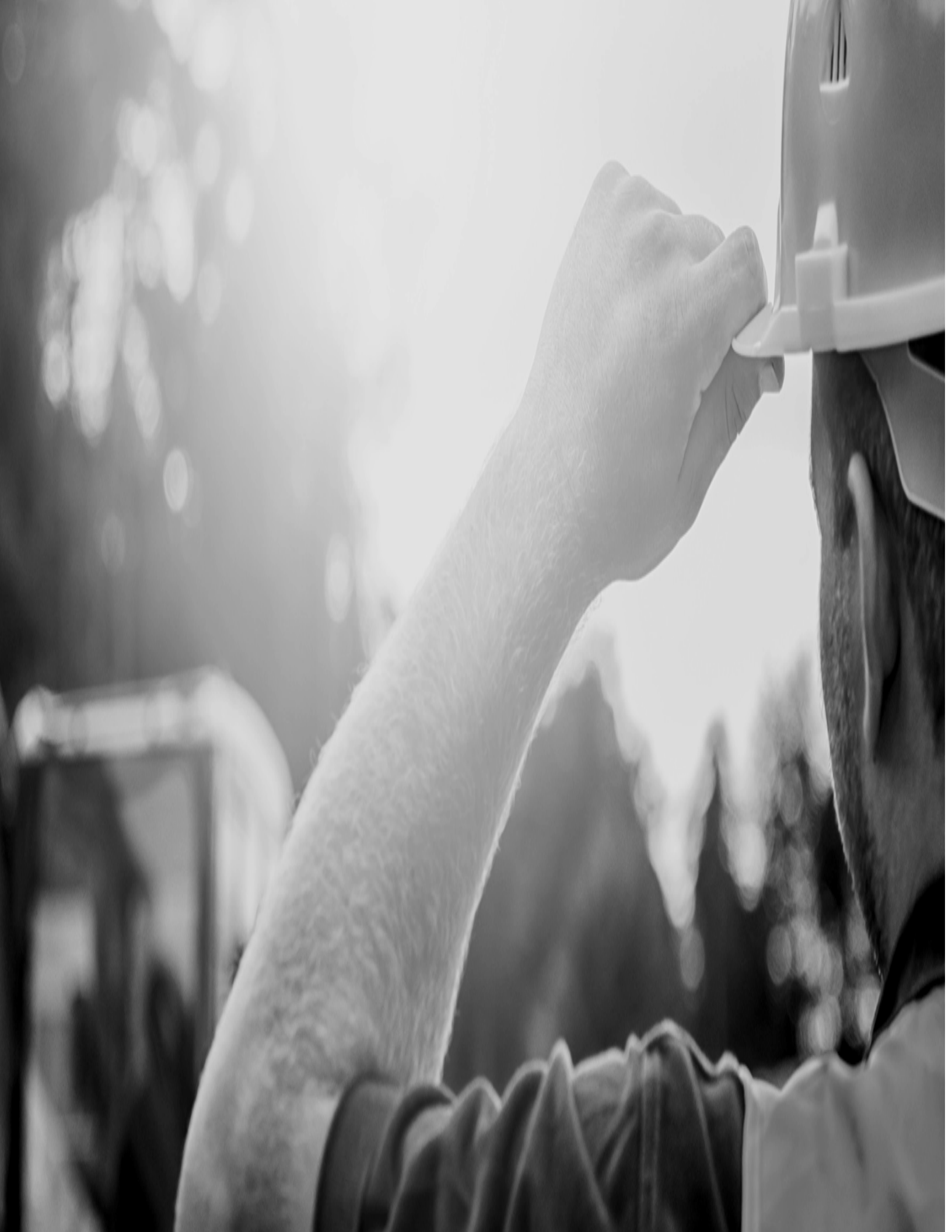
TOWNSHIP OF MAPLETON

Asset Management Plan

2022 Core Assets



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List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
ADT	Average Daily Traffic
CCBF	Canada Community-Building Fund (formerly Federal Gas Tax)
CCTV	Closed-Circuit Television
CoF	Consequence of Failure
CPI	Consumer Price Index
DC	Development Charges
DCL	Dedicated Capital Levy
FIR	Financial Information Return
IIMM	International Infrastructure Management Manual
LOS	Levels of Service
MPMP	Municipal Performance Measurement Program
NPV	Net Present Value
NRBCPI	Non-Residential Building Construction Price Index
NWWBI	National Water and Wastewater Benchmarking Initiative
MMS	Minimum Maintenance Standards
OCI	Overall Condition Index
OCIF	Ontario Community Infrastructure Fund
O.Reg	588/17 Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure
OLG	Ontario Lottery and Gaming
OSIM	Ontario Structure Inspection Manual
PACP	Pipeline Assessment and Certification Program
PoF	Probability of Failure
PRI	Pavement Roughness Index
PSAB	Public Sector Accounting Board
P3	Public-Private Partnership
RFP	Request for Proposal
RFQ	Request for Quotation
RSL	Remaining Service Life
SDI	Surface Distress Index
SPS	Sewage Pumping Station
SO	Statutes of Ontario
TCA	Tangible Capital Assets
EUL	Estimated Useful Life
WPCP	Water Pollution Control Plant
WDS	Water Distribution System
WSIB	Workplace Safety and Insurance Board

Executive Summary

Much of the infrastructure at the Township was constructed decades ago and needs rehabilitation and repair. At the same time, the population of the Township is growing and changing, which means that we need to build new assets and retrofit existing assets to meet these new demands. Additionally, shifts in the climate are necessitating more frequent and intensive interventions to keep assets like roads and bridges in good condition.

This Asset Management Plan is an overview of the processes in place at the Township of Mapleton that help us understand what assets we have, what condition they are in, and what we need to do to maintain those assets and the levels of service that our residents expect.

Assets included in this plan.

- Roads & Transportation – roads/sidewalks/traffic signs/street signs/lights
- Bridges & Culverts
- Stormwater Network
- Water Network
- Wastewater Network

All other Township assets will be included in the 2024 Asset Management Plan update.

The Asset Management Plan for each asset class consists of three main sections:

- Introduction
- Asset Summary and Descriptions – a detailed summary of each of the asset classes that we maintain, including their replacement costs, condition, average age, and maintenance needs.
- Strategic Asset Management Plan – breaks down the total financial demand of maintaining our assets, as well as our plan to meet that demand

For each class of assets, this plan outlines:

- Inventory: what we own
- Replacement: the cost to replace
- Condition: the level of functionality
- Lifecycle Strategy: Lifecycle activities to maintain assets to its EUL
- Performance: is it meeting the levels of service required
- Financial Accounting Valuation: what it is worth

The asset management plan is one of the links that translates our organizational strategic business goals into “on the ground,” day-to-day operational activities. The asset management plan informs the operational plans of our departments, including annual budgets, capital projects, operational and maintenance plans, and procedures. The plan defines performance targets, strategies for achieving those targets, and the resources available. It also collates the needs of each of our departments and helps us understand the challenges and opportunities that we face as an organization, which ultimately informs our strategic direction.

Lifecycle Management Plan

The forecast of Lifecycle management costs, necessary to provide the service covered by this AM plan includes the direct costs for operations, maintenance, renewal, acquisition, and disposal of assets. This includes asset specific lifecycle costs as well as more indirect "non-infrastructure solutions", such as studies and master plans that assist in the management of assets.

One of the factors influencing the longevity of Township assets is the demand for the services provided by those assets. Demand will change over time, both in terms of service quality and quantity as well as the types of services required. Demand can be driven by several factors, including population growth, demographic shifts, changes in the types of services provided, the ways in which the Township is expected to provide those services, land-use changes, economic development trends, and environmental changes. Anticipated changes in demand should be considered and accounted for within an asset management plan.

Risk assessments are incorporated into the asset management planning process to identify critical (or higher risk) areas to prioritize asset investments. In many cases, the demand for asset investment exceeds the actual funding available, requiring the need to allocate funds based on a risk management approach.

Although the AM Plan be prepared for a range of time periods, it typically informs a Long-term Planning period of 10-years. Therefore, a summary output from the AM Plan is the forecast of 10-years total outlays; for the assets covered within this AM Plan it is estimated that the Townships expenditures will be $208,259,101 or $20,825,910 on average per year.

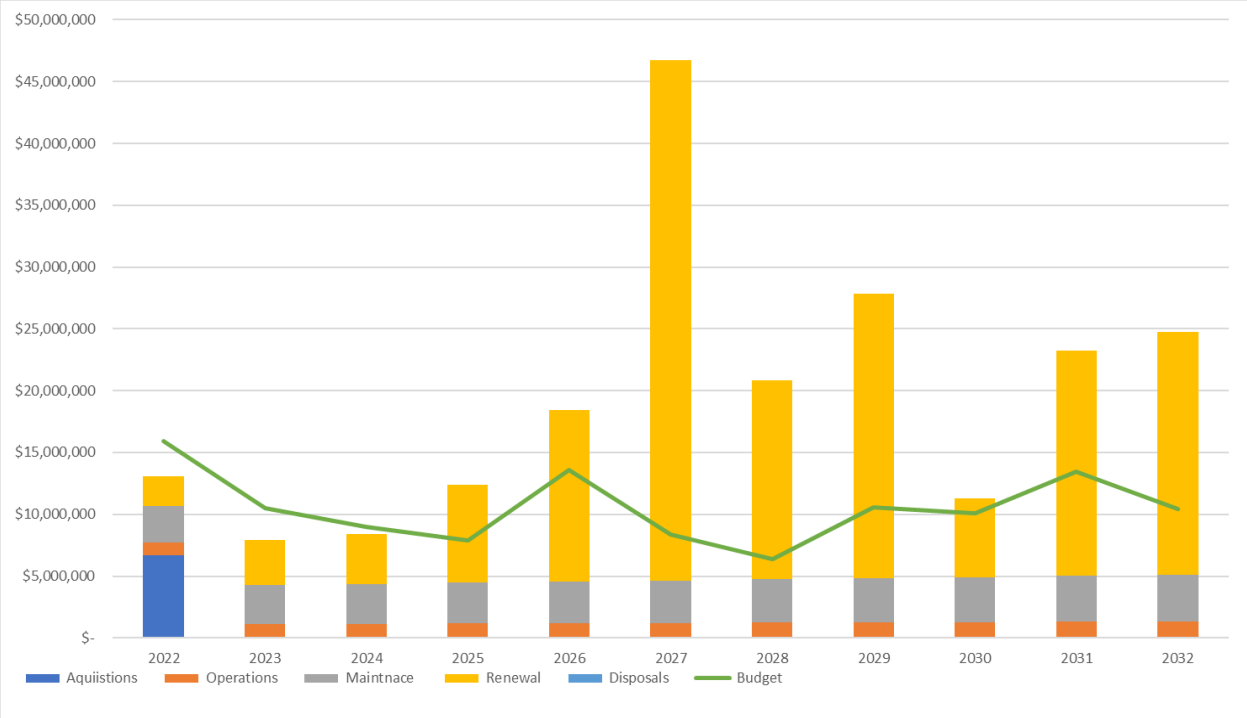
Financial Summary

What we can do

- Estimated available funding for the 10-year period is $109,431,441 or $10,943,144 on average per year, as per the Long -Term financial plan (the current Planned Budget). This is 53% of the cost to sustain the current level of service at lowest lifecycle cost.
- The anticipated Planned Budget for Core Assets leaves a shortfall of -$9,882,866 on average per year of the forecast lifecycle costs required to provide services in the AM Plan compared with the Planned Budget currently included in the Long-Term Financial Plan.
- We plan to provide for the acquisition, operation, maintenance, and renewal of critical assets to meet service levels set by the Township's annual budgets.
- We plan to provide within the 10-year planning period, major renewals and acquisition based on the capital budget and other master planning documents.
- We will continue to implement and use the Township's asset management software to advance assets management processes.
- We will provide asset management training and encourage key personnel to enroll in webinars, and certification programs.

- We will build confidence and reliability on the asset inventory (data sets) through better internal processes, more condition assessments, and with improved replacement cost estimation processes.
- We will strive to Improve levels of service by defining additional LOS measures, tracking, and collecting the LOS performance data for all asset types and
- We will develop and document asset class-specific strategies to better forecast lifecycle activities of acquisition, operations, maintenance, renewal, and potential disposals, to predict spending requirements.
- We will refine the risk mapping/assessment process that define the parameters contributing to probability of failure and the consequence of failure (safety, reliability, economic, environment and climate change and others).
- We will increase community and stakeholder coordination and collaboration in asset management activities.
- We will update AMP, AM policies and Strategies every five (5) years to compliance O.Reg 588/17

Forecast Lifecycle Costs and Planned Budgets



What we cannot do

- Complete 47% of renewal works required with the first 10 years to meet lifecycle demands
- Implementation of all lifecycle activities currently forecasted in the AMP is a challenge because of the funding restrictions
- Replacement and rehabilitation as per the projection
- New acquisition demanded by demand drivers
- Address all the backlog and deferred maintenance

Asset Management Planning Practices

Key assumptions made in this AM Plan are:

- Asset Register, consultants' reports, and technical estimates was used for all capital renewals.
- Depreciated values assumed based on current replacement cost and percentage currently consumed
- Assumed function and capacity were the same as condition in asset register
- Does not account for works being deferred due to budget constraints

Assets requiring renewal are identified from either the asset register or an alternative method.

- The timing of capital renewals based on the asset register is applied by adding the useful life to the year of acquisition or year of last renewal,
- Alternatively, an estimate of renewal lifecycle costs is projected from external condition modelling systems and may be supplemented with, or based on, expert knowledge.

This AM Plan is based on a reliable, level of confidence information.

Monitoring and Improvement Program

The next steps resulting from this AM Plan to improve asset management practices are:

- Further development of asset register to enhance data set (completeness and accuracy)
- Incorporate additional stakeholder/customer satisfaction data with respect to infrastructure level, risks, and financial considerations
- Monitor asset resilience and complete resilience assessment and plan
- Develop a more robust risk management plan
- Incorporation of recommendation for the Township and County Greenhouse (GHG) emission reduction plan anticipated to be completed in 2023

Message from the CAO

This 2022 Asset Management Plan represents the first Township staff prepared Plan. This is important for a number of reasons, but I will outline the top two. Firstly, staff take a lot of pride and ownership in this Plan. They have detailed knowledge and understanding of Township assets and the ability for those assets to provide services, which enhances the overall discussions and recommendations contained within this report. Secondly, this is the first step in the overall process of integrating asset management planning practices into day-to-day Township operations. Asset management will play a role in almost everything we do in the future, therefore working these practices into existing corporate, departmental, and staff processes is not only efficient, but very effective.

The Asset Management Plan is one of the most critical Township documents, along with the Strategic Plan and the annual budget. These three documents provide the overall strategic and operational direction for the corporation. Going forward, discussions cannot take place on one of these documents without mentioning the other two.

I would like to thank the members of our Township Staff for their efforts in the development of this Asset Management Plan:

- John Morrison, Director of Finance
- Sam Mattina, Director of Public Works
- Mohammad Ammad, Manager of Assets and Infrastructure
- Anil Sigdel, Asset Management Technician

I would also like to thank the Senior Management Team and various other Township staff for their input and assistance in pulling this Plan together.

The recommendations contained within this report are critical to the overall success of the Township in providing services at desired levels over the long-term. Approval of these recommendations as well as a continuous improvement approach to asset management planning are the keys to success.

Manny Baron
Chief Administrative Officer
Township of Mapleton

Message from the Treasurer

The 2022 Asset Management Plan for Core Assets is intended to communicate the requirements for the sustainable delivery of services through the management of assets, compliance with regulatory requirements, and required funding to provide the appropriate levels of services over the long planning period.

This Asset Management Plan is to be read with The Township's Strategic Plan and with its Long-Term Financial Plans as outlined in the Township's Multi-year Operating Budget and 10-year Capital Budget. These documents, fully integrated will help guide Council to make fiscally responsible, evidence driven decisions that will promote both short-term and long-term outcomes that best serve the residents and business of the Township.

The goal of managing infrastructure assets is to meet the defined level of services (as amended for time to time) in the most cost-effective manner for present and future customers. As evident throughout Chapter 3: State of the Township's Core Assets, there is a significant gap between Planned vs Forecasted Lifecycle Requirements. This funding gap is a budget discussion as the Township continues to plan for the acquisition, operation, maintenance, renewal, and potential disposal costs of its infrastructure assets.

The Asset Management Plan presented herein, is the culmination of efforts by members from both Public Works and Finance, who invested significant time and effort collaborating on a document that stands to serve the Township of Mapleton for years to come. All contributions from this asset management team should be both recognized and celebrated, as this staff report will be a benchmark for which future assets management efforts and initiatives can be both measured and communicated to the residents and Council for the Township of Mapleton.

John Morrison B.A., C.P.A., G.G.A
Director of Finance & Treasurer

Chapter 1: Introduction

The Township of Mapleton provides a range of services to its residents, including the maintenance of local roads, bridges, stormwater, water, wastewater, parks, and recreational facilities. We provide these services by maintaining infrastructure assets across the Township including 374 kilometers of roadways, over 78 bridges and 234 culverts, 2 community centers and 1 arena, Township also maintain a fleet of vehicles and equipment, and an IT infrastructure.

Infrastructure assets are essential to the delivery of municipal services. They allow for the efficient flow of people and products, support cultural enrichment and economic development initiatives, and contribute to the quality of life for residents across the Township. Fundamentally, infrastructure assets exist to provide services to our communities.

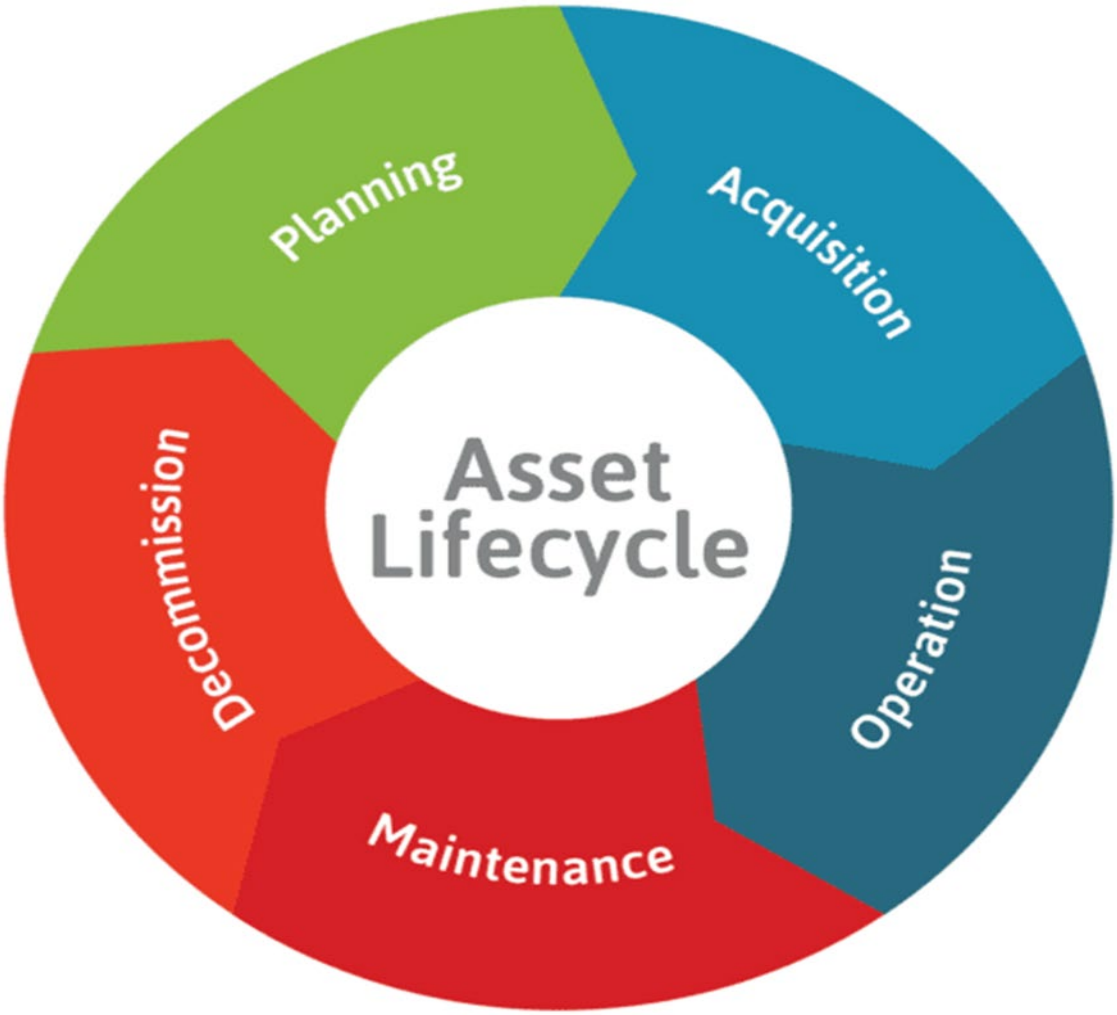
Assets are things that have potential or actual value to the Township. This includes everything from roads and bridges to library books and computer screens. All these things help us provide services to residents, and it is our responsibility to make sure that we provide those services in a cost-efficient and sustainable manner, by maintaining our assets.

Construction of infrastructure surged across Canada from the 1950-70's due to growth, modernization, and urbanization following the end of WWII. The following decades saw little investment in infrastructure maintenance, and as a result, a significant proportion of infrastructure across Canada has fallen into disrepair. Poor planning and under-investment have left Ontario with the most serious infrastructure deficit in our history. The burden of this deficit falls largely on municipalities who own roughly 60% of all public infrastructure but receive only eight cents of every tax dollar collected.

In 2009, all municipalities across Canada were required to incorporate Tangible Capital Assets (TCA) reporting into their financial statements (PSAB standard 3150).

This gave municipalities a better understanding of what assets they owned, and their financial value. Accounting for tangible capital assets in annual financial reports allows for municipalities to understand the rate of asset deterioration, or "consumption", from a financial perspective, and anticipate infrastructure investment needs.

The Township maintains roughly $52 million (historical cost) of tangible assets. Some assets are relatively new, or recently repaired, and are close to their original condition, while others are approaching the end of their useful lives and have significant investment needs. Many of our communities are faced with an aging and quickly deteriorating asset base but have limited revenues to rehabilitate or replace those assets. The Township must balance the maintenance needs of newer assets with the more capital-intensive repair and rehabilitation needs of older assets.



With limited available funding, municipalities must make key decisions, including:

- Choosing between fixing things immediately or delaying maintenance
- Reducing levels of service or eliminating services that we provide
- Increasing tax rates and user fees to help bridge the maintenance funding gap
- Delaying new projects
- Determining the appropriate amount to set aside into a reserve fund; and
- Defining critical infrastructure and identifying the urgent needs

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Infrastructure Gap

The annual investment in our assets is comprised of both the maintenance costs of our existing infrastructure and the construction of new infrastructure. For example, we maintain our existing roads network, while also widening roads and expanding the network where needed. However, there is not enough funding available to fulfill all the maintenance and growth needs across the Township. Municipalities only receive approximately 8 cents for every tax dollar collected across Canada yet are responsible for the stewardship of 60% of the national infrastructure. The infrastructure gap represents the difference between the infrastructure investments that we should be making on a regular basis and the funding that we have available.

Strategic Management of our Infrastructure

As a Township, we have committed to working towards ensuring that the Township has:

1. The best people in place, to provide the best services and make the best decisions
2. The best processes in place, to collectively make the best decisions
3. The best services in place, to support our residents and businesses; and
4. The best infrastructure in place, to meet the current and future needs of the Township

As part of the ongoing work toward achieving these objectives, the Township has developed a Long-Term Financial Sustainability Strategy to guide investment decisions across the Township. The nine core principles of the strategy are:

1. Respect the Taxpayer: The Township strives to deliver its desired service outcomes without placing undue financial pressure on its taxpayers.

