% Taxy Levy Increase until 2025

Water Network	Maintain 8% User Supported Levy Increase until 2025
Wastewater Network	Maintain 8% User Supported Levy Increase until 2025
Stormwater Network	Ad-hoc annual expenditure until the completion of the Stormwater Management Master Plan

The Municipality's AMP is a key component of the framework from which future asset management decisions will be made. It will be used to communicate progress in asset management effectiveness and the Municipality's performance in meeting its service objectives and goals. This AMP is designed to be a living document that will be reviewed annually and revised in response to changing environmental, social and economic needs within our communities, and any changes to provincial regulations.

STATE OF INFRASTRUCTURE

IN THE MUNICIPALITY OF MEAFORD

ROAD NETWORK

Good

BRIDGES & CULVERTS

Good

STORMWATER NETWORK

Very Good

WATER NETWORK

Fair

WASTEWATER NETWORK

Very Good

2.0 Introduction

2.1 Importance of Infrastructure

Asset Management strives to continually improve the management of infrastructure. The following is a list of goals that asset management programs and processes aim to achieve:

- **Reduced life cycle cost** (i.e. total operating, maintenance and capital resources) of providing services to residents.
- **Reduced risk exposure** to the Municipality by ensuring that assets are managed in a manner that matches the risk that their failure represents to the delivery of services.
- **An informed and transparent decision-making process** that provides Council with the knowledge that they need to make decisions regarding capital expenditures, operating costs and revenue requirements (i.e. rate and tax levels).
- A mechanism to ensure that the services that are delivered through infrastructure can be provided at a **sustainable** level at a cost that is affordable to residents.

2.2 Relationship to Other Strategies, Plans & Documents

2.2.1 Alignment to Strategic Plan

The goals of this AMP are aligned with the Municipality of Meaford's strategic priorities. The initiatives contained within this AMP support the values and strategic directions as set out in the 2019-2022 Strategic Plan as it pertains to the following Strategic Directions.

In the Municipality's 2019-2022 Strategic Priorities document there is a Strategic Focus Area dedicated towards investing in the Municipality's infrastructure. The vision is as follows:

Vision: Wise investment in infrastructure is the backbone of strong governance. There is a pressing need for effective expenditure to build and maintain often neglected roads, bridges, facilities and parks that won't compromise the strong financial position we have built for this community. We shall seek efficiencies and adopt innovative technologies to ensure an ever-improving level of service while minimizing the burden on ratepayers.

Through an upgraded roads network and modern public buildings and open spaces staffed by an engaged and effective workforce, we aim to make Meaford a shining example for the rest of Ontario.

The vision is supported by the following objectives.

Table 2.2.1.1 Alignment of the Asset Management Plan to the Strategic Plan

Strategic Plan Statement	**Asset Management Plan Alignment**
Objective 1: Funding of Infrastructure	
Dedicate a 2.5% annual tax increase to infrastructure projects (1% to roads, 1% to bridges, 0.5% to facilities).	The 2022 version of the Asset Management Plan includes the 1% annual tax increase for both roads and bridges. The 0.5% annual tax increase for facilities will be reviewed during the development of the 2025 version of the Asset Management Plan.
Use debt to expedite and maximize the financing of infrastructure projects which will enhance economic or housing development within the Municipality.	The use of debt or a guiding strategy have not been included in the 2022 version of the Asset Management Plan until such time that the Municipality's Development Charge study and 2025 version of the Asset Management Plan have been approved.
Objective 2: Maintenance of Assets	
Complete an analysis, including public consultation, for the year-round operation of parks, trails, and open spaces by the end of 2021.	The update of the existing Parks & Recreation Master plan has been forecasted for the 2023 budget. This document will help guide the development of the 2024 & 2025 versions of the Asset Management Plan.

Strategic Plan Statement	Asset Management Plan Alignment
Conduct a rationalization study of non-core assets such as facilities, land improvements, etc. and make recommendations to Council for the disposal of surplus assets	The 2022 Facility Needs Study will be presented to Council in mid-2022. This document will help guide the development of the 2024 & 2025 versions of the Asset Management Plan.
Objective 3: Levels of Service	
Develop Levels of Service for core assets (Roads, Bridges, Water, Wastewater, Stormwater, etc.) by the end of 2020 and non-core assets (Facilities, Land Improvements, etc.) by the end of 2021.	This objective has not been met due to changes in the O. Reg. 588/17 legislation. The 2022 and 2024 versions of the Asset Management Plan will focus on the confirmation of current levels of service for core and non-core assets, which will help the Municipality determine the current levels prior to making decisions on proposed levels of service.
Establish an integrated asset and work management system to track the Municipality's compliance to Levels of Service and performance of the Municipality's assets by the end of 2022.	The integrated asset and work management system project is scheduled to commence in June 2022 and will be substantially completed by the end of 2022.

2.2.2 Alignment to Other Municipal Plans and Policies

The guiding principles used in the development of this AMP were established consistent with the goals set out in the following Municipality plans and policy:

Table 2.2.2.2 Alignment of the Asset Management Plan to other Municipal Plans and Policies

Municipal Plan and Policies	Asset Management Plan Alignment
Official Plan	Provides the criteria and direction for growth surrounding asset decision-making processes.
Business Plans	The service level and budget set out in the Asset Management Plan are incorporated into department business plans as budgets, goals and performance measures.
Capital Plan	The capital plan consists of a capital budget and capital implementation program over a 10-year horizon. The plan identifies capital projects and equipment purchases, provides a planning schedule and identifies financing sources for the plan.
Infrastructure Master Plans	The AMP utlizes and incorporates various infrasturture master plans, in turn the asset management plan may influence future plans and recommendations.
By-Laws, Policies, and Procedures	The AMP will utilize various infrastructure related by-laws, policies and procedures.
Regulations	Abide by senior level government regulations.

2.3 Purpose and Development Methodology

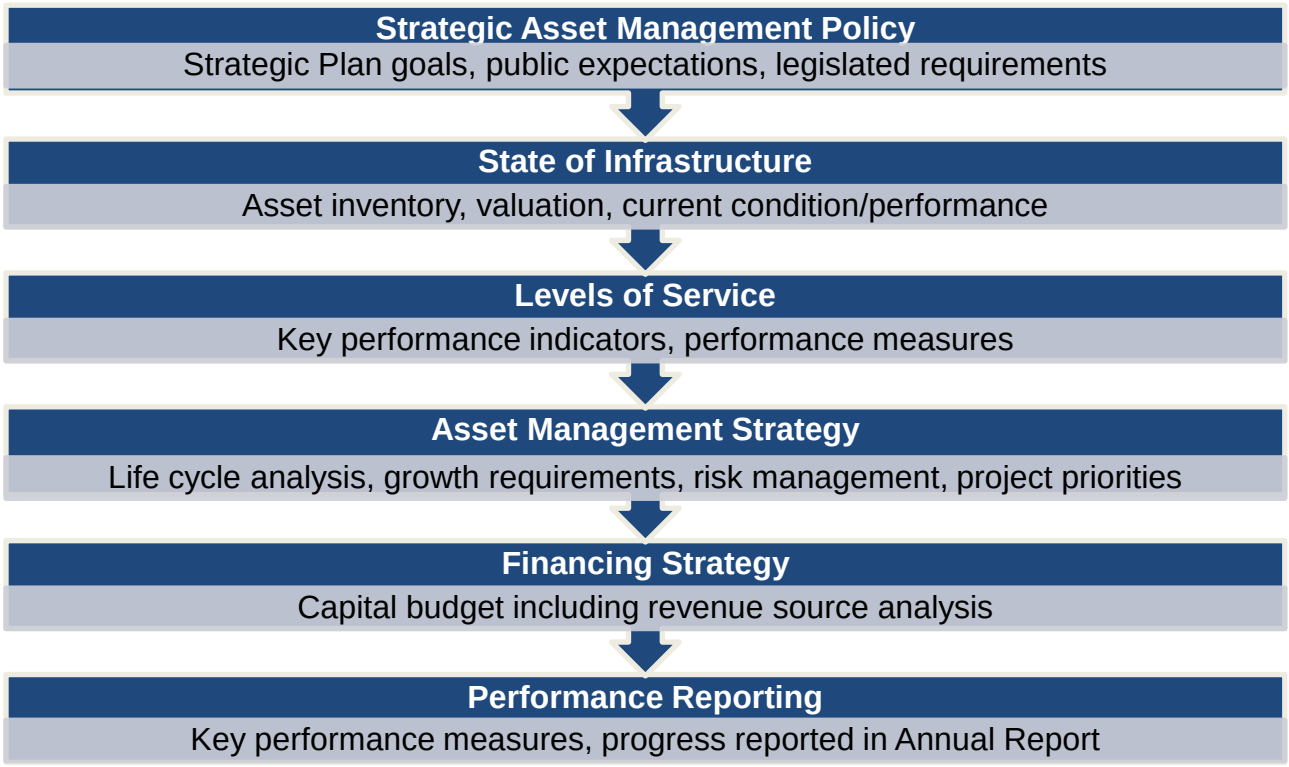
The purpose of the AMP is to set out how the Municipality's infrastructure will be managed in accordance with the Municipality's Strategic Plan; various

plans and policies; and legislation, to ensure that the Municipality is capable of providing the levels of service required to support the public's needs.

The output from the AMP serves as a framework for the Municipality's long term capital plan, including reconstruction and rehabilitation strategies; maintenance, operations and repair activities; and financial planning.

2.3.1 Review Methodology

The methodology employed to develop and review the AMP is based on the following key components:



As illustrated above, the Municipality's infrastructure planning process begins with the Municipality's Strategic Asset Management Policy, aligned with the public's expectations and government regulations.

The process evaluates the state of infrastructure which is determined by current conditions and performance assessment for each asset class. Report cards are used to assess and report the state of the infrastructure categories.

Performance measures are established and tracked to provide an understanding of the current levels of service. This framework will guide the development of desired levels of service in future versions of the AMP and determine which performance measures are used to evaluate progress in achieving the current and desired levels of service.

The asset management strategy component of the planning process provides a detailed analysis for each infrastructure class. This analysis is based on best practices and industry standards employed to manage the assets. This component includes a comprehensive conditions assessment based on clearly identified rehabilitation strategies that trigger specific life cycle events. The specified life cycle event is dependent upon return on investment, risk assessment and prioritization of projects.

The next step in the planning cycle is developing the financing strategy. This is an integral component of the 10-year capital plan (budget). Only annual tax and user fee levies have been incorporated into the 2022 version of the AMP so that long-term financial needs are not constrained until current levels of service have been established for all asset classes. Until the completion of the 2025 AMP, staff will determine on an ad-hoc basis for the use all possible revenue sources for each capital project such as grants, reserves, gas tax, development charges, debt, user fees (rates), and tax levy. This stage of the process will be reviewed and developed concurrently with the Municipality's annual operating and capital budget to ensure the overall budget is achievable and manageable, both technically and financially.

The final component of the infrastructure planning process is performance reporting and evaluating against key performance measures established to assess progress towards achieving the desired levels of service in the future. This exercise will also identify weaknesses in performance that will trigger re-assessment of the desired service levels or rehabilitation strategies as the Municipality's Asset Management program develops.

2.3.2 Plan Content

This AMP complies with the provincial government directives as set out in the Ministry of Infrastructure's "Building Together - Guide for Municipal Asset Management Plans". Based on this Guide, qualifying AMPs must include the following information:

Table 2.3.2.1 – Asset Management Plan Content

Section	Content
Executive Summary	Succinct overview of the Asset Management Plan highlighting major points.
Introduction	Overview of asset management within the Municipality and sets out the overall context and expectation for the report.
State of Local Infrastructure	Information on the asset portfolio including inventory, condition, cost, etc. accompanied by information on supporting data.
Expected levels of Service	How service is linked to infrastructure investment and defined how service is measured and how performance goals and expectations are identified and set.
Asset Management Strategy	Sets planned actions that will enable assets to provide the desired levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost (i.e. through preventative action).
Financing Strategy	Identifies lifecycle investment requirements and appropriate funding strategies for completing the work.

2.3.3 Resources

At the organizational level, the Municipality's corporate asset management process involves collaboration among various departments and programs.

The Chief Administrative Officer, supported by User Department Directors, is ultimately responsible for asset management planning across the municipality and maintaining compliance with the regulation. The Manager of Assets, Senior Management and User Department Managers are responsible for asset management planning activities that fall within their service area and in support of others.

To support the development of the AMP, software applications called Brightly Asset Essentials and Assetic Predictor are being implemented for capital asset long term financial planning and analysis. The components of the combined software solution include:

- Comprehensive asset inventory including condition ratings;
- Replacement costs for the asset inventory items;
- Asset maintenance management system developed in order to assess maintenance, operation and replacement activities of existing asset infrastructure;
- Asset accounting for PSAB purposes in accordance with PSAB 3150;
- Asset service levels and expected useful lives have been developed and regularly monitored for updating as new information becomes available;
- Modeling and master planning based on condition assessment; data of existing and planned future replacements; and, growth related asset infrastructure.

2.3.4 Limitations of the plan

Limitations of the plan include the aligning of ongoing condition data updates, financial planning and asset management planning. Continuous improvement is sought to enable the asset management planning process to better inform the Municipality's budget preparation process and facilitate an evidence-based discussion around service levels, funding and affordability of service. This will include the alignment of future linear infrastructure projects with road reconstruction to ensure the best return on investment. Additional

focus will also need to be placed on balancing maintenance of the existing assets while also accommodating growth.

2.4 Plan Scope and Time Frame

The first version of the Municipality's Asset Management Plan was issued in 2013. The 2013 plan also focused on core infrastructure assets but was based on age-based condition assessments only, rather than technical measures. The development of the 2022 version of the AMP has focused on increasing data integrity, collecting condition data and laying the foundation for lifecycle analysis by establishing asset profiles and recommending new asset management strategies.

The 2022 Asset Management Plan includes the following assets:

1. Road network
2. Bridges and culverts
3. Water network, including facilities
4. Wastewater network, including facilities
5. Stormwater Network

The AMP utilizes a long-term strategic planning window of 25 years to show the effects of current decisions. The 2022 version of the AMP will utilize a 10-year financing window until the 2025 version of the plan has been developed based on proposed levels of service and has been fully financed to match the levels of service. Having a long-term strategic planning window allows the plan to model the exceptionally long service lives of some infrastructure assets (i.e. buried infrastructure of water and wastewater, road bases, etc.). Although the accuracy of a long-term planning window is highly subject to assumptions and estimates, it allows decision makers to better assess the asset funding requirements, and sustainably fund the Municipality's infrastructure.

O. Reg. 588/17 requires the Municipality update the asset management plan at least every five years. However, the AMP is designed to be a living document that will be reviewed annually and revised in response to changing environmental, social, and economic needs within our communities and to make the necessary adjustments for asset condition and the delivery of services.

2.5 Improvement Plan

Improved asset management planning is vital to the long-term sustainability of infrastructure for the Municipality and throughout the province.

Throughout the appendices attached to the AMP, areas of improvement are identified in more detail as they relate to each asset class in order to improve the state of the infrastructure, lifecycle management strategy, or the financing strategy. Highlighted here are a few common improvements for all asset classes:

- Continue to support integrated asset management planning.
- Developing a level of service framework upon the determination of current levels of service for all asset classes.
- Further track lifecycle renewal projects as maintenance, renewal/rehabilitation and replacement activities to coincide with program costing in annual operating budgets and work order management software.
- Determine how to effectively plan for expansion projects using current tools and alongside current level of service and financial constraints.
- Establish a scoring system including mapping to correlate asset condition ratings for both road and linear assets in the urban area to ensure timely rehabilitation or replacement of all assets within the road corridor.

3.0 State of Municipality Infrastructure

3.1 Inventory

Infrastructure assets are detailed within section 2.1 of each asset class report card by component and quantity.

3.2 Valuation

Replacement cost valuation is forward-looking and accounts for expected inflation, changes in technology and other factors. Valuation techniques used are detailed in section 2.2 of each report card.

3.3 Assessment Approach

As each asset type is unique, the Municipality undertakes a variety of formal and informal condition assessments. These approaches are detailed within section 2.3 of each report card.

3.4 Asset Condition Assessment

The current condition of the Municipality's assets are detailed by component within section 2.4 of each report card.

Condition and Performance - Present condition of the asset and an assessment as to how well it currently performs.

Table 3.4.1 Condition Descriptions

Assetic Condition	Written Condition	Description
0	New	New asset or asset with a condition score equal to or above 95%
1	Very Good	No noticeable defects

Assetic Condition	Written Condition	Description
2	Good	Minor deterioration
3	Fair	Deterioration evident, function is affected
4	Poor	Serious deterioration, function is inadequate
5	Very Poor	No longer functional, general or complete failure
6	End of Life	Failed asset that can no longer provide service

3.5 Useful Life

Asset useful lives are detailed within section 2.5 of each report card. This includes the assets anticipated life from new build, and the anticipated added life of some rehabilitation strategies, which are used for PSAB purposes. Infrastructure assets undergo a continual process of repair, rehabilitation, and refurbishment to maintain their intended purpose and to deliver services.

It should be noted that estimated useful lives, based purely on age, can provide a misleading view on the asset replacement requirements. In many cases, assets that are properly constructed and maintained may outlive their estimated useful life and continue providing service. In other cases, due to a lack of funding and lack of proactive maintenance, assets may fail before they fulfill their anticipated useful life. This is highlighted in some of the asset related appendices attached to this report.

4.0 Current Levels of Service

4.1 Levels of Service Context

Levels of Service are parameters, or combination of parameters, which reflect social, political, environmental, and economic outcomes that the organization delivers. Parameters can include, but are not necessarily limited to safety, customer satisfaction, quality, quantity, capacity, reliability, responsiveness, environmental acceptability, cost, and availability. O. Reg. 588/17 separates levels of service into either community or technical categories.

Identifying levels of service ensures that asset management decisions are:

- Based on impact to customers, the community and the environment;
- Focused to deliver the required level of service; and
- Aligned with the strategic goals of the Municipality.

It is important to define and quantify the levels of service within each service area as key indicators of asset needs and the basis for investment decisions. Service levels communicate to Council and the residents the state and trend of the Municipality's infrastructure. Funding scenarios can be created based on different service levels, which allows Council to set priorities on the targeted service level for each asset type.

Levels of service take into consideration:

1. **Legislative and regulatory requirements:** These requirements prevent levels of service from declining below a certain standard. (i.e. Minimum Maintenance Standards for municipal highways, safe drinking water, building codes and the Accessibility for Ontarians with Disabilities Act)
2. **Corporate goals and objectives:** These goals and objectives define the Municipality's priorities, and guide future spending.
3. **Customer needs:** The expectations of the general public have a direct impact on the level of service demanded from infrastructure.

4.2 Performance Measures

4.2.1 O.Reg. 588/17 Requirements

By July 1, 2022, each Municipality will require a plain language explanation of the current levels of service being provided by each category of core infrastructure assets. O. Reg. 588/17 prescribes the levels of service that the Municipality must report on.

By July 1, 2024, each Municipality will require a plain language explanation of the current levels of service being provided by each category of both core and non-core (facilities, fleet, land improvements, equipment, etc.) infrastructure assets. O. Reg. 588/17 does not prescribe the levels of service that the Municipality must report on. Staff will work with groups like the Municipal Finance Officers Association, Asset Management Ontario, Canadian Network of Asset Management and other municipal associations to develop levels of service to be tracked for this version of the AMP.

By July 1, 2025, each Municipality will require a plain language explanation of the proposed levels of service for all infrastructure assets included in the 2022 and 2024 versions of the AMP.

4.2.2 Key Performance Indicators

Currently, the Municipality measures performance of assets as part of the Key Performance Indicators (KPIs) reported in the Municipal Performance Measurement Program only. Through the implementation of a Work Order Software in 2022, the Municipality will be able to develop a series of KPI's using both the combined Asset Management and Work Order software platforms.

4.3 External Trends and Issues

There are always external factors that are beyond the control of the Municipality that can influence the level of service of assets. Performing an analysis of this will ensure that the performance targets are well-aligned with the environment which the Municipality operates in.

The following are known external trends/issues impacting levels of service:

- **Aging infrastructure**: old infrastructure will continue to burden the Municipality and will require a higher funding investment to maintain

safety and reliability. Infrastructure that was installed during high growth periods of the municipality will also require future replacement in similar small intervals. This can also be impacted by a lack of investment in previous years or decades that has resulted in assets missing out on rehabilitation opportunities.

- **Declines in water consumption**: ongoing conservation efforts lead to a decline in revenue generated from rates due to the same standard overhead requirements.
- **Inflation index for construction projects**: inflation rates that increase at a rate greater than expected could result in a shortage of funding to complete projects.
- **Climate Change / Environmental factors**: unusual weather events can significantly impact the condition of assets, changing the timeframe that maintenance is required.
- **Changes in senior level government funding:** changes in funding levels or priorities will require the Municipality to take another look at our ability to fund capital programs.
- **Uncertainty of growth forecasts**: can result in increased deterioration, the need for additional infrastructure and growth upgrades quicker than expected.
- **Active transportation**: increases in the use of alternative transportation results in increased pressure to maintain a safe and reliable transportation network.

5.0 Asset Management Strategy

The AMP's asset management strategy represents a set of planned actions to enable a sustainable level of service, while managing risk at the lowest life cycle costs. The detailed asset management strategies have been reported as part of section 4.0 in each of the report card appendices.

5.1 Procurement Methods

The Municipality's Purchasing Policy (By-law 2021-56) sets out guidelines for the Municipality to ensure that all purchases of goods, services and construction provide the lowest costs, including where appropriate, life cycle costs, consistent with the required quality and levels of service.

The key objectives of the purchasing policy are to:

- Ensure an open and honest process that is fair and impartial;
- Provide clear direction and accountabilities;
- Define the types of procurement processes that shall be used;
- Ensure objectivity and integrity of the procurement process;
- Ensure fairness between bidders; and
- Maximize savings for the taxpayers.

Procurement can include joint contracts with internal divisions and external municipalities/agencies through capital planning or development-related infrastructure planning.

To ensure the most efficient allocation of resources and funds, the Municipality will consider bundling projects when issuing tenders, to realize cost-benefits of economy of scale.

5.2 Lifecycle Activities and Planned Actions

The set of planned actions are referred to as strategies – which are identified in table 4.1.1 of each of the appendicies to this report. Each asset class will have a unique trigger – which are also identified in table 4.1.1 of each report card.

Table 5.2.1 Lifecycle Activities and Planned Actions

Activities	Planned Actions
Non-infrastructure Solutions	Actions or policies that can lower costs or extend life and can include adjustments to levels of service
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.
Renewal/Rehabilitation	Significant repairs designed to extend the life of the asset.
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.
Disposal	Activites associated with disposing of an asset once it has reached its useful life, or is otherwise no longer needed by the municipality.
Expansion	Planned activities required to extend services to previously unserviced areas – or expand services to meet growth demands (includes road urbanization projects).

5.3 Risks Associated with the Strategy

The Municipality is continuing to develop a better understanding and risk profile for each asset type. Within the asset profiles several factors can be used to determine the probability of failure along with the consequence of failure.

The consequence of failure is specific to each asset class and is provided in more detail within section 4.2 of each report card appendices.

Risk = probability of failure X consequence of failure

Table 5.3.1 Probability of Failure

Scoring	Likelihood	Asset Rating
0,1	Very low	Very Good
2	Low	Good
3	Medium	Fair
4	High	Poor
5,6	Very high	Very Poor

The Municipality's does not currently have a Risk Management Plan, but it is recommended that the Municipality generate one in the future, which will describe how risk and exposure to loss will be managed by the Municipality. The document would describe processes that will be used to identify, record, analyze and respond to risks, and the roles and responsibilities of the people involved in projects and services provided by the Municipality.

Chart 4.2.2 of each report card shows a summary of assets relative to their probability of failure and consequence of failure. Those assets highlighted in red pose the highest risk and consequence to the Municipality where those assets highlighted in green are low risk.

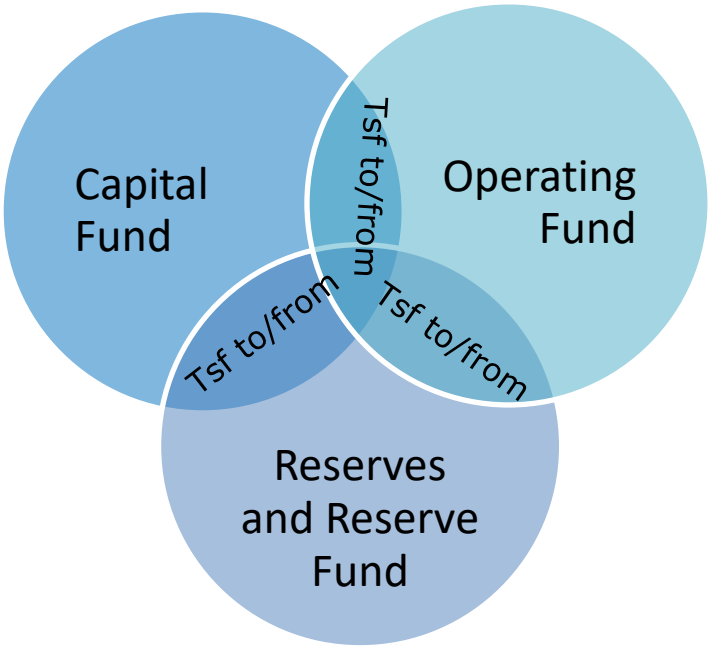
5.4 Lifecycle Analysis

Undertaking a lifecycle analysis is necessary when developing a strategy for managing the Municipality's assets. The analysis reviews the actions required that would enable assets to provide the desired levels of service.

6.0 Financing Strategy

6.1 Financing Strategies

The establishment of guidelines for a financial plan is a critical component of the AMP and helps to bring the plan into action. A sound financial plan demonstrates that the Municipality has integrated the asset management plan into financial planning and budgets, and that it has utilized all available funding tools. The diagram below illustrates how the different funds work together to help achieve the optimum funding strategy.



In the event that this AMP identifies funding shortfalls in any of the asset categories, O. Reg. 588/17 indicates that the impacts of the shortfall must be identified. The identification of shortfalls, risk, and impacts will be included in the 2025 Asset Management Plan that encompasses all municipal assets. The action plan may include any of the following approaches:

1. Reduce levels of service which will effectively reduce the funding requirement; and
2. Employ asset management and financial strategies, such as:
    a. use of debt;
    b. use of reserves and reserve funds;

c. increase of annual levies; and

d. increase or introduce user fees.

When evaluating asset funding requirements and shortfalls, it is important to consider intergenerational equity which refers to the fairness between generations. From an asset perspective, this speaks to who should pay for assets that have long term benefits. For assets such as fleet and equipment with short lives, 10 years or less, the current generation receives the full benefit of the asset and should be responsible for the asset's financing. For assets with longer lives such as water and wastewater infrastructure with a 80-year life, multiple generations will receive the benefit and establishing fairness for the asset financing is more difficult.

6.2 Expenditure Forecasts

Each asset report card shows the yearly expenditure forecast on asset lifecycle activities and the Municipality's current expenditure forecast (Appendix Tables - Table 5.2.1). The expenditure forecast is different from the lifecycle management strategy and allows for the confirmation of a "funding gap" until the approval of the 2025 version of the AMP. The 2025 version will identify both proposed levels of service that will be supported by financing strategies that use all available tools to the Municipality.

6.3 Capital Revenues

Each asset report card shows the yearly revenues forecast based on annual tax or user fee levies only. The only exception to this is the use of the Canada Community Building Fund (formerly the Federal Gas Tax Fund) for road projects until 2025. The use of other financing tools is not recommended until all asset classes have been included in the 2025 version of the AMP, so that a capital forecast is not built with funding sources that could potentially be removed in 2025. Other financing tools (i.e. OCIF) will be used on an ad-hoc basis until 2025.

6.4 Financial Requirements and Strategies

Each asset report card contains an analysis of the financial requirements to adequately fund the asset lifecycle. The report identifies any funding shortfalls based on current asset management strategies. The recommendations consider the impact of the shortfall and how the impact will be managed.

Appendix A

Road Network

1.0 Introduction

The Municipality's road network is broken out into five classifications and includes the following:

- **Connecting Link** - Roads that link two segments of provincial highways under the jurisdiction of the Municipality.
- **Rural Collector** - Roads that link traffic from local roads to the arterial road network (county, provincial and connecting link) outside of the urban settlement area.
- **Urban Collector** - Roads that link traffic from local roads to the arterial road network (county, provincial and connecting link) within the urban settlement area.
- **Rural Local** - Roads that carry traffic and goods from the provincial, county, and collector road system to individual properties outside of the urban settlement area.
- **Urban Local** - Roads that carry traffic and goods from the provincial, county, and collector road system to individual properties inside the urban settlement area.

Provincial and County roads are primarily transportation corridors and are designed to provide continuous efficient movement of traffic as part of the overall transportation network and are not under the jurisdiction of the Municipality.