2. Ensure the Capital Plan is sustainable: The Township reviews capital expenditures in the context of its affordability and that the ongoing operating impact of that expenditure is also sustainable and affordable.
3. Manage Assets: The Township will replace or maintain assets over their lifecycle in a timely manner to enable service delivery.
4. Deliver Value for money: The Township continuously looks for efficiency and quality improvements to manage and deliver services.
5. Users pay where appropriate: The Township will determine how and when the users of services pay for the services and thereby balances growth-related investments with revenue to achieve intergenerational equity where possible.
6. Work with area municipalities to manage growth and support economic viability of the community: The Township goal is to ensure that it is a desirable area to live, work and play.
7. Make responsible investments: The Township maintains an investment portfolio that balances safety of principal and maintenance of liquidity while striving to obtain returns that benefit residents and businesses.
8. Mitigate significant fluctuations in tax and utility rates: The Township seeks to provide a financially stable and predictable environment for residents and businesses.
9. Borrow when appropriate for capital infrastructure: The Township seeks an affordable level of debt required to achieve desired service levels while minimizing the impact of borrowing to the taxpayer and ensuring intergenerational equity.

The Asset Management Plan is part of the overall corporate financial sustainability strategy, integrating a number of these principles in order to support optimized decision-making processes and practices.

What is Asset Management?

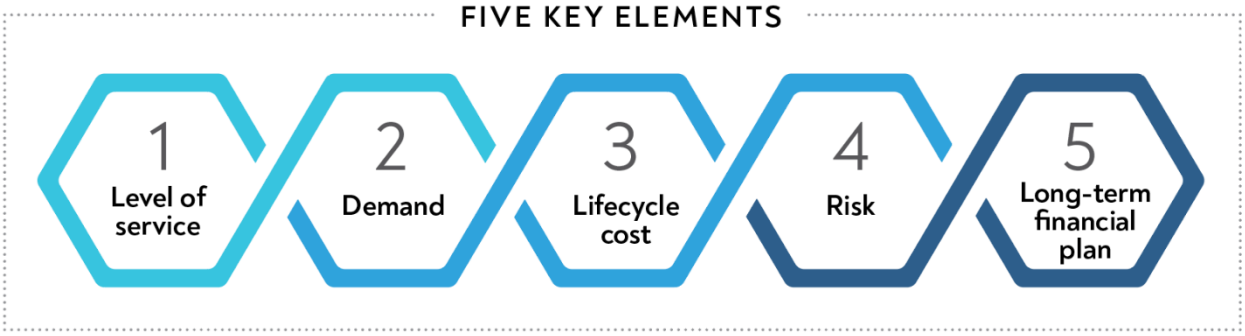
Asset management planning is the process of realizing the value of assets and making the best possible decisions regarding the acquisition, operation, maintenance, renewal/replacement, and disposition of assets.

Asset management is an integrated set of processes and practices that minimize the lifecycle costs of owning, operating, and maintaining assets, at an appropriate level of risk, while continuously delivering established levels of service. The core catalysts for the establishment of an organization-wide Asset Management Program include population change, the impacts of climate change, and the increasing costs associated with providing a range of services to our residents within the context of a challenging municipal funding model.

Asset management planning allows us to make informed asset investment decisions, prioritize our investments, improve our financial performance, manage risk, improve organizational sustainability, and improve efficiency and effectiveness.

The key elements of asset management are:

- Providing a defined level of service and monitoring performance.
- Managing the impact of demand changes (growth as well as decline) through demand management, infrastructure investment, and other strategies.
- Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet that defined level of service.
- Identifying, assessing, and appropriately controlling risks; and
- Having a long-term financial plan which identifies required expenditures and how they will be funded.



Ontario Regulation 588/17

Ontario Regulation 588/17 was released in late 2017, and outlines the new requirements for asset management planning, which are phased-in over a 6-year period.

Table 1.1: Ontario Regulation 588/17

Date	Requirement	Description
July 1, 2019	Strategic Asset Management Policy	The policy identifies municipal goals the asset management plan supports, how the budget is informed, asset management planning principles, considerations for climate change, and a commitment to provide opportunities for stakeholder input.
July 1, 2022	Asset Management Plan (Core Assets)	The plan must address current levels of service and the associated costs of maintaining that service for water, wastewater, roads, bridges, culverts, and storm water assets.
July 1, 2024	Asset Management Plan (All municipal asset)	The plan must address current levels of service and the associated costs of maintaining that service for all municipal assets.
July 1, 2025	Proposed Levels of Service	Builds on the 2023 requirement by including a discussion of proposed levels of service, what activities will be required to meet proposed levels of service, and a strategy to fund those activities

This AM Plan is compliant with the July 1, 2022, regulatory requirements (APPENDIX A).

The remainder of the Asset Management Plan is divided into 5 chapters:

1. Chapter 1: Introduction – What is Asset Management.
2. Chapter 2 Key Concepts in Asset Management – What is replacement value, useful life, demand management, Climate change, Lifecycle maintenance, Conditional assessment, Risk, Critical assets, and Levels of Service
3. Chapter 3 Asset Summary and Descriptions– A snapshot of the overall state of our infrastructure, and the long-term funding needs, divided by asset class. The asset classes included in this AM Plan are roads, bridges and culverts, stormwater networks, water networks and wastewater networks. In each asset class we include their replacement costs, condition, average age and maintenance needs
4. Chapter 4: Financial Summary– A summary of the total financial demand of maintaining our assets, as well as our plan to meet that demand.
5. Chapter 5: Monitoring and Improvement Plan– A summary of ongoing improvement and collaborations.

Chapter 2: Key Concepts in Asset Management

Asset replacement value estimated useful life, lifecycle maintenance, condition assessments, risk, and levels of service are key concepts in asset management. Understanding the interplay between these concepts is critical to optimizing asset management practices.

Replacement Value

The replacement value is the cost that the Township would incur if it were to replace an asset. The replacement value can be calculated by several methods:

Table 2.1: Replacement Value Methods

Method	Description
Property Insurance Values	Replacement costs as identified in the most recent insurance contract
Engineer Condition Assessment	Replacement costs identified by external consultants from Building Condition Assessments (BCAs) or from engineering inspections of Bridges and Culverts
Historical Cost Inflation	The historical cost inflated to the current dollar value
Current market cost	Applying recent acquisition costs to assets

A high priority in the development of asset management capacity at the Township is the calculation of replacement costs for all Township assets. To date, we have developed models for determining the replacement costs of the core assets (roads, bridges and culverts, water, wastewater, and stormwater assets). Future iterations of the AM Plan will contain replacement cost estimates for all Township assets, including our facilities, and all other assets not included in this plan.

Table 2.2: Replacement Value and Method

Asset Class	Total Replacement Value	Replacement Value Methodology
Roads	**$269,416,546.00**	Calculation using most recent construction contracts, Engineering Condition Assessment
Bridges and Culverts	**$96,442,424.80**	Calculation using most recent construction contracts, Engineering Condition Asse
Stormwater Assets	**$16,496,774.00**	Applying recent acquisition costs to assets, prior year investment indexed to inflation
Water	**$29,780,361.00**	Prior year investment indexed to inflation, applying recent acquisition costs to assets
Wastewater	**$22,573,291.00**	Prior year investment indexed to inflation, consultant reports
TOTAL	**$434,709,396.00**	

The replacement value of an asset is a critical calculation for developing the financial models in the Asset Management Plan. The replacement value calculations will be updated on a regular basis to reflect changes in input costs, such as construction materials, parts, and labor. This will provide a more accurate

estimate of our infrastructure funding needs and will enable us to evaluate trends in input costs to better predict future costs.

Useful Life

The estimated useful life of an asset is an estimate of how long the Township expects to realize the economic benefits of asset ownership. An asset is considered to have exceeded its useful life when it is no longer required (such as technology that becomes obsolete), when it no longer provides the required level of service (such as when a road is too narrow for the growing community), or when it is more cost-effective to replace the asset than to continue to maintain it. The useful life is both a *technical* estimate, and an estimate of future *demand*.

To estimate the *technical* useful life of an asset, we consider the construction materials, current condition, anticipated wear and tear over time, and the maintenance requirements for the asset. With this information, we can estimate how long we will be able to use a certain asset or group of assets.

The useful life of an asset can also be impacted by future *demand*. For example, a road may be in good condition and have several years of useful life remaining based on the technical assessment, but it may be in a high-growth area that requires wider roads. We may need to intervene much earlier than the *technical* useful life would suggest. Demand management enables us to predict the impact of various trends on our future asset needs.

Demand Management

One of the factors influencing the longevity of our infrastructure is the demand for the services provided by that infrastructure. Demand will change over time, both in terms of quantity (such as increased waste removal requirements for growing communities) and the type of service required.

Demand is driven by several factors, including population growth, demographic shifts, changes in the types of services our residents expect and the ways in which we are expected to provide those services, land-use changes that impact both our rural and urban communities, economic development trends, and environmental changes. We need to incorporate anticipated changes in demand, and their effects on our infrastructure, into our long-term plans.

Table 2.3 below provides a high-level assessment of significant drivers of demand for the Township of Mapleton, as well as the associated impact on services.

Table 2.3: Demand Drivers, Projection and Management Strategies

Demand Drivers	Current position	Projection	Impact on Services	Demand Management Strategies
Population Growth	Approximately 11,100	Anticipated 15,200 by 2051	Increase asset usage &demand requires increase capacity for various asset classes & services	Plan for the projected change in lifecycle costs associated with Township assets 1/ Education - educate residents & business on the use of assets (i.e. road bypasses)
Non-Residential Growth	Approximately 4,430	Anticipated 7,000 by 2051		
Tourism	Mapleton has 37 Festivals and events	Tourism will continue to thrive in Mapleton		

Housing Affordability	Demand is driving the price of housing upwards	Housing affordability is a concern at levels of government & mitigation factors are underway	Specific services need to be tailored to encourage attainable housing options	**2/ Legislation –** restrict assets using legislation (i.e. enforcement related to by-laws) **3/ Demand substitutions –** provide alternative services in substitution for demanded services (i.e. bicycle lanes) **4/ Asset Expansion** – expand asset, capacities, and services offered in alignment with Master Plans **5/ Asset Efficiency –** promote efficient use of assets/services (i.e. higher density housing) **6/ Asset Sustainability –** ensure funding is available for sustainable services and projected increase in demand
Resident Preferences	Automobile use with focus on alternate form of transportation	Increased use of bicycles lanes and/or other road enhancements	Relieves some stress on some assets, however, may increase demand for alternative assets/services	
Farm & Gravel Pit Usage	Farm & gravel pit industries rely on Township Road network	It is expected that this usage will continue in the future	Reduction in road useful life & accelerated need for rehabilitation or replacement	
Seasonal Factors & Climate Change	Extreme weather is affecting the type & frequency of asset rehabilitation & replacement	Extreme weather is expected to increase in frequency & intensity	Asset lifecycle costs including evolving technologies will require Township to adapt	

Population and Employment Forecasts

The population of the Township of Mapleton is projected to grow to 14,100 residents by 2041: an increase of 27% over the next 20 years. The housing forecast will increase by 1,140 units. Most of the growth is concentrated in the urban areas of Drayton and Moorfield.

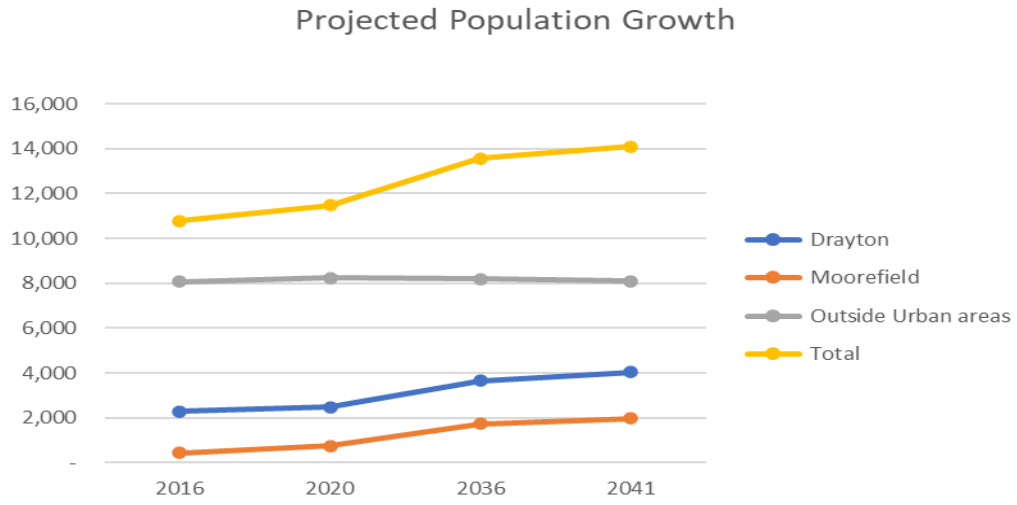
Table 2.4: Population Growth and Housing Forecast

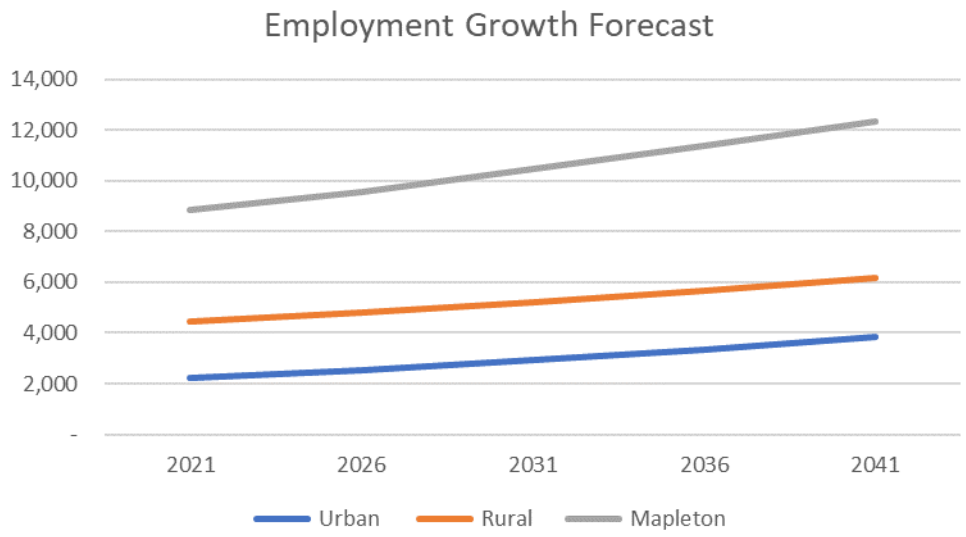
	Population			Housing Units			
YEAR	UBRAN	Rural	Mapleton	Drayton	Moorefield	Rural	Mapleton
2021	2,900	8,200	11,100	850	180	2,160	3,190
2026		8,300	11,800	960	270	2,240	3.540
2031	4,100	8,300	12,400	1,110	360	2,250	3,780
2036		8,300	12,900	1,160	470	2,260	3,960
2041	5,800	8,300	14,100	1,400	660	2,270	4,330
Growth	2,900	100	3,000	550	480	110	1,140

Between 2021 and 2041 there are 1,585 additional jobs anticipated in the Urban Settlement Areas. This represents 90% of all employment growth (1,755 jobs). The remaining 10% is for Rural Employment and includes a forecast of 170 jobs. In the Urban settlement area employment growth is forecast to be distributed between Population Related Employment (RPE) at 65% (1,135 jobs) and Employment Land Employment (ELE) growth at 26% (450 jobs)

Table 2.5: Employment Growth Forecast

	Urban			Rural Areas			
YEAR	ELE	PRE	Total Urban	ELE	Other	Total Rural	Total Employment
2021	510	1,740	2,250	400	1,780	2,180	4,430
2026	710	1,825	2.535	420	1,830	2,250	4,785
2031	790	2,145	2,935	450	1,850	2,300	5,235
2036	870	2,475	3,345	480	1,860	2,340	5,685
2041	960	2,875	3,835	490	1,860	2,350	6,185
Growth	450	1,135	1,585	90	80	170	1,755
%	26%	65%	90%	5%	5%	10%	100%





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Climate Change

Climate change significantly impacts the management and maintenance of infrastructure. Climate change may reduce the lifespan and performance of our infrastructure, resulting in rising costs of maintenance and replacement. More frequent and severe weather events can cause increased damage to assets, and changes in the intensity of precipitation will impact levels of service across our organization.

For example, water, wastewater, and stormwater infrastructure in Ontario faces three major pressure points: population growth, climate change, and deterioration due to ageing. Our growing population will put greater stress on assets, aging infrastructure may be inadequate to perform its function, climate change will cause more severe weather events and push assets beyond capacity.

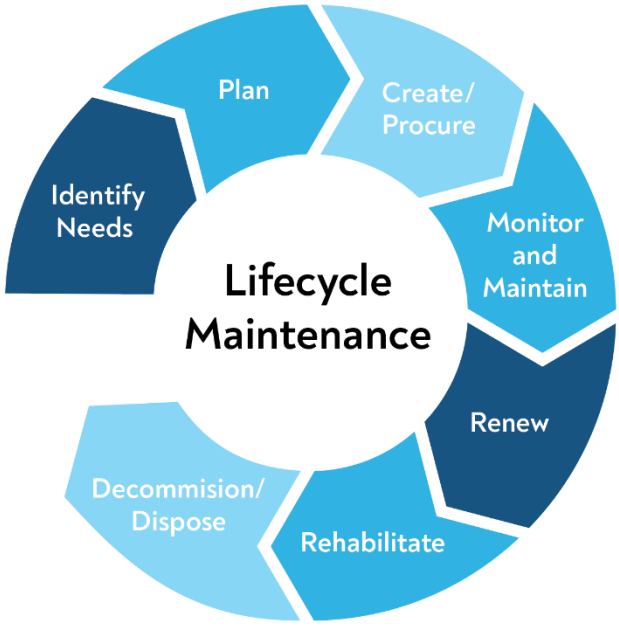
When infrastructure is unable to cope, disruptions can be significant. In June of 2017, flooding in the village of Drayton caused considerable damage. From road washouts, culvert failures, flooded basements to an emergency repair by-pass required for the wastewater collection system. These previously rare

“100-year” storm events are becoming much more common, and existing stormwater infrastructure is unable to cope. Stormwater infrastructure is not unique in this regard. Most infrastructure is not constructed to cope with conditions that are becoming increasingly more common.

Climate change adaptation is an inevitable, major investment that is made up of an array of projects that help our communities withstand the consequences of a changing climate. For example, our roads maintenance practices have already adjusted to changing weather patterns that necessitate more frequent and intensive intervention to ensure our roads are safe. Future adaptation strategies may include re-considering the way we construct assets to consider flood risks, severe storms, and other consequences of the changing climate.

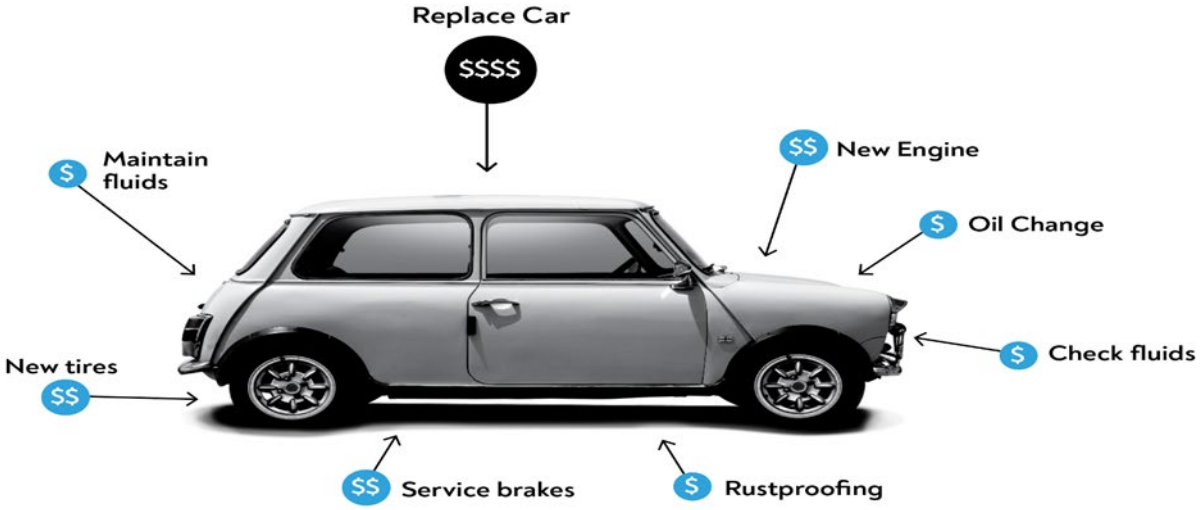
Lifecycle Maintenance

The costs associated with asset ownership can be broken down into three categories: initial investment costs, operating costs, and disposal costs. Once in operation, assets are renewed and rehabilitated at regular intervals to extend their useful life as much as possible. Once an asset has reached the end of its useful life, it is disposed of appropriately. Assets are generally replaced once the costs of maintenance exceed the benefits received.

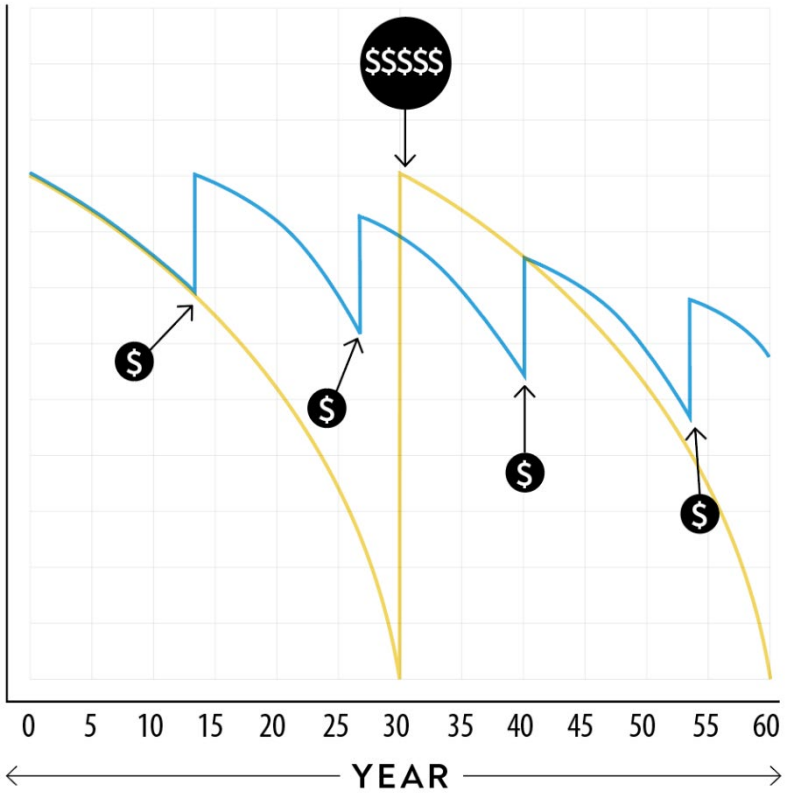


While initial investment costs may be significant, the ongoing maintenance costs over the life of the asset make up the bulk of the cost of asset ownership. Lifecycle maintenance strategies are built into asset management practices to reduce the costs associated with the ownership and maintenance of assets.

This is like vehicle ownership. When purchasing a vehicle, the initial up-front cost represents only a fraction of the cost of ownership. Vehicles require regular maintenance, as well as occasional retrofitting and replacement of components. Investing in regular maintenance, such as oil changes, extends the life of the vehicle and delays the costs of replacing components that break down.



We add regular maintenance activities into our annual budgets and make regular contributions to reserve funds. Lifecycle



maintenance strategies are built into asset management practices in order to reduce the costs associated with the ownership and maintenance of assets. Making small but timely investments in renewing assets enables us to extend the useful life of an asset and ensure that we use our assets as efficiently as possible. When we plan ahead, and schedule more capital-intensive work like rehabilitation and renewal projects, we are able to set aside funds in earlier years to offset those larger costs. This enables us to keep property taxes relatively stable.

Condition

We assess the condition of our assets on a regular basis, to evaluate whether they are meeting regulatory and service level requirements, and to inform our short- and long-term funding decisions. The condition of various types of assets is collected differently, reflecting the different functions and construction of infrastructure across the Township. Roads are assessed using a modified Pavement Condition Index (PCI), which ranges from a score of 0, indicating a road in need of reconstruction, to a score of 100, which represents a newly constructed road. Bridges, on the other hand, are measured on a Bridge Condition Index, with a range of 0 to 100. Other assets, such as buildings, are rated as either "Good", "Fair", or "Poor", depending on several factors. For some assets, condition assessments were not available, and instead, age was used as a proxy for condition. Older assets were assumed to be in worse condition than newer assets.

Table below summarizes the condition methodology and proportion of assets with assessed condition ratings, per asset class.

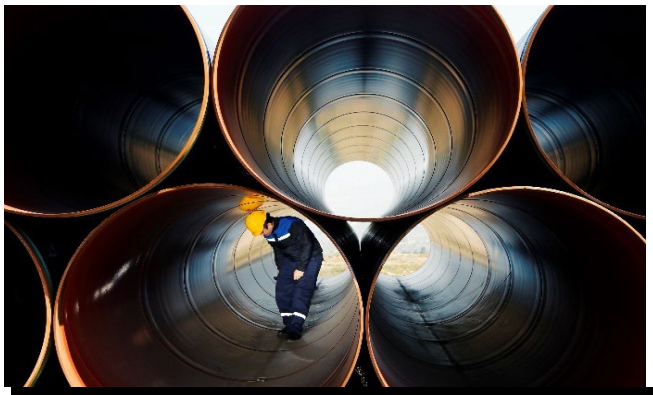
Table 2.6: Condition Measurement and Source

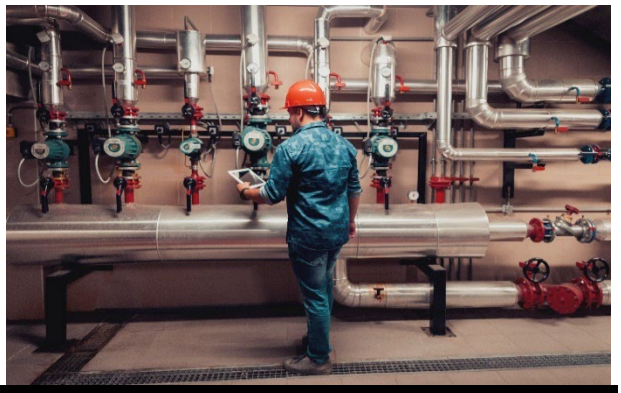
Asset Class	Condition Measurement	Condition Assessed	Source
Roads	Pavement Condition Index (PCI)	100%	Consultant report, 2020
Bridges and Large Culverts	Bridge Condition Index (BCI)	100%	Consultant report, 2020
Stormwater Assets	PSD Citywide Age Based projection and recent upgrade analysis	100%	PSD Citywide
Water Assets	PSD Citywide Age Based Projection and Consultant Report	100%	PSD City Wide and CIMA+
Wastewater Assets	PSD Citywide Age Based Projection and Consultant Report	100%	PSD City Wide and CIMA+

To standardize the condition ratings across asset classes, we have developed a five-point condition scale, which ranges from Very Poor to Very Good. It can be used to estimate condition based on the estimated useful life remaining or to translate existing condition data onto a standardized score.

Table 2.7: Age Based Condition Grading

Condition Grade	% Of Estimated Useful Life Remaining
Very Good	80 – 100%
Good	60 – 79%
Fair	40 – 59%
Poor	20 – 39%
Very Poor	< 20%





	Definition	Associated Budget	Our assets are:
Very Good	The asset is in very good condition, typically new or recently rehabilitated. Maintenance needs should be minimal until the next assessment of the asset.	Operating	Fit for the future
Good	The asset is physically sound and is in good condition, with some elements showing general signs of wear that require attention. Maintenance is minimal, and costs associated with maintenance activities fit within the departmental operating budget. Typically, the asset has been used for some time but is still within early to mid-stage of its expected life.	Operating	Adequate for now
Fair	The asset shows general signs of deterioration and is performing at a lower level than originally intended. Some components of the asset are becoming physically deficient and component replacement may be necessary. Maintenance requirements and costs are increasing. The asset needs either minor capital repairs, or additional maintenance.	Operating, Minor Capital	In need of attention
Poor	The asset is approaching the end of its useful life and exhibits significant deterioration. Major repairs are required, with significant capital investment.	Minor Capital, Major Capital	At risk of failure
Very Poor	The asset is in unacceptable condition with widespread signs of advanced deterioration and has a high probability of failure. Maintenance costs are unacceptable, and rehabilitation is not cost-effective. The asset needs major replacement or refurbishment.	Major Capital	Unfit for sustained service

Risk

Chapter 3 (State of Township Assets) introduced the risk assessments that have been performed on the various Township assets, using the "probability of failure" (PoF) multiplied by "consequence of failure" (CoF) formula (in most instances). PoF represents the likelihood (or probability) that an asset will not achieve the desired level of service or will not be able to fulfill a particular need. If the condition of an asset deteriorates, the risk of this happening will increase. However, even assets with a high condition score can be at risk of failing to meet community needs if they no longer meet regulatory requirements or are inadequate to meet changing demand from a functionality or capacity point of view. The factors used to estimate the probability of failure vary by asset class:

Table 2.9: Probability of Failure (POF)Variables

Asset Class	Probability of Failure
Road Base	Age and Average Daily Traffic (ADT)
Road Surface	Pavement Condition Index (PCI)
Bridges & Culverts	Average Daily Traffic (ADT), Bridge Condition Index (BCI) and Load Limits
Water Network Assets	Main Breaks per 100m and Age Base
Wastewater Network Assets	Force main Status and Age Base

Consequence of failure (CoF) represents the consequences if an asset does not achieve the desired level of service or is not able to fulfill a particular need. The factors used to estimate the consequence of failure vary by asset class:

Table 2.10: Consequence of Failure(COF) Variables

Asset Class	Consequence of Failure
Road Base	Average Daily Traffic (ADT) and Speed Limit
Road Surface	
Bridges & Culverts	Emergency Response Time, Detour Lengths, Average Daily Traffic (ADT), Local Access
Water Network Assets	Static Pressure (kpa), Redundancy, Pipe Diameter (mm), Average Daily Traffic (ADT) and Accessibility of Pipes
Wastewater Network Assets	Force main Status, Pipe Diameter (mm), Proximity to Water, Average Daily Traffic (ADT) and Accessibility to Pipes

The probability of failure is multiplied by the overall consequence of failure to arrive at a risk score, which is plotted on a risk matrix (sample below) and provides a summary of priority assets. As outlined in Chapter 4, this risk matrix can change from asset category to asset category

CONSEQUENCE →

RISK MATRIX	Low	Medium	High
High	Low	Medium	High
Medium	Low	Medium	Medium
Low	Low	Low	Low

PROBABILITY ↑↓

Critical Assets

Critical assets are defined as those that would have significant impacts on our communities, and ones that we cannot afford to allow to fail. These assets are monitored closely to ensure that we are proactively managing any risks of failure. Critical assets include key infrastructure like roads and bridges, as well as assets that are central to service networks, like large stormwater pipes that manage significant water flow.

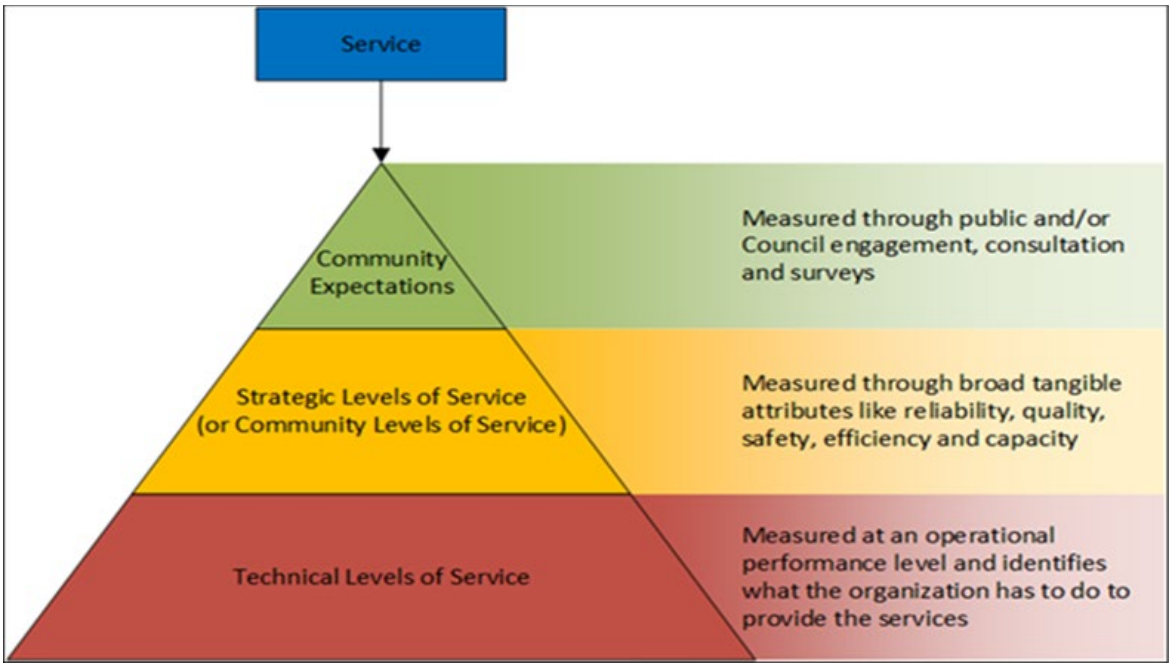
The prioritization exercise is critical, as the Township does not have sufficient funds to address the maintenance, rehabilitation, and renewal needs of all assets. We must allocate the available funding in the most cost-effective way possible, and one of the key parameters we take into consideration during this process is risk.

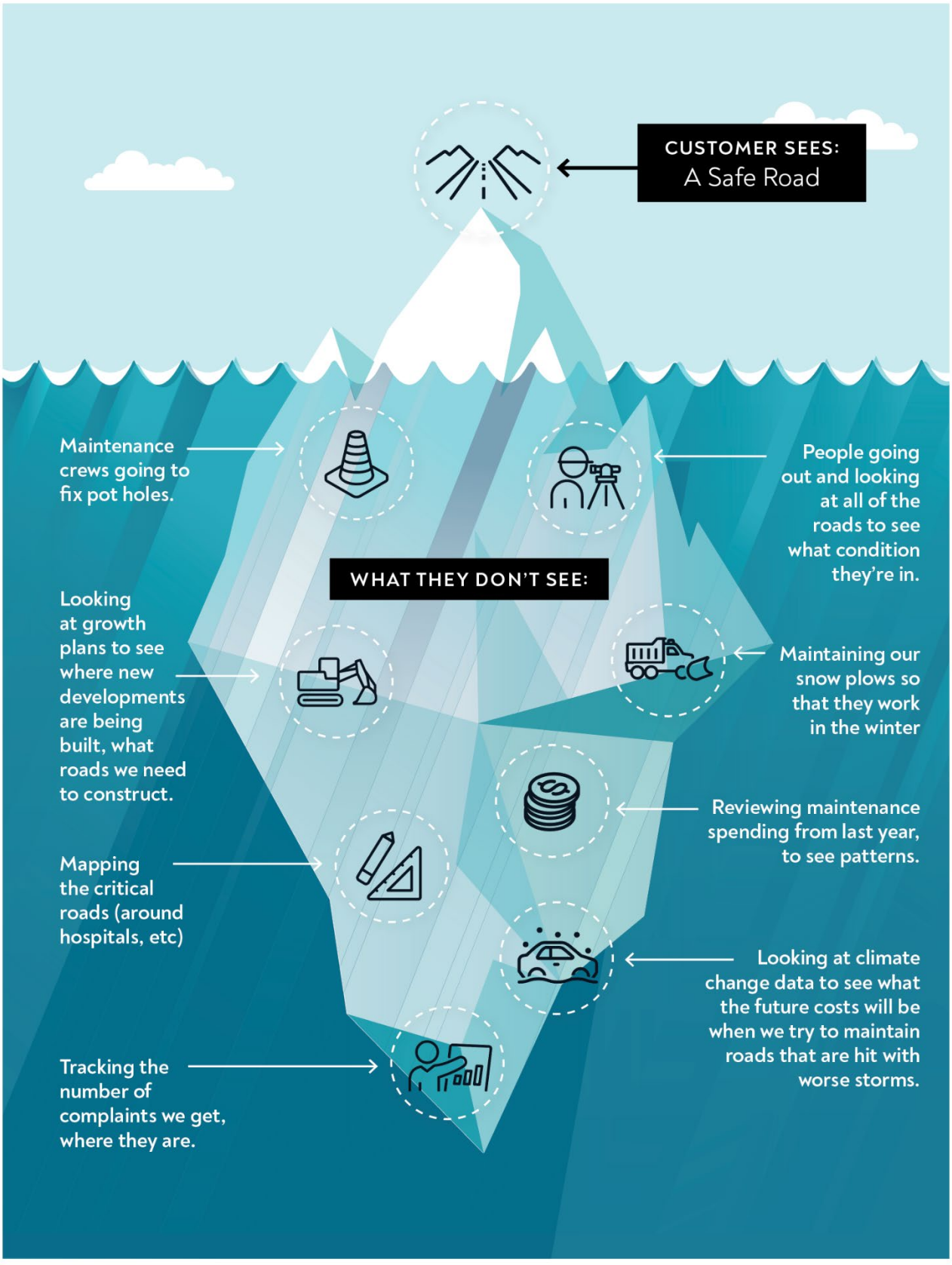
Levels of Service

The backbone of our asset management program is an understanding of the levels of service we are expected to provide to our residents. We base our infrastructure investment decisions on the types of services our residents want to have, as well as the quality of service that they are willing to accept. We know that our residents appreciate having safe roads, accessible and affordable childcare options, first-class community libraries, efficient waste removal services, safe communities, and so on. We strive to strike a balance between providing a breadth of services, at the highest quality possible, while keeping costs as low as possible.

Levels of service provide the link between higher-level strategic goals at the Township level and the more technical, day-to-day activities done at the departmental level. We measure our progress toward delivering services through performance measurement program across the organization. We measure our performance from both the customer perspective, as well as a technical perspective. Customer performance measures reflect our services from the resident perspective, and give us an idea of service quality, reliability, and sustainability. We know how quickly we can clear snow off our roads, and what the detour length will be if we close a certain section of road for construction. We also use technical performance measures to evaluate how effectively we are delivering services, using metrics such as average condition ratings, number of incident reports and work orders, and average daily traffic.

This asset management plan reflects the current levels of service delivered. Future asset management plans will include goals for future levels of service, including assessments of how we will fund changes in service levels. These changes may include enhanced levels of existing services, or the provision of additional services that we are not currently providing.




CUSTOMER SEES:
A Safe Road
Maintenance crews going to fix pot holes.
People going out and looking at all of the roads to see what condition they're in.
WHAT THEY DON'T SEE:
Looking at growth plans to see where new developments are being built, what roads we need to construct.
Maintaining our snow plows so that they work in the winter
Reviewing maintenance spending from last year, to see patterns.
Mapping the critical roads (around hospitals, etc)
Looking at climate change data to see what the future costs will be when we try to maintain roads that are hit with worse storms.
Tracking the number of complaints we get, where they are.

Chapter 3: State of the Township's Core Assets

The Township owns and manages its core assets roads, bridges and culverts, storm water assets, water assets and wastewater assets. In 2022, the value of those core assets in terms of its replacement value is approximately $435 million. Table below breaks down the asset's specific replacement cost and their average conditions, respectively.

Table 3.1.1.: Core Assets Replacement Value ($2022)

Asset Type	Replacement Cost (2022$)
Road related Assets	**$269,416,546**
Bridges and Culverts	**$96,442,425**
Stormwater Networks	**$16,496,774**
Water Networks	**$29,780,361**
Wastewater Networks	**$22,573,291**
Total	**$434,709,397**

Table 3.1.2: Core Assets Average Condition

Asset Type	Average Condition Score	Average Condition
Road related Assets	54.28	Fair
Bridges and Culverts	41.5	Fair
Stormwater Networks	62	Good
Water Networks	64	Good
Wastewater Networks	64	Good

The remainder of this chapter will focus on key asset information for each asset type.

Road Related Assets

Township is responsible for the movement of goods, services, people, and business in timely, safe, reliable, and cost-efficient manner, with ensured sustainability. Road Related networks are the backbone of the stronger economy, business, and quality of life of citizens. Business gets promoted, new employment opportunities get generated, chances of new markets creation with easy access of good roads and related assets. Road related assets are used to support reliable, efficient, and safe transportation through road networks, traffic signs and signals, sidewalk, signage, streetlights, and improved pavement markings.

Township roads make up the core of our transportation system and support essential community services. The road network represents the largest asset category in terms of replacement costs, necessitating effective asset management practices to ensure that the Township can maintain a functional and safe road network.

INVENTORY AND REPLACEMENT VALUE

The cross-section of a road section is made up of an underlying granular base for drainage, a base course of asphalt to support the traffic load, a wearing course of asphalt to provide a smooth riding surface, and the curb and gutter for drainage of stormwater. The cross-section thickness varies by road class, with arterial roads having much thicker structures than local roads to accommodate the heavier traffic flow and increased loads of heavier vehicles. The assets included in the Roads section of the AM Plan include the paved and unpaved roads surfaces an roads bases, earthen roads, gravel roads and paved roads. Future AM Plans will also include pedestrian networks, parking, traffic control assets, and safety infrastructure.

The replacement cost is calculated using a three-year historic construction cost average, to obtain the actual construction costs incurred. This cost includes associated costs related to the construction of a pavement section, including design, survey, construction, testing, contract administration, inspection, and final acquisition of the newly constructed asset. Replacement costs are calculated in current year dollars and are reviewed and updated bi-annually.

Table 3.1.3: Replacement Cost Chart of Road Related Assets

Asset Types	Quantity	Replacement Cost Method	Total Replacement Cost
Earth Roads	10130 m	Cost/ linear meter	$1,714,401
Gravel Roads	154780 m	Cost/ linear meter	$82,273,309
Paved Roads	210556 m	Cost/ linear meter	$177,264,991
Sidewalks	18086 m	Cost/ linear meter	$4,340,640
Traffic Signs	1365 #	cost/unit	$470,925
Street Signs/Lights	1065 #	cost/unit	$3,352,280
		Total	**$269,416,546**

CONDITION

METHODOLOGY

The Township's Public Works Department determines the overall condition of the road surface using the Pavement Condition Index (PCI). PCI Evaluations are performed for each km of roadway on a bi-annual basis. The pavement condition index (PCI) is a numerical rating of the pavement condition that ranges from 0 to 100, with 0 being the worst possible condition, and 100 being the best possible condition.

The PCI is then approximated to a Structural Adequacy score which is a measure of the percentage of the surface of the road that is exhibiting distress. Combining both methodologies provides the Township with sufficient information in six critical areas:

1. Geometrics
2. Surface Type
3. Surface Width
4. Capacity
5. Structural Adequacy (Distress)
6. Drainage

The Riding Condition Rating (RCR) is also assessed during the inspection. A rating from 1 – 10 is applied and is also a factor in the overall PCI calculation. The Township uses a Riding Condition Rating based on travel at the posted speed limit. Most of the roads within the Township have a posted speed limit of 80 km/hr. requiring a higher PCI to maintain a comfortable rating. The RCR is used to prioritize repair or replacement activities when roads have similar PCI values.

Table 3.1.4: Riding Condition Rating

Assessment	RCR
Excellent – Smooth & Pleasant	8-10
Good – Comfortable	6-8
Fair – Uncomfortable	4-6
Poor – Very rough and bumpy	2-4
Dangerous at 80 km/h	0-2

Table 3.1.5: Four Point Condition Scale and Description

Condition Grade	Time of Need (TON)	Typical Range (Condition BG)	Description
Good to Excellent	Adequate	85-100	No resurfacing or reconstruction needs. Minor maintenance should be considered.
Good	6-10 years	75-85	Roads that require reconstruction in the next 6-10 years.
Fair	1-5 years	55-75	Roads that require reconstruction within the next 5 years.
Poor	Now	<55	Little to no service life remaining. Roads that require immediate reconstruction or major rehabilitation.

Roads Condition Grade. Source: Roads Master Workbook

To enable comparisons with other asset classes, the above four-point condition scale has been translated onto a 5-point condition scale, with the following PCI value ranges:

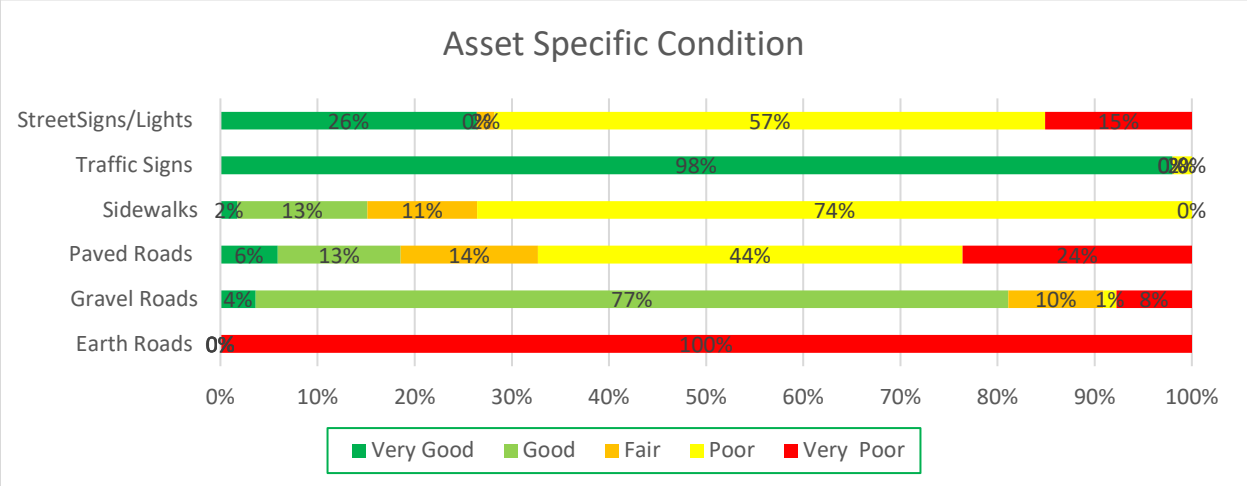
Table 3.1.6: Four Point Condition Scale Translated to Five Point and Description

Scale	PCI	Service Level	Associated Work
Very Good	80 – 100	The road segment is relatively new, or recently reconstructed. There are no visible cracks and no structural issues. The ride is smooth.	Minor maintenance
Good	60 – 79	The road segment is starting to exhibit few, if any, signs of surface deterioration, random cracks, and rutting. The ride is relatively smooth.	Crack sealing, spot drainage
Fair	40 – 59	The road segment is exhibiting signs of surface deterioration, random cracks, rutting, and some patching of surface defects. The ride is becoming rough.	Crack sealing, spot drainage, micro surfacing, bonded wearing course, spot drainage, re-ditching
Poor	20 – 39	The road segment shows signs of deterioration, cracks, rutting, and patching of surface defects that occurs over 50 percent of the surface. Some structural issues are starting to show. The ride is uncomfortable.	Resurface, asphalt recycling, re-ditching, reconstruction
Very Poor	<20	The road segment is reaching the end of its useful life. There are significant structural issues with large visible cracks, rutting and patching surface defects that occurs over 75 percent of the surface. The road is difficult to drive at the posted speed limit.	Reconstruction, widen, resurface, asphalt recycling, re-ditching

Scale	Photo
Very Good PCI: 80-100	
Good PCI: 60-79	
Fair PCI: 40-59	
Poor PCI: 20-39	
Very Poor PCI <20	

Table 3.1.7: Road Network Assets Condition

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Earth Roads	4.70%	Very Poor	100% Age Based
Gravel Roads	72.00%	Good	100% Assessed
Paved Roads	51.00%	Fair	100% Assessed
Sidewalks	60.00%	Good	100% Age Based
Traffic Signs	98%	Very Good	100% Assessed
Street Signs/Lights	40.00%	Fair	100% Age Based
Average	**54.28%**	**Fair**	**50% Assessed**



ESTIMATED USEFUL LIFE

The different sections of a pavement cross-section (granular base, base asphalt, and wearing surface) each have different useful lives, due to different construction materials and exposure to external stresses. The base has an estimated average useful life of 50 years, while the asphalt surface has an estimated useful life of 20 years.

Township roads deteriorate at different rates. Pavements typically deteriorate slowly at first, followed by more rapid deterioration. For example, high-class bituminous 1 road deteriorate faster than high-class bituminous 4 roads, representing the difference in deterioration of different classes of asphalt used for the road surface. A typical pavement lifecycle is best illustrated by a Pavement Deterioration Curve, below (nicer image TBD). This curve represents the rapid deterioration of roads in the last 25% of their useful life.