2.0 State of Infrastructure

2.1 Inventory

Tables 2.1.1 and 2.1.2 summarize the road network inventory by classification and surface type.

Table 2.1.1 Road Network Inventory by Classification

Asset Type	Road Classification	Current Inventory
Road Network	Connecting Link	3 km
	Rural Collector	23 km
	Urban Collector	5 km
	Rural Local	328 km
	Local Urban	34 km
	Total	**393 km**

Table 2.1.2 Road Network Inventory by Surface Type

Asset Type	Surface Type	Current Inventory	Average Age of Road Surface
Road Network	Asphalt	125 km	31 Years
	Surface Treatment	86 km	16 Years
	Gravel	182 km	3 Years
	Total	**393 km**	

2.2 Valuation

Replacement Cost Valuation

In order to take into account the varying road surface and base widths, the 2022 replacement costs were determined based on square metre. This results in a more accurate estimate of the total replacement cost of the road network. The estimated replacement cost of the Municipality's entire road network in 2022 dollars is $184.31 million.

Table 2.2.1 Road Network Replacement Valuation

Asset Type	Unit Replacement Cost	Replacement Cost	% of Total Value
Asphalt	$102-$119/m^2	$92,763,815	50.33%
Surface Treatment	$68/m^2	$38,098,020	20.67%
Gravel	$55/m^2	$53,453,936	29.00%
	Total	**$184,315,771**	**100%**

2.3 Assessment Approach

2.3.1 Hard Surfaced Roads

The state of the Municipality's hard surfaced (Asphalt and Surface Treatment) road network is determined based on the Pavement Condition Index (PCI) in accordance with American Society for Testing and Materials (ASTM) D6433-20. The ASTM standard is utilized by many municipalities in the Province of Ontario.

The Municipality last conducted a third-party road condition assessment in 2019 through StreetScan. The condition information utilized for the assets included in this plan is based on the 2019 data. The scoring has been adjusted for road sections that have had work completed since being evaluated in the 2019 study and modified in accordance with the hard

surface road deterioration curve to reflect the deterioration of the road since this time. The next road condition assessment is forecasted for 2023 and will be used to evaluate the Municipality's deterioration curve as well as to provide an analysis of the effects of the Municipality's lifecycle management program for these assets.

The PCI tells the current condition of the road segment and can help determine the rate of deterioration of that segment by comparing PCI values over time. It helps to identify immediate maintenance and rehabilitation requirements and provides a base for establishing a long-term maintenance strategy. The chart below summarizes the PCI values and how they relate to the overall quality of the road segment.

Table 2.3.1.1 Pavement Condition Index (PCI)

PCI Value	Assetic Score	Rating
100	0	New
86-99	1	Very Good
71 - 85	2	Good
56 - 70	3	Fair
26 - 55	4	Poor
1- 25	5	Very Poor
0	6	End of Life

2.3.2 Granular Surfaced Roads

The Municipality last conducted a third-party road condition assessment for its granular road network in 2014 through 4Roads Management, utilizing a visual inspection method. The state of the Municipality's granular surface road network is determined based on the MTO's Inventory Manual for

Municipal Roads (RIMS) as inspected in the 2014 State of the Infrastructure for Municipal Roads. The RIMs manual was well utilized in the 1980s and 1990s by the province when allocating financial resources to municipalities for road programs. Since then, a more current model for assessment has not been widely adopted, and each Municipality has approached granular road condition assessments differently. The Municipality has an ongoing granular maintenance program that addresses the surface of the road but does not account for the improvement needs for the entire road platform in a similar fashion to the Structural Adequacy that was utilized to generate a Time of Need for repair in the 2014 assessment.

The Structural Adequacy helped to identify immediate maintenance (i.e. ditching) and rehabilitation (i.e. base repairs) requirements and provides a base for establishing a long-term maintenance strategy, however, has not been updated since that time. For the purposes of this Asset Management Plan, the condition data has not been included and future financial needs have been based on the replacement of the road base on a 50-year lifespan.

2.4 Asset Condition Assessment

The table below provides the condition score of the road network based on the 2019 hard surfaced road inspections. The conditions have been adjusted along the appropriate deterioration curve by the Municipality's asset management software.

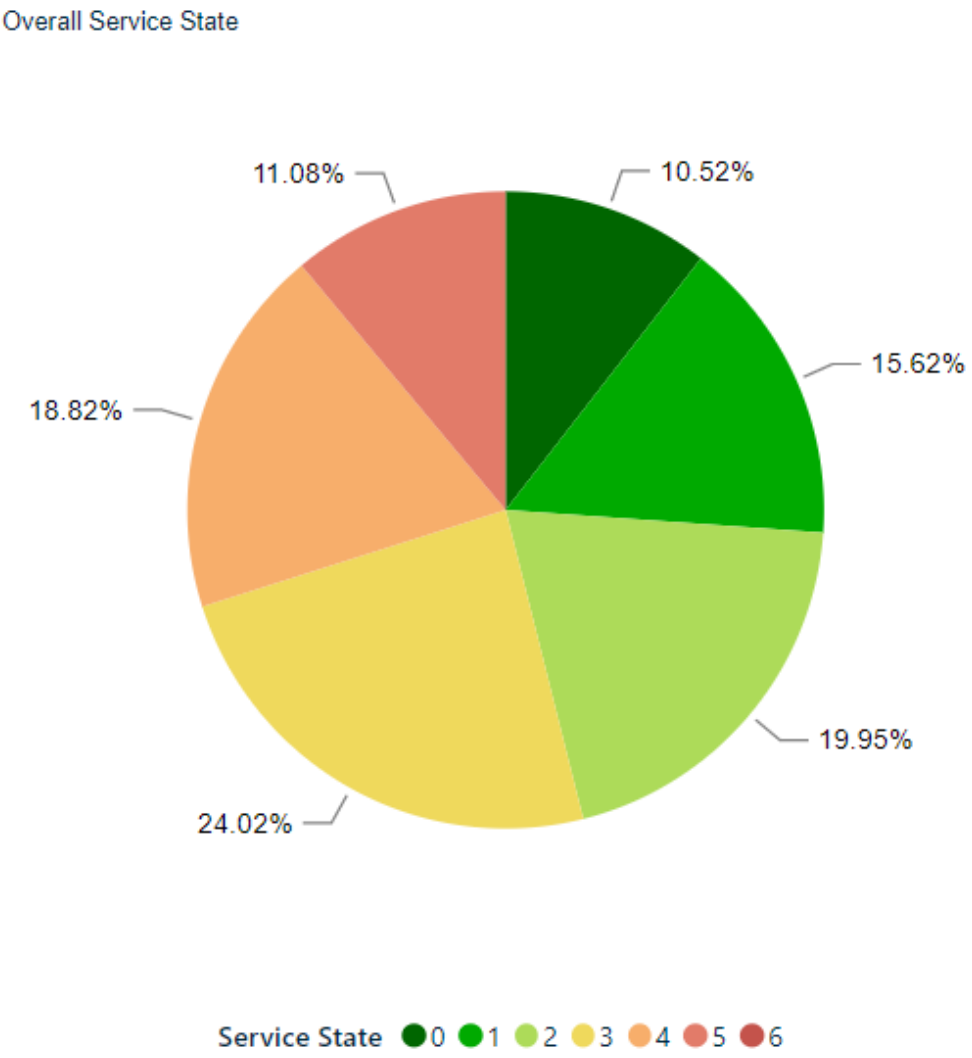
Table 2.4.1 Road Network Condition Assessment

Asset Type	Surface Type	Condition Score	Condition System
Road Network	Asphalt	68	Pavement Condition Index (PCI)
	Surface Treatment	71	Pavement Condition Index (PCI)
	Granular	N/A*	TBD

*The Municipality does not currently utilize a condition rating system for granular roads.

The Municipality's asset management software generates a State of Assets Report that provides a pie chart breaking out the asset by condition for the Municipality's hard surface road network, as shown in Chart 2.4.1 below.

Chart 2.4.1 Visual Road Network Condition Assessment – Hard Surface



The State of Assets at December 31, 2021 indicates that 46.09% of hard surface road assets are in very good or good condition, 24.02% are in fair condition, and 29.89% are in poor or very poor condition. The weighted average is 2.09, which means that the entire system is considered in good condition.

Because the Municipality does not currently track granular road conditions with a standardized rating system, there is an inability to use Assetic for granular roads to generate a State of The Assets Report until a condition system is utilized. This information will be updated in the 2025 Asset Management Plan.

2.5 Useful Life

The useful life of the road network will vary by component, and the overall life is significantly impacted by the maintenance strategies. The Municipality has developed various maintenance strategies depending on the asset component and surface type.

Table 2.5.1 outlines the anticipated useful life for each new build/replacement, along with the anticipated added life for each type of maintenance strategy. These lives are used for PSAB purposes and align with the Municipality's capital asset policy.

It is possible to have segments exceed the lives defined as well as segments that require replacement prior to the end of their anticipated life.

The Municipality completes granular road resurfacing on a three-year rotation. As the resurfacing is generally considered a maintenance item, the Municipality no longer includes this treatment in its annual Tangible Capital Asset calculations. The future of capital projects for these road segments will be based on the suitability of the road base and will be further examined in 2023.

Table 2.5.1 Useful Life

Roads Network	**Anticipated Useful Life (years)**
New Build / Replacement	
Rural/Semi-Urban - Asphalt Surface	25

Roads Network	Anticipated Useful Life (years)
Rural/Semi-Urban - Asphalt Base	50
Rural - LCB Surface	7
Rural - LCB Base	50
Urban – Asphalt Surface	30
Urban – Asphalt Base	80
Maintenance Strategy	
Surface Treatment	7
Asphalt Resurfacing	15
Asphalt Rehabilitation	25

3.0 Level of Service

Municipal roads are primarily transportation corridors that are designed to provide continuous efficient movement of people and goods as part of the overall transportation network. The correct service level is influenced by traffic volume, including volume of large transportation vehicles, preferences for maintenance routes to achieve plow efficiency, and resident preferences (their belief that the road network meets their needs and expected condition). The Transportation Master Plan (TMP) is based on the principle that Municipal roads should provide relatively good connectivity and a good level of roadway service throughout the Municipality. The target PCI based

on the different road classifications will need to be included in the 2025 version of the Asset Management Plan.

3.1 Corporate Objective

The corporate objective of road maintenance is to ensure people and goods are able to move safely and efficiently throughout the Municipality of Meaford. The roads inventory includes several border roads with other municipalities, where the Municipality of Meaford and the bordering municipality share in the maintenance of these roads. Service Agreements are in place to ensure that service levels are maintained.

3.2 Legislative Requirements - Maintenance

Ontario Regulation 239/02 specifies the Maintenance Standards for Municipal Highways. It covers items such as, but is not limited to, patrolling frequency, snow accumulation, potholes, and regulatory/warning signs and traffic signals. The level of service provided by the Municipality of Meaford for winter maintenance meets the level required by Ontario Regulation 239/02.

3.3 Legislative Requirements - O. Reg. 588/17

O. Reg. 588/17 requires for each asset category, the current levels of service being provided, determined in accordance with the prescribed qualitative descriptions and technical metrics and based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan. For the Municipality's road network, the following Levels of Service must be identified:

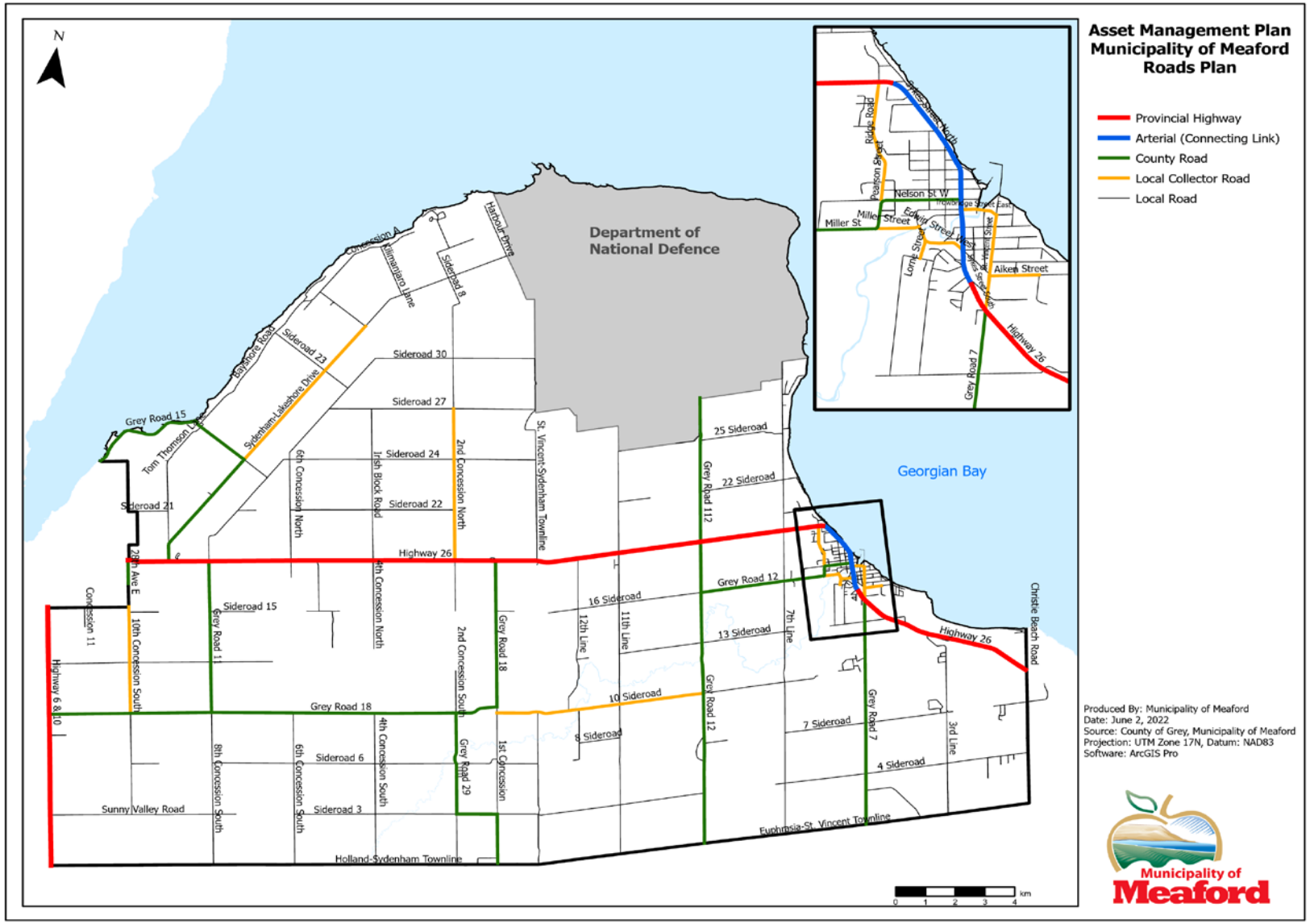
3.3.1 Scope of Services - Road Network

Community Levels of Service

A description, which may include maps, of the road network in the municipality and its level of connectivity.

Figure 3.3.1.1 shows the Municipality's road network including the different classifications.

Figure 3.3.1.1 Road Network by Classification



Technical Levels of Service

The number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality.

The breakout of each road type is included in Table 3.3.1.1 below:

Table 3.3.1.1 Road Classifications as % of Proportion of land area

Asset Type	**Road Classification**	**Current Inventory (Lane-km)**	**% of Proportion of Sq. Km. of land area**
Road Network	Connecting Link	6 km	0.006%
	Rural Collector	46 km	0.025%
	Urban Collector	10 km	0.007%
	Rural Local	656 km	0.326%
	Local Urban	68 km	0.044%
	Total	**786 km**	

3.3.2 Quality of Services – Road Network

Community Levels of Service

A description or images of the condition of roads and how this would affect use of the roads.

The poorer the condition of the road surface, the increase in the user dissatisfaction with the asset. This can mean different things for different road classifications and for different users. For example, the deterioration of collector roads will force increased traffic to local roads to avoid roads in poor condition, while the deterioration of local roads will have a negative effect on active transportation users who cannot navigate around cracking and or pot holes.

Table 3.3.2.1 PCI Condition Description with Images

Pavement Condition Index (PCI)	**Condition State**	**Example Photo**
86 < PCI ≤ 100	Very Good	 Thompson St – Lombard and Albert

Pavement Condition Index (PCI)	Condition State	Example Photo
71 < PCI ≤ 85	Good	 Union St – Grace and Augusta
56 < PCI ≤ 70	Fair	 7th Line – Sdrd 4 and Euphrasia - St. Vincent Townline

Pavement Condition Index (PCI)	Condition State	Example Photo
26 < PCI ≤ 55	Poor	 Ridge Rd – Sykes N and Ridge Creek
0 < PCI ≤ 25	Very Poor	 Lakeshore Rd S – Centreville and Algonquin

Technical Levels of Service

For paved roads in the municipality, the average pavement condition index value.

Table 3.3.2.2 identifies the average PCI for the hard surfaced roads based on their classification.

Table 3.3.2.2 Average PCI by Road Classification

Asset Type	Road Classification	Average PCI
Road Network	Connecting Link	80
	Rural Collector – Asphalt	86
	Rural Collector – Surface Treatment	71
	Urban Collector - Asphalt	67
	Rural Local – Asphalt	68
	Rural Local – Surface Treatment	72
	Urban Local – Asphalt	66
	Urban Local – Surface Treatment	72

For unpaved roads in the municipality, the average surface condition (e.g., excellent, good, fair or poor).

Table 3.2.2.3 identifies the average surface condition for granular surfaced roads based on their classification. For the purposes of the 2022 Asset Management Plan, the condition of the granular roads has been established as “Good” based on the three-year resurfacing program.

Table 3.2.2.3 Average Surface Condition by Road Classification - Granular

Asset Type	Road Classification	Average Surface Condition
Road Network	Rural Local – Granular	Good

4.0 Asset Management Strategy

4.1 Lifecycle Activities and Planned Actions

To effectively maintain the road network at the established service levels, they require the appropriate maintenance or rehabilitation strategy applied throughout an asset's lifecycle. There are six lifecycle maintenance strategies considered in the overall sustainable management of road segments, described in Table 4.1.1 below.

Table 4.1.1 Lifecycle Activities

Activities	Planned Actions	Lifecycle Activities
Non-infrastructure Solutions	Actions or policies that can lower costs or extend life and can include adjustments to levels of service	Load Limit By-law System Master Planning

Activities	Planned Actions	Lifecycle Activities
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	Visual Inspection Emergency Repairs (as required) Pot Hole Repair Washout Repair Should Drop Off Repair Crack Repair Roadside Ditching Roadside Tree / Vegetation Maintenance
Renewal/Rehabilitation	Significant repairs designed to extend the life of the asset.	Maintenance Gravel
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.	SST / DST Resurfacing ST Rehabilitation ST Reconstruction HM Resurfacing HM Rehabilitation HM Reconstruction

Activities	Planned Actions	Lifecycle Activities
Disposal	Activites associated with disposing of an asset once it has reached its useful life, or is otherwise no longer needed by the municipality.	Hard Surface Pulverizing
Expansion	Planned activities required to extend services to previously unserviced areas – or expand services to meet growth demands (includes road urbanization projects).	Construction of new road segments

4.2 Risks Associated with the Strategy

The Municipality uses the highway classification from O. Reg. 239/02 to determine the consequence of failure. The higher the classification, the greater the consequence if the road segment deteriorates to the point where it is no longer drivable. The highway classification is used, as it takes into account the speed limit on the road segment and the average daily traffic volume.

Table 4.2.1 Consequence of Failure

Scoring	Consequence	Highway Classification
1	Very Low	5,6
2	Low	4
3	Medium	3

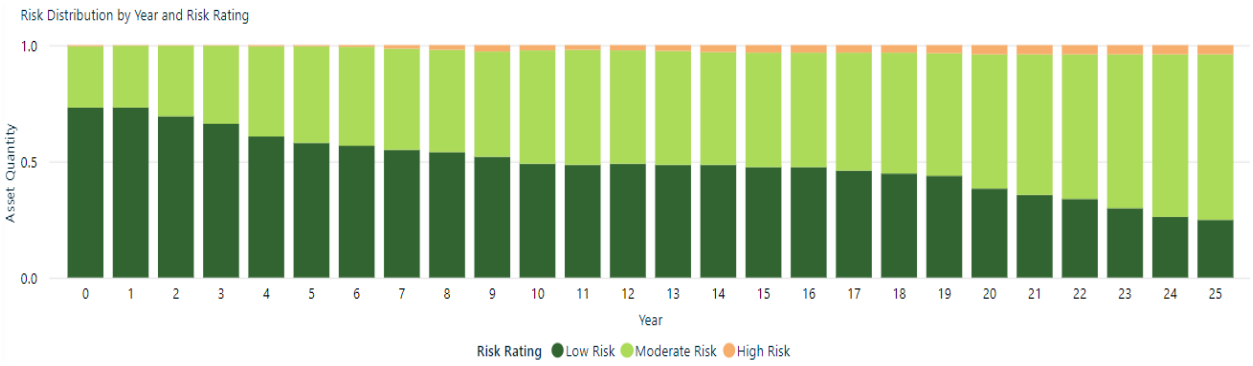
4	High	N/A
5	Very High	N/A

The risks associated with the road network are compared against the risks associated with all municipal assets. While looking at the road network only, there is justification that the consequence of failure of some roads is very high compared to others. There also needs to be consideration given to the failure of these assets versus critical assets like water, wastewater, and other assets that can negatively impact many users or private property. Roads are still able to be driven on under most circumstances, and generally, an alternative route for users is provided if they wish to avoid deteriorated roads. This results in very few assets in the high-risk and very high-risk categories.

Utilizing the asset's condition to determine the likelihood of failure and the highway classification as the consequence of failure, the Municipality's asset management software can generate a risk analysis profile for the road network for the period of the plan.

As mentioned in Section 2.3 of this plan, the Municipality does not currently have a standardized condition rating system for granular roads, and therefore cannot utilize Assetic for the purposes of generating a risk analysis profile. Graph 4.2.1 provides the Risk Analysis profile for hard surface roads only.

Graph 4.2.1 Risk Analysis profile – Hard Surface Roads



The Risk Analysis profile at December 31, 2021 indicates that 73.13% of the road segments are considered low risk, 26.37% are considered moderate

risk, 0.50% are considered high risk, and none are considered very high risk.

The risk profile for the 25-year period identified in the Asset Management Plan shows that almost one-half of the road segments currently listed as moderate and high risk will double over this period.

4.3 Lifecycle Analysis

The Municipality's Transportation Master Plan (TMP) has developed strategies and guidelines for managing the Municipality's transportation network and will be implemented by staff in future years as part of the action plan stemming from the project.

Determining if a road segment should be rural, semi-urban or urban can have significant impacts to the lifecycle costs associated with maintaining the assets at those levels. The Municipality determines the desired asset component based on the Transportation Master Plan and the Municipality's Engineering Standards. At the time of the preparation of this report, the Municipality's Official Plan, Engineering Standards and other design documents were currently under review. The road network data reflects a few road replacements to new standards with the intention that the 2025 Asset Management Plan will include all future road upgrades in that document.

In addition to the guiding documents identified above, several factors will also influence when maintenance, rehabilitation, or reconstruction is completed. These include any below ground infrastructure maintenance requirements, such as water and wastewater infrastructure. A failure of these below ground assets could require rehabilitation or replacement of the road regardless of the roads current state. The Municipality reviews all infrastructure within the vicinity prior to planning construction projects. This review also includes working with area and neighbouring municipalities, as appropriate. This review helps minimize the disruption to the Municipality of Meaford's residents and minimizes the overall costs for completing the asset updates, regardless of whether the asset is municipally owned.

Hot Mix Asphalt Roads

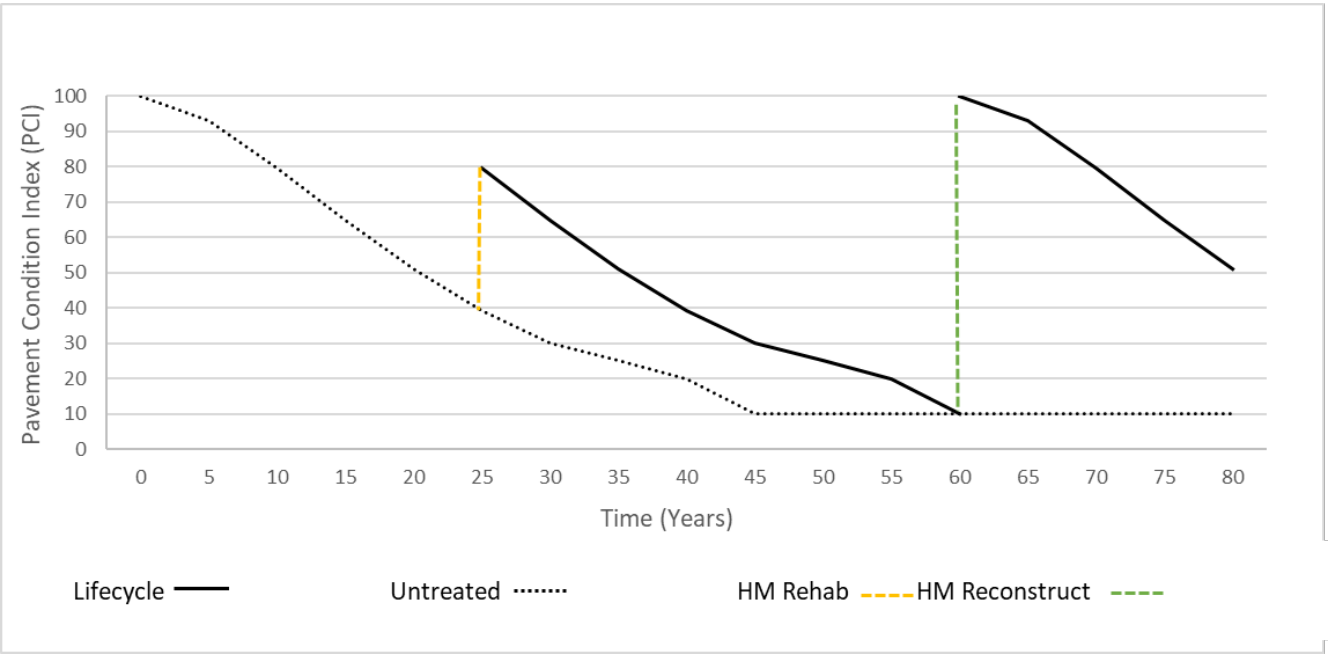
Referring to the maintenance strategies in section 2.5, Graph 4.3.1 illustrates the anticipated lifecycle for Hot Mix Asphalt segments if the Municipality were completing treatments in accordance with the 2014 State

of the Infrastructure Report. As can be seen, if no maintenance strategies were applied to the surface, it is expected it would reach very poor condition and require complete reconstruction by age 40. However, by applying several resurfacing strategies, the life of the surface is extended to approximately 75 years if it were left to deteriorate to complete failure or to be aligned with the lifecycle activities of underground infrastructure. Unless other asset replacement is needed, the intention is to reconstruct the road surface after 60 years or when the PCI approaches 30.