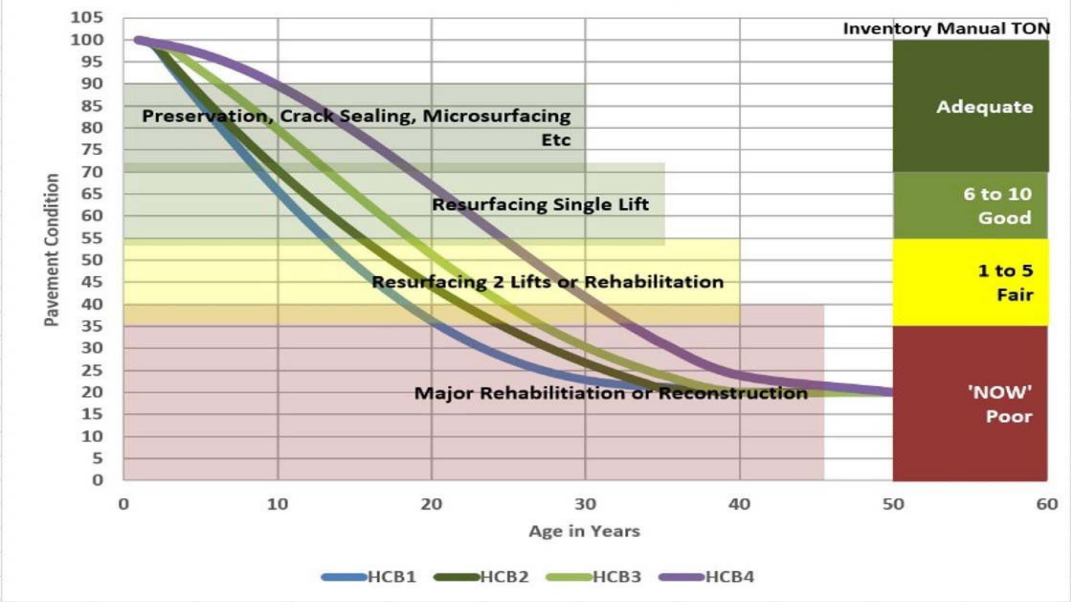
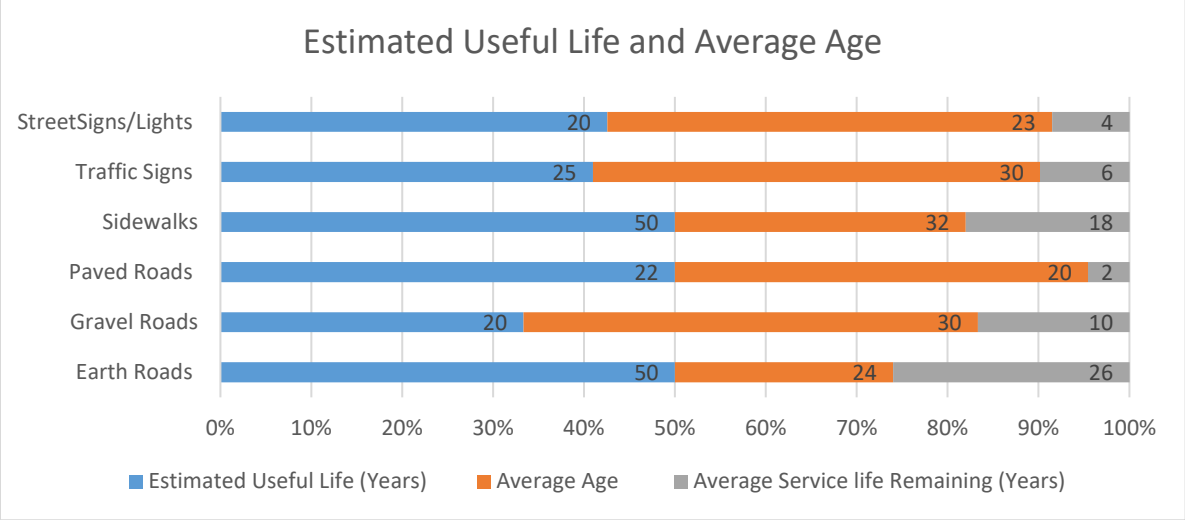
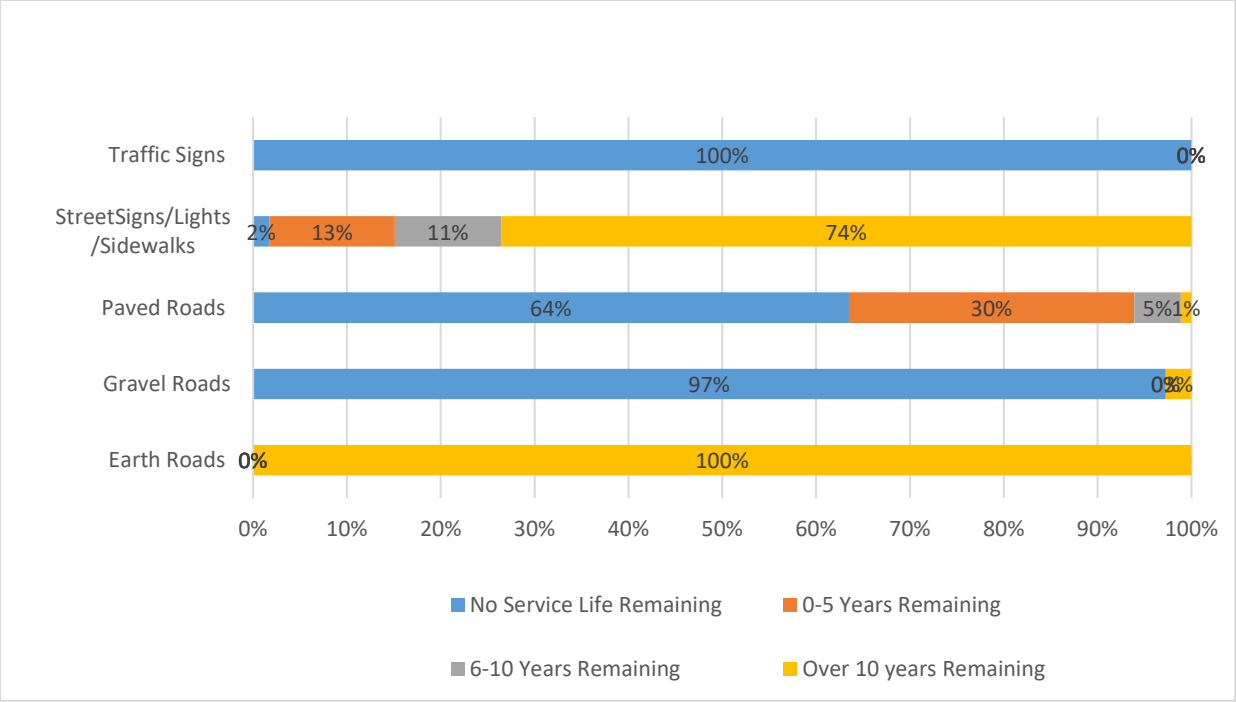


Table 3.1.8: Estimated Useful Life, Average Age, remaining Service Life

Asset Segment	Estimated Useful Life (Years)	Average Age	Average Service life Remaining (Years)
Earth Roads	50	24	26
Gravel Roads	20	30	10
Paved Roads	20	20	2
Sidewalks	50	32	18
Traffic Signs	25	30	6
Street Signs/Lights	20	23	4
	Average	**26.5**	**11**





RISK

Table 3.1.9: Risk Model

	Probability of Failure Metrics	Consequence of Failure Metrics
Paved Roads	Condition	Replacement cost
Gravel Roads	Condition	Replacement Cost
Earth Roads	Condition	Replacement Cost
Side Walks	Condition	Replacement Cost
Traffic Signs	Condition	Replacement Cost
Streetlights /Signs	Condition	Replacement Cost

The probability of failure and the consequence of the failure are product together to calculate risk associated with each asset. In our risk analysis, age of the assets and the inspected condition both estimate the likelihood/probability of the failure. The updated replacement cost is the parameter contributing to the consequence of the failure, considering the financial impact to the township. There is other more factors contributing to the risk like average daily traffic, detour length, material type, load limit, type of the traffic supported etc. All these parameters are planned to be included in the future risk analysis based on the availability of the precise data.

RISK MATRIX

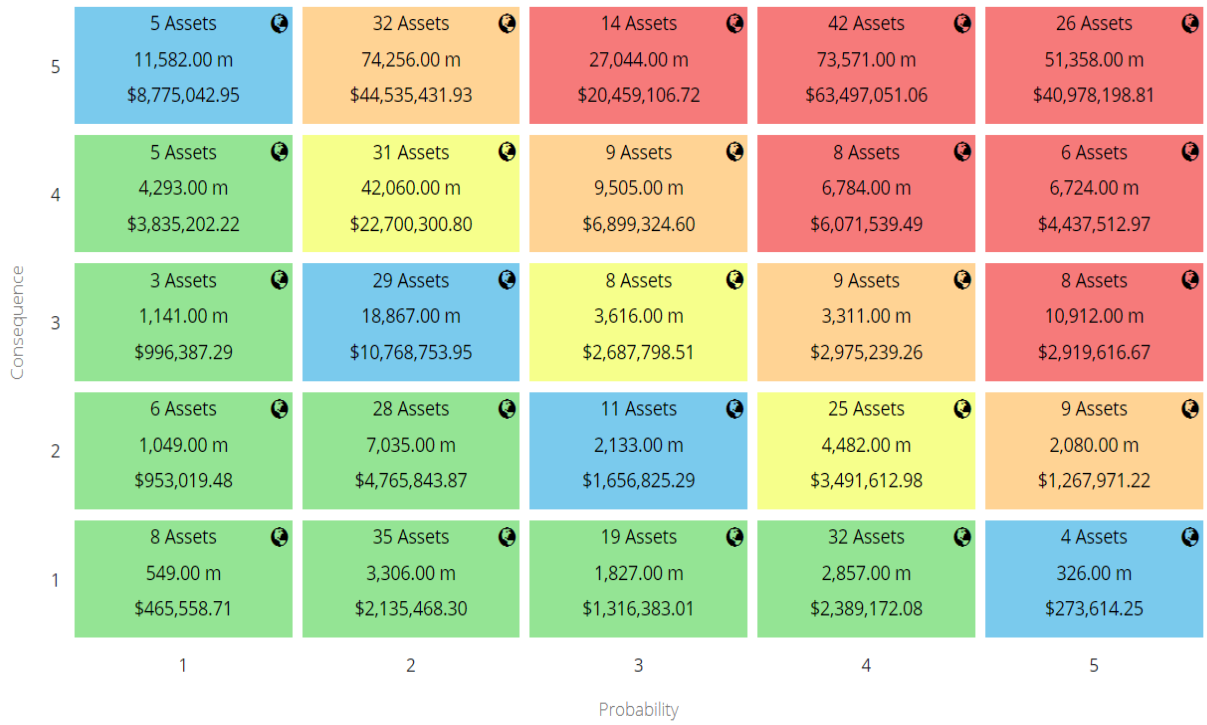


Table 3.1.10: Asset Prioritization List

Assets	From	To	POF	COF	Risk	Cost	Quantity(M)
M140	Wellington Rd. 86	Wellington Rd. 861.3 km N. of Wellington Rd. 86	5	5	25	$1223788.5	1,164.00
M140A	1.3 km N. of Wellington Rd. 86	Concession 3	5	5	25	$1234642.5	1,554.00
M147	Wellington Rd. 8	Concession 12	5	5	25	$2411937	2,751.00
M215	Sideroad 15	Diamond Sideroad	5	5	25	$1659757.5	1,833.00
M221	Sideroad 3	Wellington Rd. 9	5	5	25	$1626885	1,854.00
M225	Sideroad 15	Wellington Rd. 10	5	5	25	$3745561.5	4,017.00
M231	Sideroad 3	Wellington Rd. 9	5	5	25	$1672596	1,822.00
M232	Sideroad 6	Sideroad 3	5	5	25	$1684530	1,835.00
M261	Sideroad 3	Wellington Rd. 9	5	5	25	$1618110	1,844.00
M262	Sideroad 6	Sideroad 3	5	5	25	$1589152.5	1,811.00
P167A	Blind Line	Third Line	5	5	25	$1280772	1,442.00
P223	Wellington Rd. 12	Sideroad 17	5	5	25	$1668802.5	1,842.00
P226	Yatton Sdrd.	Sideroad 19	5	5	25	$1657044	1,832.00
P231	Sideroad 16	Wellington Rd. 11	5	5	25	$1450982	1,840.00

P295	Sideroad 19	Sideroad 18	5	4	20	$ 745,248.0	1,612.00

LEVELS OF SERVICE

The Township Road network is maintained to provide a safe and efficient means of transportation. The network is inspected in accordance with the Minimum Maintenance Standards for Municipal Highways, wherein the Provincial government mandates the frequency of the inspection of roads based on traffic volume and posted speed limits. Roads with higher volumes and higher speed limits are required to be inspected more frequently. The inspection evaluates the existence of shoulder drop offs, cracks, and pavement surface discontinuities that would compromise the driving ability on the road section at the posted speed limit. Once a defect has been identified, the MMS prescribes the maximum time for repair based on the traffic volume and posted speed limit.

Table 3.1.11: Levels of Service

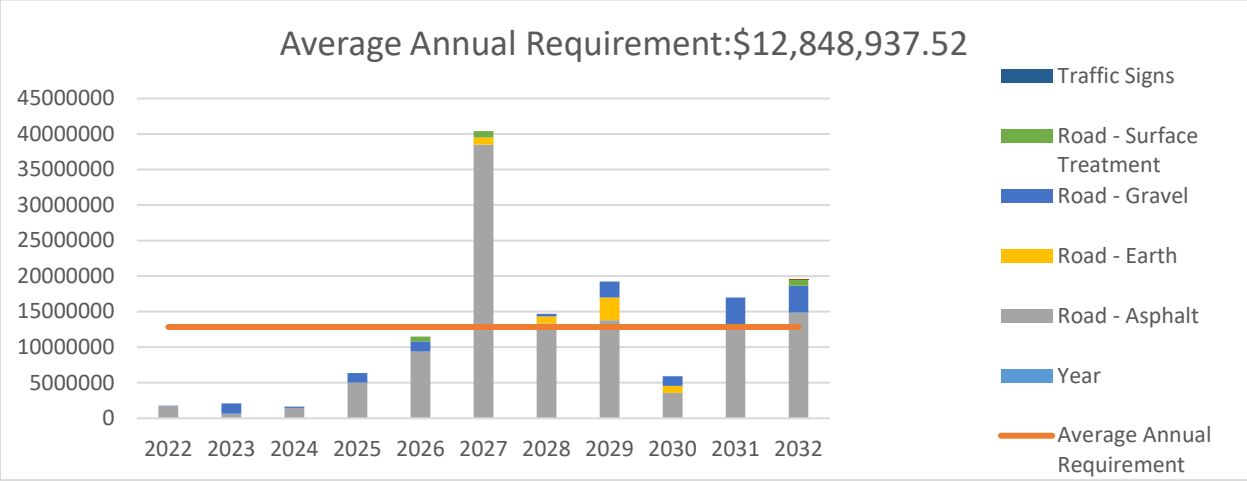
Community levels of service (qualitative descriptions)		
Scope		
Description, which may include maps, of the road network in the municipality and its level of connectivity.	APPENDIX D	
Quality		
Description or images that illustrate the different levels of road class pavement condition.	APPENDIX D	
Technical levels of service (technical metrics)		
Scope	2020	2021
Number of lane-kilometres of paved road as a proportion of square kilometres of land area of the municipality.	0.8	0.8
Number of lane-kilometres of gravel road as a proportion of square kilometres of land area of the municipality.	0.6	0.6
Number of lane-kilometres of earthen road as a proportion of square kilometres of land area of the municipality.	0.4	0.4
Quality	2020	2021
1. For paved roads in the municipality, the average pavement condition index value	60	60
2. For Gravel roads in the municipality, the average surface condition (e.g., excellent, good, fair or poor).	good	good
3. For earthen roads in the municipality, the average surface condition (e.g., excellent, good, fair or poor).	Fair	Fair

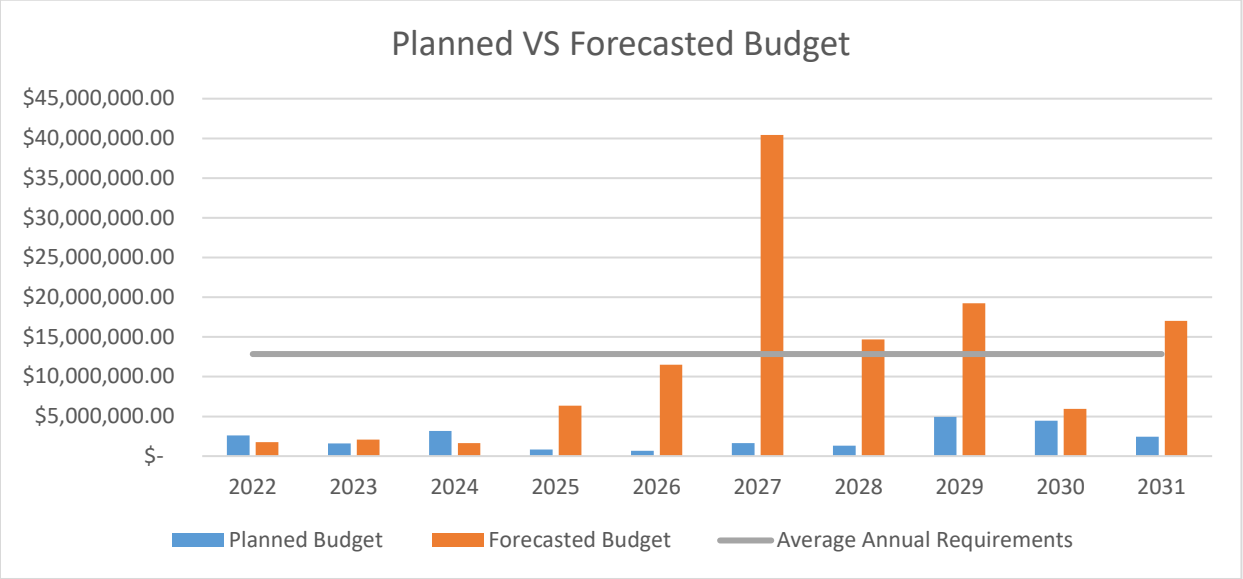
FINANCIALS

Future demand on the road network will be shaped by utilization and population and employment growth. Shifting changes in utilization, such as changing transportation preferences, may reduce the pressure on Townships Road networks.

Road networks. On the other hand, increasing population density and an increase in the purchase of larger vehicles such as SUVs, will increase the load on Township roads and accelerate deterioration, requiring more frequent and earlier intervention, which ultimately negatively impacts the useful life of the asset.

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Planned Budget	$ 2,621,000.00	$ 1,597,900.00	$ 3,185,700.00	$ 847,800.00	$ 673,000.00	$ 1,625,100.00	$ 1,326,800.00	$ 4,930,110.00	$ 4,440,000.00	$ 2,450,000.00
Forecasted Budget	$ 1,771,000.00	$ 2,070,921.90	$ 1,654,000.00	$ 6,347,851.23	$ 11,494,811.87	$ 40,429,699.67	$ 14,695,274.40	$ 19,242,416.68	$ 5,936,547.20	$ 17,040,322.26
Average Annual Requ	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52	$ 12,848,937.52





LIFECYCLE MANAGEMENT

Over the life of the pavement, different maintenance and rehabilitation treatments are applied to extend the useful life. There are three main treatments that are applied to Township paved roads:

1. Resurfacing: the removal and replacement of the top lift of asphalt. This is done within the first phase of the useful life of the asset, when surface cracking is beginning to expand. Prior to this treatment, crack sealing and micro resurfacing treatments are an option.
2. Minor Reconstruction: involves the removal and replacement of both layers of asphalt (the wearing surface, and base asphalt). This is required when surface cracking is more extensive.
3. Full Reconstruction: is the complete removal and replacement of the entire pavement system, including the wearing surface, base asphalt, and granular base. This treatment is applied to sections of pavement that cannot be resurfaced due to extensive wear and is usually done in conjunction with work on the underlying pipe infrastructure.

Rehabilitation and reconstruction treatments are triggered by the age and condition of the pavement section. The rehabilitation of pavement assets presents an opportunity to renew other assets such as underground utilities.

Key activities related to Road's surface management include (from 2013 plan – review with Roads):

1. Patching: patching potholes and cracks in asphalt to repair minor damage
2. Shoulder grading: building up gravel shoulders with new material to meet the proper slope of the asphalt surface
3. Grading loose top: applying new gravel to gravel roads with grading and compaction
4. Dust control: suppression dust, where necessary, with the application of magnesium chloride
5. Washout & base repair: applying new gravel to roads and shoulders that have been damaged by heavy rain and other weather events
6. Sweeping: maintaining paved intersections free of gravel on the pavement

Key activities related to roads shoulder maintenance include (from 2013 plan – review with Roads):

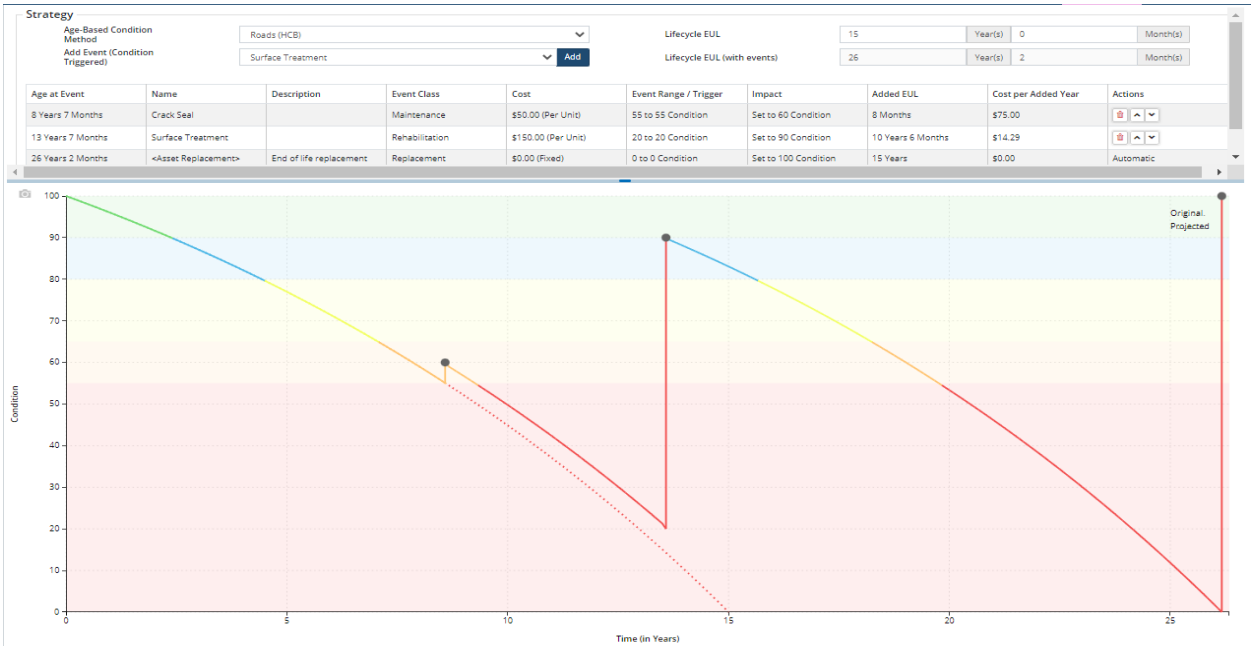
7. Tractor mowing: mowing to improve roadside visibility and control noxious weeds
8. Tree removal and tree planting: removing trees that may cause safety hazards and planting trees where appropriate
9. Brush cutting removing brush that may obstruct visibility or impede various roadside operations
10. Debris pick-up: picking up illegally dumped garbage, including litter tossed from vehicles
11. Adopt-a-road: coordinating roadside cleanup on Township roads
12. Dead animal removal
13. Weed control: spraying and mowing to reduce the spread of noxious weeds

Minor capital road construction is intended to delay road deterioration and allow a road to reach its useful life. The key activities in the minor capital road construction include (from 2013 plan – review with Roads):

14. Bridge repairs / OSIM bridge inspections
15. Engineering studies

16. Traffic-related studies to predict and analyze traffic volumes
17. Hot mix patches: a more extensive asphalt repair than either cold mix patches or smaller pothole repairs
18. Guide rail: to protect driver safety

Life cycle Management Strategy: Paved Roads



DATA QUALITY

Roads & Transportation Network

Table 3.1.12: Data Quality

	Level 1	Level 2	Level 3	Level 4
Inventory	Inventory data is incomplete.	Reliable inventory data exists for critical assets	Inventory data is complete for all assets in this asset class.	Inventory data is complete, accurate, and in a centralized, accessible format.
Condition	Condition data is incomplete.	Condition data is complete for critical assets.	Condition data is complete and accurate for all assets.	Condition data is complete, accurate, and regularly updated. Data is centralized and accessible.
Levels of Service	Services provided by this asset class are understood by departmental staff.	Current levels of service have been defined and performance metrics are used to measure progress.	Current levels of services are defined, tracked, and reported on a regular basis.	Proposed levels of service have been defined, and funding impacts are assessed. Trends in performance are tracked.
Risk	Critical assets and services are understood by department staff.	Risk is estimated according to remaining service life.	Risk models exist for assets in this asset class. Critical assets have been identified, and risk management strategies exist.	Risk management strategies are documented for all assets, including level of resilience and risk tolerance.
Lifecycle Maintenance Strategy	Lifecycle activities required to maintain current levels of service are understood.	Lifecycle activities required to maintain current levels of service are understood and documented.	Costs of lifecycle activities and risks associated with deferred maintenance are documented.	Projected lifecycle maintenance needs are defined, funding shortfalls are identified, and risks associated with inadequate funding are documented.
Financial Sustainability Strategy	Budgets are based on prior year spending.	Prior year spending is adjusted to account for inflation and other variables.	Asset replacement schedules have been built into the long-term capital forecast.	Full lifecycle costs have been built into long-term forecasts. Demand forecasts inform the budget.

Bridges & Culverts

INTRODUCTION

In accordance with the Canadian Highway Bridge Design Code, a bridge is defined as "a structure that provides a roadway or walkway for the passage of vehicles, pedestrians, or cyclists across an obstruction, gap, or facility and is greater than 3m in span."

Culverts are defined as "a structure that forms an opening through soil", as per the Canadian Highway Bridge Design Code. Culverts included in the OSIM inspection have a span greater than or equal to 3 meters, and more than 600 mm of cover. Smaller culverts are not assessed based on OSIM methodology but are included as part of the Stormwater network.

INVENTORY AND REPLACEMENT VALUE:

The inventory in this AM plan represents structures "owned" by the Township. Township owns and maintains 78+ bridges and 232+ culverts. Township ensures that bridges are culverts are safe, reliable for the movement of goods, people, and services in most cost efficient and timely manner, and keeps the community connected.

Bridges and Culverts replacement costs: replacement costs are calculated based on construction technique and structure components and have been calculated using a 3-year historic construction cost average. All associated costs related to the construction, such as design, survey, construction, testing, contract administration, inspection, and final acquisition of the newly constructed asset is included in the estimated unit cost.

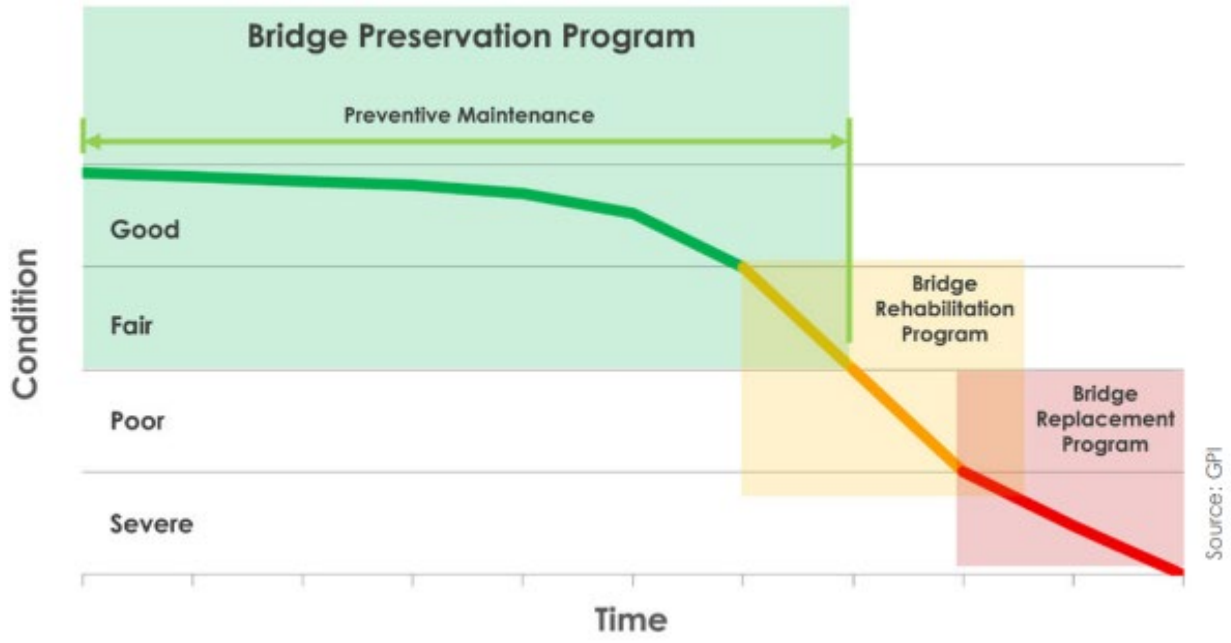
Table 3.2.1: Inventory and Replacement Value

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridge	78 #	Unit Cost	$82,965,924.80
Culverts	232 #	NRBCPI Quarterly (Toronto)	$13,476,500.00
		Total	**$96,442,424.80**

CONDITION

The condition of Township bridges and large culverts is assessed every two years, in accordance with the Ontario Structure Inspection Manual (OSIM), by external consultants. The inspection reports produce a list of priority investments through a recommended Time of Need (TON) assessment.

Bridge Condition Over Time:



Bridges are made up of various components, each of which deteriorate at different rates. The OSIM inspections visually evaluate each component of the structure and classify it by condition. These individual component condition scores are compiled into a summary metric, the Bridge Condition Index (BCI). In addition to a visual inspection, the need for further detailed inspection of structures is defined within the OSIM report, which would provide more information on the rehabilitation requirements of the structure.

Each structure is assigned a condition rating based on the Bridge Condition Index (BCI). The BCI ranges from 0, indicating that a bridge is in poor condition and requires replacement, to 100, indicating that a bridge is in excellent condition. The BCI takes into consideration a weighted average condition of the components in each structure, and is classified into one of three categories[1]:

Table 3.2.2: BCI score and Condition Rating

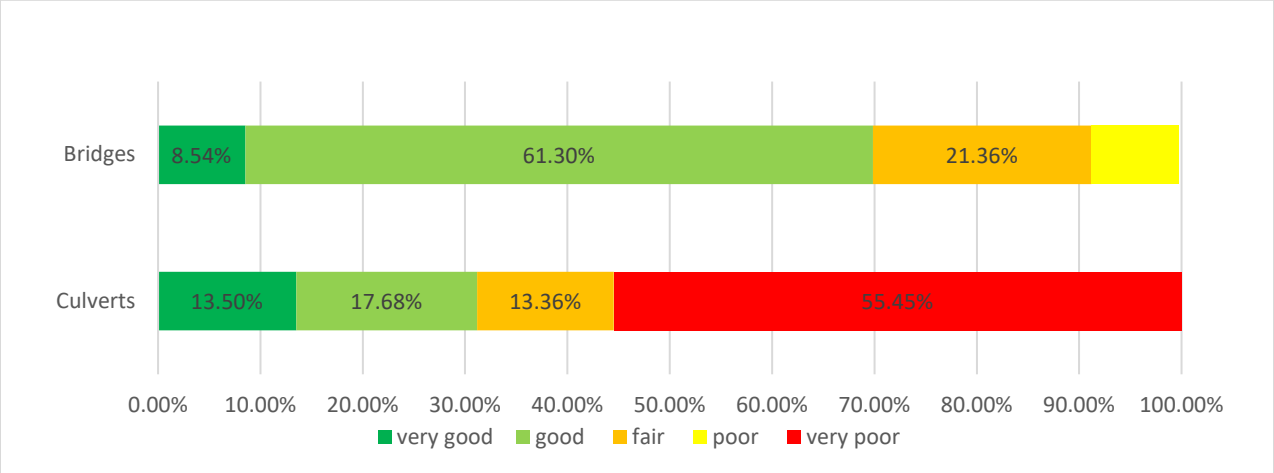
Condition	BCI	Maintenance Schedule
Good	70 – 100	Maintenance is not usually required within the next five years.
Fair	60 – 70	Maintenance work is usually scheduled within the next five years. This is the ideal time to schedule major bridge repairs to get the most out of bridge spending.
Poor	Less than 60 BCI	Maintenance work is usually scheduled within one year.

Table 3.2.3: Standardized Five Point Scale

Scale	BCI	Associated Work
Very Good	>80	Deck cleaning, drainage outlets cleanout
Good	59 – 79	Deck cleaning, drainage outlets cleanout
Fair	40 – 59	Deck cleaning, drainage outlets cleanout, new asphalt deck surface, waterproofing, rehabilitation
Poor	20 – 39	Rehabilitation, Reconstruction
Very Poor	<20	Reconstruction

Table 3.2.3: Asset Specific Average Condition

Asset Segment	Asset Condition (%)	Average Condition Rating	Condition Sourcing
Bridges	67.00%	Good	100% Assessed
Culverts	16.00%	Very Poor	Age Based
Average	41.50%	Fair	50% Assessed

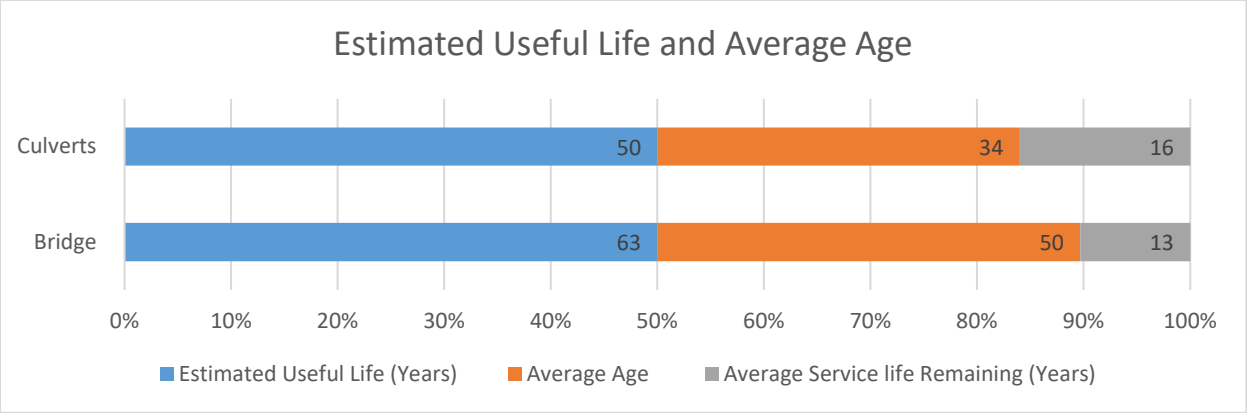


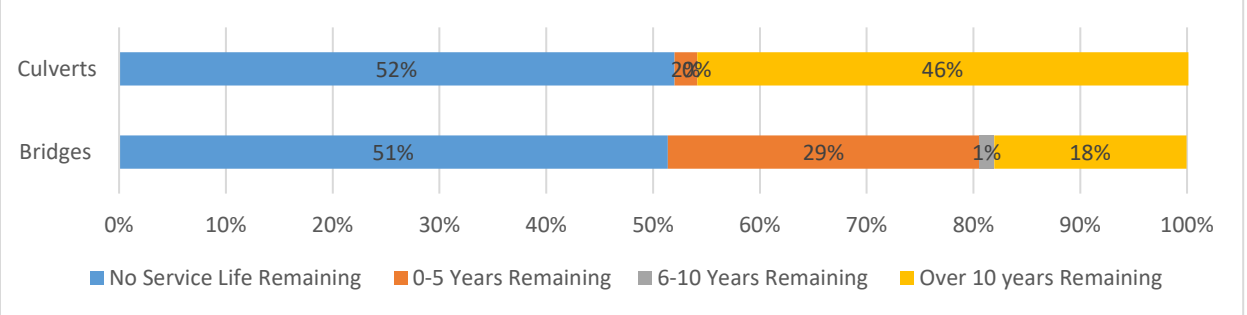
ESTIMATED USEFUL LIFE

The estimated useful life for bridges and large culverts is based on a review of historical replacement timelines for similar assets. It varies by construction material, as some bridges are built of concrete while others are built of steel trusses. Different construction materials have different useful lives and deterioration curves. For the purposes of this asset management plan, we have grouped all bridges as one asset class, and reflected their useful life as an average across construction materials.

Table 3.2.4: Asset Expected Useful Life

Asset	Useful Life
Bridge Base	50 Years
Bridge Surface	20 Years
Large Culvert	63 Years





RISK

The probability of failure and the consequence of the failure are product together to calculate risk associated with each asset. In our risk analysis, age of the assets and the inspected condition both estimate the likelihood/probability of the failure. The updated replacement cost is the parameter contributing to the consequence of the failure, considering the financial impact to the township. There is other more factors contributing to the risk like average daily traffic, detour length, material type, load limit, type of the traffic supported etc. All these parameters are planned to be included in the future risk analysis based on the availability of the precise data.

The probability of failure for both bridges and large culverts is the result of overall deterioration due to ageing, increased loading, cracking, corrosion, environmental effects such as freeze-thaw events, and fatigue. This is reflected in the BCI.

Table 3.2.5: Risk Model

Asset Class	Probability of Failure Metrics	Consequence of Failure Metrics
Bridges	Bridge Condition Index (BCI)	Replacement Cost
Culverts	Age Based Condition	Replacement Cost

RISK MATRIX:

Table 3.2.6: Assets Prioritization List

Assets	Location	POF	COF	Risk	Cost	Quantity(m)
MB002	Sideroad 6	4	5	20	$ 1,305,480	17
MB015	Sideroad 15	4	4	16	$ 727,375	6
PB011	Sideroad 21	4	4	16	$ 949,026	7
PB015	12th Line	3	5	15	$ 1,038,105	9
PB016	17 SIDEROAD	3	5	15	$ 1,502,705	15
PB019	19 SIDEROAD	4	4	16	$ 713,000	10
PB020	Yatton Sideroad	3	5	15	$ 1,070,190	9
PB021	4th Line	3	5	15	$ 1,300,650	9
PB022	4th Line	3	5	15	$ 1,226,820	8
PB029	17 SIDEROAD	4	4	16	$ 540,960	6
PB031	Sideroad 21	4	4	16	$ 747,040	6
PB033	12th Line	4	4	16	$ 588,627	4
PB037	Yatton Sideroad	4	4	16	$ 816,500	10
PB059	14th Line	3	5	15	$ 1,206,120	1

LEVEL OF SERVICE/PERFORMANCE

Table 3.2.7: Levels of Service

Community levels of service (qualitative descriptions)		
Scope		
Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	All type of traffic supported. No restriction.	
Quality		
1. Description or images of the condition of bridges and how this would affect use of the bridges.	APPENDIX D	
2. Description or images of the condition of culverts and how this would affect use of the culverts.	APPENDIX D	
Technical levels of service (technical metrics)		
Scope	2020	2021
Percentage of bridges in the municipality with loading or dimensional restrictions.	0.04	0.04
Percentage of culverts in the municipality with loading or dimensional restrictions.	0	0
Quality	2020	2021
1. For bridges in the municipality, the average bridge condition index value.	67	67
2. For structural culverts in the municipality, the average bridge condition index value.	60	60

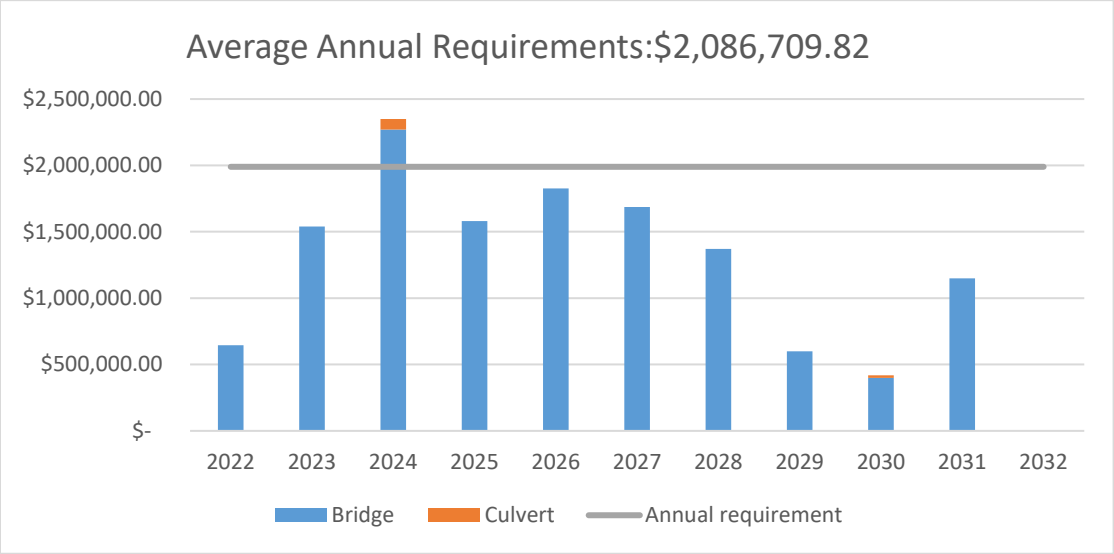
The Township must meet legislated requirements to ensure that local bridges are safe, including:

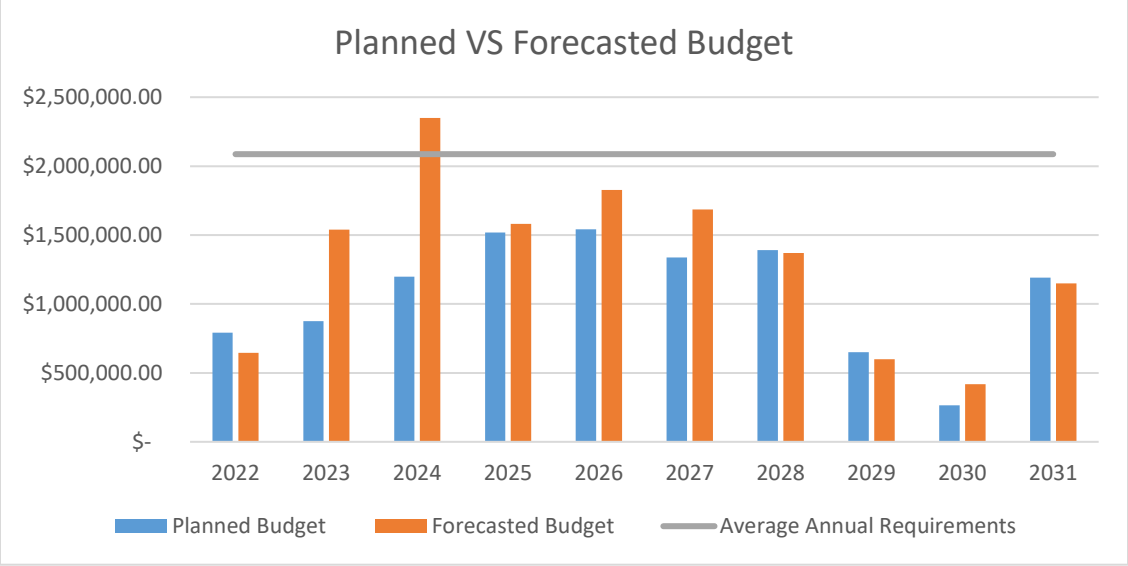
1. Provincial government mandates, through Ontario Regulation 239/02 – Minimum Maintenance Standards for Municipal Highways, that bridges are inspected for deck spalling on regular intervals based on road class.
2. Biennial inspections completed in accordance with Ontario Regulation 104/97 using methodology outlines in the Ontario Structure Inspection Manual (OSIM). Any safety-related deficiencies identified during the OSIM inspection are prioritized.
3. Bridge and large culvert design work must be done in accordance with CSA S6-14 Standard – Canadian Highway Bridge Code, and Ontario Regulation 104/97: Standards for Bridges

FINANCIALS

Future demand on Township bridges is driven by several factors. Climate change is negatively impacting the deterioration rates of bridges and large culverts. Changing the materials from which we construct these assets and with which we reinforce these assets will mitigate the increased pressures of climate change on the deterioration of these structures. We are also expanding the size of culverts to increase the capacity of stormwater management.

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Planned Budget	$ 791,000.00	$ 875,000.00	$ 1,199,000.00	$ 1,519,000.00	$ 1,542,500.00	$ 1,336,500.00	$ 1,390,000.00	$ 650,000.00	$ 265,000.00	$ 1,190,000.00
Forecasted Budget	$ 646,000.00	$ 1,540,000.00	$ 2,350,250.00	$ 1,580,500.00	$ 1,827,500.00	$ 1,686,500.00	$ 1,370,000.00	$ 600,000.00	$ 418,750.00	$ 1,150,000.00
Average Annual Requ	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82	$ 2,086,709.82





LIFECYCLE MANAGEMENT

Recommended improvements are categorized into three categories:

1. Minor repairs (<$50,000 per structure)
2. Major repairs / replacements (>$50,000 per structure)
3. Barrier / guide rail needs
4. Rehabilitation and Replacement at end of life

Minor repairs are relatively inexpensive but can defer or delay the need for major repairs or replacements in the future, thereby extending the useful life of Township bridges and culverts. Minor repairs include such work as extending deck drains, adding scour protection, repairing undermined foundations, and sealing leaking expansion joints.

Barrier and /or approach guide rail work is also included in ongoing maintenance. Some structures already have approach guide rails, but they do not meet current standards for length, post spacing, and/or end treatments, as defined in the Roadside Safety Manual (MTO, 1993).

Needs are prioritized based on the condition and/or design of existing guiderails (if any), traffic volumes, speed, road alignment, and the severity of the hazard posed by the lack of guiderails or the inappropriateness of existing guide rails. The need for barrier and guide rail improvements is a safety issue, and as a result, installing or updating barrier and guide rails is a priority investment.

Functional needs of bridges are also assessed. Functional needs are associated with the width and/or vertical clearance of the bridge, according to the Geometric Design Standards for Ontario Highways (MTO, 1985).

Township steel truss bridges are, in most cases, over 60 years old, with limited load capacities and inadequate travel width. Additionally, the steel trusses are exposed in the “splash zone” and require expensive and frequent cleaning and re-coating for maintenance.