Graph 4.3.1 Lifecycle Curve – Hot Mix Asphalt (HMA) Roads

However, the 2014 State of the Infrastructure Report for Municipal Roads identified that the annual lifecycle management strategy costs would be approximately $3.8 Million in 2014 dollars to properly maintain the Municipality's roads. The report also identified that to keep the road network in the same condition it was in 2014 the Municipality would need to spend $2.2 Million. Through the addition of a 1% Tax Levy increase from 2015-2022 the Municipality is only funding approximately $1.4 towards hard surface road projects. The underfunding of the road resurfacing program has now increased the cost to maintain the current levels of service from $2.2 Million to $3.8 Million, which will still result in some roads continuing to be in very poor condition. Based on a combination of insufficient funding and concerns from Council and the community about keeping the "good roads good", the Municipality has since changed its approach to hard surface roads to focus more on roads that require rehabilitation. The effect of this change can be seen in the updated anticipated lifecycle in Graph 4.3.2

Graph 4.3.2 Lifecycle Curve – Hot Mix Asphalt (HMA) Roads Rehab Strategy



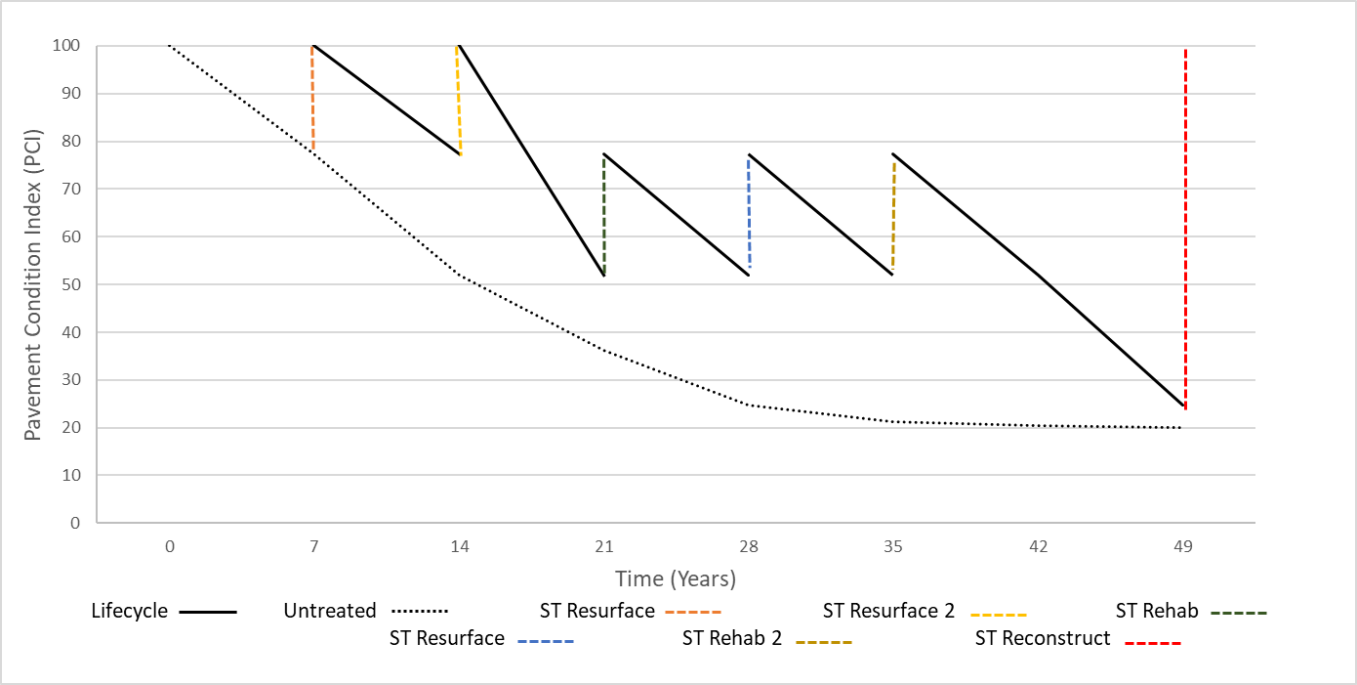
While both lifecycle strategies recommend road reconstruction at age 60, there is a significant difference in the condition ratings throughout the lifespan of the surface. The average PCI for the lifecycle management strategy is 68, which is at the top end of the poor overall condition score, while the PCI for the rehabilitation only strategy is 40, which is at the midpoint of the poor overall condition score. The difference in the two strategies will result in significantly lower than current levels of service and will be accompanied by user dissatisfaction and additional maintenance costs as the Municipality rehabilitates fewer kilometres per year than the recommended lifecycle strategy.

Surface Treated Roads

Referring to the maintenance strategies in section 2.5, Graph 4.3.3 illustrates the anticipated lifecycle for Surface Treatment segments if the Municipality were completing treatments in accordance with the 2014 State of the Infrastructure Report. As you can see, if no maintenance strategies were applied to the surface, it is expected it would reach very poor condition and require complete reconstruction by age 35. However, by applying several resurfacing strategies, the life of the surface is extended to approximately 56 years if it were left to deteriorate to complete failure. The intention is to reconstruct the road surface after 49 years or when the PCI

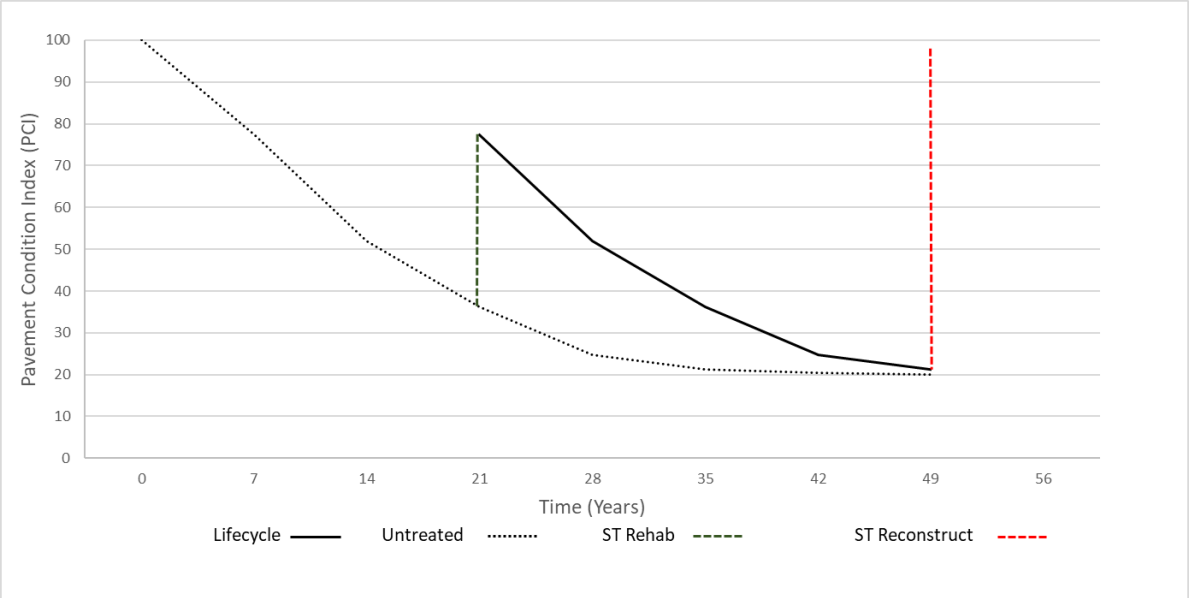
approaches 25 due to the major upgrades to the road base and ditches being required.

Graph 4.3.3 Lifecycle Curve – Surface Treated (ST) Roads



However, the 2014 State of the Infrastructure Report for Municipal Roads identified that the annual lifecycle management strategy costs would be approximately $3.8 Million in 2014 dollars to properly maintain the Municipality's roads. The report also identified that to keep the road network in the same condition it was in 2014 the Municipality would need to spend $2.2 Million. Through the addition of a 1% Tax Levy increase from 2015-2022 the Municipality is only funding approximately $1.4 towards hard surface road projects. The underfunding of the road resurfacing program has now increased the cost to maintain the current levels of service from $2.2 Million to $3.8 Million, which will still result in some roads continuing to be in very poor condition. Based on a combination of insufficient funding and concerns from Council and the community about keeping the "good roads good", the Municipality has since changed its approach to hard surface roads to focus more on roads that require rehabilitation. The effect of this change can be seen in the updated anticipated lifecycle in Graph 4.3.4.

Graph 4.3.4 Lifecycle Curve – Surface Treated (ST) Roads Rehab Only

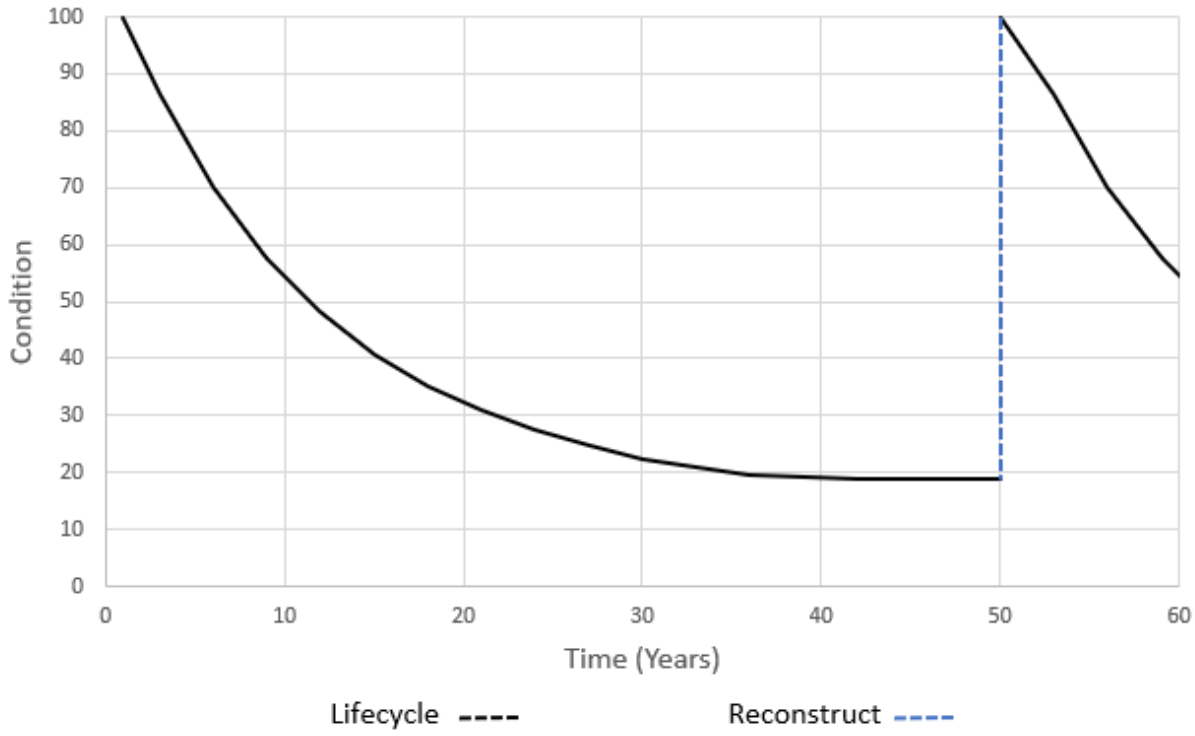


While both lifecycle strategies recommend road reconstruction at age 49, there is a significant difference in the condition ratings throughout the lifespan of the surface. The average PCI for the lifecycle management strategy is 67.5, which is at the top end of the poor overall condition score, while the PCI for the rehabilitation only strategy is 42.5, which is at the midpoint of the poor overall condition score. The difference in the two strategies will result in significantly lower than current levels of service and will be accompanied by user dissatisfaction and additional maintenance costs as the Municipality rehabilitates fewer kilometres per year than the recommended lifecycle strategy.

Granular Roads

Referring to the maintenance strategies in section 2.5, Graph 4.3.5 illustrates the anticipated lifecycle for granular road segments. As you can see, no rehabilitation strategies were applied to the surface other than an application of granular material every three years, it is expected it would reach very poor condition and require complete reconstruction by age 50. The 2025 version of the Asset Management Plan will include an update to the deterioration curve based on the application of rehabilitation treatments to both the road surface and base.

Graph 4.3.5 Lifecycle Curve – Granular Roads



5.0 Financing Strategy

5.1 Financing Strategy

O. Reg. 588/17 requires the Municipality to identify the cost of the lifecycle activities that would need to be undertaken to maintain the current levels of service for each of the ten years following the year for which the current levels of service are determined along with the costs of providing those activities.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities for roads are as follows:

Table 5.1.1 Lifecycle Financing Strategy – Hard Surface Roads

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	32	33	33	33	33	33	33	33	133	33
Maintenance	117	119	122	124	127	129	132	134	137	140
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	3,827	3,827	3,827	3,827	3,827	3,827	3,827	3,827	3,827	3,827
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	3,976	3,979	3,981	3,984	3,986	3,989	3,991	3,994	4,097	4,000

Table 5.1.2 Lifecycle Financing Strategy – Granular Roads

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	0	0	0	0	0	0	0	0	0	0
Maintenance	110	110	110	110	110	110	110	110	110	110
Renewal / Rehabilitation	300	300	300	300	300	300	300	300	300	300
Replacement	1,069	1,069	1,069	1,069	1,069	1,069	1,069	1,069	1,069	1,069
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479

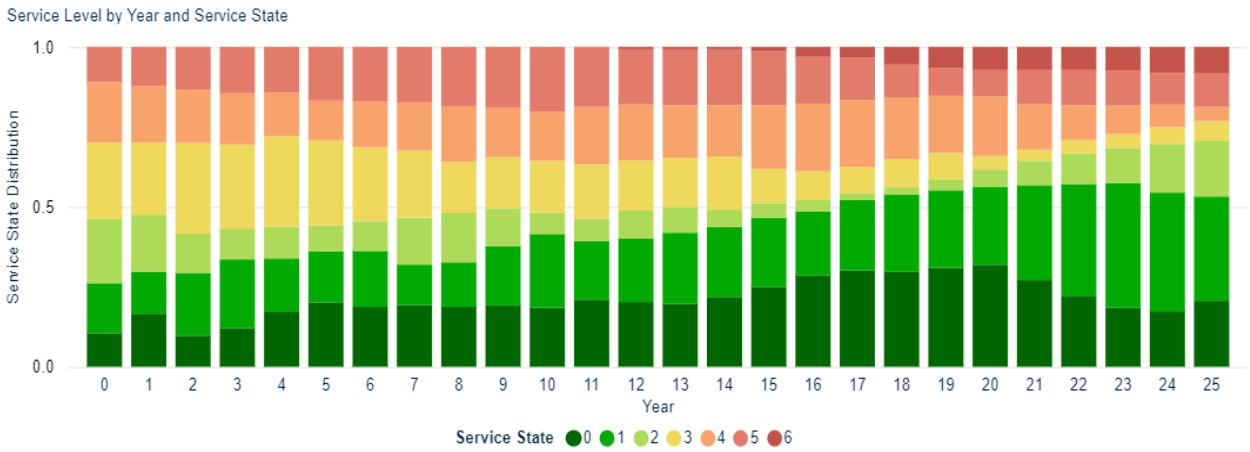
The non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and do not include expenses that have not been applied to an operating program or project. These costs also do not include debt servicing costs until a strategy has been finalized. Further development of the Municipality's asset management program will allow additional operating cost accuracy to be applied to these categories for the 2025 version of the Asset Management Plan.

Where possible, replacement activities for the road network are planned in conjunction with the replacement needs for water and wastewater infrastructure to minimize the construction impact on residents and provide a cost-effective approach to maintaining the Municipality's assets.

Expansion / Development Charge related costs have not been included in this version of the Asset Management Plan as the 2022 Development Charge Study has not been finalized and approved by Council at the time of the preparation of this report. This study needs to be incorporated into the financing strategy to determine the costs to be raised through Development Charges and allocated for replacement to be funded by existing users.

The Municipality's Asset Management Software can produce a Service State Analysis Report based on this strategy using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.1.1 Hard Surface Roads - Service Level by Year and Condition State – Lifecycle Strategy



The State of Assets at December 31, 2021 indicates that 46.09% of hard surface road assets are in very good or good condition, 24.02% are in fair condition, and 29.89% are in poor or very poor condition. The weighted average is 2.09, which means that the entire system is considered in good condition.

The State of Assets at December 31, 2032 indicates that 48.22% of hard surface road assets are in very good or good condition, 16.13% are in fair condition, and 35.66% are in poor or very poor condition. The weighted average is 2.48, which means that the entire system is considered in good condition.

The State of Assets at December 31, 2047 indicates that 70.57% of hard surface road assets are in very good or good condition, 6.17% are in fair condition, and 23.25% are in poor or very poor condition. The weighted average is 2.06, which means that the entire system is considered in good condition.

5.2 Expenditure Forecasts

The Municipality's 2014 State of The Infrastructure Report (SOTI) was approved by Council in 2014. The plan recommended a 1% annual increase to the overall Roads budgets. The expenditure forecast for the purposes of this Asset Management Plan will continue the 1% annual increases until such time that Council approves the 2025 Asset Management Plan and establishes proposed levels of service at that time.

As the non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and require more extensive review, the expenditure forecast is based on the annual 1% increase for capital until 2025 and then stays the same.

Capital investments for the roads network are currently funded by levy-supported dedicated reserves, Canada Community Building Fund (formerly Federal Gas Tax), development charges for growth projects and levy contributions. With the exception of infrastructure replacement and road reconstruction projects, debentures are not currently used to fund general roads projects. The Ontario Community Infrastructure Fund (OCIF), a provincial funding program, also provides funds available for roads projects. However, to date, the Municipality has invested its annual OCIF funds on various projects related to asset management planning, bridges, culverts, and roads. The Canada Community Building Fund allotment of approximately $350,000 per year has been maintained in this model until the 2025 Asset Management Plan covering all asset classes has been approved.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities within the approved 1% annual increase are as follows:

Table 5.2.1 Expenditure Forecast – Hard Surface Roads

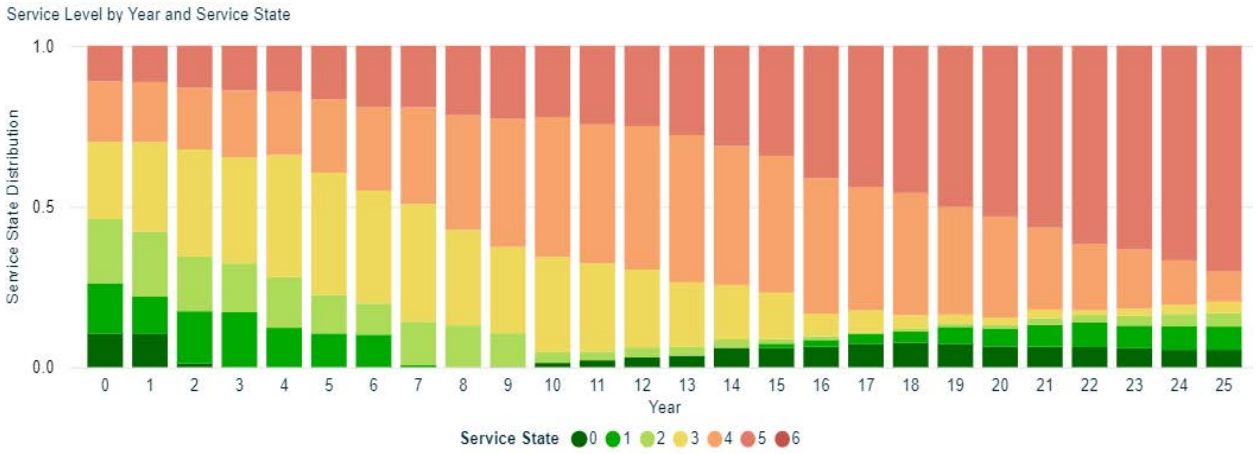
Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	32	33	33	33	33	33	33	33	133	33
Maintenance	117	119	122	124	127	129	132	134	137	140
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	1,432	1,587	1,487	1,487	1,487	1,487	1,487	1,487	1,487	1,487
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	1,580	1,739	1,641	1,643	1,646	1,648	1,651	1,654	1,757	1,659

Table 5.2.2 Expenditure Forecast – Granular Roads

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	0	0	0	0	0	0	0	0	0	0
Maintenance	110	110	110	110	110	110	110	110	110	110
Renewal / Rehabilitation	300	300	300	300	300	300	300	300	300	300
Replacement	0	0	0	0	0	0	0	0	0	0
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	410	410	410	410	410	410	410	410	410	410

The Municipality's Asset Management Software can produce a Service State Analysis Report based on the current expenditure forecast using the deterioration curve associated with the various lifecycle treatments. The 25-year model is for hard surfaced roads only and is shown in Chart 5.2.1.

Chart 5.2.1 Hard Surface Roads Rehab Only Strategy - Service Level by Year and Condition State – Current Expenditure Forecast



The State of Assets at December 31, 2021 indicates that 46.09% of hard surface road assets are in very good or good condition, 24.02% are in fair condition, and 29.89% are in poor or very poor condition. The weighted average is 2.09 which means that the entire system is considered in good condition.

The State of Assets at December 31, 2032 indicates that 4.69% of hard surface road assets are in very good or good condition, 29.62% are in fair condition, and 65.69% are in poor or very poor condition. The weighted average is 3.8 which means that the entire system is considered in fair condition.

The State of Assets at December 31, 2047 indicates that 16.78% of hard surface road assets are in very good or good condition, 3.61% are in fair condition, and 79.61% are in poor or very poor condition. The weighted average is 4.15, which means that the entire system is considered in poor condition.

5.3 Lifecycle Financing Strategy vs. Expenditure Forecast Analysis

The analysis between the Lifecycle Financing Strategy and the Expenditure Forecast identifies the funding gap between the two financial models. The result of this analysis is included in Tables 5.3.1 and 5.3.2 as follows:

Table 5.3.1 Financing Strategy vs. Expenditure Forecast - Hard Surface Roads

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost ($)	3,976	3,979	3,981	3,984	3,986	3,989	3,991	3,994	4,097	4,000
Expenditure Forecast ($)	1,580	1,739	1,641	1,643	1,646	1,648	1,651	1,654	1,757	1,659
Funding Gap ($)	**(2,395)**	**(2,240)**	**(2,340)**	**(2,341)**	**(2,340)**	**(2,341)**	**(2,340)**	**(2,340)**	**(2,340)**	**(2,341)**

Table 5.3.2 Financing Strategy vs. Expenditure Forecast – Granular Roads

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost ($)	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Expenditure Forecast ($)	410	410	410	410	410	410	410	410	410	410
Funding Gap ($)	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**	**(1,069)**

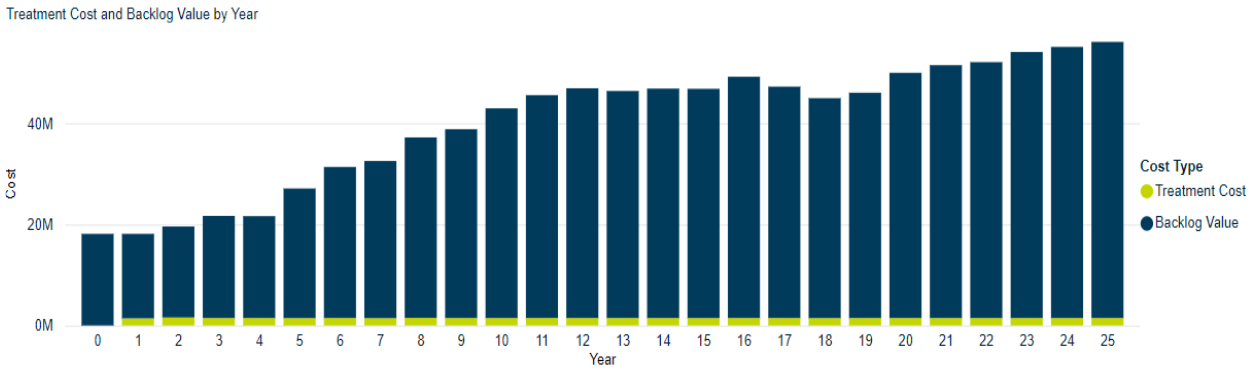
In order to meet the financial requirements of the Lifecycle Financing Strategy, the Municipality will be required to fund projects through additional revenue tools such as reserve and reserve funds, grants, debt, new revenues, or additional annual levy increases. Alternatively, projects will need to continue to be deferred, which will have a negative impact on the road network condition.

5.4 Lifecycle Financing Strategy Limitations

The Lifecycle Financing Strategy has been developed on the current levels of service and programs being delivered by the Municipality. This strategy implies that these practices have been in place since the installation of the assets and does not recognize the impacts of previous investment that has resulted in the current system condition.

The Municipality's asset management software can generate a backlog report that identifies the backlog of asset rehabilitation or replacement needs that shows the number of assets that are currently not meeting the current levels of service. The backlog report based on the current system condition is shown in Chart 5.4.1.

Chart 5.4.1 – Backlog Report – Hard Surface Roads



The current workbank backlog is $18,123,423.87 and includes backlogged treatment for both hot mix asphalt ($14,413,878.16) and surface treated roads ($3,709,545.71), with over $11 Million in both categories required for road reconstruction.

The Year 10 backlog is $41,461,785.72 and includes backlogged treatment for both hot mix asphalt ($26,513,660.46) and surface treated roads ($14,948,125.26) and includes rehabilitation and reconstruction projects for both categories. The increased backlog on reconstruction indicates that the

annual available funds are going towards rehabilitation type projects to maintain the current service levels.

The Year 25 backlog is $54,583,222.97 and includes backlogged treatment for hot mix asphalt roads ($26,085,003.68) for both rehabilitation and reconstruction projects. The increased backlog on hot mix road reconstruction indicates that the annual available funds are going towards rehabilitation type projects to maintain the current service levels as well as getting the surface treated roads caught back up to the surface treated lifecycle.

The accumulation of backlogged work will also increase as the Municipality finalizes a model for its granular surfaced roads. Based on funding for the replacement of these roads not being included in the annual capital program, the $1 Million annual capital cost could potentially increase the backlogged amount to $80 Million after 25 years.

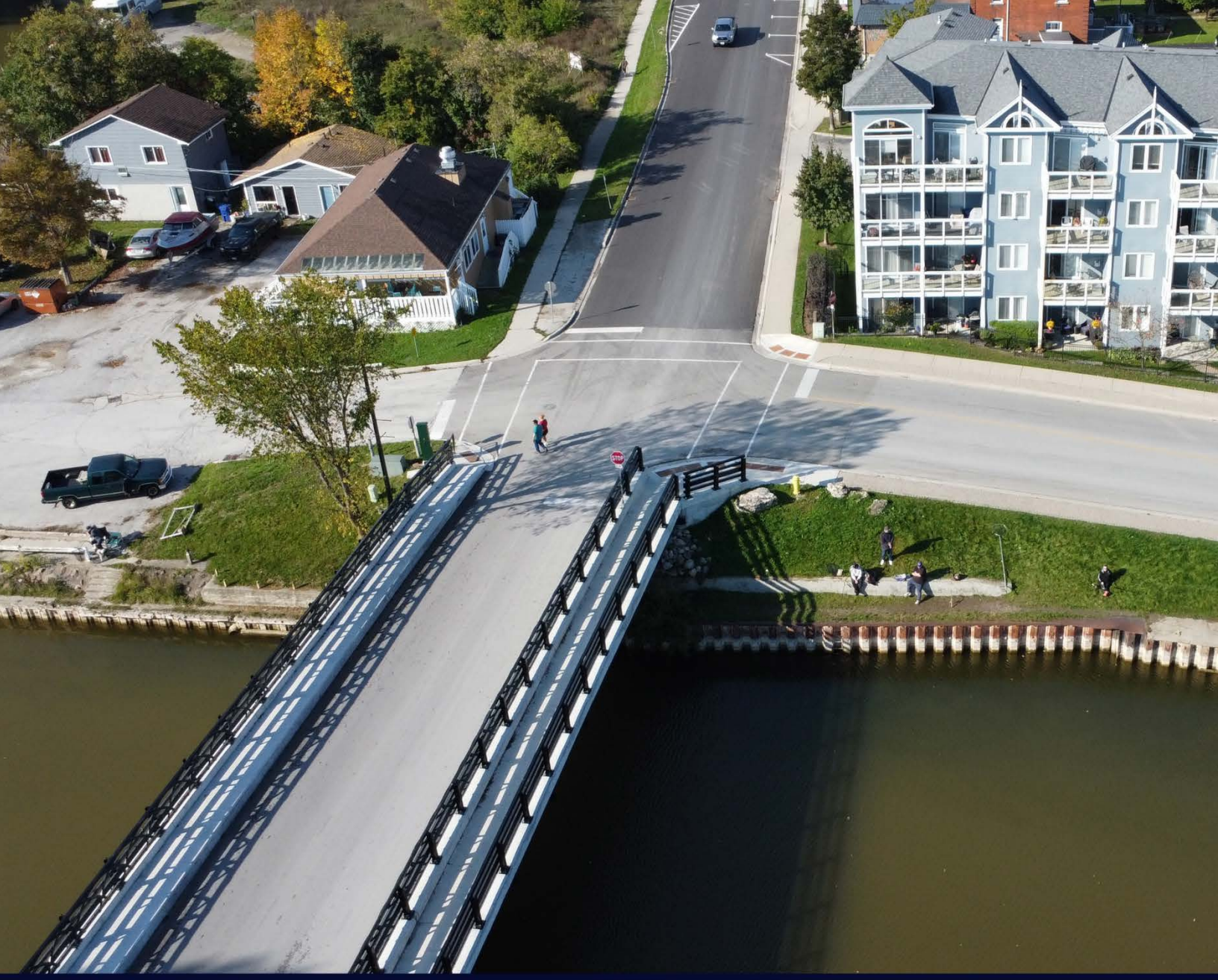
6.0 Improvement Plan and Recommendations

The following recommendations are based on the review of current management practices; and inventory, valuation and condition analysis.

Table 6.0.1 Road Network Recommendations

	Recommendations
1.	Conduct road surface inspections on both hard surfaced and granular roads in 2023 to monitor lifecycle work completed to date and to develop a model for granular roads.
2.	Establish and monitor appropriate and measurable levels of service and performance measures, including the establishment of target PCI averages for the various road classifications.

	Recommendations
3.	Continue annual taxation increase of 1% annually until the completion of the 2025 version of the Municipality's Asset Management Plan.
4.	Continue use of annual allotment of the Canada Community Building Fund towards roads related capital until the completion of the 2025 version of the Municipality's Asset Management Plan.
5.	Embrace emerging technologies and techniques to extend pavement surface life, including the continued use of Reclamite, CRF, microsurfacing, crack sealing, etc.
6.	Establish a scoring system including mapping to correlate asset condition ratings for both road and linear assets in the urban area to ensure timely rehabilitation or replacement of all assets within the road corridor.