The following is a list of maintenance activities associated with bridges and large culvert structures:

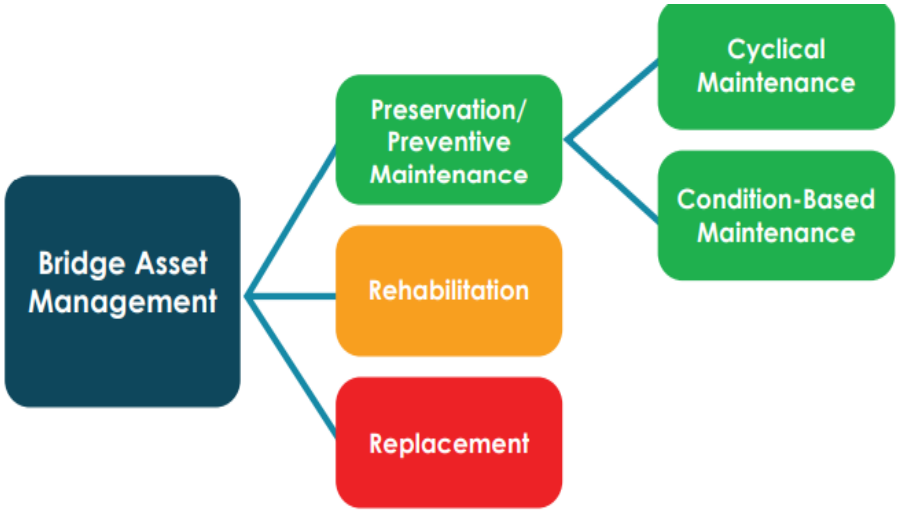
- Annual washing to remove debris from Township winter operations (sand and salt)
- Creak sealing of wearing surface
- Regular re-coating of railing systems
- Preventative maintenance and cleaning of wearing items
- Regular clearance of debris around and within the structures
- Monitoring for minimum maintenance standards, including safety systems and signs

To maintain the condition, safety, and to maximize the life of the asset maintenance for bridges and culverts is comprised of:

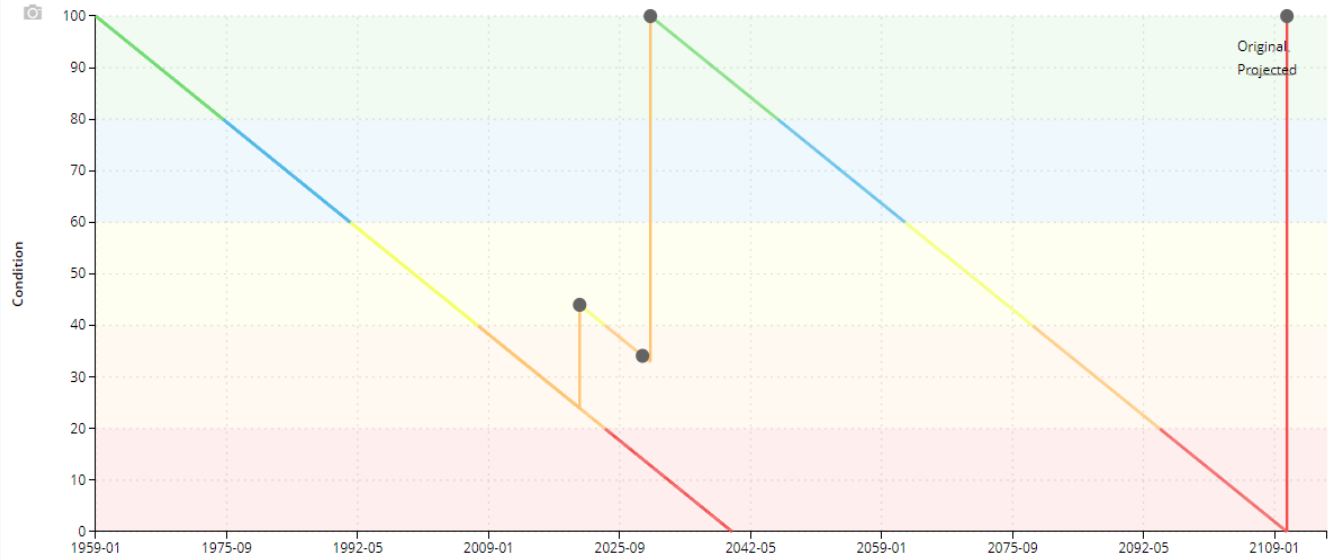
- Ditching: digging roadside ditches for the prevention of roadway flooding and removing vegetation and debris to maximize drainage while maintaining erosion control
- Bridge Maintenance: inspecting and maintaining Township bridge structures
- Culvert Maintenance: installing and repairing the culverts that channel water under roadways and driveways

- Manhole and Catch Basin Repair and Maintenance: inspecting, cleaning, and repairing catch basins and manholes

Lifecycle Strategy for Bridge:



	2028-08-01 (Manual)	Engineering	Design	Rehabilitation	$40,000.00 (Provided)	Capital	0 to 70 Condition	No Impact	0 Months	$0.00
	2029-08-01 (Manual)	Repair / Rehabilitation	Major rehabilitation to extend structure life	Rehabilitation	$600,000.00 (Provided)	Capital	50 to 70 Condition	Set to 100 Condition	54 Years 4 Months	$11,037.53
	2110-08-01	<Asset Replacement>	End of life replacement	Replacement	$466,267.50 (Fixed)	Capital	0 to 50 Condition	Set to 100 Condition	50 Years	$9,325.35



DATA QUALITY

Bridges & Culverts

Table 3.2.8: Data Quality

	Level 1	Level 2	Level 3	Level 4
Inventory	Inventory data is incomplete.	Reliable inventory data exists for critical assets	Inventory data is complete for all assets in this asset class.	Inventory data is complete, accurate, and in a centralized, accessible format.
Condition	Condition data is incomplete.	Condition data is complete for critical assets.	Condition data is complete and accurate for all assets.	Condition data is complete, accurate, and regularly updated. Data is centralized and accessible.
Levels of Service	Services provided by this asset class are understood by departmental staff.	Current levels of service have been defined and performance metrics are used to measure progress.	Current levels of services are defined, tracked, and reported on a regular basis.	Proposed levels of service have been defined, and funding impacts are assessed. Trends in performance are tracked.
Risk	Critical assets and services are understood by department staff.	Risk is estimated according to remaining service life.	Risk models exist for assets in this asset class. Critical assets have been identified, and risk management strategies exist.	Risk management strategies are documented for all assets, including level of resilience and risk tolerance.
Lifecycle Maintenance Strategy	Lifecycle activities required to maintain current levels of service are understood.	Lifecycle activities required to maintain current levels of service are understood and documented.	Costs of lifecycle activities and risks associated with deferred maintenance are documented.	Projected lifecycle maintenance needs are defined, funding shortfalls are identified, and risks associated with inadequate funding are documented.
Financial Sustainability Strategy	Budgets are based on prior year spending.	Prior year spending is adjusted to account for inflation and other variables.	Asset replacement schedules have been built into the long-term capital forecast.	Full lifecycle costs have been built into long-term forecasts. Demand forecasts inform the budget.

Stormwater Network

INTRODUCTION

It is necessary for the Township to protect its citizens, natural environment and built environment through the well efficient management of the stormwater and its drainage. Overall stormwater management system checks the happening flood by organized draining of rainwater away from buildings and roads and controlling the rate of discharge to rivers and streams. Most of the run-off water from areas developed in recent decades is treated to help remove sediment and pollutants before its outlets to the natural environment. The Township also works to protect groundwater aquifers through managing infiltration and being compliant with source water protection laws when considering development approvals. The stormwater network consists of a variety of assets, including open ditches, storm sewers, and culverts less than 3m in diameter. Storm sewers consist of catch basins, manholes, storm main pipes, storm lateral pipes, storm water management ponds, storm oil/water separators, and sub drains.

The stormwater network is essentially composed of two classes of assets: storm sewer pipes, and storm sewer structures. Pipes can be further segmented into construction materials, which include brick, concrete, polyvinyl chloride (PVC), high-density polyethylene (HDPE), or galvanized corrugated steel (CSP). The storm sewer structures comprise the access points of the system, for maintenance and inspection work (manholes), or inlet structures designed to catch the runoff water from hard surfaces.

INVENTORY AND REPLACEMENT VALUE:

Having accurate and comprehensive asset data is critical for all assets but is especially important for underground infrastructure. The Township maintains around 11 km of storm sewer pipes and 793 related point assets, such as catch basins, maintenance holes and storm water management ponds. In addition to condition data, the Township collects data on the location, length, size (diameter), construction material, and construction year (other?).

The storm sewer inventory is derived from historical construction record, drawings and was updated by external consultants. To date, we have accounted for the location of 100% of our assets.

FUN FACT: Both the age and material of pipes can lead to failure. Pipes are now commonly made of PVC, steel, and concrete. However, across Ontario, older pipes have been constructed from materials ranging from cast iron, lead, and clay to wood and cardboard. For nearly two decades after WWII, many cities in Canada began installing cardboard pipes, or “coal tar-impregnated wood fiber’. They were easier and faster to install, which was necessary to meet the infrastructure needs of a growing baby-boomer population. In Waterloo, a 1994 survey identified 100,000 homes that were serviced by such pipes. These pipes began to dissolve and cost more than $650 million to replace at the time. An engineering study revealed that the hot water from dishwashers was the catalyst behind the rapid failure of these pipes. (Source: OSWCA, 14)

REPLACEMENT VALUE METHODOLOGY:

To properly valuate the storm sewer network, historic construction costs were used to determine the average amount for excavation. The material and size of the pipe were analyzed, and unit costs were developed for pipes larger and smaller than 450mm. Pipes larger than 450mm are typically reinforced

and are therefore more expensive. The construction material also influences the replacement cost of the pipes. The unit cost of the pipe is combined with the average excavation and estimated soft cost to produce a unit replacement cost that is applied to all pipe sections in the network. Maintenance holes, catch basins, etc., are valued based on a three-year historic construction cost and applied to each asset in the network.

Table 3.3.1: Inventory and Replacement Cost

Asset Types	Quantity	Replacement Cost Method	Total Replacement Cost
Storm Water Catchbasin	214 #	Cost/Unit	$1,982,363
Storm Water Collection System	10500 m	Cost per linear meter	$9,705,784
Storm Water Manholes	416 #	Cost/Unit	$3,494,429
Storm Water Municipal Drains	163 #	Cost/Unit	$191,101
Storm Water System SWM Ponds	8 #	Cost/Unit	$1,123,098
		Total	$16,496,774

CONDITION

Storm sewer inspection is conducted using closed circuit television (CCTV), based on the CSA Pipeline Assessment and Certification Program (PACP) standard. A camera is placed into a pipeline and the picture is relayed to an operator located above ground, who interprets the images and records the location and nature of any observed deficiencies. The images are recorded, allowing for further review by engineering staff later.

Based on PACP, the defects are rolled into a pipe score value, which represents the condition of the entire length of a storm sewer section. A pipe score of 1 would represent a new pipe, whereas a pipe score of 5 would represent a pipe that requires rehabilitation.

As an alternative to CCTV condition assessments, the condition of some assets is inferred from the remaining useful life, according to the following table:

Table 3.3.2: PACP Score and Grade

Grade	PACP Score	Remaining Useful Life
Very Good	1	+50 Years
Good	2	21 to 50 years
Fair	3	11 to 20 years
Poor	4	1 to 10 years
Very Poor	5	Beyond useful life

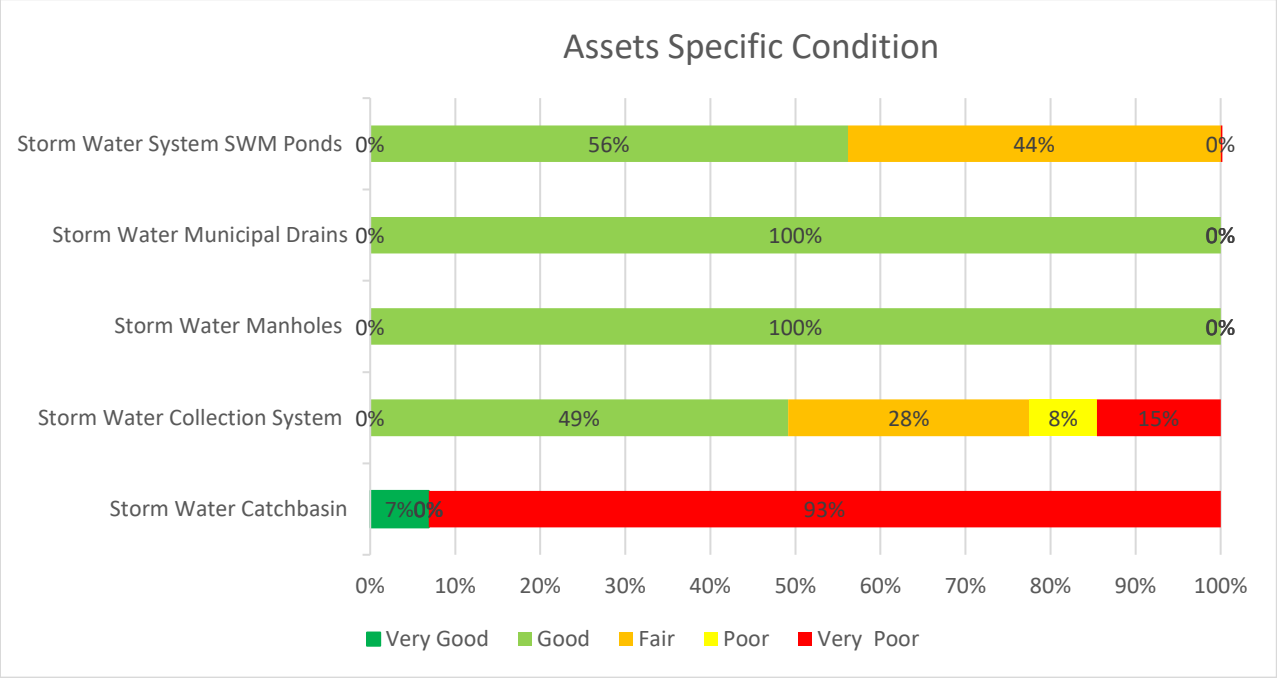
The condition of the pipe network is scheduled to be re-assessed every 2 to 5 years, while the condition of stormwater assets is assessed on a regular basis.

CURRENT ASSET CONDITION:
Summary of condition ratings for this asset class.

Table 3.3.3: Asset Segment and Average Condition

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Storm Water Catch basin	19.00%	Very Poor	100% Age Based
Storm Water Collection System	76.00%	Good	50% Age Based and 50% Assessed
Storm Water Manholes	70.00%	Good	50% Age Based and 50% Assessed
Storm Water Municipal Drains	83.00%	Very Good	100% Age Based
Storm Water System SWM Ponds	62.00%	Good	Recently Upgraded
Average	62.00%	Good	60% Age Based and 40% Assessed

ASSETS SPECIFIC CONDITION



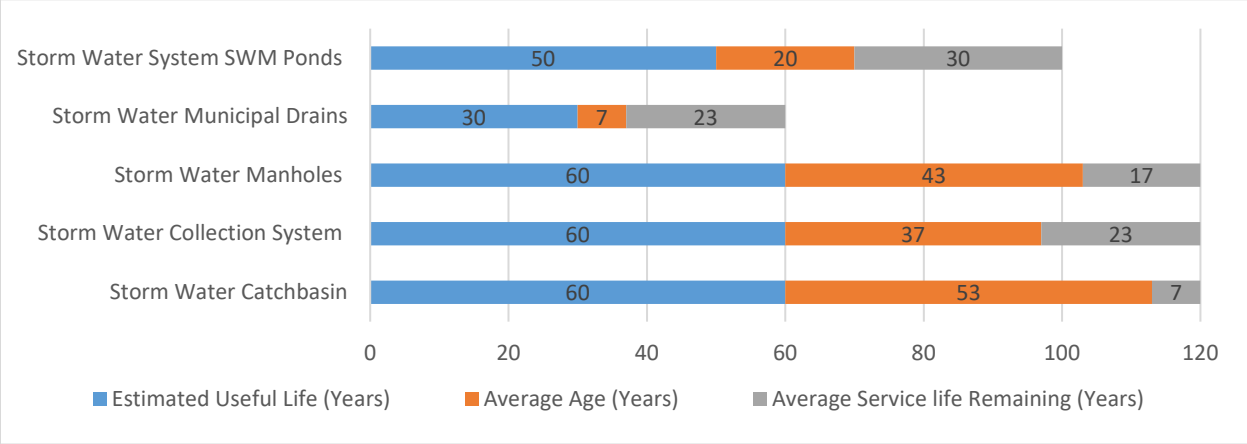
ESTIMATED USEFUL LIFE

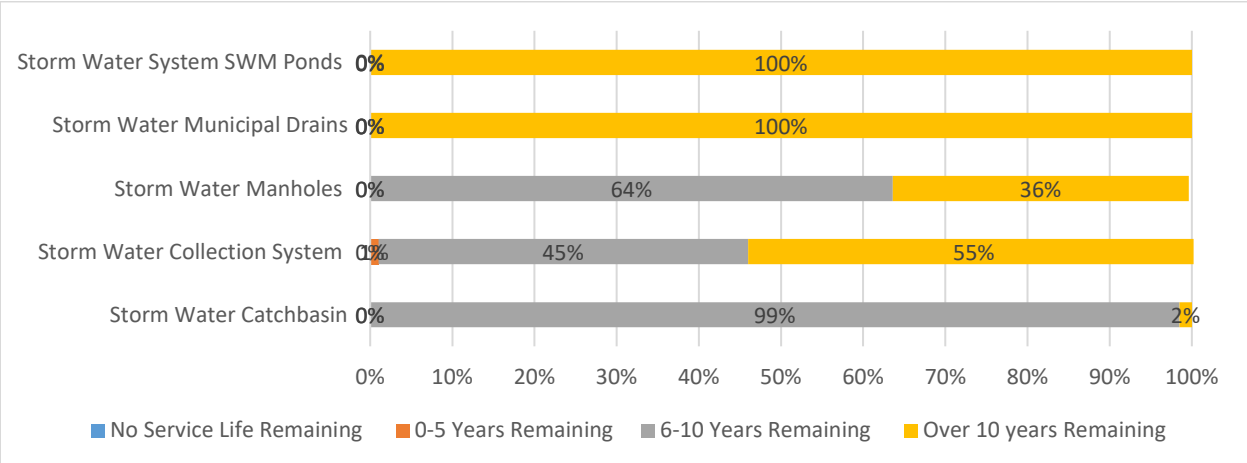
The useful life of a storm sewer pipe is based on the material of the asset. The useful life of a concrete pipe is approximately 75 years, while the useful life of a corrugated steel pipe is closer to 35 years. Storm sewers point assets, such as manholes, are constructed of concrete and have a useful life of 75 years.

Table 3.3.4: Assets Specific Estimated Useful Life

Asset	Useful Life
Storm Water Management Pond	50 Years
Storm Water Municipal Drain	30 Years
Storm Water Manhole	60 Years
Storm Water Collection System Mains	60 Years
Storm Water Catch Basin	60 Years

ESTIMATED USEFUL LIFE & AVERAGE AGE:





RISK

In this report the probability of the failure is function of the condition and age, and consequence of the failure is the function of the replacement cost. Moreover, the consequence of risk is a function of the diameter of the pipes, as larger pipes are more central to the network and thus have a wider impact in the event of failure than do more peripheral pipes. Once we have data available, we will start working more on the risk side.

3.3.5: Risk Model

Asset Class	Probability of Failure Metrics	Consequence of Failure Metrics
Storm Water Management Ponds	Condition	Replacement Cost
Storm Water Municipal Drains	Condition	Replacement Cost
Storm Water Manholes	Condition	Replacement Cost
Storm Water Collection System Mains	Condition	Replacement Cost
Storm Water catch basins	Condition	Replacement Cost

Risk Matrix:

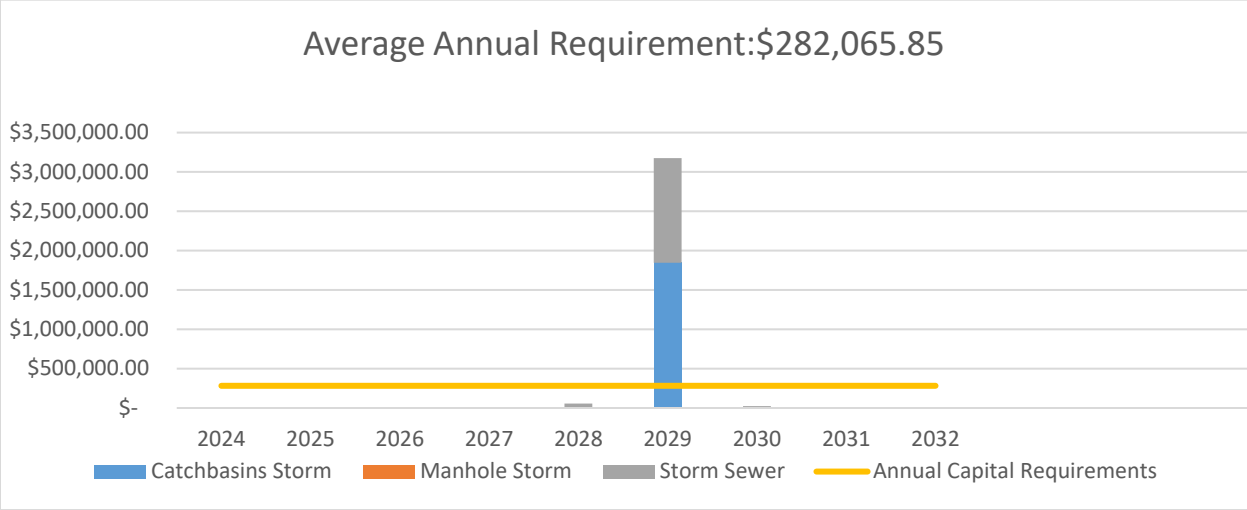
LEVELS OF SERVICE

There are currently no legislative requirements for the inspection of storm sewer pipes. However, due to the criticality of these assets, the Township has prioritized the condition assessments of our pipe network, to better allocate funding toward ensuring that our underground infrastructure remains functional.

Table 3.3.6: Level of Service Table

Community levels of service (qualitative descriptions)		
Scope		
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.	N/A	
Technical levels of service (technical metrics)		
Scope	2020	2021
1. Percentage of properties in municipality resilient to a 100-year storm.	80	80
2. Percentage of the municipal stormwater management system resilient to a 5-year storm.	80	80
Quality	2020	2021
1. For storm sewers in the municipality, the average condition value.	76	76
2. For storm management ponds in the municipality, the average condition.	Good	Good

FINANCIALS



LIFECYCLE MANAGEMENT

Storm sewers and connecting structures undergo regular flushing or hydrovacing, to clear out debris. The pipes are used to the end of their useful life, and then replaced, as regular rehabilitation activities require excavating and digging up surface roads, which is prohibitively costly. All rehabilitation and replacement activities are typically coordinated with pavement rehabilitation projects unless the defect is critical and/or threatens public safety. Catch basins are cleaned every year.

Minor maintenance - planned regularly scheduled maintenance and inspection programs and have a flexibility to modify and adapt to township based specific practices

- Includes inspection 5-10-year cycle for the smaller diameter mains,
- For larger diameter mains inspections based on projected age-based condition and criticality,
- Cleaning and flushing, annual street cleaning, field staff monitoring the fundamental safety issues related to manhole and its repairs,
- CCTV inspections, and minor repairs to stormwater structures and piping
- catch basin cleaning every 3-5 years and annual street cleaning (Spring)
- field staff to check for general safety issues, and visual inspection for blockages at high risk

Major maintenance typically includes activities that will ensure estimated useful life of the assets specific with their design, construction process, materials and the regular operation and maintenance requirements

- Proactive flushing of mains that ensure the prevention of the blockages and scheduled/reactive flushing if pipes get blocked emergency repairs, root cutting, leaf clearing and spill response
- Proactive flushing of manhole that ensure the prevention of the blockages and scheduled/reactive flushing if pipes get blocked emergency repairs, root cutting, leaf clearing and spill response
- Other emergency repairs of inlets, outlets, culverts, and ditches to maintain service for the stormwater systems.

Rehabilitation is generally a one-time repair event designed to extend the service life of the asset to its established life expectancy and more.

- Trenchless rehabilitation of the mains at later life
- Replacement of the grade adjustment units and grates as required of the catch basins
- Replacement of the grade adjustment units and manhole covers as required as required
- Activities can include sewer lining programs and seal & grout programs.

Replacement of assets occurs at the end of the useful service life where renewal/rehabilitation is no longer an option. The life expectancy of an asset is impacted by the natural properties of its materials of construction and can vary greatly from this depending on several environmental factors that impact the degree of deterioration and performance.

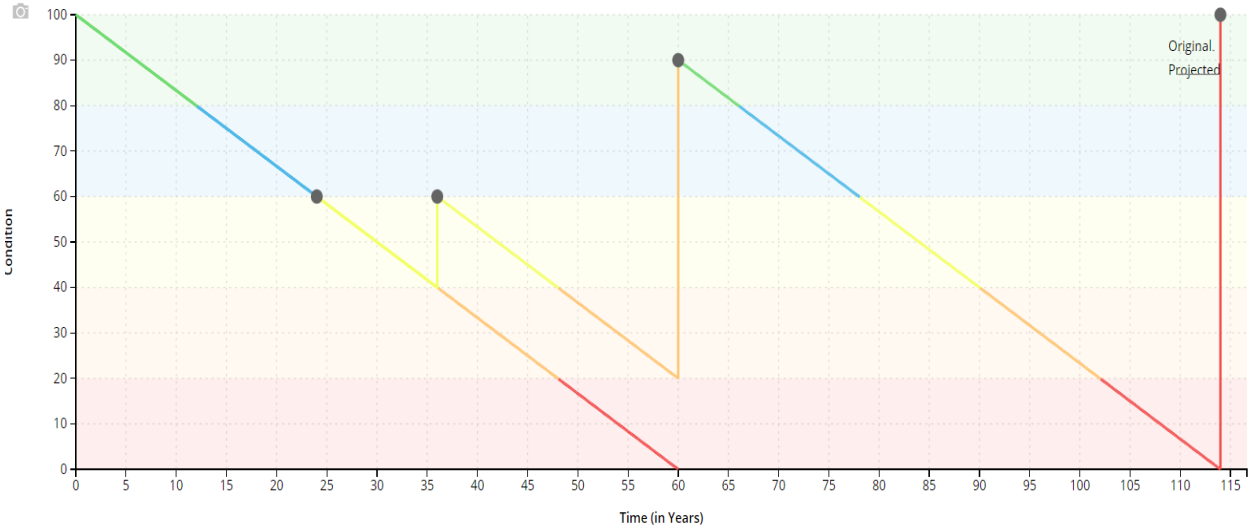
- Replacement of grade adjustment units (if broken or compromised) or addition of grade adjustment unit, replacement of grates that are used in both manhole and catch basins
- Replacement of maintenance hole cover / lid as required

- Replace of storm mains at End of Life

Disposal activities associated with the disposal of a decommissioned asset including sale, donation, demolition & abandonment.

- Decommission at End of Life if asset is no longer required

24 Years	Minor Maintenance		Maintenance	$0.00 (Fixed)	60 to 80 Condition	No Impact	0 Months	$0.00	
36 Years	Major Maintenance		Maintenance	$0.00 (Fixed)	40 to 60 Condition	Set to 60 Condition	12 Years	$0.00	
60 Years	Rehabilitation		Rehabilitation	$0.00 (Fixed)	20 to 40 Condition	Adds 70 Condition	42 Years	$0.00	
114 Years	<Asset Replacement>	End of life replacement	Replacement	$0.00 (Fixed)	0 to 0 Condition	Set to 100 Condition	60 Years	$0.00	Automatic



DATA QUALITY

Stormwater Network

Table 3.3.7: Data Quality

	Level 1	Level 2	Level 3	Level 4
Inventory	Inventory data is incomplete.	Reliable inventory data exists for critical assets	Inventory data is complete for all assets in this asset class.	Inventory data is complete, accurate, and in a centralized, accessible format.
Condition	Condition data is incomplete.	Condition data is complete for critical assets.	Condition data is complete and accurate for all assets.	Condition data is complete, accurate, and regularly updated. Data is centralized and accessible.
Levels of Service	Services provided by this asset class are understood by departmental staff.	Current levels of service have been defined and performance metrics are used to measure progress.	Current levels of services are defined, tracked, and reported on a regular basis.	Proposed levels of service have been defined, and funding impacts are assessed. Trends in performance are tracked.
Risk	Critical assets and services are understood by department staff.	Risk is estimated according to remaining service life.	Risk models exist for assets in this asset class. Critical assets have been identified, and risk management strategies exist.	Risk management strategies are documented for all assets, including level of resilience and risk tolerance.
Lifecycle Maintenance Strategy	Lifecycle activities required to maintain current levels of service are understood.	Lifecycle activities required to maintain current levels of service are understood and documented.	Costs of lifecycle activities and risks associated with deferred maintenance are documented.	Projected lifecycle maintenance needs are defined, funding shortfalls are identified, and risks associated with inadequate funding are documented.
Financial Sustainability Strategy	Budgets are based on prior year spending.	Prior year spending is adjusted to account for inflation and other variables.	Asset replacement schedules have been built into the long-term capital forecast.	Full lifecycle costs have been built into long-term forecasts. Demand forecasts inform the budget.

Water Network

The water network consists of a variety of assets, including water mains, water valves, blow off valves, hydrants, buildings, equipment, water towers, supply wells and others. Township is responsible for providing safe, clean, high-quality water to the residents and businesses of Mapleton by efficient management of reliable water system capable of providing sufficient quality, flow, and pressure to satisfy drinking, recreational, irrigation, sanitary, fire protection, and business needs. Water is distributed and metered to all the water customers while meeting pressure, flow, and quality standards.

The water mains network is essentially composed of two classes of assets: water mains (pipes), and water network structures. Pipes can be further segmented into construction materials, which include concrete, polyvinyl chloride (PVC), high-density polyethylene (HDPE), or galvanized corrugated steel (CSP). The water network structures comprise wells, water towers, buildings.

INVENTORY AND REPLACEMENT VALUE

The municipal water network is comprised of around 18 kilometers of water mains, 86 hydrants, 2 buildings (pump stations Moorefield and Drayton), equipment, 1 water tower, 4 supply wells, 88 water valves and 7 blow off valves.

Table 3.4.1: Inventory and Replacement Value

Asset Types	Quantity	Replacement Cost Method	Total Replacement Cost
Water Network Hydrants	86	Cost/Unit	$735,874
Water Network Blow off Valves	7	Cost/Unit	$108,898
Water Network Water Valve	88	Cost/Unit	$537,188
Drayton Water Tower	1	Cost/Unit	$6,700,000
Drayton Water Distribution System	1	Consultant Report	$2,839,954
Moorefield Water Distribution System	1	Consultant Report	$3,292,261
Water Mains	17781.3 m	Cost/linear meter	$15,566,187
		Total	**$29,780,361**

CONDITION

The condition assessment methodology varies by asset type. Some assets, such as the water tower and wastewater treatment assets, are assessed regularly by external contractors, who use either contractor-specific methodologies or standard inspection forms. Other assets, such as hydrants and watermains, are assessed by township staff, who conduct visual inspections to assess failure. The following table summarizes the condition assessment methodologies used for various components of the water and wastewater networks.

Hydrants and valves are assessed based on function, including whether they are leaking or not, difficult to turn, and so on, and are repaired or replaced as needed. Watermains are assessed on a three-year cycle for leak testing, or as need, and their condition is defined by whether they are functional or not. Water tower assessments recommend future capital needs, but do not provide an overall condition assessment.

In general, the failure rate of water and wastewater assets is indicative of their condition. Where asset condition data is unavailable, asset age serves as a proxy to condition.

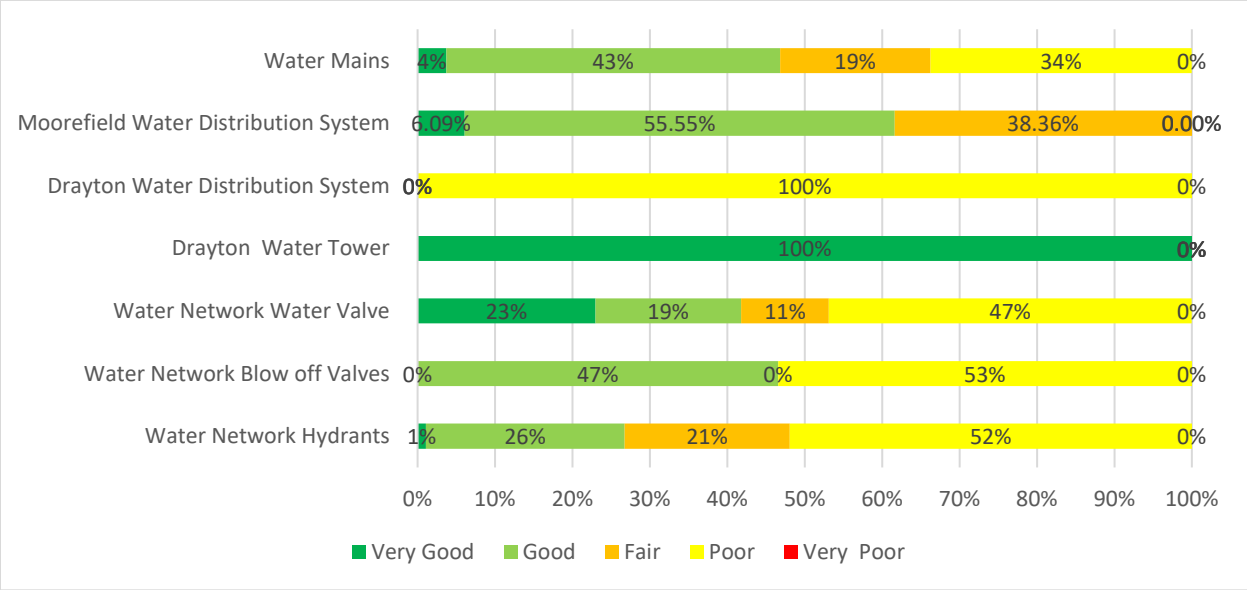
Table 3.4.2: Water Assets Condition Assessment Methodology

Asset	Condition assessed by	When	Methodology
Watermain	Asset Failure Records by Township team and contractor (OCWA)	OCWA do need assessment	Inspection like leakage detection and based on complaints
Hydrant	Annual Inspections by Township by contractors (OCWA)	Annually	Inspection and pressure test by OCWA
Buildings and Equipment	R J Burnside / CIMA+	Inspection based on request by Township staff	Inspection by Consultant Engineers
Water Tower	Newly Constructed	Need based	Inspection by Consultant Engineers
Well Supply	R J Burnside / CIMA+/OCWA	Inspection based on request by Township staff Several Times Annual	Inspection by Consultant Engineers and OCWA
Valves	R J Burnside / CIMA+	Inspection based on request by Township staff 3-YR Cycle	Inspection by Consultant Engineers

Table 3.4.3: Water Assets Average Condition and Average Condition Rating

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Water Network Hydrants	51.00%	Fair	100% age based
Water Network Blow off Valves	60.00%	Good	100% age based
Water Network Water Valve	60.00%	Good	100% age based
Drayton Water Tower	100.00%	Very Good	100% assesses
Drayton Water Distribution System	50.00%	Fair	100% assessed
Moorefield Water Distribution System	60.00%	Good	100% assessed
Water Mains	65.00%	Good	100% age based
Average	63.71%	Good	60% age basses

Asset Specific Condition:



ESTIMATED USEFUL LIFE

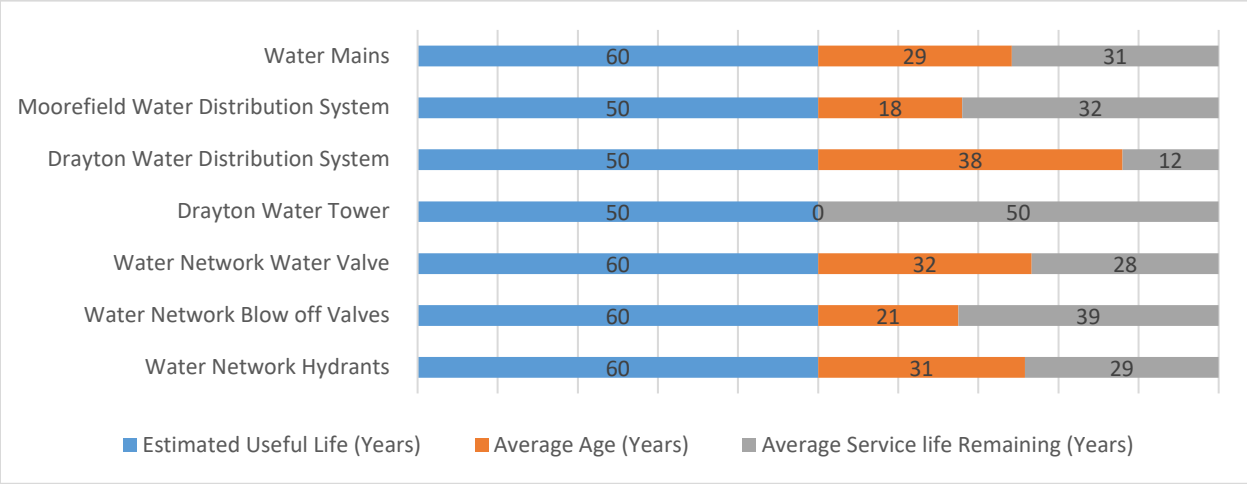
The useful life of a water mains pipe is based on the material of the asset. The useful life of a concrete pipe is approximately 75 years, while the useful life of a corrugated steel pipe is closer to 35 years. Water point assets, such as man buildings are constructed of concrete, valves hydrants, and have a useful life of 60 years.

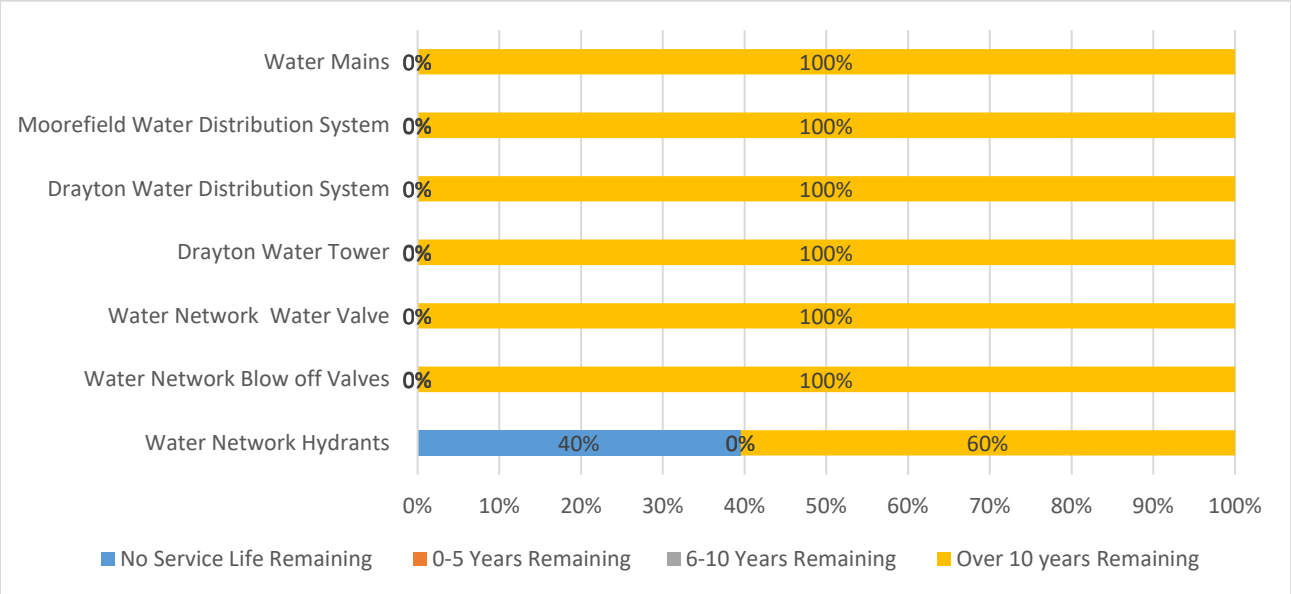
Table 3.4.4: Estimated Useful Life, Water Network Assets

Asset	Useful Life
Water Mains	60 Years
Moorefield Water Distribution System	50 Years
Drayton Water Tower	50 Years
Drayton Water Distribution System	50 Years
Water Network Water Valve	60 Years
Water Network Blow off valve	60 Years
Water Network Hydrants	60 Years

Table 3.4.5: Average Age and Average Remaining Service Life

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service life Remaining (Years)
Water Network Hydrants	60	31	29
Water Network Blow off Valves	60	21	39
Water Network Water Valve	60	32	28
Drayton Water Tower	50	0	50
Drayton Water Distribution System	50	38	12
Moorefield Water Distribution System	50	18	32
Water Mains	60	29	31
	Average	**24**	**31**





RISK

In this report the probability of the failure is function of the condition and age, and consequence of the failure is the function of the replacement cost. Moreover, the consequence of risk is a function of the diameter of the pipes, as larger pipes are more central to the network and thus have a wider impact in the event of failure than do more peripheral pipes. Once we have data available, we will start working more on the risk side.

Table 3.4.6: Risk Model

Asset Class	Probability of Failure Metrics	Consequence of Failure Metrics
Water Mains	Condition	Replacement Cost
Moorefield Water Distribution System	Condition	Replacement Cost
Drayton Water Tower	Condition	Replacement Cost
Drayton Water Distribution System	Condition	Replacement Cost
Water Network Water Valve	Condition	Replacement Cost
Water Network Blow off valve	Condition	Replacement Cost
Water Network Hydrants	Condition	Replacement Cost

Risk Matrix

Table 3.4.7: Asset Prioritization List

City Wide Asset ID	Assets	Probability of Failure	Consequence of Failure	Risk Rating	Cost	Quantity (m)	From Street	To Street
1275	water main	4	3	12	$ 312,046	350	West End	Queen St
1286	water main	4	3	12	$ 294,245	313	ELM ST	JOHN ST
1304	water main	4	3	12	$ 371,331	395	Edward St	MILL ST
1325	water main	5	2	10	$ 217,158	231	MILL ST	RIDGEVIEW DR
1326	water main	5	2	10	$ 108,109	115	QUEEN ST	KING ST
1342	water main	5	2	10	$ 231,805	260	MAPLE ST	MAPLE ST
1347	water main	5	2	10	$ 123,150	131	SOUTH END	RIDGEVIEW DR
1351	water main	5	2	10	$ 112,081	132	SOUTH END	Easement
1352	water main	5	3	15	$ 272,623	290	Easement	Bedell Dr

PERFORMANCE MEASURE/ Levels of Service

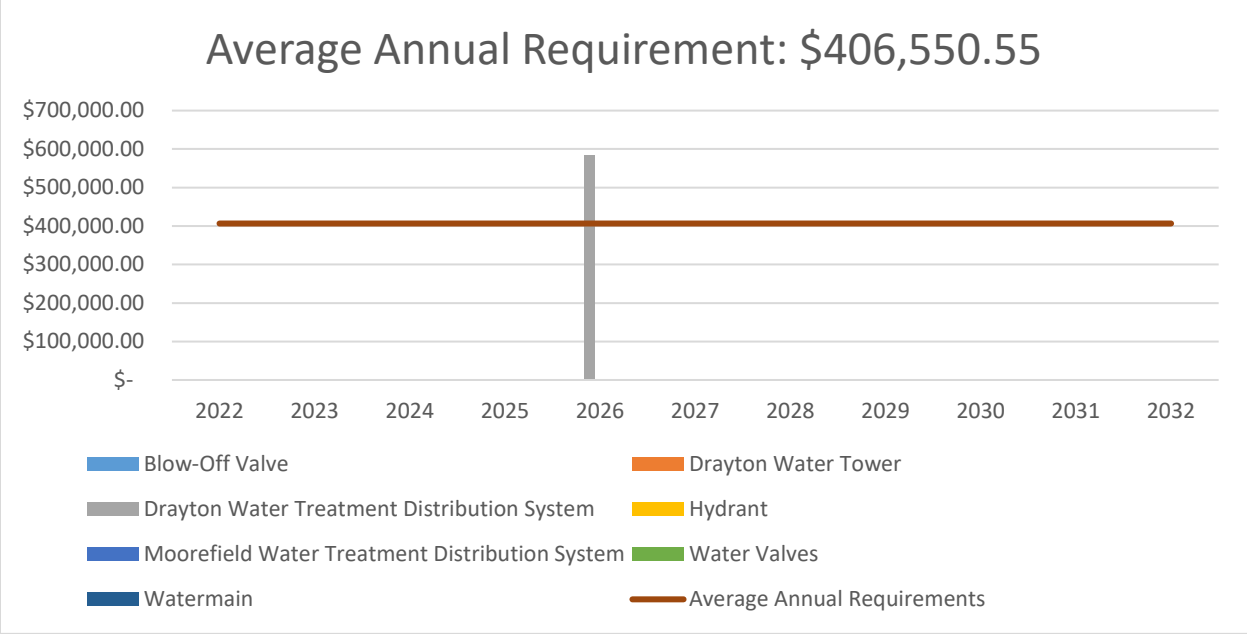
Table 3.4.8: Levels of Service

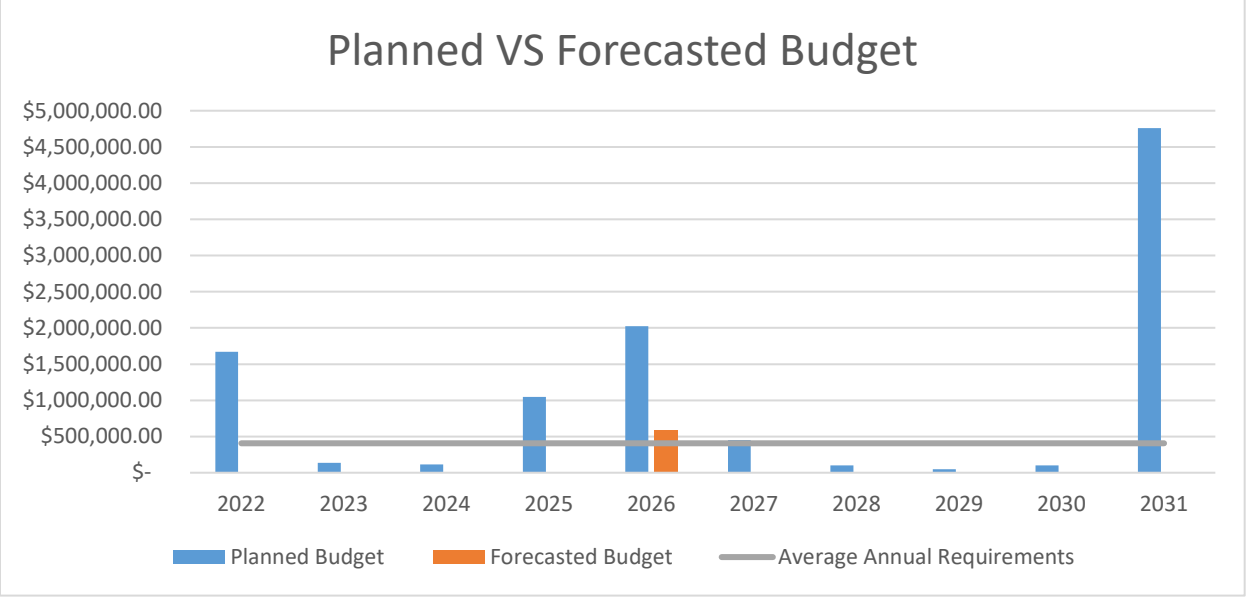
Community levels of service (qualitative descriptions)		
Scope		
1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.	APPENDIX D	
2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	N/A	
Reliability		
Description of boil water advisories and service interruptions.	No advisories	
Technical levels of service (technical metrics)		
Scope	2020	2021
1. Percentage of properties connected to the municipal water system.	25	26
2. Percentage of properties where fire flow is available.	25	25
Reliability	2020	2021
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.	None	None
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. compared to the total number of properties connected to the municipal wastewater system.	None	None

FINANCIALS

Summary of the Financials:

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Planned Budget	$ 1,671,445.00	$ 135,813.00	$ 116,000.00	$ 1,047,812.00	$ 2,022,526.00	$ 449,557.00	$ 101,000.00	$ 50,000.00	$ 100,000.00	$ 4,760,368.00
Forecasted Budget	$ -	$ -	$ -	$ -	$ 582,300.00	$ -	$ -	$ -	$ -	$ -
Average Annual Requ	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55	$ 406,550.55





LIFECYCLE MANAGEMENT

Different assets specific lifecycle activities are done throughout the assets life making sure assets are performing on their full capacity providing the current required levels of service in a balanced way, managing the risk in most efficient lifecycle cost.

Water mains and connecting structures undergo regular flushing as a regular cleaning. The pipes are used to the end of their useful life, and then replaced, as regular rehabilitation activities require excavating and digging up surface roads, which is prohibitively costly. All rehabilitation and replacement activities are typically coordinated with pavement rehabilitation projects unless the defect is critical and/or threatens public safety.

Minor maintenance planned regularly scheduled maintenance and inspection programs including cleaning and flushing, manhole repairs, CCTV inspections, and minor repairs to water main structures and piping. These would be modified to adapt to specific practices of the municipality.