Appendix B

Bridges & Culverts

1.0 Introduction

The municipal bridges and culverts network helps to provide continuous efficient movement of people and goods as part of the overall transportation network.

The structural network is categorized into three components being bridges, concrete culverts, and steel culverts all with spans greater than 3m.

Bridges and culverts are not currently classified into sub-categories and assume the same level of importance as the road that the structure is located on. (i.e., Connecting Link, Rural and Urban Collector, and Rural and Urban Local).

2.0 State of Infrastructure

2.1 Inventory

Tables 2.1.1 and 2.1.2 summarize the bridge and culvert network by the asset and construction type.

Table 2.1.1 Bridges and Culverts Inventory

Asset Type	Asset Component	Current Inventory	Average Age
Bridges & Culverts	Bridges	36	62
	Culverts - Concrete	33	54
	Culverts - Steel	8	38

There are several different types of structures that the Municipality has in its inventory. The table below summarizes the number and types of structures.

Table 2.1.2 Types of Bridge and Culvert Structures

Structure Type	Construction Type	Current Inventory
Bridges	T-Beam	3
	Concrete Slab on Steel Girder	6
	Concrete Rigid	20
	Concrete Slab on Precast	5
	Timber Deck	2
Culverts	Steel	8
	Concrete	33

2.2 Valuation

Replacement Cost Valuation

Replacement costs are provided annually within the Ontario Structure Inspection Manual (OSIM) summary reports, replacing each structure in a "like for like" fashion as any future changes are subject to detailed design and adherence to design standards at that time. For the purposes of this plan, the total replacement value for each structure type has been divided by the total square metres of the deck/cover for the component.

Table 2.2.1 Bridges and Culverts Replacement Cost

Material	Cost per m²
Bridges	$11,210
Culverts - Concrete	$8,945
Culverts - Steel	$5,655

Table 2.2.2 Bridges and Culverts Replacement Valuation

Asset Component	Replacement Cost	% of Total Value
Bridges	$58,632,000	55.5%
Culverts - Concrete	$40,348,000	38.2%
Culverts - Steel	$6,625,000	6.3%
Total Replacement Cost	**$105,605,000**	**100%**

2.3 Assessment Approach

OSIM Inspections are required to be carried out every two years to comply with the Public Transportation and Highway Improvement Act and the Ontario Regulation 104/97, amended to Ontario Regulation 160/02. The structure inspections are to be performed under the direction of a professional engineer. The study evaluates the structural and serviceability of individual elements and recommends required improvements.

The OSIM has specified condition states for each material type and, where required, for specialized elements. However, the general philosophy is outlined in the table below:

Table 2.3.1 Bridge & Culvert Condition State Characteristics

Condition	**Characteristics**
Excellent	This refers to an element (or part of an element) that is in “new” (as constructed) condition. No visible deterioration type defects are present and remedial action is not required. Examples: • “Bug holes” in concrete barrier walls • Well-formed patina in atmospheric corrosion resistant (ACR) steel girders
Good	This refers to an element (or part of an element) where the first sign of “Light” (minor) defects are visible. This usually occurs after the structure has been in service for several years. These types of defects would not normally trigger any remedial action since the overall performance of the element is not affected. Examples: • Light corrosion (no section loss) • Light scaling • Narrow cracks in concrete • Light decay in wood

Condition	Characteristics
Fair	This refers to an element (or part of an element) where medium defects are visible. These types of defects may trigger a “preventative maintenance” type of remedial action (e.g., sealing, coating, etc.) where it is economical to do so. Examples: • Medium corrosion (up to 10% section loss) • Medium cracks in concrete
Poor	This refers to an element (or part of an element) where severe and very severe defects are visible. In concrete, any type of spalling or delamination would be considered “poor” since these defects usually indicate more serious underlying problems in the material (e.g. corroding reinforcing steel). These types of defects would normally trigger rehabilitation or replacement if the extent and location affect the overall performance of that element. Examples: • Severe corrosion (Greater than 10% section loss) • Spalling, delamination, etc.

Once inspections have been completed, the Bridge Condition Index (BCI) for each structure is determined based on the MTO Methodology. The BCI determined helps to schedule maintenance and rehabilitation work and is not an indication of the safety of the bridge. The BCI is related to the condition states defined within the MTO Methodology, with poor being split into poor and very poor, as outlined below:

Table 2.3.2 Bridge Condition Index

BCI Value	Assetic Score	Rating
100	0	New
91-99	1	Very Good
71-90	2	Good
61-70	3	Fair
41-60	4	Poor
1-40	5	Very Poor
0	6	End of Life

2.4 Asset Condition Assessment

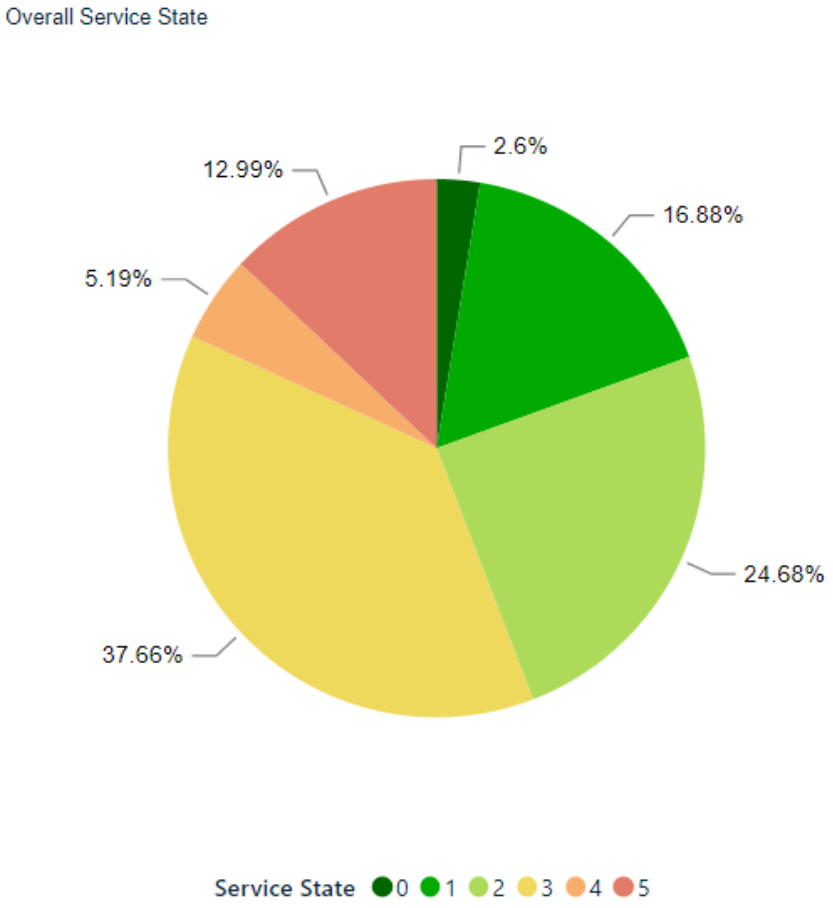
The table below provides the condition score of the Bridge and Culvert network based on the 2020/2021 OSIM inspections. The conditions have been adjusted along the appropriate deterioration curve by the Municipality's asset management software.

Table 2.4.1 Bridges and Culverts Condition Assessment

Asset Component	2020/2021 Condition Rating
Bridges	Fair
Steel Culverts	Good
Concrete Culverts	Fair

Based on the approach identified in Section 2.3, the Municipality's asset management software can generate a state of assets report for Bridges and Culvert network. This chart can be seen below:

Chart 2.4.1 Visual Bridge & Culvert Network Condition Assessment



The State of Assets at December 31st, 2021 indicates that 44.16% of bridge and culvert assets are in very good or good condition, 37.66% are in fair condition, and 18.18% are in poor or very poor condition. The weighted average is 2.65, which means that the entire bridge and culvert network is considered in good condition.

2.5 Useful Life

Table 2.5.1 outlines the anticipated useful life for each new build/replacement. These lives are used for PSAB purposes and align with the Municipality's Tangible Capital Asset policy.

Full replacement is anticipated at the end of the defined lifecycle. However, it is possible to have structures to either exceed their anticipated lifespan or require replacement prior to the end of their anticipated lifespan. The potential for extended lifespan or premature failure is dependent on many factors including preventative treatment, climate, change of use, etc.

Table 2.5.1 Useful Life

Bridges and Culverts	**Anticipated Useful Life (years)**
New Build / Replacement	
Culverts - Concrete	75
Culverts - Steel <3m	60
Bridge	75
Maintenance Strategy	
Bridge Rehabilitation	25

3.0 Levels of Service

Municipal roads are primarily transportation corridors and are designed to provide continuous efficient movement of people and goods as part of the overall transportation network. Bridges and culverts are assets that are within this road system that help with the movement of people and goods over various watercourses. Determining the correct service level is influenced by traffic volume, including volume of large transportation vehicles, preferences for maintenance routes to achieve plow efficiency, and resident preferences (their belief that the road network meets their needs and expected condition). The Transportation Master Plan (TMP) is based on the principle that Municipal roads should provide relatively good connectivity and a good level of roadway service throughout the Municipality.

3.1 Corporate Objective

The corporate objective of road maintenance is to ensure people and goods are able to move safely and efficiently throughout the Municipality of Meaford. The objective also extends to the maintenance of the Municipality's bridge and culvert structures as they are located within the road system. The bridge and culvert inventory includes a number of structures located on border roads with neighbouring municipalities in which the Municipality and neighbouring municipalities share in the maintenance activities and their costs. Service agreements are in place to ensure that service levels are maintained. The County of Grey also maintains structures on the boundary roads of the former St. Vincent and Sydenham Township as well as on roads that were downloaded to the Municipality shortly after amalgamation in the early 2000's.

3.2 Legislative Requirements

In addition to Ontario Regulation 104/97, amended to Ontario Regulation 160/02 specifying the requirements for a biennial Bridge Needs analysis, and Ontario Regulation 239/02 which establishes the Maintenance Standards for Bridge Decks. The maintenance requirement is based on what highway class the bridge is located on.

3.3.1 Scope of Services - Bridge Network and Traffic

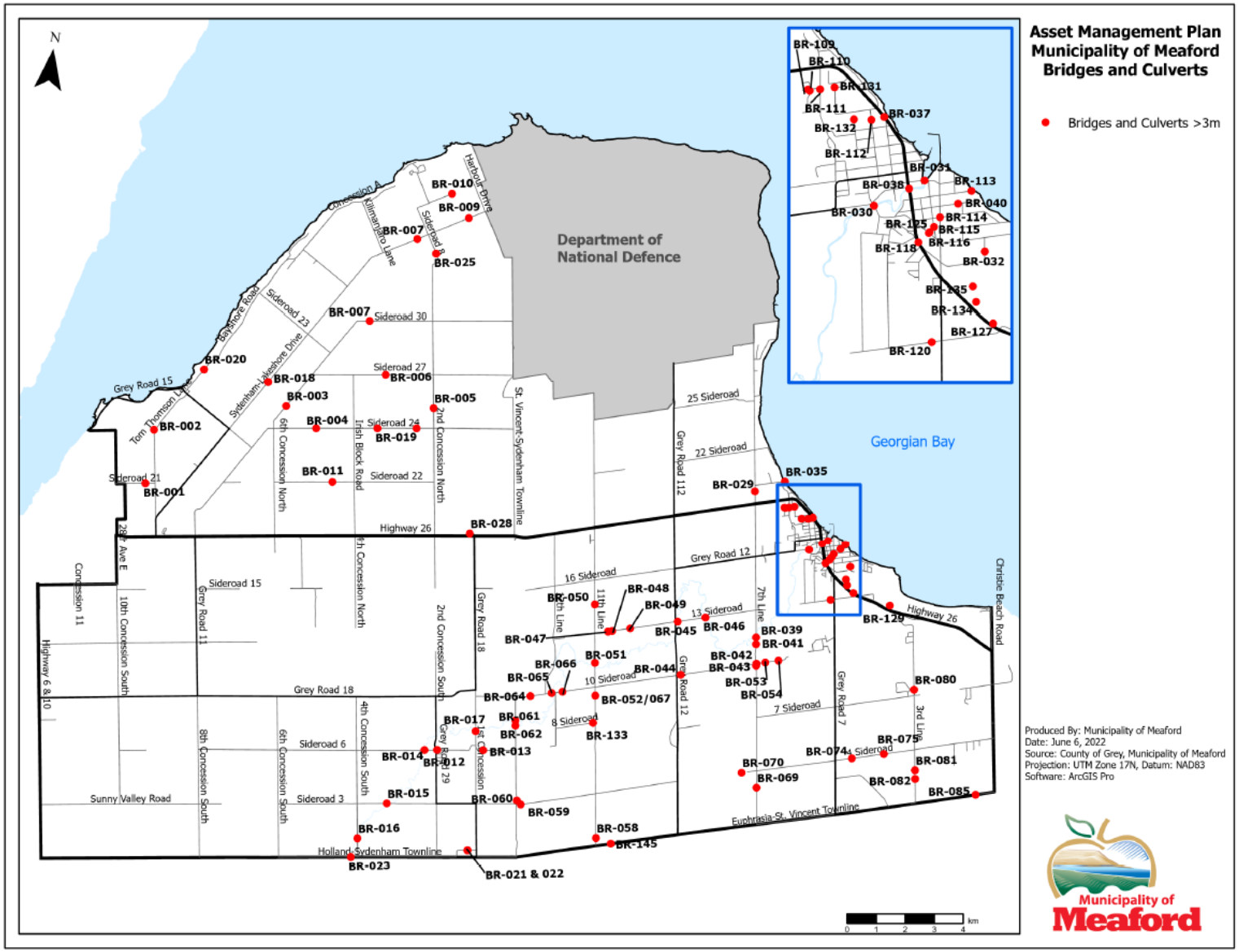
Community Levels of Service

A Description of the traffic that is supported by municipal bridges.

Structures within the Municipality support various traffic needs. Motor vehicles, emergency vehicles, pedestrians and cyclists, along with heavy transport and farming vehicles are supported by the Municipality's bridge and culvert network. For bridges with load-limit restrictions, this traffic support will vary depending on the limit.

A Map of the Municipality's Bridges & Culverts with over 3 metre span is provided in Figure 3.3.1.

Figure 3.3.1 – Map of Municipal Bridges & Culverts with over 3m Span



Technical Levels of Service

The identification of the percentage of structures in the municipality with loading or dimensional restrictions.

15% of the Municipality's structures have either loading or dimensional restrictions. Table 3.3.1.1 lists the structures that have load restrictions in accordance with By-law 2017-69, and Table 3.3.1.2 lists the structures that have dimensional restrictions (i.e., less than 2 lanes in width). Table 3.3.1.2 does not include pedestrian bridges, such as those on walking trails.

Table 3.3.1.1 Structures with Load Restrictions

Asset Name	Load Limit (t)
BR-002	8
BR-009	15
BR-013	8
BR-015	12
BR-027	10
BR-054	15
BR-059	15
BR-062	15
BR-066	15
BR-070	5

Asset Name	Load Limit (t)
BR-133	12
BR-145	5

Table 3.3.1.2 Structures with Dimensional Restrictions

Asset Name	**Dimensional Restriction**
BR-002	Single Lane
BR-009	Single Lane
BR-013	Single Lane

3.3.2 Quality of Services - Structure Condition

Community Levels of Service

A description or images of the condition of bridges and how this would affect use of the bridges.

As the condition rating declines there is an increase in the potential load restrictions to increase, which will impact the movement of goods and services through restricted use for larger vehicles and for the structure to fail and not provide service at all.

Table 3.3.2.1 Bridge Conditions with Example Photo

Bridge Condition Index (BCI)	Condition State	Example Photo
86 < BCI ≤ 100	Very Good	 BR NO.12 – Sideroad 6
71 < BCI ≤ 85	Good	 BR NO. 112 - Thompson St
56 < BCI ≤ 70	Fair	 BR NO.35 – Lakeshore Rd S

Bridge Condition Index (BCI)	Condition State	Example Photo
26 < BCI ≤ 55	Poor	 BR NO.70 – Sideroad 4
0 < BCI ≤ 25	Very Poor	 BR NO.145 – Euphrasia – St. Vincent Townline

Technical Levels of Service

For bridges in the municipality, the average bridge condition index value.

The average Bridge Condition Index within the Municipality is 65 (Fair).

3.3.2 Scope of Services – Culvert Condition

Community Levels of Service

A description or images of the condition of culverts and how this would affect use of the culverts.

As the condition rating declines there is an increase in the potential load restrictions to increase, which will impact the movement of goods and services through restricted use for larger vehicles and for the structure to fail and not provide service at all.

Table 3.3.2.1 Examples of Culvert Conditions

Bridge Condition Index (BCI)	Condition State	Example Photo
86 < BCI ≤ 100	Very Good	 BR NO. 43 – 7th Line
71 < BCI ≤ 85	Good	 BR NO.58 – 11th Line S
56 < BCI ≤ 70	Fair	 BR NO. 74 – Sideroad 4

Bridge Condition Index (BCI)	Condition State	Example Photo
26 < BCI ≤ 55	Poor	 BR NO. 129 – Georgian Trail
0 < BCI ≤ 25	Very Poor	 BR NO. 22 (Inactive) – Holland-Sydenham Townline

Technical Levels of Service

For culverts in the municipality, the average bridge condition index value.

For Steel Culverts within the Municipality, the average Bridge Condition Index is 74 (Good).

For Concrete Culverts within the Municipality, the average Bridge Condition Index is 67 (Fair).

4.0 Asset Management Strategy

4.1 Lifecycle Activities and Planned Actions

To effectively maintain the bridge and culvert network at the established service levels, they require the appropriate maintenance or rehabilitation strategy applied throughout an asset's lifecycle. There are six lifecycle maintenance strategies considered in the overall sustainable management of bridge and culverts, described in Table 4.1.1 below.

Table 4.1.1 Lifecycle Activities

Activities	**Planned Actions**	**Lifecycle Activities**
Non-infrastructure Solutions	Actions or policies that can lower costs or extend life and can include adjustments to levels of service	Load Limit By-law System Master Planning
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	Bridge Deck Washing Bridge Structure Washing Vegetation Removal Bi-annual OSIM Inspections Emergency Repairs (as required)

Activities	Planned Actions	Lifecycle Activities
Renewal/Rehabilitation	Significant repairs designed to extend the life of the asset.	Bridge Deck Rehabilitation Superstructure Rehabilitation (railing, curbs, girders) Substructure Rehabilitation (abutments, wingwalls) Culvert Rehabilitation (barrel, ends) Culvert Relining
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.	Bridge Deck Replacement Superstructure Replacement (railing, curbs, girders) Whole Bridge Replacement Culvert Replacement

Activities	Planned Actions	Lifecycle Activities
Disposal	Activites associated with disposing of an asset once it has reached its useful life, or is otherwise no longer needed by the municipality.	Bridge Removal Culvert Removal
Expansion	Planned activities required to extend services to previously unserviced areas – or expand services to meet growth demands.	Bridge Enlargement (hydraulic, deck width)

4.2 Risks Associated with the Strategy

The Municipality uses the highway classification to determine the consequence of failure for its bridge and culvert network. The higher the classification, the greater the consequence if the bridge or culvert deteriorates to the point where it is no longer passable. The highway classification is used as it takes into account the speed limit on the road segment and the average daily traffic volume.

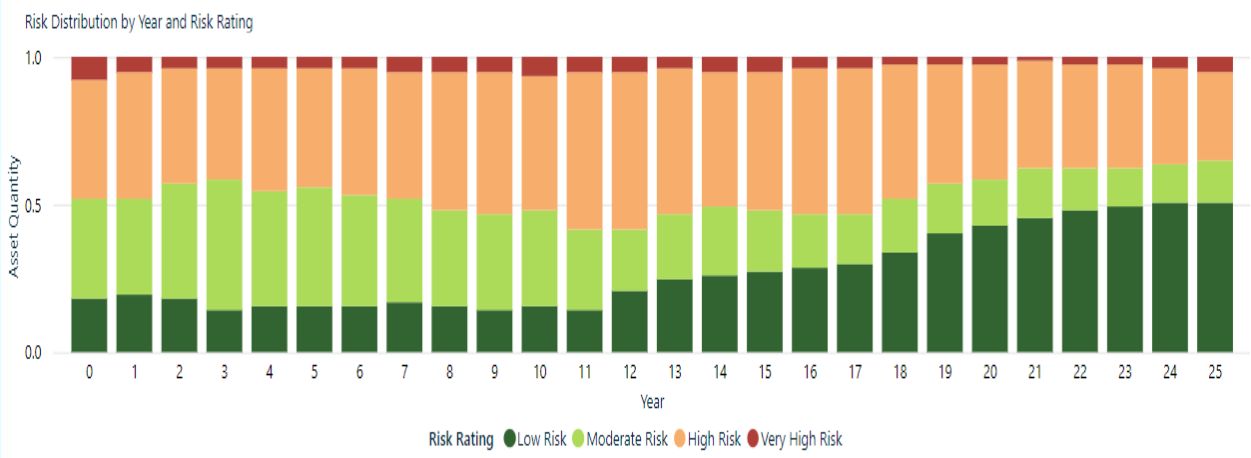
Table 4.2.1 Consequence of failure

Scoring	Consequence	Highway Classification
1	Very Low	N/A
2	Low	N/A
3	Medium	5,6
4	High	4
5	Very High	3, Dead End Roads

The risks associated with the bridge and culvert network are compared against the risks associated with all municipal assets. While looking at the bridge and culvert network only, there is justification that the consequence of failure of some bridges and culverts are very high compared to others. There also needs to be consideration given to the failure of these assets versus critical assets like water, wastewater, and other assets that can also have a negative impact on many users or private property. Bridges and culverts are still able to be driven on until a load restriction is placed on them or they become closed, and generally, an alternative route for users is provided if they wish to avoid restricted or closed structures.

Utilizing the asset's condition to determine the likelihood of failure and the highway classification as the consequence of failure, the Municipality's asset management software can generate a risk analysis profile for the road network for the period of the plan.

Graph 4.2.1 Risk Analysis profile



The Risk Analysis profile at December 31, 2021 indicates that 18.18% of bridges and culverts are considered low risk, 33.77% are considered moderate risk, 40.26% are considered high risk, and 7.79% are considered very high risk.

The risk profile for the 25-year period identified in the Asset Management Plan shows that there is not much change over the 25-year period due to the high number of bridge and culvert replacements included in the 25-year plan.

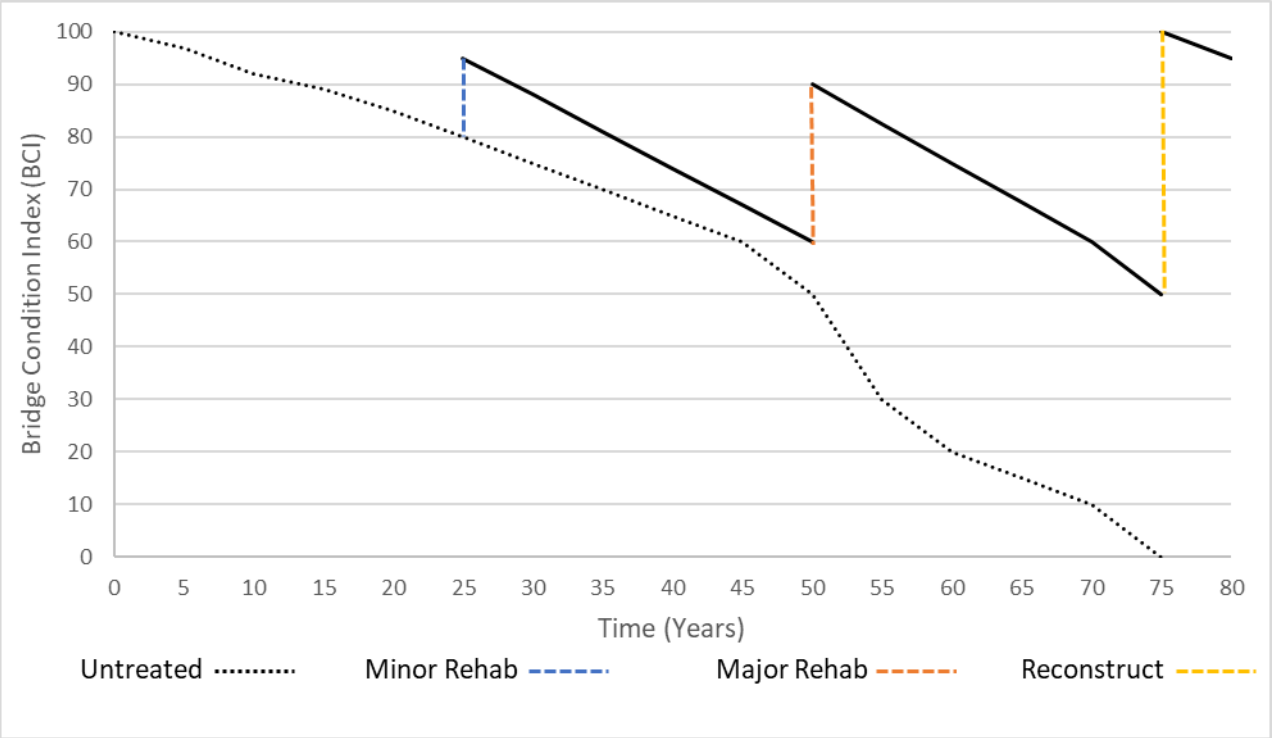
4.3 Lifecycle Analysis

There are several factors that will also influence when maintenance is to be completed. The Municipality reviews all infrastructure within the vicinity prior to planning construction projects. This review also includes working with area and neighbouring municipalities, as appropriate. This helps to minimize the disruption to stakeholders along with reducing the overall costs for completing the asset updates, regardless of whether the asset is wholly owned.

The annual OSIM inspections include a summary report outlining the maintenance, rehabilitation and replacement needs for a 10-year period. These needs are based on Urgent, 1-2 Year, 1-5 Year, and 6-10 Year time periods. Staff are working towards determining a method that factors these results into a modified deterioration curve to better predict future lifecycle needs and timing.

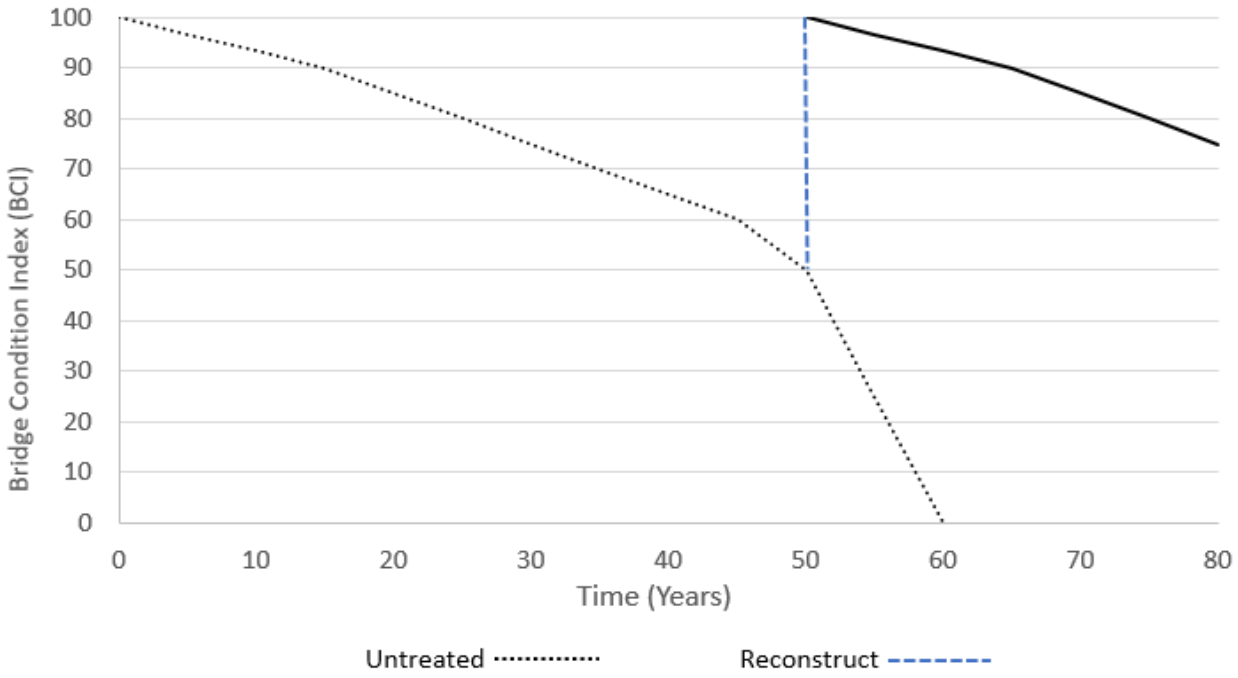
The rehabilitation and replacement lifecycle strategies in section 2.5 are illustrated in Chart 4.3.1.1 in relation to the anticipated lifecycle for bridges and culverts. As you can see in Chart 4.3.1.1, if no maintenance strategies were applied to a bridge or concrete culvert, it is expected it would reach complete failure around 75 years. By applying two rehabilitation strategies to these bridges, the useful life is extended to 100 years if it is allowed to deteriorate to complete failure. The Municipality plans to replace these structures after 75-80 years to prevent failure or when the BCI score is 40 depending on the results of the annual OSIM Inspections.

Chart 4.3.1.1 Illustrative Condition Over Lifecycle – Bridges and Concrete Culverts



The rehabilitation and replacement lifecycle strategies in section 2.5 are illustrated in Chart 4.3.1.2 in relation to the anticipated lifecycle for bridges and culverts. As you can see in Chart 4.3.1.2, if no maintenance strategies were applied to a steel culvert, it is expected it would reach complete failure around 60 years. The Municipality has not investigated major rehabilitation projects like culvert relining as a lifecycle management tool and therefore has planned to replace these culverts after 50 years of age in order to prevent failure or when the BCI score is 40 depending on the results of the annual OSIM Inspections.

Chart 4.3.1.2 Illustrative Condition Over Lifecycle – Steel Culverts



5.0 Financing Strategy

5.1 Financing Strategy

O. Reg. 588/17 requires the Municipality to identify the cost of the lifecycle activities that would need to be undertaken to maintain the current levels of service for each of the ten years following the year for which the current levels of service are determined along with the costs of providing those activities.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities for roads are as follows.

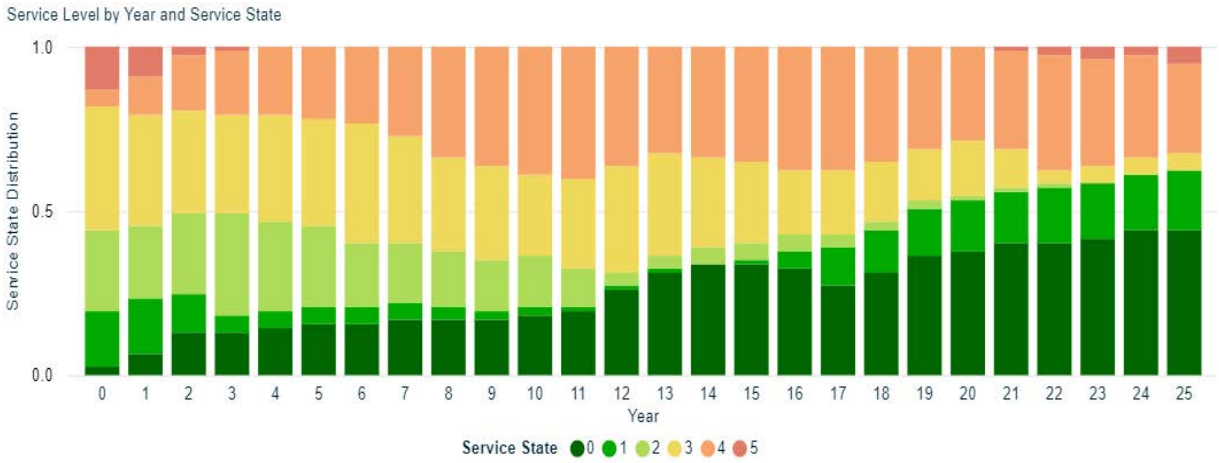
Table 5.1.1 Lifecycle Financing Strategy – Bridges and Culverts

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	38	39	39	39	39	39	40	40	40	40
Maintenance	75	75	75	75	75	75	75	75	75	75
Renewal / Rehabilitation	990	990	990	990	990	990	990	990	990	990
Replacement	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322	1,322
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	0	0	0	0	0	0	0	0	0	0
Total ($)	2,425	2,426	2,426	2,426	2,426	2,426	2,427	2,427	2,427	2,427

The non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and do not include expenses that have not been applied to an operating program or project. Further development of the Municipality's asset management program will allow additional operating cost accuracy to be applied to these categories for the 2025 version of the Asset Management Plan.

The Municipality's Asset Management Software can produce a Service State Analysis Report based on this strategy using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.1.1 Bridges and Culverts Service Level by Year and Condition State – Lifecycle Strategy



The State of Assets at December 31, 2021 indicates that 44.16% of bridge and culvert assets are in very good or good condition, 37.66% are in fair condition, and 18.18% are in poor or very poor condition. The weighted average is 2.65, which means that the entire bridge and culvert network is considered in good condition.

The State of Assets at December 31, 2032 indicates that 36.36% of bridges and culvert assets are in very good or good condition, 24.68% are in fair condition, and 38.96% are in poor or very poor condition. The weighted average is 2.78, which means that the entire system is considered in good condition.

The State of Assets at December 31, 2047 indicates that 62.34% of bridge and culvert assets are in very good or good condition, 5.19% are in fair condition, and 32.46% are in poor or very poor condition. The weighted average is 2.22, which means that the entire system is considered in good condition.

5.2 Expenditure Forecasts

The Municipality's 2016 State of The Infrastructure Report (SOTI) for Municipal Bridges and Culverts was approved by Council in 2016. The plan recommended a 1% annual increases to the overall capital expenditures for roads and bridges. The expenditure forecast for the purposes of this Asset Management Plan will continue the 1% annual increases until such time that Council approves the 2025 Asset Management Plan and establishes proposed levels of service at that time.

As the non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and require more extensive review, the expenditure forecast is based on the annual 1% increase for capital until 2025 and then stays the same.

Capital investments for the bridge and culvert network are currently funded by levy-supported dedicated reserves and the occasional use of debt and upper-tier grant funding (i.e. OCIF).

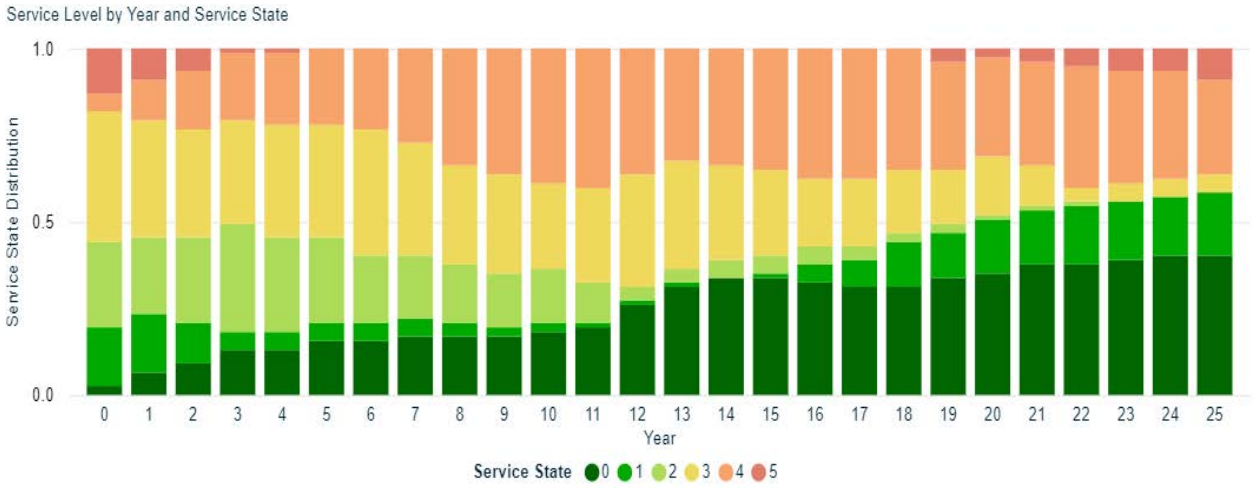
Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities within the approved 1% annual increase are as follows:

Table 5.2.1 Expenditure Forecast – Bridges and Culverts

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	38	39	39	39	39	39	40	40	40	40
Maintenance	75	77	78	80	81	83	84	86	88	90
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	1,628	1,788	1,948	1,948	1,948	1,948	1,948	1,948	1,948	1,948
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	0	0	0	0	0	0	0	0	0	0
Total ($)	1,741	1,903	2,064	2,066	2,068	2,070	2,072	2,073	2,075	2,077

The Municipality's Asset Management Software can produce a Service State Analysis Report based on the current expenditure forecast using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.2.1 Hard Surface Service Level by Year and Condition State – Expenditure Forecast



The State of Assets at December 31, 2021 indicates that 44.16% of bridge and culvert assets are in very good or good condition, 37.66% are in fair condition, and 18.18% are in poor or very poor condition. The weighted average is 2.65, which means that the entire bridge and culvert network is considered in good condition.

The State of Assets at December 31, 2032 indicates that 36.36% of bridges and culvert assets are in very good or good condition, 24.68% are in fair condition, and 38.96% are in poor or very poor condition. The weighted average is 2.78, which means that the entire system is considered in good condition.

The State of Assets at December 31, 2047 indicates that 58.44% of bridge and culvert assets are in very good or good condition, 5.19% are in fair condition, and 36.36% are in poor or very poor condition. The weighted average is 2.63, which means that the entire system is considered in good condition.

5.3 Lifecycle Financing Strategy vs. Expenditure Forecast Analysis

The analysis between the Lifecycle Financing Strategy and the Expenditure Forecast identifies the funding gap between the two financial models. The result of this analysis is as follows:

Table 5.3.1 Financing Strategy vs. Expenditure Forecast – Bridges and Culverts

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost	2,425	2,426	2,426	2,426	2,426	2,426	2,427	$2,427	2,427	2,427
Expenditure Forecast	1,741	1,903	2,064	2,066	2,068	2,070	2,072	2,073	2,075	2,077
Funding Gap ($)	**(684)**	**(523)**	**(362)**	**(360)**	**(358)**	**(356)**	**(355)**	**(354)**	**(352)**	**(350)**

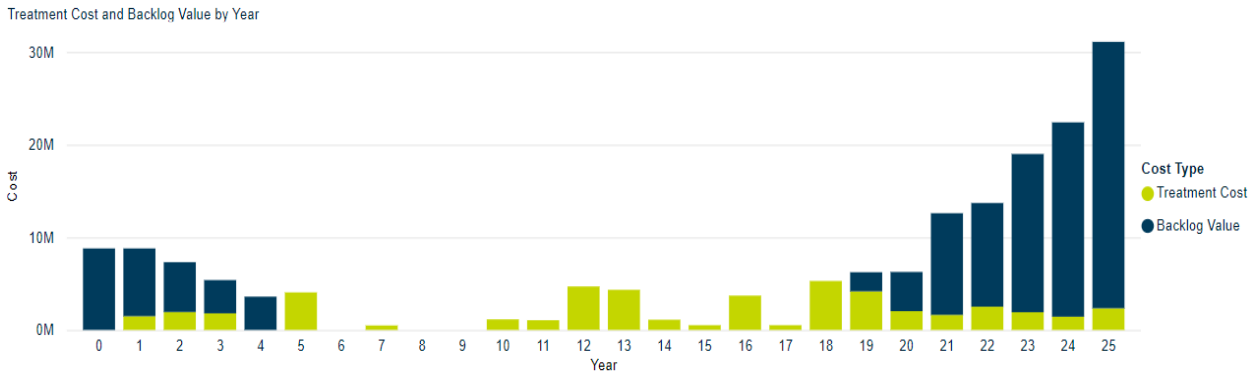
In order to meet the financial requirements of the Lifecycle Financing Strategy, the Municipality will be required to fund projects through additional revenue tools such as reserve and reserve funds, grants, debt, new revenues, or additional annual levy increases. Alternatively, projects will need to continue to be deferred, which will have a negative impact on the overall bridge network condition.

5.4 Lifecycle Financing Strategy Limitations

The Lifecycle Financing Strategy has been developed on the current levels of service and programs being delivered by the Municipality. This strategy implies that these practices have been in place since the installation of the assets and does not recognize the impacts of previous investment that has resulted in the current system condition.

The Municipality's asset management software can generate a backlog report that identifies the backlog of asset rehabilitation or replacement needs that shows the number of assets that are currently not meeting the current levels of service. The backlog report based on the current system condition is shown in Chart 5.4.1

Chart 5.4.1 Backlog Report – Bridges and Culverts



The current workbank backlog is $8,793,329.18 and includes backlogged requirements for the structures that are currently closed, the large culvert on the Georgian Trail, as well as a series of smaller structures on lower traffic roads.

The Year 10 backlog is $0 due to a series of bridge replacement projects in the first seven years of the model. The effect of the replacement projects on the overall system is that it has lowered the overall service score because of the deferral of rehabilitation works to years 12 and 13 of the model.

The Year 25 backlog is $28,753,451.76 and includes 7 structures that are no longer eligible for rehabilitation. The effect of works completed during 2017-2022 are now requiring further rehabilitation or replacement at the end of this period, adding to the amount of backlogged work.

6.0 Improvement Plan and Recommendations

The following recommendations are based on a review of current management practices; and, inventory, valuation and condition analysis and will help support the update of this document for the 2025 Asset Management Plan.

	Recommendations
1.	Continue to develop a model that incorporates the deterioration of the bridge and culvert network and applies the time of need for rehabilitation or replacement.
2.	Continue to monitor new construction methods / rehabilitation technologies as they emerge in order to extend useful lives of structures or to reduce treatment costs.
3.	Establish and monitor appropriate and measurable levels of service and performance measures.
4.	Bi-annually review and update condition information and replacement costs to help inform the budget process. Confirm the replacement costs include all non-construction related fees and reflect current legislation.

	Recommendations
5.	Collaborate with neighbouring municipalities to align asset management plans to gain efficiencies by optimizing investment priorities of linear assets.
6.	Establish target Bridge Condition Index (BCI) level of service to match the Municipality's road classifications.

Appendix C

Stormwater Network

1.0 Introduction

The Municipality's stormwater collection network is broken out into one category and includes the following:

- **Stormwater Mains –** Pipe segments that convey stormwater from Catchbasin and Catchbasin Maintenance Hole (CBMH) to Catchbasin Maintenance Hole and eventually to an outlet (ditch, watercourse, open water).

For the purposes of the 2022 Asset Management Plan, the stormwater collection mains and leads includes catchbasins, catchbasin maintenance hatches, oil/grit separators and other appurtenances associated with the system.

2.0 State of Infrastructure

2.1 Inventory

Table 2.1.1 summarizes the stormwater collection network inventory by classification

Table 2.1.1 Stormwater Systems Inventory

Asset Type	Asset Component	Current Inventory (m)	Average Age
Linear	Stormwater Collection Main <380mm	13,964	30
	Stormwater Collection Main <550mm	4,337	32
	Stormwater Collection Main <760mm	2,671	36
	Stormwater Collection Main <915mm	404	33

2.2 Valuation

Replacement Cost Valuation

In order to take into account the varying diameter of stormwater collection mains and the absence of a stormwater management master plan (SWMP), the 2022 replacement costs were determined based on the per metre replacement cost of the existing pipe with the same diameter as its current size. This results in an estimate of the total replacement cost of the stormwater network at a lower cost than will be identified upon completion of the SWMP. The estimated replacement cost of the Municipality's entire stormwater collection network in 2022 dollars is $37.1 Million.

The replacement cost valuation for stormwater collection mains is based on our 2021 tender prices, where available. Table 2.2.1 breaks out the replacement cost of the stormwater collection network.

Table 2.2.1 Stormwater Systems Replacement Valuation

Road Network	**Road Network**	**Road Network**
Stormwater Collection Main <380mm	$23,040,600	62.14
Stormwater Collection Main <550mm	$7,698,175	20.76
Stormwater Collection Main <760mm	$5,342,000	14.41
Stormwater Collection Main <915mm	$999,990	2.69
Total Replacement Cost	**$37,080,765**	**100%**

2.3 Assessment Approach

The Pipeline Assessment Certificate Program (PACP) is the North American Standard for pipeline defect identification and assessment. Zoom Camera inspections conducted in 2020/21 was the method of inspecting stormwater collection system mains, leads, and CBMH's. A structural rating, on a scale of 0-5, was assigned using standardized sewer condition assessment standards, with 0 representing an asset in very good condition (minimal structural deficiencies) and 5 representing an asset in very poor condition (on the verge of failure).The rating system is broken out as follows:

Table 2.3.1 PACP Scoring

PACP Structural Score	Assetic Score	Rating
0*	0	New
0,1	1	Very Good
2	2	Good
3	3	Fair
4	4	Poor
5	5	Very Poor
EoL*	6	End of Life

* denotes a score that is added to the Municipality's asset management software to reflect the service life of an asset.

The Municipality's target for completing visual inspections on each pipe segment is 10 years, which aligns with industry practice. The Municipality

may perform more frequent inspections on pipes with poor condition ratings as required.

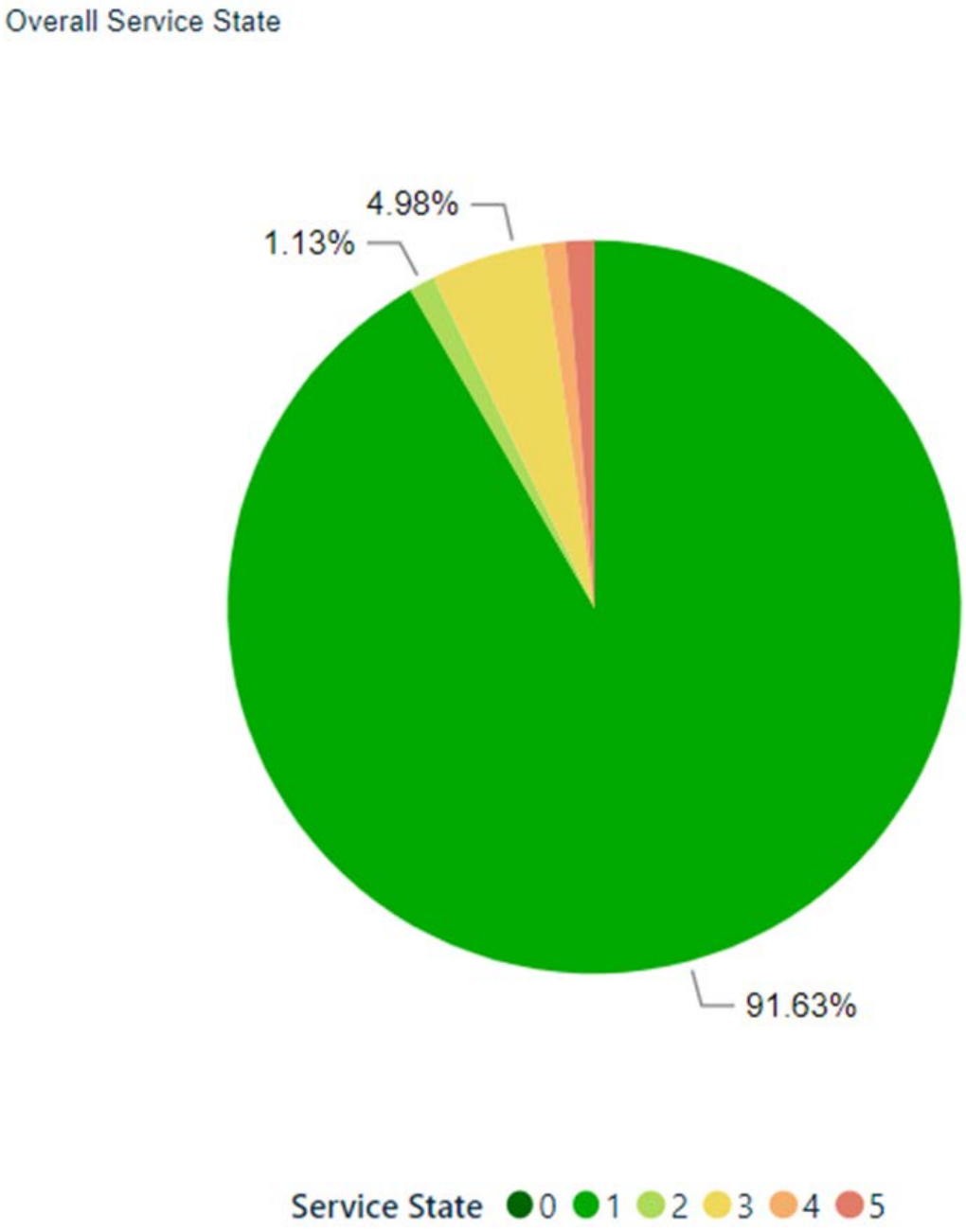
2.4 Asset Condition Assessment

Based on the approach identified in Section 2.3, the Municipality's asset management software can generate a State of Assets report for the Stormwater distribution network.

Table 2.4.1 Stormwater Systems Condition Assessment

Asset Component	2020 Condition Rating
Stormwater Collection Main	Very Good

Chart 2.4.1 Visual Stormwater Network Condition Assessment



The State of Assets at December 31st, 2021, indicates that 92.76% of stormwater collection assets are in very good or good condition, 4.98% are in fair condition, and 2.26% are in poor or very poor condition. The weighted average is 1.19, which means that the entire system is considered in very good condition.

2.5 Useful Life

Table 2.5.1 outlines the anticipated useful life for each new installation/replacement. These lives are used for PSAB purposes and align with the Municipality's Tangible Capital Asset Policy. Materials that have been installed in previous years but do not have a similar anticipated useful as outlined below have been adjusted within the asset management software.

The Municipality has not investigated the potential for relining pipe segments and will be able to identify opportunities upon the completion of the SWMP. For the purposes of this plan, full replacement is anticipated at the end of the anticipated useful life defined. However, it is possible to have components either exceed the lives defined or require replacement prior to the end of their anticipated life.

Table 2.5.1 Useful Life

Stormwater Systems	**Anticipated Useful Life (years)**
New Build / Replacement	
Stormwater Collection Main	80

3.0 Level of Service

The Municipality defines the stormwater collection system as an external service that collects surface water from both public and private lands and conveys it to an outlet to prevent damage to both municipal assets and private property. The Municipality will be commencing a SWMP in 2023 which will provide the Municipality with a guiding document in the development of its levels of service for this asset class.

3.1 Corporate Objective

The stormwater collection system ensures protection of the environment and public health of residents and visitors to the Municipality.

3.2 Legislative Requirements

The Municipality's stormwater collection system regulated under the Ontario Water Resources Act and operated in accordance with Certificates of Approval issued by the Ontario Ministry of the Environment, Conservation and Parks.

3.3 Legislative Requirements - O. Reg. 588/17

O. Reg. 588/17 requires for each asset category, the current levels of service being provided, determined in accordance with the prescribed qualitative descriptions and technical metrics and must be based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan. For the Municipality's stormwater collection system, the following Levels of Service must be identified:

3.3.1 Scope of Services - Stormwater Collection System

Community Levels of Service

A Description, which may include maps of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.

The Municipality cannot determine or report on the extent of protection provided by the stormwater management system until the completion of the SWMP. Historically there have been very few stormwater related incidents however this is difficult to quantify with the limited information available.

The Municipality's stormwater collection system is predominately located in the Municipality's urban settlement area. The map of this area can be seen below:

Figure 3.3.1.1 Map of Stormwater Network-Municipality View

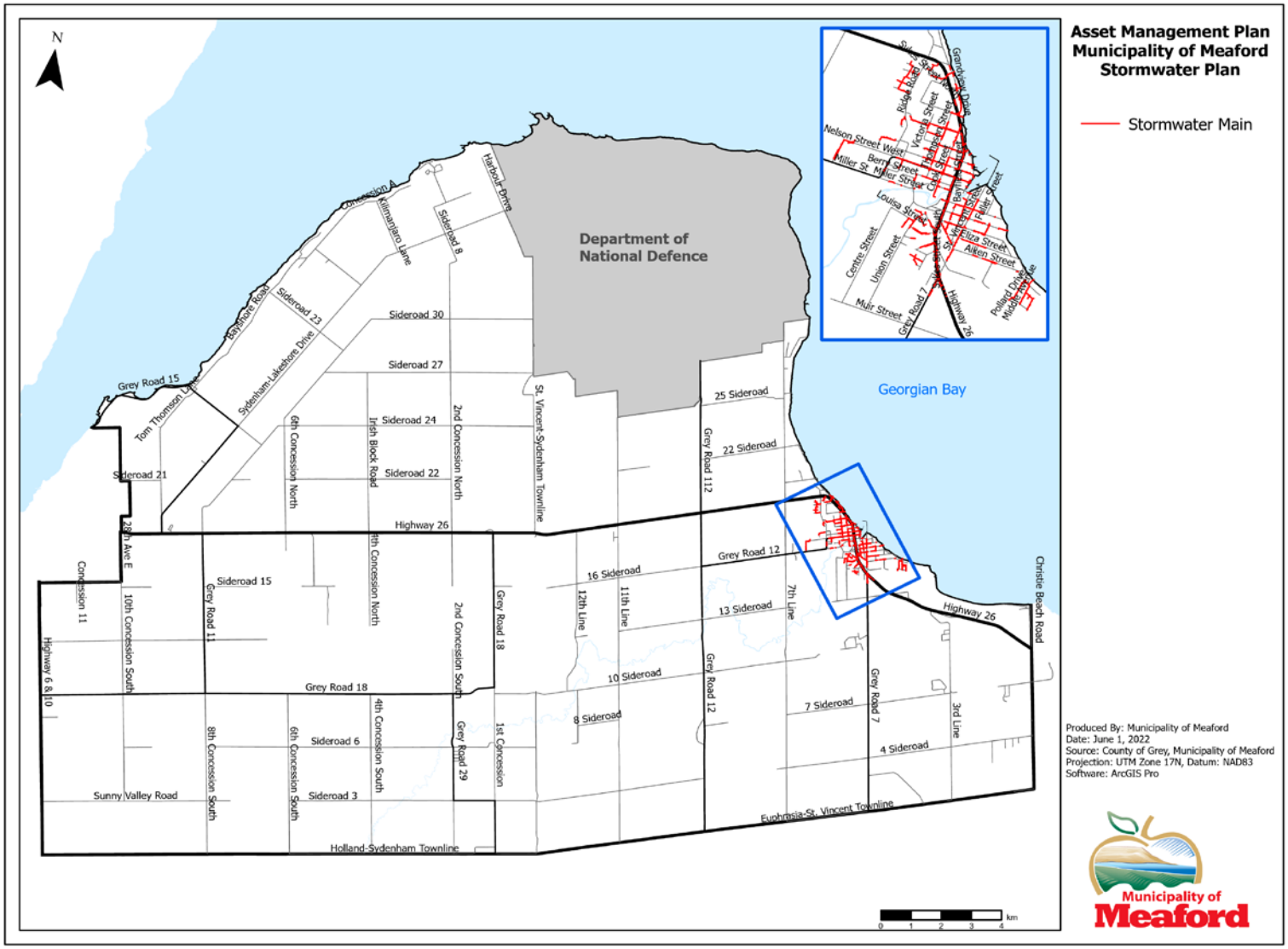


Figure 3.3.1.1 Map of Stormwater Network

Technical Levels of Service #1

Percentage of the municipal stormwater management system resilient to a 5-year storm.

The Municipality is unable to report on this metric until the completion of the SWMP.

Technical Levels of Service #2

The identification of the percentage of properties in municipality resilient to a 100-year storm.

The Municipality is unable to report on this metric until the completion of the SWMP.

4.0 Asset Management Strategy

4.1 Lifecycle Activities and Planned Actions

To effectively maintain the stormwater collection system at the established service levels they require the appropriate maintenance or rehabilitation strategy applied throughout an asset's lifecycle. There are six lifecycle maintenance strategies considered in the overall sustainable management of stormwater segments, described in Table 4.1.1 below.

Table 4.1.1 Lifecycle Activities

Activities	**Planned Actions**	**Lifecycle Activities**
Non-infrastructure Solutions	Actions or policies that can lower costs or extend life and can include adjustments to levels of service	Sewer Use Bylaw Design Guidelines Flow Monitoring System Master Planning
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	CCTV Inspections Maintenance Hole Inspections Emergency Repairs (as required)
Renewal/Rehabilitation	Significant repairs designed to extend the life of the asset.	Catch Basin Repair

Activities	Planned Actions	Lifecycle Activities
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.	Full Pipe Segment Replacement Partial Pipe Segment Replacement Maintenance Hole Reconstruction
Disposal	Activites associated with disposing of an asset once it has reached its useful life, or is otherwise no longer needed by the municipality.	Abandonment of Pipe Segments In-situ Removal of Pipe Segment
Expansion	Planned activities required to extend services to previously unserviced areas – or expand services to meet growth demands.	Installation of Pipe Segments for Future Growth Upsizing of Pipe Segments for Future Growth

4.2 Risks Associated with the Strategy

Until such time the Municipality's completes the SWMP, the Municipality will use the diameter of the stormwater collection pipe to determine the consequence of failure. The higher the classification, the greater the consequence if the pipe segment deteriorates to the point where it is no longer conveys stormwater.

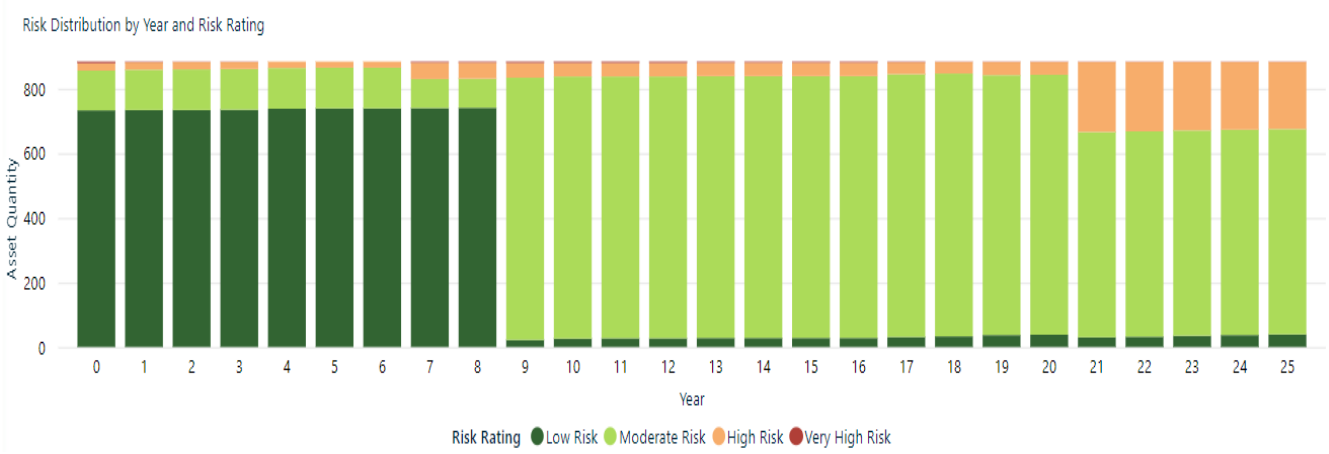
Table 4.2.1 Consequence of Failure

Scoring	Consequence	Pipe Diameter (mm)
1	Very Low	<150
2	Low	150 – 200
3	Medium	200 – 400
4	High	400 – 600
5	Very High	>600 + Outlets

The risks associated with the stormwater network are compared against the risks associated with all municipal assets. While looking at the stormwater collection system only, there is justification that the consequence of failure of some pipe segments are very high compared to others. There also needs to be consideration given to the failure of these assets versus critical assets like water, wastewater, and other assets that can also have a negative impact on many users or private property. The SWMP will be able to provide a more detailed risk analysis of the network.

Utilizing the asset's condition to determine the likelihood of failure and the diameter of the pipe as the consequence of failure, the Municipality's asset management software can generate a risk analysis profile for the stormwater collection system, for the period of the plan.

Chart 4.2.1 Asset risk profile



The Risk Analysis profile at December 31st, 2021 indicates that 82.92% of the pipe segments are considered low risk, 13.91% are considered moderate risk, 2.60% are considered high risk, and 0.57% are considered very high risk.

The risk profile for the 25-year period identified in the Asset Management Plan changes significantly as many assets considered low risk change to moderate risk due to their condition scoring based on the deterioration curve and their age combined with the replacement only strategy being utilized for the model.

4.3 Lifecycle Analysis

The development of a SWMP is required to determine the lifecycle requirements of the facilities and their processes. It is anticipated that this will include a detailed component breakdown to allow for strategies to be developed. This will prioritize projects and aid in the development of future capital budgets.

5.0 Financing Strategy

5.1 Financing Strategy

O. Reg. 588/17 requires the Municipality to identify the cost of the lifecycle activities that would need to be undertaken to maintain the current levels of service for each of the ten years following the year for which the current levels of service are determined and the costs of providing those activities.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities are as follows:

Table 5.1.1 Lifecycle Financing Strategy – Stormwater Mains

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	0	0	0	0	0	0	0	0	0	0
Maintenance	20	20	20	20	20	20	20	20	20	20
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	464	464	464	464	464	464	464	464	464	464
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	484	484	484	484	484	484	484	484	484	484

The non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and do not include costs that have not been applied to an operating program or project. The information collected through the work order management system will allow for the allocation of overhead, staffing, utility, debt servicing costs, etc., to be applied to these categories for the 2025 version of the Asset Management Plan.

Expansion / Development Charge related costs have not been included in this version of the Asset Management Plan as the 2022 Development Charge Study has not been finalized and approved by Council at the time of the preparation of this report. This study needs to be incorporated into the financing strategy to determine the costs to be raised through Development Charges but also allocated for replacement to be funded by existing users.

The Municipality's Asset Management Software can produce a Service State Analysis Report based on this strategy using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.1.1 Stormwater Collection Service Level by Year and Condition State – Lifecycle Strategy

The State of Assets on December 31, 2021 indicates that 92.76% of stormwater collection assets are in very good or good condition, 4.98% are in fair condition, and 2.26% are in poor or very poor condition. The weighted average is 1.19, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2032 indicates that 95.02% of stormwater collection assets are in very good or good condition, 0.00% are in fair condition, and 4.98% are in poor or very poor condition. The weighted

average is 2.06, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2047 indicates that 7.24% of stormwater collection assets are in very good or good condition, 91.63% are in fair condition, and 1.13% are in poor or very poor condition. The weighted average is 2.81, which means that the entire system is considered in very good condition.

5.2 Expenditure Forecasts

The Municipality does not have a financial plan for its stormwater collection system. Historically, stormwater asset replacement occurs at the same time as water, wastewater, and road assets or as a result of premature failure. Future needs will be better defined upon the completion of the SWMP.

As the non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and require more extensive review, the capital expenditure forecast based is on the average tax levy contributions towards stormwater replacement projects.

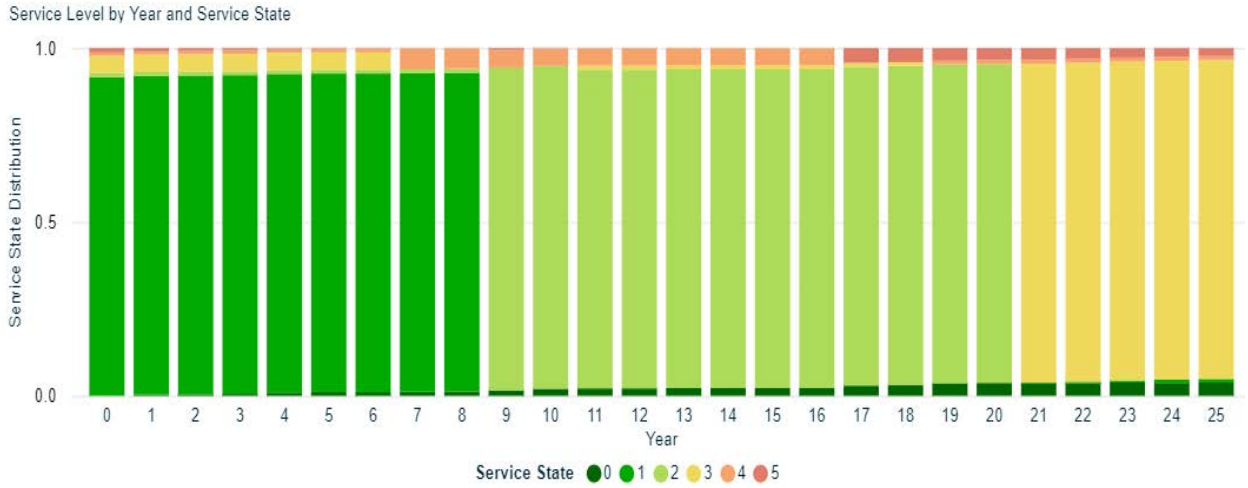
Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities within the approved annual expenditure is as follows:

Table 5.2.1 Expenditure Forecast – Stormwater Mains

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	0	0	0	0	0	0	0	0	0	0
Maintenance	20	20	20	20	20	20	20	20	20	20
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	50	50	50	50	50	50	50	50	50	50
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	70	70	70	70	70	70	70	70	70	70

The Municipality's Asset Management Software can produce a wastewater main Service State Analysis Report based on the current expenditure forecast using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.2.1 Stormwater Collection - Service Level by Year and Condition State – Current Expenditure Forecast



The State of Assets on December 31, 2021 indicates that 92.76% of stormwater collection assets are in very good or good condition, 4.98% are in fair condition, and 2.26% are in poor or very poor condition. The weighted average is 1.19, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2032 indicates that 94.80% of stormwater collection assets are in very good or good condition, 0.00% are in fair condition, and 5.23% are in poor or very poor condition. The weighted average is 2.08, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2047 indicates that 4.87% of wastewater collection assets are in very good or good condition, 91.63% are in fair condition, and 3.51% are in poor or very poor condition. The weighted average is 2.97, which means that the entire system is considered in good condition.

5.3 Lifecycle Financing Strategy vs. Expenditure Forecast Analysis

The analysis between the Lifecycle Financing Strategy and the Expenditure Forecast identifies the funding gap between the two financial models. The result of this analysis is as follows:

Table 5.3.1 Financing Strategy vs. Expenditure Forecast – Stormwater Mains

	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lifecycle Cost ($)	484	484	484	484	484	484	484	484	484	484
Expenditure Forecast ($)	70	70	70	70	70	70	70	70	70	70
Funding Gap ($)	(414)	(414)	(414)	(414)	(414)	(414)	(414)	(414)	(414)	(414)

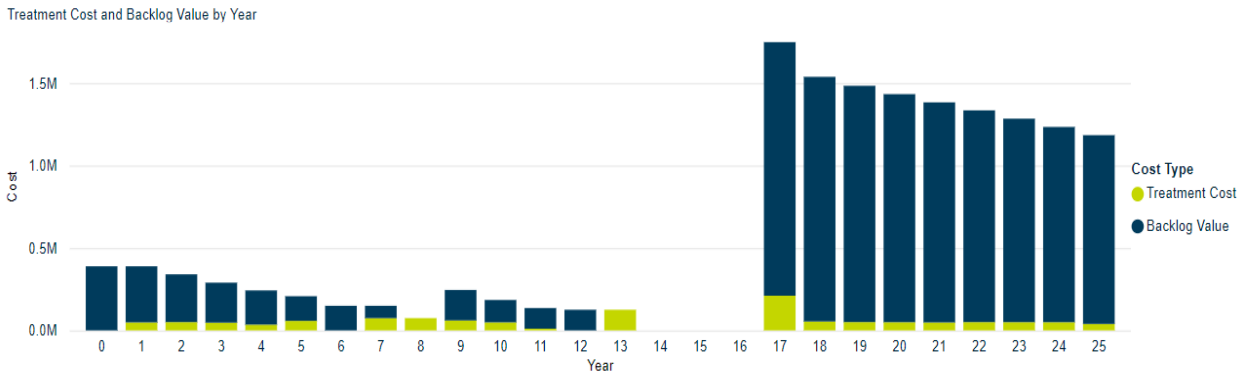
Based on table 5.3.1 , the annual funding gap for stormwater mains between the two strategies will remain the same for 2023 to 2032. This will not have a significant impact on the overall condition as the assets will end up in good condition; however, the further deterioration of the pipe segments might limit the ability for them to be rehabilitated (re-lined) in the future. In order to meet the financial requirements of the Lifecycle Financing Strategy, the Municipality will be required to fund projects through additional revenue tools such as reserve and reserve funds, grants, debt, new revenues, or additional annual levy increases. Alternatively, projects will need to continue to be deferred, which will have a negative impact on the overall system condition.

5.4 Lifecycle Financing Strategy Limitations

The Lifecycle Financing Strategy has been developed on the current levels of service and programs being delivered by the Municipality. This strategy implies that these practices have been in place since the installation of the assets and does not recognize the impacts of previous investment that has resulted in the current system condition. The Municipality's asset management software can generate a backlog report which identifies the backlog of asset rehabilitation or replacement needs. This report shows the number of assets that are currently not meeting the current levels of

service. The backlog report based on the current system condition is shown in Chart 5.4.1.

Chart 5.4.1 Backlog Report



The current workbank backlog is $388,995.41 and generally consists of the pipe segments that need to be replaced due to a combination of poor material, age, and insufficient capacity to meet levels of service.

The Year 10 backlog is $135,854.48 and represents approximately $250,000 in replacement of the pipe segments identified in the current workbank backlog between year 1 and 10.

The Year 25 backlog is $1,144,382.48 and represents the effects of the Municipality not being able to replace end of life pipe segments due to most of the system beginning to require replacement at the same time

6.0 Improvement Plan

The following recommendations are based on the review of current management practices, and inventory, valuation and condition analysis.

	Recommendations
1.	Complete a Stormwater Management Master Plan to further develop the Municipality's asset management program and to establish and monitor appropriate and measurable levels of service and performance measures.
2.	Establish a scoring system including mapping to correlate asset condition ratings for both road and linear assets in the urban area to ensure timely rehabilitation or replacement of all assets within the road corridor.

Appendix D

Water Network

1.0 Introduction

The Municipality's Water Treatment and Distribution system is broken out into four categories and includes the following:

- Distribution Mains (Local & Transmission)
- Booster Pumping / Re-Chlorination Stations
- Water Treatment Plant
- Water Tower

The Sustainable Water and Sewage Systems Act, 2002 indicates that regulated entities must prepare and approve a report concerning the provision of water and wastewater services. The report must include an inventory of and management plan for the infrastructure needed to provide the services, certified by a professional engineer and an assessment of the total cost of providing the services and the revenue obtained to provide them. The Act specifies that the total cost of providing services includes source water protection costs, operating costs, financing costs, renewal and replacement costs and improvement costs.

2.0 State of Infrastructure

2.1 Inventory

The Municipality continues to make improvements to increase the integrity of the water data. As a result of this work, hydrants and valves are now being captured as separate components to represent the different maintenance strategies and costs. However, for the purposes of this Asset Management Plan, the costs for these assets have been incorporated into the per metre replacement cost of the watermain segments.

Table 2.1.1 Water Systems Inventory

Asset Type	Asset Component		Current Inventory
Linear	Local Main (<400mm)	m	51,083
	Transmission Main (>400mm)	m	9,899
Facilities	Booster Pumping / Re-chlorination Stations	each	4
	Storage (Water Tower)	each	1
	Water Treatment Plant	each	1

2.2 Valuation

Replacement Cost Valuation

The replacement cost valuation for linear water assets is based on costs for replacement with PVC pipes using our 2021 tender prices, where available. The cost per metre includes the cost of the watermain, hydrants, services, temporary construction measures, engineering, and contingency allowance, in order to understand the cost of replacing watermains as a whole, rather than by individual component.

The facilities replacement costs are primarily based on the 2018 replacement values as identified in the 2018 Building Condition Assessment (BCA) project. Some changes were made where work was completed, or the Municipality received updated information. The Municipality plans to complete further investigations in this area to ensure the correct values are assigned to the building and processes.

Table 2.2.1 Water Systems Replacement Cost per Metre

Material	Cost per m
Watermain (<250mm Diameter)	$2,275
Watermain (251mm – 349mm Diameter)	$2,475
Watermain (>350mm Diameter)	$2,675

Table 2.2.2 Water Systems Replacement Valuation

Asset Component	Replacement Cost	% of Total Value
Local Main (<350mm)	$132,018,050	70.99
Trunk Main (>350mm)	$10,159,650	5.46
Booster Pumping/ Chlorination Stations	$6,793,600	3.65
Storage (Water Tower)	$1,668,750	.90
Water Treatment Plant	$35,336,000	19.00
Total Replacement Cost	**$185,976,050**	**100%**

2.3 Assessment Approach

Watermains are difficult to inspect due to the high-pressure flow of water constantly underway within the pipes. In addition, completing physical inspections would require service disruptions and are time-consuming and costly to complete.

Rather than using an age-based only evaluation, Municipal staff have reviewed different condition assessment methods and have developed a method that takes into consideration the age of the percentage of the estimated life consumed by the pipe, the number of watermain breaks on the pipe segment, and the vulnerability of the material that the pipe segment is constructed of.

70% of the rating has been assigned to the percent of consumed life to recognize the age of the pipe and the duration that it has been installed in the ground, 20% of the rating has been assigned to the number of watermain breaks on the pipe segment to recognize deterioration related to pipe bedding, environmental factors, operational factors, poor construction, etc., while the remaining 10% of the rating has been assigned to the pipe material based on the failure rate of the materials that have been documented in the industry and by the Municipality. The 2015 Water Master Servicing Plan included recommendations on the immediate replacement of 100mm Cast Iron watermains due to their performance. The rating system described above has included this recommendation when determining the system, as many of the pipe segments identified in the 2015 document have already exceeded their estimated useful life. The results of the internal rating system are broken out as follows:

Table 2.3.1 Condition Ratings – Watermains

Condition Value	Rating
0	New
1	Very Good
2	Good
3	Fair
4	Poor

Condition Value	Rating
5	Very Poor
6	End of Life

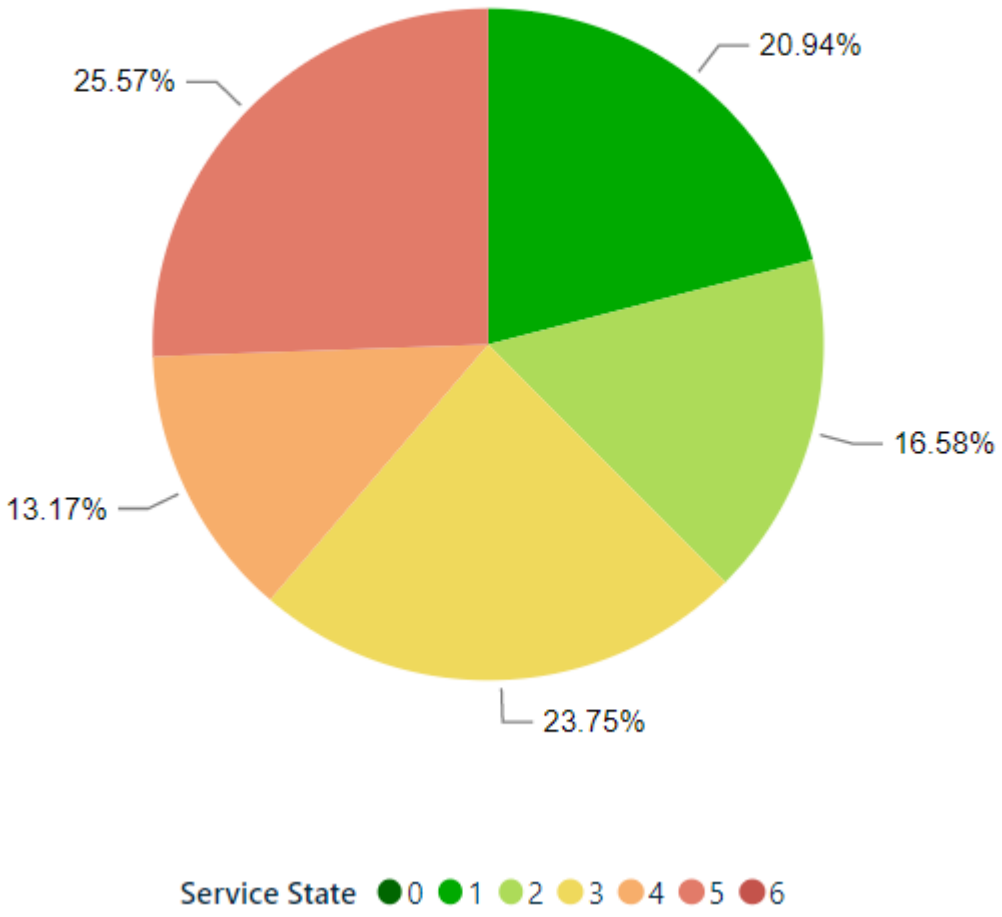
The assessment approach for facilities was completed in 2017 and 2018 through separate projects with one report focusing on the treatment equipment and the other focusing on the facility components. The results of the two projects were combined to develop a Facility Condition Index (FCI) score for the facilities. The FCI score is based on the work required divided by the replacement value of the facility. The results of the rating system are broken out as follows:

Table 2.3.2 Condition Ratings – Water Facilities

Condition Score	Rating
0 - 5 %	Good
6 - 10%	Fair
11 - 30%	Poor
>31%	Critical

2.4 Asset Condition Assessment

Chart 2.4.1 Visual State of Assets



The State of Assets on December 31, 2021 indicates that 37.52% of water distribution assets are in very good or good condition, 23.75% are in fair condition, and 38.74% are in poor or very poor condition. The weighted average is 3.06, which means that the entire system is considered in fair condition.

Table 2.4.2 Condition of Assets

Asset Component	2021 Condition Score	2021 Condition Rating
Pumping/Chlorination Stations	.02	Good
Water Tower	0	Good
Water Treatment Plant	.90	Good

The Municipality's water related facilities are considered in good condition due to the importance of the equipment and in some instances the redundancy that has been put in place. A more comprehensive review and prioritization of important equipment is needed in order to ensure that proper funding can be allocated in the future.

2.5 Useful Life

Table 2.5.1 outlines the anticipated useful life for each new build/replacement, along with the anticipated added life when a structure undergoes rehabilitation. These lives are used for PSAB purposes and align with the Municipality's Tangible Capital Asset policy.

Further refinement of the asset management strategies between the component breakdown for facilities and processes is required. The most effective and efficient maintenance schedule and the overall lifecycle of each asset will be determined.

Watermain lining is a maintenance strategy that is not available in all instances and needs to be further investigated by the Municipality for larger diameter pipes. For the purposes of this plan, full replacement is anticipated at the end of the anticipated useful life defined. However, it is possible to have components either exceed the lives defined or require replacement prior to the end of their anticipated life.

Table 2.5.1 Useful Life

Water Systems	Anticipated Useful Life (years)
Local Main	80
Transmission Main	80
Water Systems	**Anticipated Useful Life (years)**
Storage (Water Tower)	75
Water Booster Pumping Station	75
Water Treatment Plant	75

3.0 Level of Service

The Municipality defines the water service as a service that supplies drinking water from source to tap for water customers.

The Municipality publishes annual reports on its website summarizing test results and operating conditions for each of the municipal drinking water systems within the Municipality.

3.1 Corporate Objective

The Municipality is committed to providing the appropriate quantity of water and quality water as it directly impacts customers' quality of life by reducing the potential for water-borne disease, allowing for economic development and fire protection, and providing opportunities for recreational activities.

3.2 Legislative Requirements

The purpose of the *Safe Drinking Water Act, 2002* is to recognize that the people of Ontario are entitled to expect their drinking water to be safe and to provide for the protection of human health and the prevention of drinking water health hazards through the control and regulation of drinking water systems and drinking water testing. Ontario Regulation 170/03 provides specifications and reporting requirements regarding drinking water systems. Ontario Regulation 169/03 specifies the Ontario Drinking Water Quality Standards. The DWQMS requires an operating authority to document a quality management system for each municipal, year-round, residential drinking water system that it operates in an operational plan which must be accepted by the MOECP.

3.3 Legislative Requirements – O. Reg. 588/17

O. Reg. 588/17 requires for each asset category, the current levels of service being provided, determined in accordance with the prescribed qualitative descriptions and technical metrics, based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan. For the Municipality's water system, the following Levels of Service must be identified:

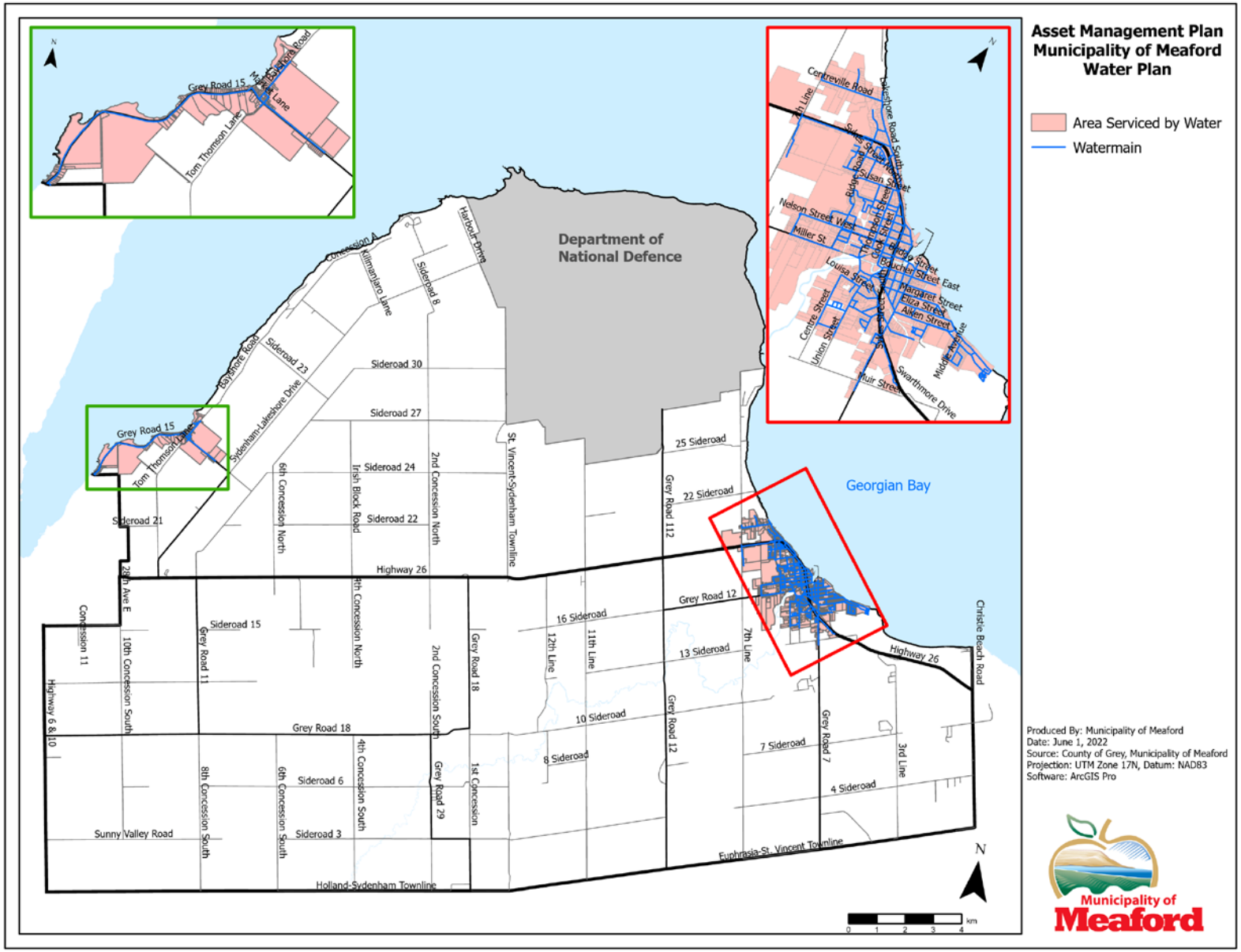
3.3.1 Scope of Services – System Connections

Community Levels of Service

A description, which may include maps, of the user groups or areas of the Municipality that are connected to the municipal water system.

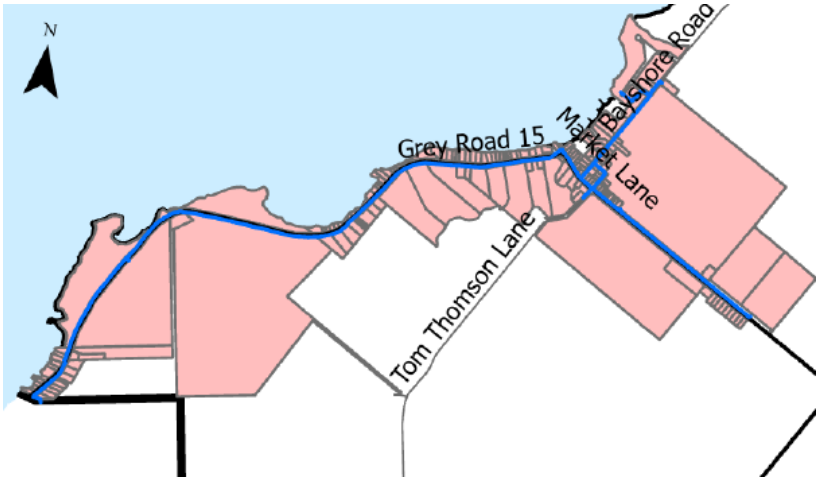
Based on the 2021 Annual Meaford Water Treatment Plant Report, the Municipality currently reports on servicing Residential and Commercial user groups. While the Municipality does service Industrial, Commercial and Institutional (ICI) customers, it is not currently tracked by unit. The two Residential and Commercial groups are split up into two areas of the Municipality; those of which are the Meaford Water System (Urban), and the secondary Leith Water System (Rural). The Meaford Water System (Urban) services 2,254 residences, and 810 commercial properties, while the Leith Water System (Rural) services 136 Residences. Figure 3.3.1.1 shows a map of Meaford and Leith Water systems.

Figure 3.3.1.1 Map of Water Network



Meaford Water System

Leith Water System



Technical Levels of Service

The identification of the percentage of properties connected to the municipal water system.

40% of the properties in the Municipality of Meaford are connected to the water system. This represents 3,200 connections out of 7,987 total properties.

3.3.2 Scope of Services – Fire Flow

Community Levels of Service

A description, which may include maps, of the user groups or areas of the Municipality that have fire flow.

The 2015 Water Servicing Master Plan utilized water system modeling to project areas of the water system that do not meet fire flow requirements. While the majority of the water system provides adequate flow, there are areas on the perimeter of the water system that do not meet these requirements. There have been upgrades to both pipe segments and equipment since 2015 that should improve the areas identified as not meeting fire flow requirements and this will be confirmed in the 2023 water modeling update project.

Technical Levels of Service

The identification of the percentage of properties where fire flow is available.

The Municipality's asset registry and water modelling data are not synchronized, so there is no ability to provide a direct answer to this Level of Service at this time.

3.3.3 Reliability of Services - Boil Water Advisories and Service Disruptions

Community Levels of Service

A description of boil water advisories and service interruptions.

Boil water advisories are issued to the public when water quality results do not meet standards. These advisories warn people not to drink water that may be or is known not to be safe to consume without boiling it first.

Service interruptions are short-term interruptions to water users and generally associated with water breaks, maintenance activities, replacement activities or other preventative measures to ensure the functionality and safety of the water system. The Municipality provides its best effort to notify residents of any system interruptions.

Technical Levels of Service #1

The number 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.

Below is a table of the Municipality's Boil water advisories, compared to the number of properties in the Municipality over the past 4 years.

Table 3.3.3.1 Boil Water Advisories

Parameter	2018	2019	2020	2021
Boil water advisory	0	0	0	0
Connection-days	0	0	0	0
Total number of properties	7,899	7,938	7,982	7,987

Technical Levels of Service #2

The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system.

Table 3.3.3.2 Watermain Breaks

Parameter	2018	2019	2020	2021
Watermain Breaks	5	8	9	4
Connection-days	0*	0*	0*	0*
Total number of properties	7,899	7,938	7,982	7,987

*The Municipality has not historically tracked the number of connections that are affect by watermain breaks and have begun to do so in 2022. Most repairs are completed “under pressure” which minimizes the number of connections affected by breaks.

4.0 Asset Management Strategy

4.1 Lifecycle Activities and Planned Actions

To effectively maintain the water system at the established service levels, they require the appropriate maintenance or rehabilitation strategy applied throughout an asset's lifecycle. There are six lifecycle maintenance strategies considered in the overall sustainable management of water segments, described in Table 4.1.1 below.

Table 4.1.1 Lifecycle Activities

Activities	Planned Actions	Lifecycle Activities
Non-infrastructure Solutions	Actions or policies that can lower costs or extend life and can include adjustments to levels of service.	Water Meter By-law Design Guidelines Flow Modeling System Master Planning
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	Hydrant Flushing Valve Turning Emergency Repairs (as required)
Renewal/Rehabilitation	Significant repairs designed to extend the life of the asset.	
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.	Full Pipe Segment Replacement Partial Pipe Segment Replacement Main Valve Replacement Hydrant Replacement

Activities	Planned Actions	Lifecycle Activities
Disposal	Activites associated with disposing of an asset once it has reached its useful life, or is otherwise no longer needed by the Municipality.	Abandonment of Pipe Segments In-situ Removal of Pipe Segment
Expansion	Planned activities required to extend services to previously unserviced areas – or expand services to meet growth demands.	Installation of Pipe Segments for Future Growth Upsizing of Pipe Segments for Future Growth

4.2 Risks Associated with the Strategy

The DWQMS requires the assessment of risks to the Drinking Water Systems. For the purposes of this version of the AMP, the Municipality has used the pipe segment diameter to determine the consequence of failure, as outlined in Table 4.2.1. Assessing risks for the drinking water systems is a complex endeavour, and further refinement is required to assign the appropriate risk to each water asset. One such factor is pipe location, as a pipe failure near a booster pumping station would have catastrophic consequence, while a pipe of the same diameter on a residential street may only have a marginal consequence.

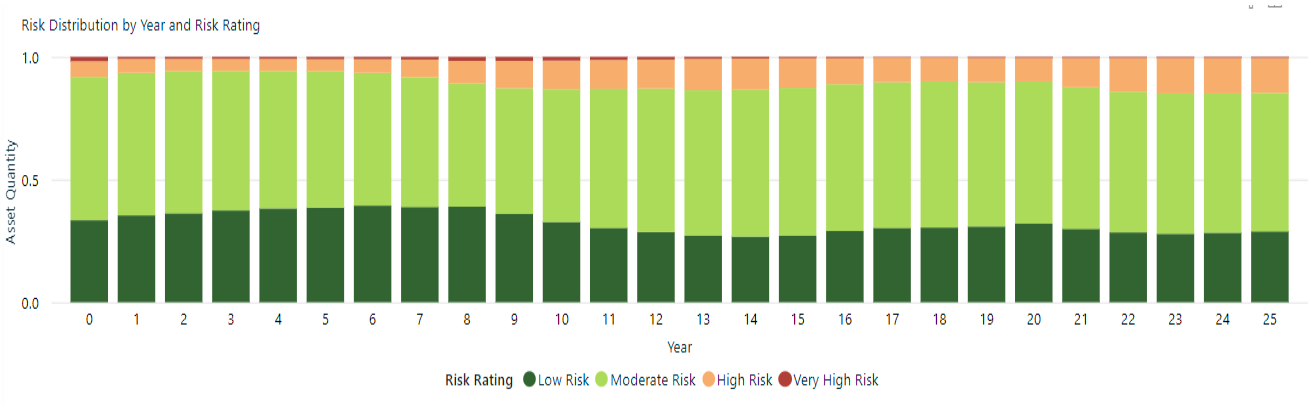
Table 4.2.1 Consequence of Failure

Scoring	Consequence	Pipe Diameter (mm)
1	Very Low	<100
2	Low	100 – 150

Scoring	Consequence	Pipe Diameter (mm)
3	Medium	150 – 250
4	High	250 – 350
5	Very High	>350

Utilizing the asset's condition to determine the likelihood of failure and the diameter of the pipe as the consequence of failure, the Municipality's asset management software can generate a risk analysis profile for the water distribution network for the period of the plan. This risk analysis can be seen in Chart 4.2.2 below:

Chart 4.2.2 Risk Analysis Profile



The Risk Analysis profile at December 31, 2021 indicates that 33.43% of the pipe segments are considered low risk, 58.36% are considered moderate risk, 6.37% are considered high risk, and 1.86% are considered very high risk.

The risk profile for the 25-year period identified in the Asset Management Plan remains consistent.

4.3 Lifecycle Analysis

Additional work is required to determine the lifecycle requirements of the valves, hydrants, water meters, and facilities and their associated processes. It is anticipated that this will include a detailed component breakdown to

allow for strategies to be developed. This will prioritize projects and aid in the development of future capital budgets.

5.0 Financing Strategy

5.1 Financing Strategy

O. Reg. 588/17 requires the Municipality to identify the cost of the lifecycle activities that would need to be undertaken to maintain the current levels of service for each of the ten years following the year for which the current levels of service are determined and the costs of providing those activities.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities are as follows.

Table 5.1.1 Lifecycle Financing Strategy – Watermains

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	35	0	75	0	0	35	0	0	0	0
Maintenance	173	144	144	144	144	144	144	144	144	144
Renewal / Rehabilitation	146	146	146	146	146	146	146	146	146	146
Replacement	2,215	2,215	2,215	2,215	2,215	2,215	2,215	2,215	2,215	2,215
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	2,570	2,505	2,580	2,505	2,505	2,540	2,505	2,505	2,505	2,505

Table 5.1.2 Lifecycle Financing Strategy – Water Facilities

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	15	0	75	0	0	35	0	0	0	0
Maintenance	96	96	96	96	96	96	96	96	96	96
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	404	403	305	159	210	264	167	242	27	6
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	515	499	401	255	306	360	263	338	123	102

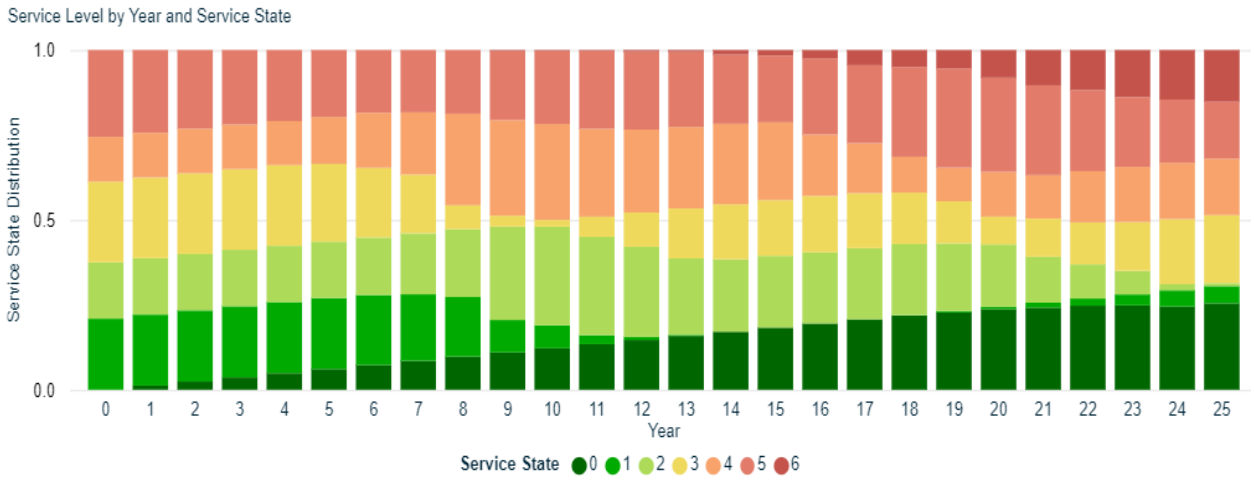
The non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and do not include costs that have not been applied to an operating program or project. These costs also do not include debt servicing costs until a strategy has been finalized. The Municipality's future water and wastewater rate study, combined with information collected through the work order management system, will allow for the allocation of overhead, staffing, utility, debt servicing costs, etc., to be applied to these categories for the 2025 version of the Asset Management Plan.

Expansion / Development Charge related costs have not been included in this version of the Asset Management Plan as the 2022 Development Charge

Study has not been finalized and approved by Council at the time of the preparation of this report. This study needs to be incorporated into the financing strategy to determine the costs to be raised through Development Charges but also allocated for replacement costs to be funded by existing users.

The Municipality's Asset Management Software can produce a Service State Analysis Report based on this strategy using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.1.1 Watermain Service Level by Year and Condition State – Lifecycle Strategy



The State of Assets at December 31, 2021 indicates that 37.52% of water distribution assets are in very good or good condition, 23.75% are in fair condition, and 38.74% are in poor or very poor condition. The weighted average is 3.06 which means that the entire system is considered in fair condition.

The State of Assets at December 31, 2032 indicates that 48.00% of water distribution assets are in very good or good condition, 1.98% are in fair condition, and 50.02% are in poor or very poor condition. The weighted average is 2.93 which means that the entire system is considered in good condition.

The State of Assets at December 31, 2047 indicates that 31.40% of water distribution assets are in very good or good condition, 20.00% are in fair condition, and 48.60% are in poor or very poor condition. The weighted average is 3.08 which means that the entire system is considered in fair

condition. However, it should be noted that starting in Year 14 there are several pipe segments that begin to show as End of Life.

5.2 Expenditure Forecasts

The Municipality's 2021-2026 Water and Wastewater Financial Plan was approved by Council in May 2020. The plan recommended 8% annual increases to the overall water and wastewater budgets. The expenditure forecast for the purposes of this Asset Management Plan will continue the 8% annual increases until such time that Council approves a new Water and Wastewater Financial Plan.

As the non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and require more extensive review, the expenditure forecast based on the annual 8% increase will only include an annual increase of 5% for renewal/rehabilitation and replacement activities associated with the Municipality's capital program leaving the remainder for other operating cost and non-infrastructure program increases.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities within the approved annual increase is as follows.

Table 5.2.1 Expenditure Forecast – Watermains

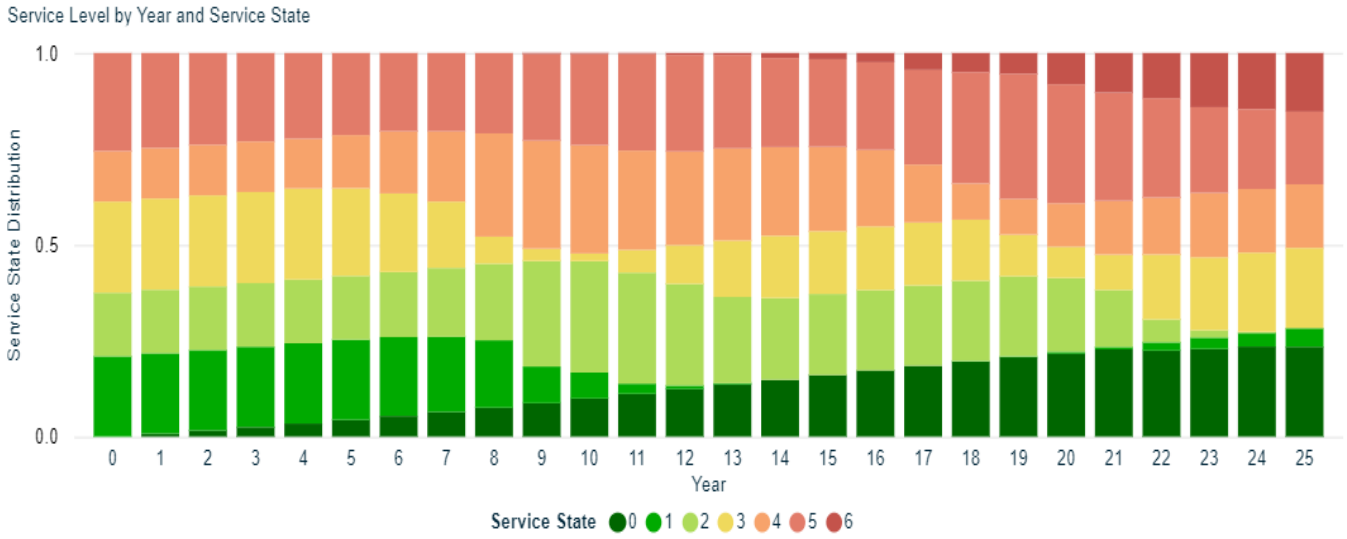
Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	35	0	75	0	0	35	0	0	0	0
Maintenance	173	144	144	144	144	144	144	144	144	144
Renewal / Rehabilitation	146	146	146	146	146	146	146	146	146	146
Replacement	1,436	1,508	1,583	1,662	1,745	1,833	1,924	2,021	2,122	2,215
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	1,790	1,797	1,948	1,952	2,035	2,157	2,214	2,310	2,411	2,505

Table 5.2.2 Expenditure Forecast – Water Facilities

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	15	0	0	0	0	0	0	0	0	0
Maintenance	96	96	96	96	96	96	96	96	96	96
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	250	250	250	250	250	250	250	250	250	250
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	361	346	346	346	346	346	346	346	346	346

The Municipality's Asset Management Software is able to produce a Watermain Service State Analysis Report based on the current expenditure forecast using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.2.1 Watermain Service Level by Year and Condition State – Current Expenditure Forecast



The State of Assets at December 31, 2021 indicates that 37.52% of water distribution assets are in very good or good condition, 23.75% are in fair condition, and 38.74% are in poor or very poor condition. The weighted average is 3.06 which means that the entire system is considered in fair condition.

The State of Assets at December 31, 2032 indicates that 45.73% of water distribution assets are in very good or good condition, 1.98% are in fair condition, and 52.29% are in poor or very poor condition. The weighted average is 3.04 which means that the entire system is considered in fair condition.

The State of Assets at December 31, 2047 indicates that 28.25% of water distribution assets are in very good or good condition, 20.94% are in fair condition, and 50.81% are in poor or very poor condition. The weighted average is 3.20 which means that the entire system is considered in fair condition, however 15.44% of the system will be considered End of Life.

5.3 Lifecycle Financing Strategy vs. Expenditure Forecast Analysis

The analysis between the Lifecycle Financing Strategy and the Expenditure Forecast identifies the funding gap between the two financial models. The result of this analysis is as follows:

Table 5.3.1 Financing Strategy vs. Expenditure Forecast - Watermains

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost ($)	2,570	2,505	2,580	2,505	2,505	2,540	2,505	2,505	2,505	2,505
Expenditure Forecast ($)	1,790	1,797	1,948	1,952	2,035	2,157	2,214	2,310	2,411	2,505
Funding Gap ($)	(779)	(708)	(632)	(553)	(470)	(383)	(291)	(195)	(94)	(0)

Table 5.3.2 Financing Strategy vs. Expenditure Forecast – Water Facilities

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost ($)	515	499	401	255	306	360	263	338	123	102
Expenditure Forecast ($)	361	346	346	346	346	346	346	346	346	346
Funding Gap ($)	(154)	(153)	(55)	91	40	(14)	83	8	223	244

Based on table 5.3.1, the annual funding gap for watermains between the two strategies will diminish by year 10, while there will be a surplus for facilities. In order to meet the financial requirements of the Lifecycle Financing Strategy, the Municipality will be required to fund projects through additional revenue tools such as reserve and reserve funds, grants, debt, new revenues, or additional annual levy increases. Alternatively, projects will need to continue to be deferred, which will have a negative impact on the water system condition.

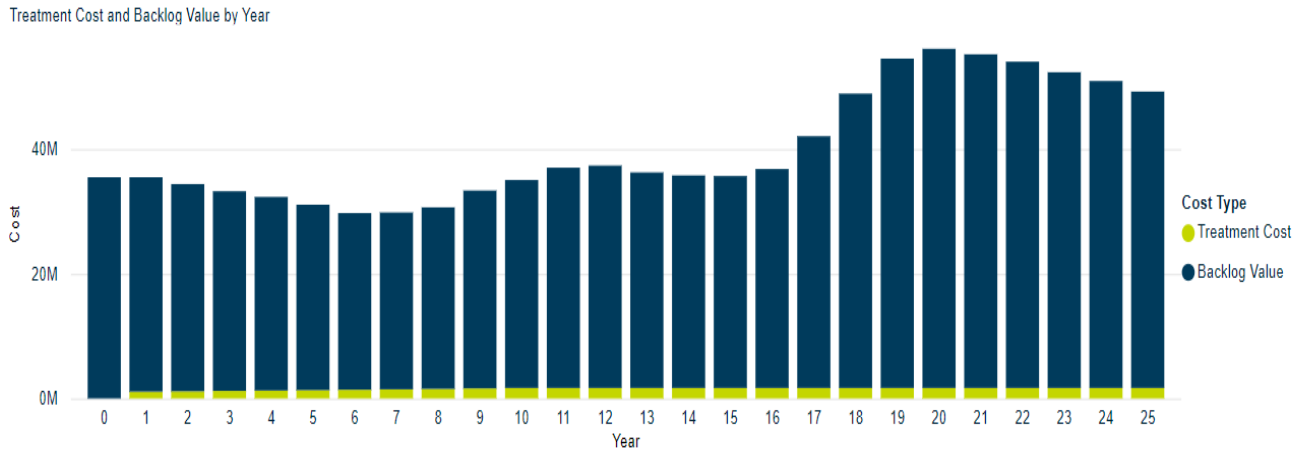
A version of this analysis will be generated for equipment and facilities as part of the 2025 version of the Asset Management Plan.

5.4 Lifecycle Financing Strategy Limitations

The Lifecycle Financing Strategy has been developed on the current levels of service and programs being delivered by the Municipality. This strategy implies that these practices have been in place since the installation of the assets and does not recognize the impacts of previous investment that has resulted in the current system condition. The Municipality's asset management software can generate a backlog report that identifies the

backlog of asset rehabilitation or replacement needs that shows the number of assets that are currently not meeting the current levels of service. The backlog report based on the current system condition is shown in Chart 5.4.1

Chart 5.4.1 – Backlog Report



The current workbank backlog is $35,471,238.07 and generally consists of the Municipality's 100mm Diameter Cast Iron pipes that need to be replaced due to a combination of poor material, age, and insufficient capacity to meet levels of service.

The Year 10 backlog is $33,327.059.68 and represents approximately $2.1 Million in replacement of the pipe segments identified in the current workbank backlog between year 1 and 10.

The Year 25 backlog is $47,710,656.18 and represents the effects of the Municipality not being able to replace end of life pipe segments due to the earlier year focus on the 100mm diameter cast iron pipes.

A version of this analysis will be generated for equipment and facilities as part of the 2025 version of the Asset Management Plan.

6.0 Improvement Plan

The following recommendations are based on the review of current management practices; and inventory, valuation and condition analysis.

	Recommendations
1.	Establish and monitor appropriate and measurable levels of service and performance measures.
2.	Ensure all watermain breaks are recorded against specific pipe segments and include the number of connections affected.
3.	Determine asset components and maintenance strategies for facilities and associated processes.
4.	Refine risk assessment to assign appropriate risk level to each asset based on different factors.
5.	Establish a scoring system including mapping to correlate asset condition ratings for both road and linear assets in the urban area to ensure timely rehabilitation or replacement of all assets within the road corridor.

Appendix E

Wastewater Network

1.0 Introduction

The Municipality's Wastewater Treatment and Collection system is broken out into four categories and includes the following:

- Collection Mains
- Force Mains
- Sanitary Pumping Stations
- Wastewater Treatment Plant

The Sustainable Water and Sewage Systems Act, 2002 indicates that regulated entities are required to prepare and approve a report concerning the provision of water services and wastewater services. The report must include an inventory of and management plan for the infrastructure needed to provide the services, certified by a professional engineer and an assessment of the full cost of providing the services and the revenue obtained to provide them. The Act specifies that the full cost of providing services includes operating costs, financing costs, renewal and replacement costs and improvement costs.

2.0 State of Infrastructure

2.1 Inventory

The Municipality continues to make improvements to increase the integrity of the wastewater data. As a result of this work, maintenance holes are now being captured as separate components to represent the different maintenance strategies and costs. However, for the purposes of this Asset Management Plan, the costs for these assets have been incorporated into the per metre replacement cost of the watermain segments.

Table 2.1.1 Wastewater Systems Inventory

Asset Type	Asset Component		Current Inventory	Average Age
Linear	Local Sewer (<400mm)	m	31,811	38
	Trunk Sewer (>400mm)	m	2,334	42
	Force main	m	1,792	52
	Total	**m**	**35,937**	
Facilities	Pumping Station(s)	each	5	33
	Wastewater Treatment Plant	each	1	52

2.2 Valuation

Replacement Cost Valuation

The replacement cost valuation for wastewater linear is based on 2021 tender prices, where available. The cost per metre includes the cost of the watermain, hydrants, services, temporary construction measures, engineering, and contingency allowance, to understand the cost of replacing watermains as a whole, rather than by individual component.

The facilities related replacement costs are largely based on the 2018 replacement values as established through the building condition assessment project. Some changes were made where work has been completed, or the Municipality has received updated information. The Municipality plans to complete further investigations in this area to ensure the correct values are assigned to the building and processes.

Table 2.2.1 Wastewater Systems Replacement Valuation

Material	Cost per m
Wastewater Main 0 – 250mm	$1,500
Wastewater Main 251mm – 400mm	$1,575
Wastewater Main > 400mm	$1,875

Table 2.2.2 Wastewater Systems Replacement Valuation by Component

Asset Component	Replacement Cost	% of Total Value
Local Sewer (<400mm)	$47,507,344	68.24
Trunk Sewer (>400mm)	$10,461,150	15.03
Force main	$3,360,806	4.83
Pumping Stations	$2,983,335	4.28
Wastewater Treatment Plant	$5,307,672	7.62
Total Replacement Cost	**$69,620,307**	**100%**

2.3 Assessment Approach

The Pipeline Assessment Certificate Program (PACP) is the North American Standard for pipeline defect identification and assessment. CCTV is the principal method of inspecting pipe segments and maintenance holes.

Having an excellent quality image will help ensure the assessment is completed accurately. In this process, a small robotic crawler vehicle with the CCTV camera attached is lowered into the pipe to complete the inspections. A technician records information regarding the pipe, including the number and type of defects. A structural rating, on a scale of 0-5, is then assigned using standardized sewer condition assessment standards, with 0 representing an asset with minimal structural deficiencies and 5 representing assets on the verge of failure. The rating system is broken out as follows:

Table 2.3.1 PACP Scoring

PACP Structural Score	Assetic Score	Rating
0*	0	New
0,1	1	Very Good
2	2	Good
3	3	Fair
4	4	Poor
5	5	Very Poor
EoL*	6	End of Life

* denotes a score that is added to the Municipality's asset management software to reflect the service life of an asset.

The Municipality's target for completing visual inspections on each pipe segment is 5 years, which aligns with industry practice. The Municipality may perform more frequent inspections on pipes with lower ratings as required.

The assessment approach for facilities is based on the age based collection of data completed in Uniformat II and updated by additional information supplied by Environmental Service staff. The annual capital rehabilitation/ replacement cost is divided by the replacement cost of the asset to generate a Facility Condition Index (FCI) score.

Table 2.3.2 Condition Ratings – Water Facilities

Condition Score	Rating
0 - 5 %	Good
6 - 10%	Fair
11 - 30%	Poor
>31%	Critical

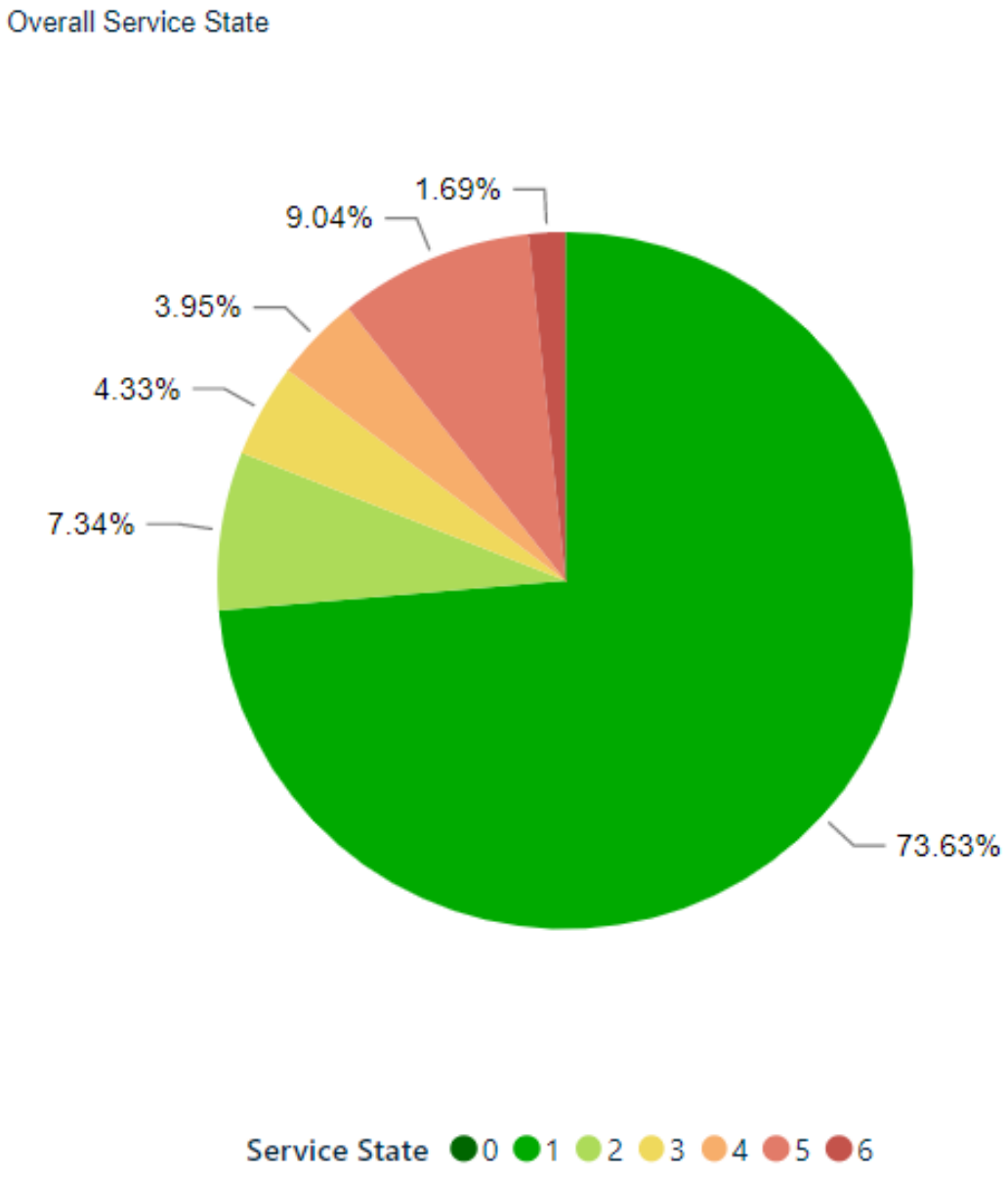
2.4 Asset Condition Assessment

Based on the approach identified in Section 2.3, the Municipality's asset management software can generate a State of Assets report for the Wastewater distribution network.

Table 2.4.1 Wastewater Systems Condition Assessment

Asset Component	**2015-2021 Condition Rating**
Local Sewer (<400mm)	Good
Trunk Sewer (>400mm)	Very Good
Force main	Very Good
Pumping Stations	Good
Wastewater Treatment Plant	Good

Chart 2.4.1 Visual Wastewater Network Condition Assessment



The State of Assets on December 31, 2021 indicates that 80.97% of wastewater collection assets are in very good or good condition, 4.33% are in fair condition, and 14.68% are in poor or very poor condition. The weighted average is 1.73, which means that the entire system is considered in good condition.

2.5 Useful Life

Table 2.5.1 outlines the anticipated useful life for each new build/replacement, along with the anticipated added life when a structure undergoes rehabilitation. These lives are used for PSAB purposes and align with the Municipality's Tangible Capital Asset policy. Materials that have been installed in previous years but do not have a similar anticipated useful as outlined below have been adjusted within the asset management software.

Further refinement of the asset management strategies between the component breakdown for facilities and processes is required. The most effective and efficient maintenance schedule and the overall lifecycle of each asset will be determined.

Full replacement is anticipated at the end of the defined lifecycle; however, it is possible to have components exceed the lives defined as well as components that require replacement prior to the end of their anticipated life.

Table 2.5.1 Useful Life

Wastewater Systems	**Anticipated Useful Life (years)**
New Build / Replacement	
Force main	80
Local Sewer	80
Trunk Sewer	80

Maintenance Strategy	
Relining	50

Wastewater Facilities	**Anticipated Useful Life (years)**
Sanitary Pumping Station	75
Wastewater Treatment Plant	75

3.0 Level of Service

The Municipality defines the wastewater service as an external service that collects and treats wastewater from a connected customers. Service blockage from fats, oils, grease and root intrusion are the primary cause of service interruptions to customers. An Inflow and Infiltration (I&I) strategy has been developed to help Meaford prioritize projects to reduce the overall I&I in the wastewater collection system that is resulting in increased flows at the Wastewater Treatment Plant (WWTP).

3.1 Corporate Objective

The wastewater collection and treatment service ensure protection of the environment and public health of residents and visitors to the Municipality.

3.2 Legislative Requirements

The Municipality's wastewater treatment plant is regulated under the Ontario Water Resources Act and operated in accordance with Certificates of Approval issued by the MOECP.

The Environmental Certificate of Approval for the Municipality's wastewater treatment plants require annual reporting of operational and treated effluent discharge parameters into the receiving streams. The reports are available on the Municipality's website.

3.3 Legislative Requirements – O. Reg. 588/17

O. Reg. 588/17 requires for each asset category, the current levels of service being provided, determined in accordance with the prescribed qualitative descriptions and technical metrics and based on data from at most the two calendar years prior to the year in which all information required under this section is included in the asset management plan. For the Municipality's wastewater system, the following Levels of Service must be identified.

3.3.1 Scope of Services – Wastewater Network

Community Levels of Service

A description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.

The wastewater collection system includes 1,791 residential service connections, and 265 commercial service connections.

A map of the wastewater network can be seen in Figure 3.3.1.1 below.

Figure 3.3.1.1 Map of Wastewater Network – Municipality View

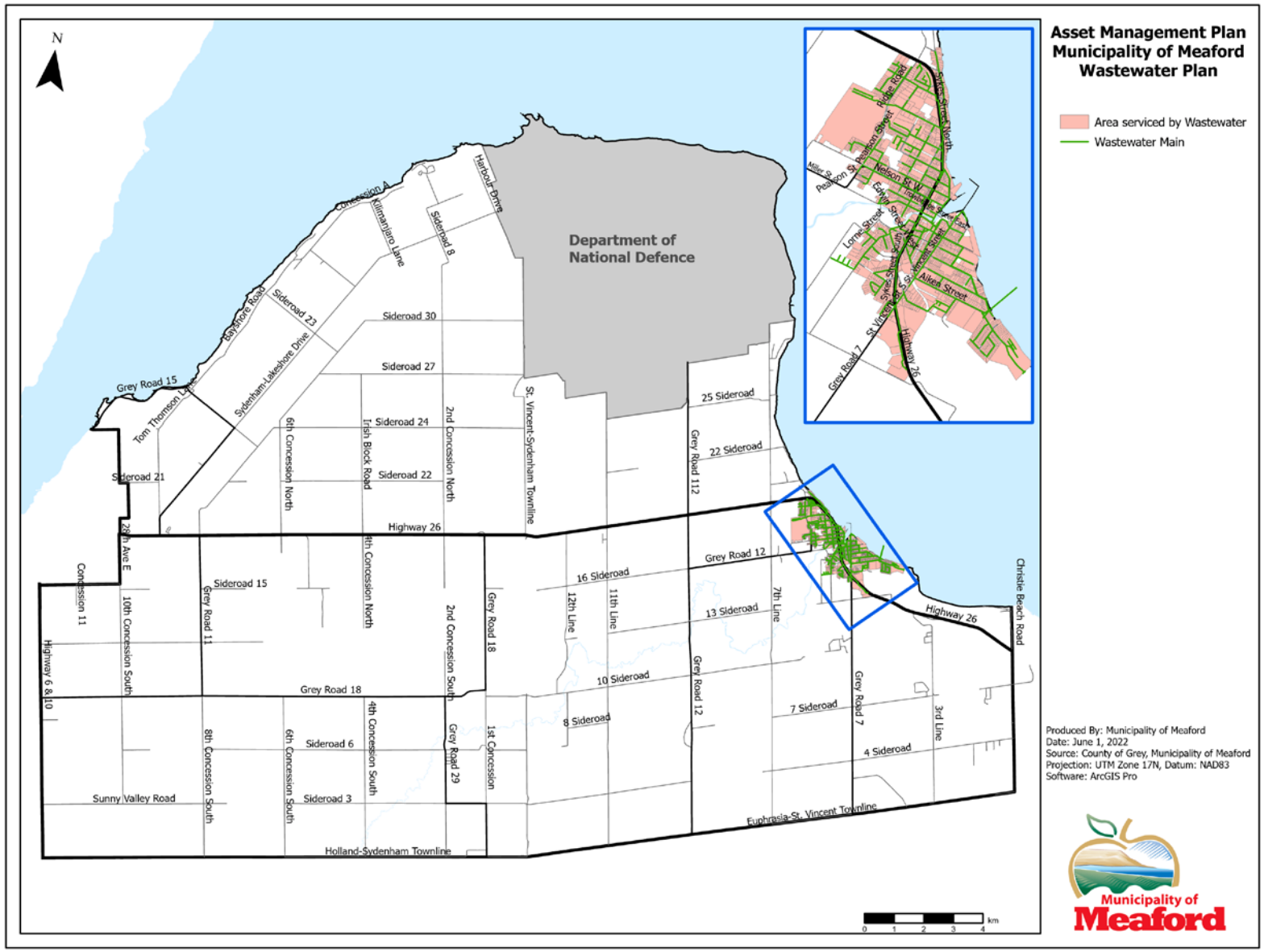


Figure 3.3.1.2 Map of Wastewater Network – Service Area

Technical Levels of Service

Percentage of properties connected to the municipal wastewater system.

26% of properties in the Municipality are connected to the wastewater system.

3.3.2 Reliability of Services – Wastewater Network

Community Levels of Service #1

A description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.

The Municipality's wastewater collection network does not include any combined segments.

Community Levels of Service #2

A description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.

The Municipality's wastewater collection network does not include any combined segments.

Community Levels of Service #3

A 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 has the potential to enter the municipal sanitary sewer system through multiple points of entry, including:

- Older construction buildings within the Municipality have storm connections that are still connected to the sanitary sewer. The Municipality is undertaking ongoing work to correct these connections;
- Inflow and infiltration of stormwater through damaged maintenance holes, pipes and joints; and
- Catchbasin and drainpipe connections.

Community Levels of Service #4

Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in level of service #3.

Resiliency in the sanitary sewer system, in the event that inflow of stormwater occurs, is created through:

- Strategic sanitary overflow points for sewer back-up relief
    - Sewage Pumping Station (SPS) #3, and #2 (via maintenance hole on Lakeside Ave.)
- I&I study was undertaken that described the state of inflow and infiltration in the system, and identified priority areas, and recommended further studies and upgrades
- Engineering design standards which provide minimum sizing and design standards for sanitary sewer infrastructure. Standards are being updated to reflect current conditions and demands
- Wastewater sewer model used to analyze capacity and changes in development
- Prohibitions and requirements under the Sewer Use By-law 54-78 including:
    - Prohibition of connection into the sewer system without Sewer Service Connection Permit
    - Minimum connection sizes to sewer from buildings
    - Prohibition of discharging storm water into the Sewage Works

Community Levels of Service #5

Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.

The annual average effluent quality is tracked and summarized in Table 3.3.2.1. The source of the table is from the 2019-2021 Annual Performance Reports.

Table 3.3.2.1 – Effluent Tracking

Parameter	2019	2020	2021
CBOD (mg/L)	4.36	4.10	4.24
TSS (mg/L)	7.84	5	6.78

Parameter	2019	2020	2021
Total Phosphorus (mg/L)	1.66	1.47	2.06
Ammonia Nitrogen (mg/L)	0.46	0.54	0.53

Technical Levels of Service #1

The number 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.

The Municipality's wastewater collection network does not include any combined segments.

Technical Levels of Service #2

The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.

Table 3.3.3.2 Wastewater Backup

Parameter	2019	2020	2021
Wastewater Backups	2	0	1
Connection-days	0*	0*	0*
Total number of properties	2056	2087	2110

*Quantification of connection days is not currently available.

Complaints received have typically been resolved on the same day of the complaint, resulting in minimal time under backup conditions.

Technical Levels of Service #3

The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.

The Municipality did not meet effluent quality objectives as follows:

2021 – The effluent from the facility did not meet the monthly Total Phosphorus objective for June, July, August, September, October and November 2021 due to the fact there is no phosphorus removal in the plant. All other effluent objectives and limits were met for 2021.

2020 – The Municipality did not meet monthly Total Phosphorus objective for July and September.

2019 – The Municipality did not meet monthly Total Phosphorus objective for July, August, September and October. The TSS was over effluent limit in December. All issues were reported to the MECP.

The Municipality experienced the following instances of overflow conditions:

2021 – The Municipality experienced no bypass events and one instance of overflow conditions. The one overflow conditions was during the month of September, resulting in 12,782 cubic meters of overflow being released into Georgian Bay.

2020 – The Municipality experienced no bypass events and four instances of overflow conditions. The four overflow conditions were during the months of June, July, and August resulting in 4,007 cubic meters of overflow being released into Georgian Bay.

2019 – The Municipality experienced no bypass events and four instances of overflow conditions. The four overflow conditions were during the months of February, March, May, and October resulting in 23,410 cubic meters of overflow being released into Georgian Bay.

4.0 Asset Management Strategy

4.1 Lifecycle Activities and Planned Actions

To effectively maintain the wastewater system at the established service levels they require the appropriate maintenance or rehabilitation strategy applied throughout an asset's lifecycle. There are six lifecycle maintenance strategies considered in the overall sustainable management of wastewater segments, described in Table 4.1.1 below.

Table 4.1.1 Lifecycle Activities

Activities	Planned Actions	Lifecycle Activities
Non-infrastructure Solutions	Actions or policies that can lower costs or extend life and can include adjustments to levels of service	Sewer Use Bylaw Design Guidelines Flow Monitoring System Master Planning

Activities	Planned Actions	Lifecycle Activities
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	CCTV Inspections Maintenance Hole Inspections Emergency Repairs (as required)
Renewal/Rehabilitation	Significant repairs designed to extend the life of the asset.	Maintenance Hole Repair Wastewater main relining
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.	Full Pipe Segment Replacement Partial Pipe Segment Replacement Maintenance Hole Reconstruction
Disposal	Activites associated with disposing of an asset once it has reached its useful life, or is otherwise no longer needed by the municipality.	Abandonment of Pipe Segments In-situ Removal of Pipe Segment

Activities	Planned Actions	Lifecycle Activities
Expansion	Planned activities required to extend services to previously unserviced areas – or expand services to meet growth demands (includes road urbanization projects).	Installation of Pipe Segments for Future Growth Upsizing of Pipe Segments for Future Growth

4.2 Risks Associated with the Strategy

For the purposes of this version of the AMP the Municipality has used the pipe diameter as well as the force main and outfall to determine the consequence of failure as outlined in Table 4.2.1. The higher the classification, the greater the consequence if the pipe segment deteriorates to the point where it is no longer conveys wastewater.

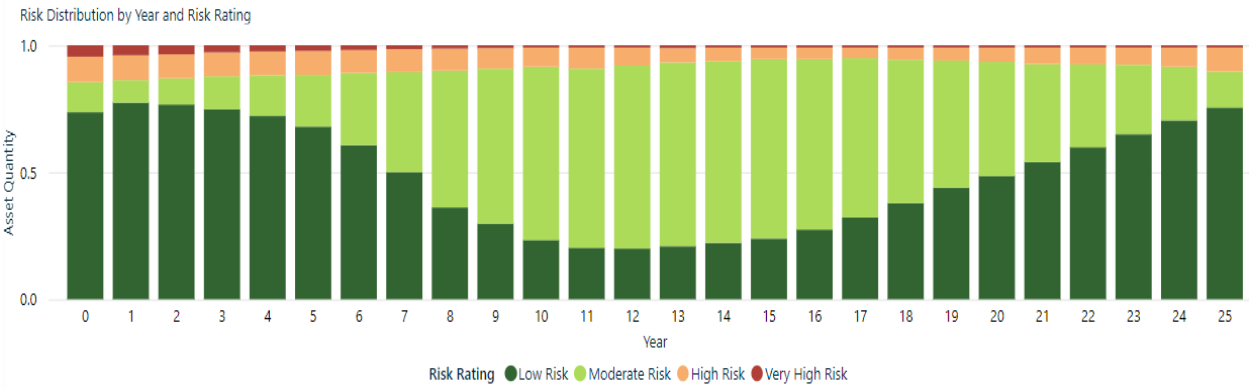
Table 4.2.1 Consequence of Failure

Scoring	Consequence	Pipe Diameter (mm)
1	Very Low	N/A
2	Low	<200mm
3	Medium	200-400mm
4	High	>400
5	Very High	Force main + Outfall

Utilizing the asset's condition to determine the likelihood of failure and the diameter of the pipe as the consequence of failure, the Municipality's asset

management software can generate a risk analysis profile for the water distribution network for the period of the plan.

Chart 4.2.2 Asset risk profile



The Risk Analysis profile at December 31, 2021 indicates that 73.63% of the pipe segments are considered low risk, 11.86% are considered moderate risk, 9.98% are considered high risk, and 4.52% are considered very high risk.

The risk profile for the 25-year period identified in the Asset Management Plan remains consistent at the beginning and end of the 25 year period.

4.3 Lifecycle Analysis

Additional work is required to determine the lifecycle requirements of the facilities and their processes. It is anticipated that this will include a detailed component breakdown to allow for strategies to be developed. This will prioritize projects and aid in the development of future capital budgets.

5.0 Financing Strategy

5.1 Financing Strategy

O. Reg. 588/17 requires the Municipality to identify the cost of the lifecycle activities that would need to be undertaken to maintain the current levels of service for each of the ten years following the year for which the current levels of service are determined and must include the costs of providing those activities.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities are as follows.

Table 5.1.1 Lifecycle Financing Strategy – Wastewater Mains

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	58	58	58	58	58	58	58	58	58	58
Maintenance	56	56	56	56	56	56	56	56	56	56
Renewal / Rehabilitation	107	107	107	107	107	107	107	107	107	107
Replacement	503	503	503	503	503	503	503	503	503	503
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	723	723	723	723	723	723	723	723	723	723

Table 5.1.2 Lifecycle Financing Strategy – Wastewater Facilities

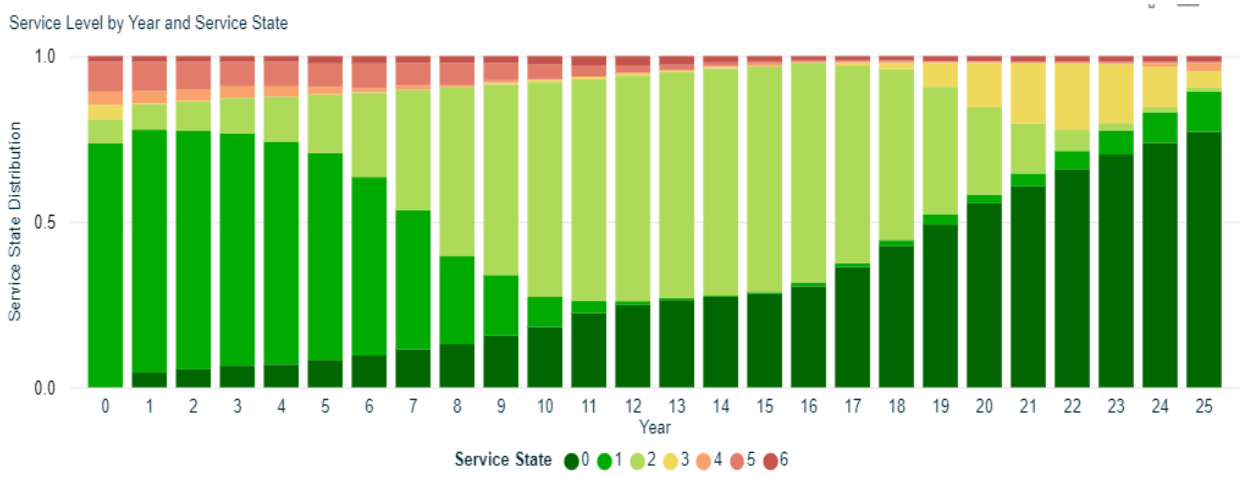
Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	6	6	6	6	6	6	6	6	6	6
Maintenance	91	71	71	71	71	71	71	71	71	71
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	1,886	71	103	100	155	93	63	65	13	7
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	1,983	147	179	176	231	169	139	141	89	83

The non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and do not include costs that have not been applied to an operating program or project. These costs also do not include debt servicing costs until a strategy has been finalized. The Municipality's future water and wastewater rate study, combined with information collected through the work order management system, will allow for the allocation of overhead, staffing, utility, debt servicing costs, etc., to be applied to these categories for the 2025 version of the Asset Management Plan.

Expansion / Development Charge related costs have not been included in this version of the Asset Management Plan as the 2022 Development Charge Study has not been finalized and approved by Council at the time of the preparation of this report. This study needs to be incorporated into the financing strategy to determine the costs to be raised through Development Charges but also allocated for replacement to be funded by existing users.

The Municipality's Asset Management Software can produce a Service State Analysis Report based on this strategy using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.1.1 Wastewater Main - Service Level by Year and Condition State – Lifecycle Strategy



The State of Assets on December 31, 2021 indicates that 80.97% of wastewater collection assets are in very good or good condition, 4.33% are in fair condition, and 14.68% are in poor or very poor condition. The weighted average is 1.73, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2032 indicates that 92.09% of wastewater collection assets are in very good or good condition, 0.75% are in fair condition, and 6.97% are in poor or very poor condition. The weighted average is 1.81, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2047 indicates that 90.58% of wastewater collection assets are in very good or good condition, 4.90% are in fair condition, and 4.52% are in poor or very poor condition. The weighted average is 0.62, which means that the entire system is considered in very good condition.

5.2 Expenditure Forecasts

The Municipality's 2021-2026 Water and Wastewater Financial Plan was approved by Council in May 2020. The plan recommended 8% annual increases to the overall water and wastewater budgets. The expenditure forecast for the purposes of this Asset Management Plan will continue the 8% annual increases until such time that Council approves a new Water and Wastewater Financial Plan.

As the non-infrastructure, maintenance, and renewal/rehabilitation costs have been extracted from the Municipality's operating budget and require more extensive review, the expenditure forecast based on the annual 8% increase will only include an annual increase of 5% for renewal/rehabilitation and replacement activities associated with the Municipality's capital program leaving the remainder for other operating cost increases.

Based on the lifecycle activities identified in Section 4.1, the expenditures required to carry out lifecycle activities within the approved annual increase is as follows.

Table 5.2.1 Expenditure Forecast – Wastewater Mains

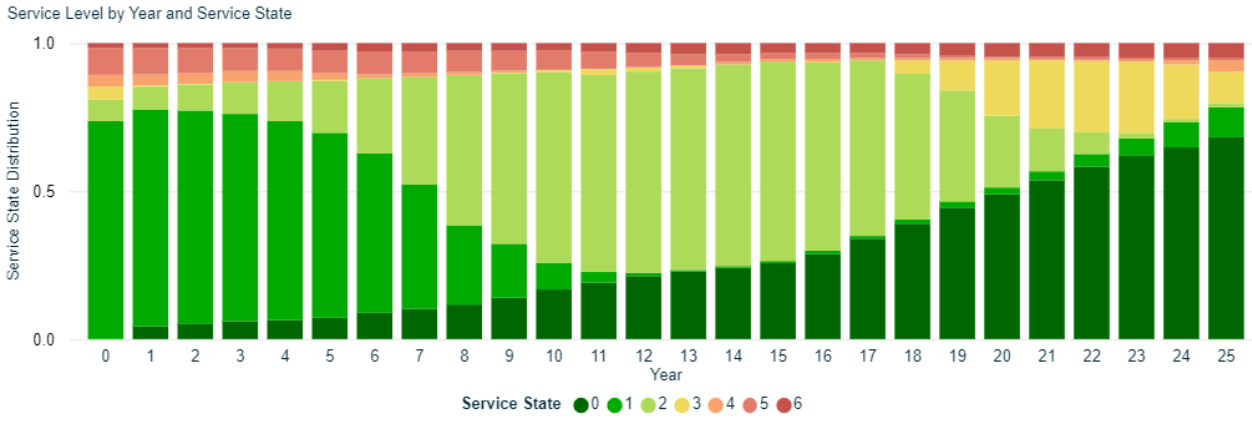
Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	58	58	58	58	58	58	58	58	58	58
Maintenance	56	56	56	56	56	56	56	56	56	56
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	437	472	509	509	509	509	509	509	509	509
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	551	586	623	623	623	623	623	623	623	623

Chart 5.2.2 Expenditure Forecast – Wastewater Facilities

Activities	Annual Costs (,000's)									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Non-Infrastructure Solutions	6	6	6	6	6	6	6	6	6	6
Maintenance	91	71	71	71	71	71	71	71	71	71
Renewal / Rehabilitation	0	0	0	0	0	0	0	0	0	0
Replacement	300	300	300	300	300	300	300	300	300	300
Disposal	0	0	0	0	0	0	0	0	0	0
Expansion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total ($)	396	376	376	376	376	376	376	376	376	376

The Municipality's Asset Management Software is able to produce a wastewater main Service State Analysis Report based on the current expenditure forecast using the deterioration curve associated with the various lifecycle treatments. The 25-year model is:

Chart 5.2.1 Wastewater Main - Service Level by Year and Condition State – Current Expenditure Forecast



The State of Assets on December 31, 2021 indicates that 80.97% of wastewater collection assets are in very good or good condition, 4.33% are in fair condition, and 14.68% are in poor or very poor condition. The weighted average is 1.73, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2032 indicates that 90.21% of wastewater collection assets are in very good or good condition, 0.56% are in fair condition, and 9.23% are in poor or very poor condition. The weighted average is 1.91, which means that the entire system is considered in good condition.

The State of Assets on December 31, 2047 indicates that 79.66% of wastewater collection assets are in very good or good condition, 10.73% are in fair condition, and 9.61% are in poor or very poor condition. The weighted average is 1.06, which means that the entire system is considered in good condition.

A version of this analysis will be generated for equipment and facilities as part of the 2025 version of the Asset Management Plan.

5.3 Lifecycle Financing Strategy vs. Expenditure Forecast Analysis

The analysis between the Lifecycle Financing Strategy and the Expenditure Forecast identifies the funding gap between the two financial models. The result of this analysis is as follows:

Table 5.3.1 Financing Strategy vs. Expenditure Forecast – Wastewater Mains

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost ($)	723	723	723	723	723	723	723	723	723	723
Expenditure Forecast ($)	551	586	623	623	623	623	623	623	623	623
Funding Gap ($)	**(173)**	**(138)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**

Table 5.3.2 Financing Strategy vs. Expenditure Forecast – Wastewater Facilities

	Annual Costs (,000's)									
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lifecycle Cost ($)	1983	147	179	176	231	169	139	141	89	83
Expenditure Forecast ($)	396	376	376	376	376	376	376	376	376	376
Funding Gap ($)	**(1,586)**	**230**	**197**	**200**	**145**	**207**	**237**	**235**	**288**	**293**

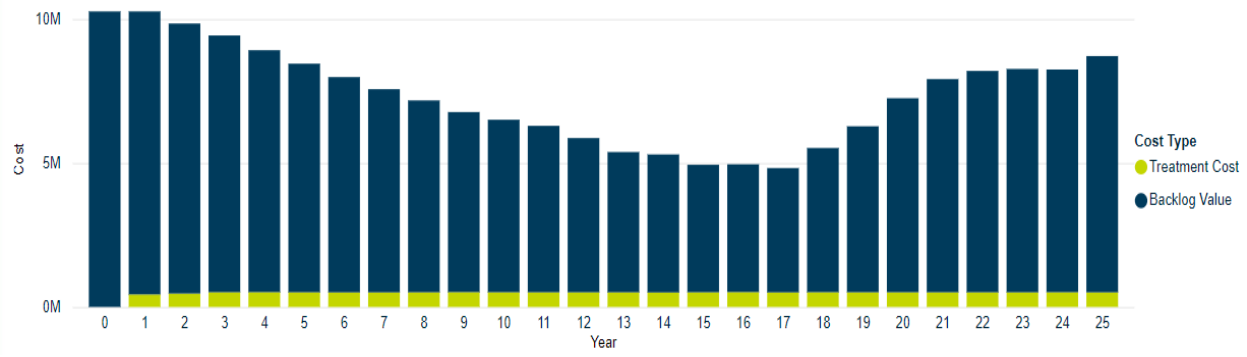
Based on table 5.3.1, the annual funding gap for wastewater mains between the two strategies will remain almost the same for 2023 to 2032. A funding model will need to be created to balance the equipment and facilities requirements to either split the costs into more consistent annual requirements or to issue short-term debt for some projects. In order to meet the financial requirements of the Lifecycle Financing Strategy for all wastewater components, the Municipality will be required to fund projects through additional revenue tools such as reserve and reserve funds, grants, debt, new revenues, or additional annual levy increases. Alternatively, projects will need to continue to be deferred, which will have a negative impact on the overall system condition.

5.4 Lifecycle Financing Strategy Limitations

The Lifecycle Financing Strategy has been developed on the current levels of service and programs being delivered by the Municipality. This strategy implies that these practices have been in place since the installation of the assets and does not recognize the impacts of previous investment that has resulted in the current system condition. The Municipality's asset management software is able to generate a backlog report that identifies the backlog of asset rehabilitation or replacement needs that shows the number of assets that are currently not meeting the current levels of service. The

backlog report based on the current system condition is shown in Chart 5.4.1.

Chart 5.4.1 Backlog Report



The current workbank backlog is $10,263,435.35 and generally consists of the pipe segments that need to be replaced due to a combination of poor material, age, and insufficient capacity to meet levels of service.

The Year 10 backlog is $5,990,379.75 and represents approximately $4.6 Million in replacement of the pipe segments identified in the current workbank backlog between year 1 and 10.

The Year 25 backlog is $8,207630.00 and represents the effects of the Municipality not being able to replace end of life pipe segments due to the earlier year focus on previous years relining and replacement projects and due to the nature of development of the Municipality in the 1970's and associated wastewater system upgrades at that time.

The backlog analysis does not include equipment and facilities and will need to be updated for the 2025 version of the Asset Management Plan.

6.0 Improvement Plan

The following recommendations are based on the review of current management practices, and inventory, valuation and condition analysis.

	Recommendations
1.	Determine asset components and maintenance strategies for facilities and associated processes.
2.	Implement condition assessments for all wastewater facility components (including processes) and linear infrastructure. Establish a plan to update and assess infrastructure condition.
3.	Refine the risk assessment to assign appropriate risk level to each asset based on different factors.
4.	Establish and monitor appropriate and measurable levels of service and performance measures.
5.	Establish a scoring system including mapping to correlate asset condition ratings for both road and linear assets in the urban area to ensure timely rehabilitation or replacement of all assets within the road corridor.