Major maintenance Including regularly scheduled inspection and maintenance, or more considerable repair and activities associated with unanticipated events.

- Typically includes activities such as repairing or replacing broken or major defects in the watermains,
- Scheduled preventative maintenance programs including air and vacuum valve maintenance program
- Scheduled inspection programs for key assets – e.g. leak detection and pipeline detection
- Continuous condition monitoring for key assets through Acoustic Fiber Optic Monitoring
- Reactive maintenance for significant portion of asset inventory
- Maintenance also triggered by public complaints through phone and web interface available for public reports/complaints and facility inspection report
- Scheduled preventative maintenance programs for most assets.
- Scheduled inspection programs for key assets
- And similar unscheduled or unplanned emergency type activities carried out to maintain service for the water systems.

Rehabilitation is generally a one-time significant repair designed to extend the life of the asset to its established life expectancy.

- Activities can include pipe re-lining, seal & grout programs, and cathodic protection (anode program)
- Water meter rehabilitation would generally not be performed – the asset would be replaced.
- Water facilities are rehabilitated based on facility inspection reports which recommend replacing pumps, valves, roofs, etc.
- Adopt the latest technology that maintains the current level of service.

Replacement of assets occurs at the end of the useful service life. Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option. The life expectancy of an asset is impacted by the natural properties of its materials of construction and can vary

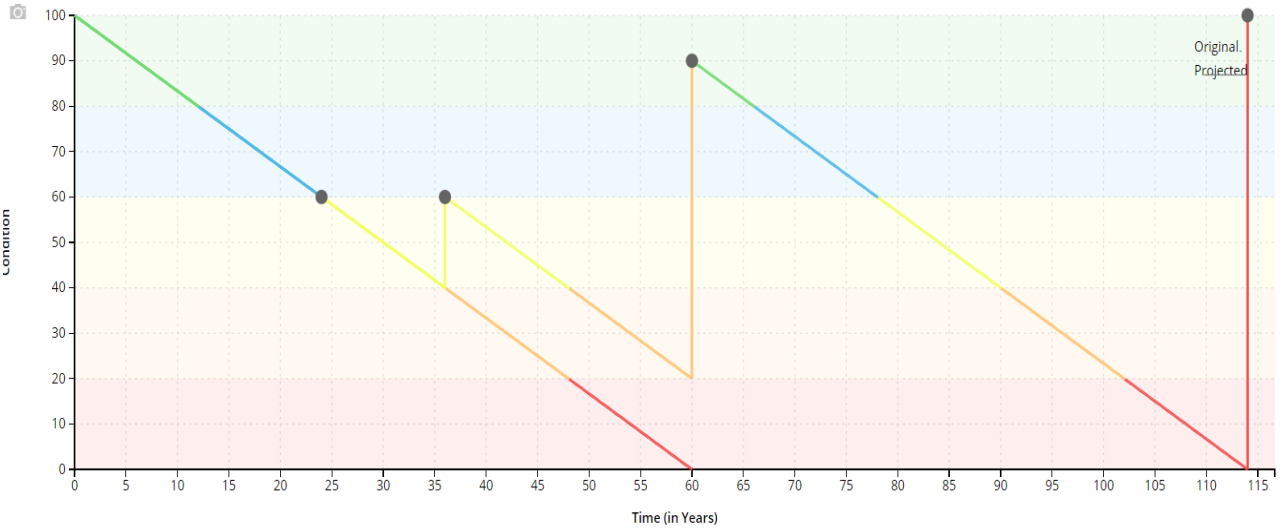
greatly from this depending on several environmental factors that impact the degree of deterioration and performance. Adopt the latest technology that maintains the current level of service.

- Watermain replacement is based on the condition rating of the infrastructure and the infrastructure needs of other service areas. In most cases, once the pipe has been inspected and given a condition rating, city staff can determine the best method for replacement: complete open cut replacement, horizontal directional drilling
- Lead service replacement program
- Water meter replacement using newer technology that maintains the current level of service
- Coordinate with wastewater, roads projects and through service are coordination

Disposal: Activities associated with disposing of an asset once it has reached the end of its useful life or is otherwise no longer needed by the municipality.

- Dispose of assets under the applicable regulation and environmental standards.

24 Years	Minor Maintenance		Maintenance	$0.00 (Fixed)	60 to 80 Condition	No Impact	0 Months	$0.00	
36 Years	Major Maintenance		Maintenance	$0.00 (Fixed)	40 to 60 Condition	Set to 60 Condition	12 Years	$0.00	
60 Years	Rehabilitation		Rehabilitation	$0.00 (Fixed)	20 to 40 Condition	Adds 70 Condition	42 Years	$0.00	
114 Years	<Asset Replacement>	End of life replacement	Replacement	$0.00 (Fixed)	0 to 0 Condition	Set to 100 Condition	60 Years	$0.00	Automatic



DATA QUALITY

Water Network

Table 3.4.9: Data Quality

	Level 1	Level 2	Level 3	Level 4
Inventory	Inventory data is incomplete.	Reliable inventory data exists for critical assets	Inventory data is complete for all assets in this asset class.	Inventory data is complete, accurate, and in a centralized, accessible format.
Condition	Condition data is incomplete.	Condition data is complete for critical assets.	Condition data is complete and accurate for all assets.	Condition data is complete, accurate, and regularly updated. Data is centralized and accessible.
Levels of Service	Services provided by this asset class are understood by departmental staff.	Current levels of service have been defined and performance metrics are used to measure progress.	Current levels of services are defined, tracked, and reported on a regular basis.	Proposed levels of service have been defined, and funding impacts are assessed. Trends in performance are tracked.
Risk	Critical assets and services are understood by department staff.	Risk is estimated according to remaining service life.	Risk models exist for assets in this asset class. Critical assets have been identified, and risk management strategies exist.	Risk management strategies are documented for all assets, including level of resilience and risk tolerance.
Lifecycle Maintenance Strategy	Lifecycle activities required to maintain current levels of service are understood.	Lifecycle activities required to maintain current levels of service are understood and documented.	Costs of lifecycle activities and risks associated with deferred maintenance are documented.	Projected lifecycle maintenance needs are defined, funding shortfalls are identified, and risks associated with inadequate funding are documented.
Financial Sustainability Strategy	Budgets are based on prior year spending.	Prior year spending is adjusted to account for inflation and other variables.	Asset replacement schedules have been built into the long-term capital forecast.	Full lifecycle costs have been built into long-term forecasts. Demand forecasts inform the budget.

Wastewater Network

The combination of the sanitary mains, sanitary manholes, sanitary valves, sanitary force mains from sanitary pumping stations to treatment facility, Moorefield, and Drayton Sewage Pumping Stations and one Waste Pollution control Plant makes a Townships Sanitary/Wastewater system and conveys flows from household, business to treatment plants where it gets purified and finally discharged.

Township protects its citizens and the natural and built environments through efficient management and treatment of sanitary sewage. Whole sanitary system is designed to collect and treat residential, commercial, and industrial wastewater. Sanitary sewers carry wastewater from homes, commercial buildings, institutional, and industrial sources to waste pollution control plants designed and operated to meet strict provincial standards. Treated water outlets to the Conestogo River.

INVENTORY AND REPLACEMENT VALUE:

The municipal wastewater network is comprised of around 17 kilometer of wastewater mains, 150 sanitary manholes, 1 sanitary valve, 2 sewage pumping station one at Drayton and another at Moorefield, around 7 kilometer of the sanitary force main that carry discharge from sewage pumping station to waste pollution control plant and 1 Sanitary waste pollution control plant.

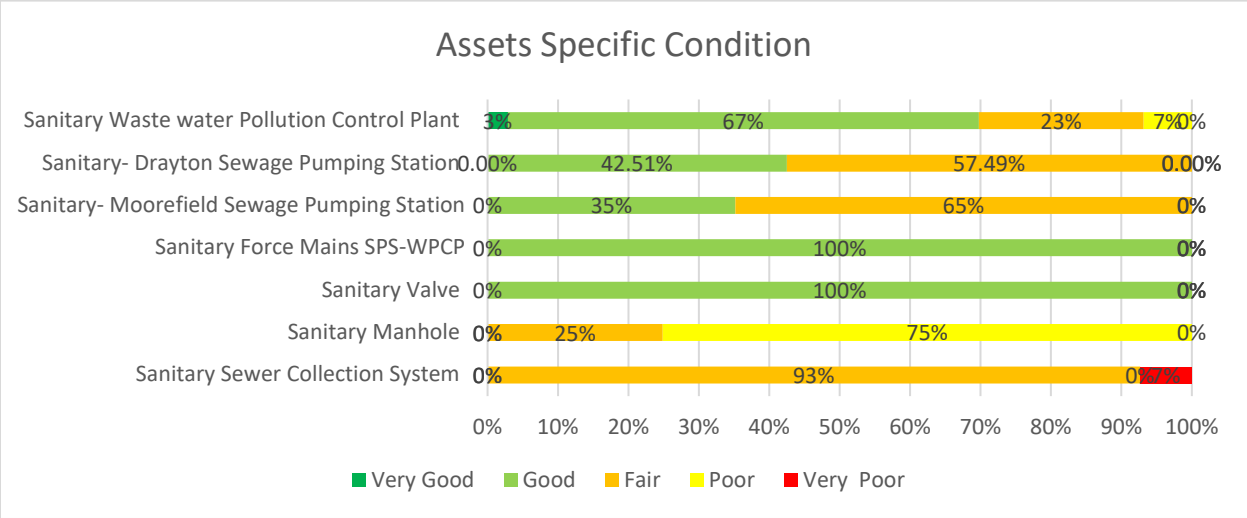
Table 3.5.1: Assets Inventory and Replacement Value

Asset Types	Quantity	Replacement Cost Method	Total Replacement Cost
Sanitary Sewer Collection System	16293 m	Cost per linear meter	$8,097,727
Sanitary Manhole	150 #	Unit Cost	$1,448,089
Sanitary Valve	1 #	Unit Cost	$25,265
Sanitary Force Mains SPS-WPCP	7500m	Cost per linear meter	**$2,172,000**
Sanitary- Moorefield Sewage Pumping Station	1 #	Unit Cost	**$473,100**
Sanitary- Drayton Sewage Pumping Station	1 #	Unit Cost	$736,850
Sanitary Waste water Pollution Control Plant	1 #	Unit Cost	**$9,620,260**
		Total	**$22,573,291**

CONDITION

Table 3.5.2: Summary of condition Rating for Assets Class

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Sanitary Sewer Collection System	52.50%	Fair	100% Age Based
Sanitary Manhole	39.00%	Poor	100% Age Based
Sanitary Valve	70.83%	Good	100% Age Based
Sanitary Force Mains SPS-WPCP	79.50%	Very Good	100% Assessed
Sanitary- Moorefield Sewage Pumping Station	65.00%	Good	100% Assessed
Sanitary- Drayton Sewage Pumping Station	69.00%	Good	100% Assessed
Sanitary Wastewater Pollution Control Plant	70.00%	Good	100% Assessed
Average	64.00%	Good	57 % Assessed



ESTIMATED USEFUL LIFE

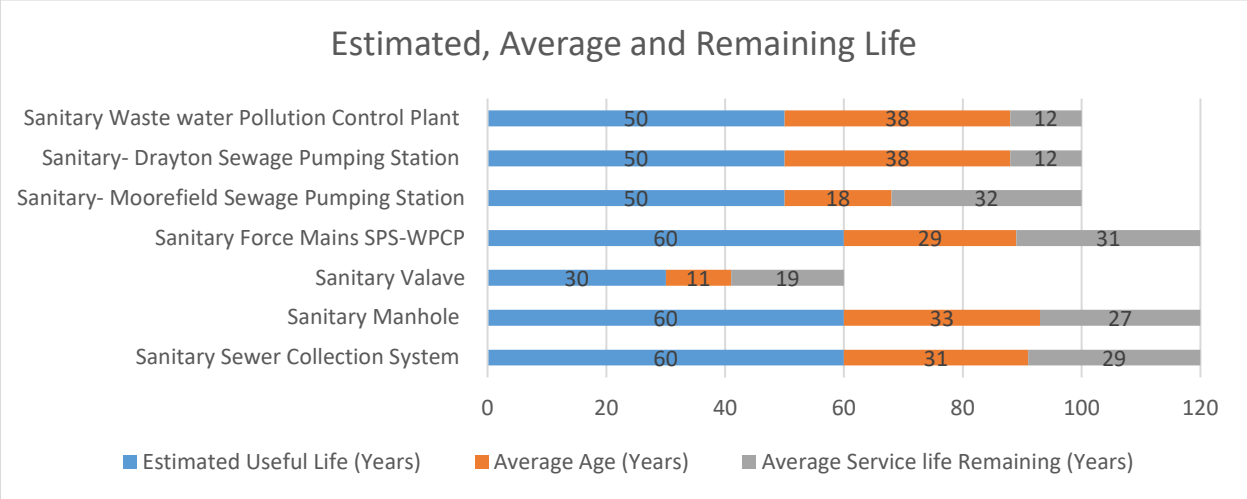
Table 3.5.3: Estimated Useful Life, Wastewater Network Assets

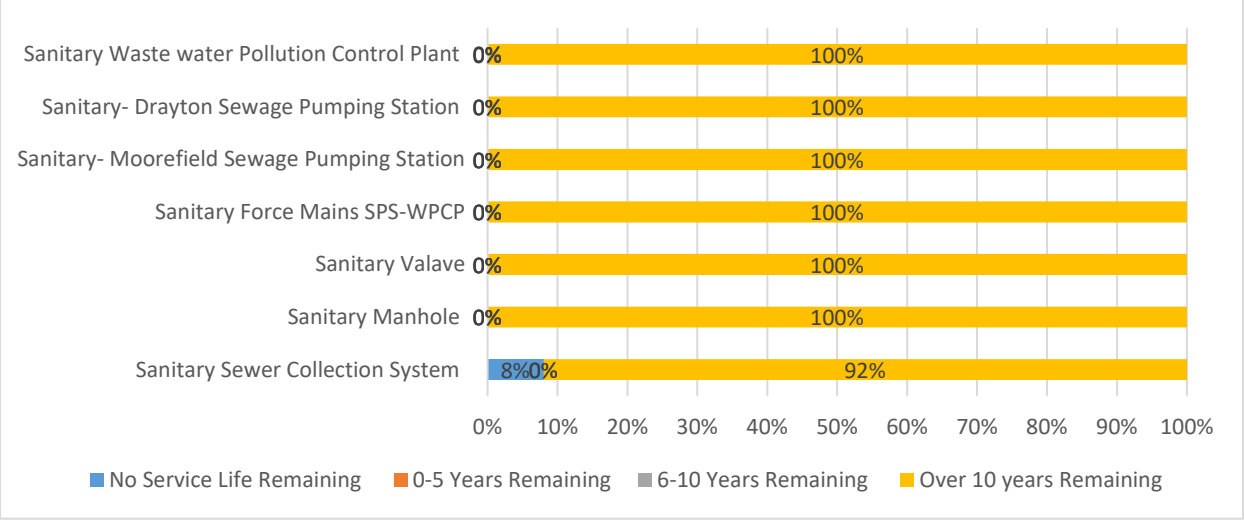
Asset	Useful Life
Sanitary Sewer Collection System	60 Years
Sanitary Manhole	60 Years
Sanitary Valve	30 Years
Sanitary Force Mains SPS-WPCP	60 Years
Sanitary- Moorefield Sewage Pumping Station	50 Years
Sanitary- Drayton Sewage Pumping Station	50 Years
Sanitary Wastewater Pollution Control Plant	50 Years

ESTIMATED USEFUL LIFE & AVERAGE AGE:

Table 3.5.4: Estimated Useful Life and Average Age

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service life Remaining (Years)
Sanitary Sewer Collection System	60	31	29
Sanitary Manhole	60	33	27
Sanitary Valve	30	11	19
Sanitary Force Mains SPS-WPCP	60	29	31
Sanitary- Moorefield Sewage Pumping Station	50	18	32
Sanitary- Drayton Sewage Pumping Station	50	38	12
Sanitary Wastewater Pollution Control Plant	50	38	12
	Average	28.28571429	23.14285714





RISK

Table 3.5.5: Risk Model

Asset Class	Probability of Failure Metrics	Consequence of Failure Metrics
Sanitary Sewer Collection System	Condition	Replacement Cost
Sanitary Manhole	Condition	Replacement Cost
Sanitary Valve	Condition	Replacement Cost
Sanitary Force Mains SPS-WPCP	Condition	Replacement Cost
Sanitary- Moorefield Sewage Pumping Station	Condition	Replacement Cost
Sanitary- Drayton Sewage Pumping Station	Condition	Replacement Cost

Risk Matrix

PERFORMANCE/ Levels of Service

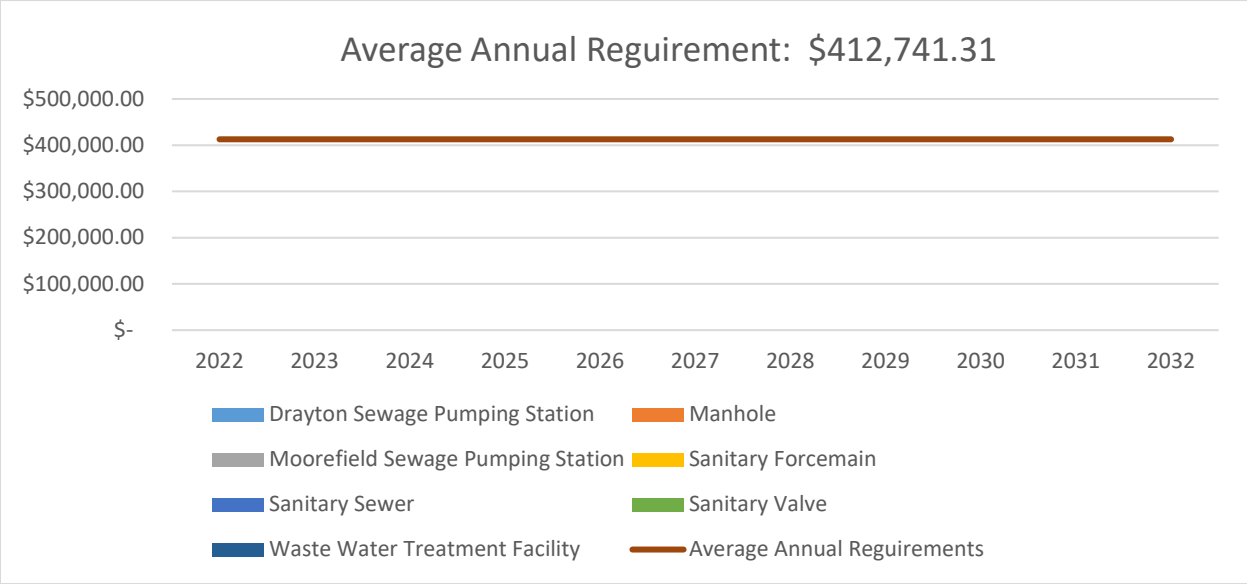
Table 3.5.6: Levels of Service

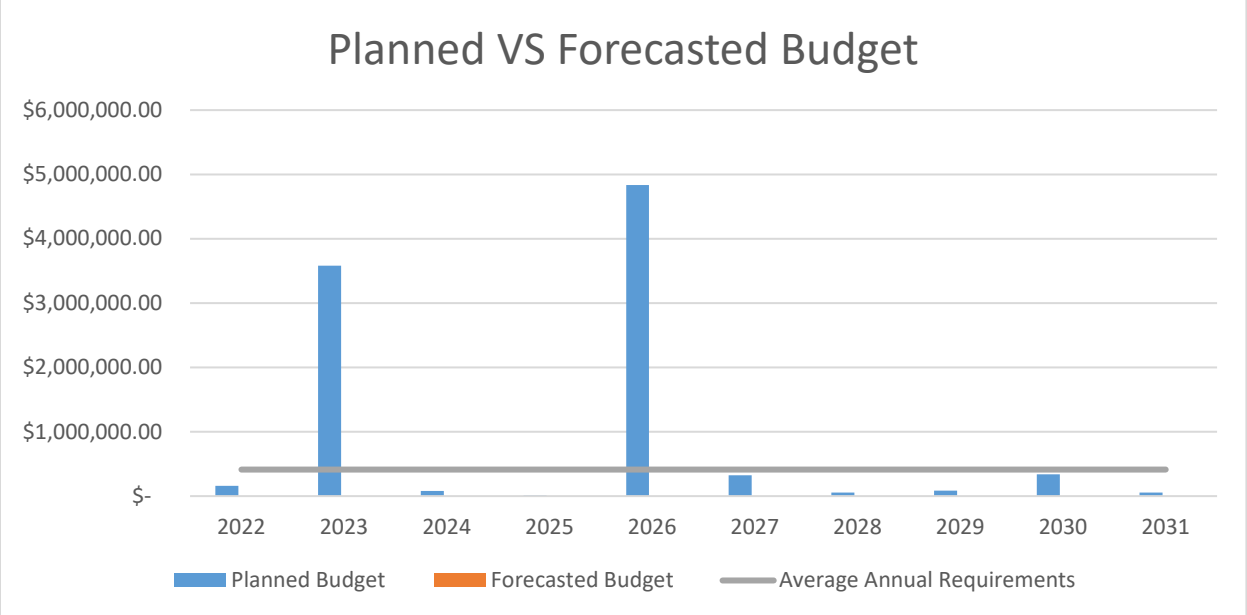
Community levels of service (qualitative descriptions)		
Scope		
Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	APPENDIX D	
Reliability		
1. Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.	N/A	
2. Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.	N/A	
3. Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes.	Sump Pump Connection and Through manhole cover	
4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3.	Sump Pump Connections are illegal. Not permitted.	
5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.	Excellent	
Technical levels of service (technical metrics)		
Scope	2020	2021
Percentage of properties connected to the municipal wastewater system.		
Reliability	2020	2021
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	N/A	N/A
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.	0	0
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.	0	0

FINANCIAL

Summary of financial measures for this asset class (investment needs, etc.).

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Planned Budget	$ 159,300.00	$ 3,580,800.00	$ 81,300.00	$ 13,000.00	$ 4,833,500.00	$ 325,000.00	$ 53,500.00	$ 83,500.00	$ 338,500.00	$ 54,000.00
Forecasted Budget	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Average Annual Requ	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31	$ 412,741.31





LIFECYCLE MANAGEMENT

Different assets specific lifecycle activities are done throughout the assets life making sure assets are performing on their full capacity providing the current required levels of service in a balanced way, managing the risk in most efficient lifecycle cost.

Wastewater and connecting structures undergo regular maintenance. The pipes are used to the end of their useful life, and then replaced, as regular rehabilitation activities require excavating and digging up surface roads, which is prohibitively costly. All rehabilitation and replacement activities are typically coordinated with pavement rehabilitation projects unless the defect is critical and/or threatens public safety.

Minor maintenance and Major Maintenance - Includes regularly scheduled inspection and maintenance programs along with major significant repair and activities associated with unexpected events which helps to ensure the life of assets at least to expected useful life. Typically includes activities such as repairing or replacing broken or major defects in the sanitary sewers, and similar unscheduled or unplanned emergency type activities carried out to maintain service for the sanitary sewer systems.

- Cleaning and flushing, manhole repairs, CCTV inspections, and minor repairs to sanitary sewer/wastewater structures and piping.
- Joint Sealing and instant/spot repairs
- These would be modified to adapt to specific practices of the municipality.

Rehabilitation is generally a one-time event designed to extend the life of the asset to its established life expectancy. Activities can include sewer lining programs and seal & grout programs.

- Pipe re-lining, immediate field repairs, flushing & cleaning.
- Manhole replacement, joint and crack sealing.
- Facilities rehabilitated are based on facility inspection reports and engineering judgement of service area like refurbish tanks, pumps, mixers, aerators, filters etc., Incinerator refurbished routinely.
- Failures in one facility can be inspected at other facilities and added to scheduled preventative maintenance routines.

Replacement of assets occurs at the end of the useful service life. The life expectancy of an asset is impacted by the natural properties of its materials of construction and can vary greatly from this depending on several environmental factors that impact the degree of deterioration and performance. Sanitary sewer replacement is based on the condition rating of the infrastructure. In most cases, once the pipe has been inspected and given a condition rating, city staff can determine the best method for replacement:

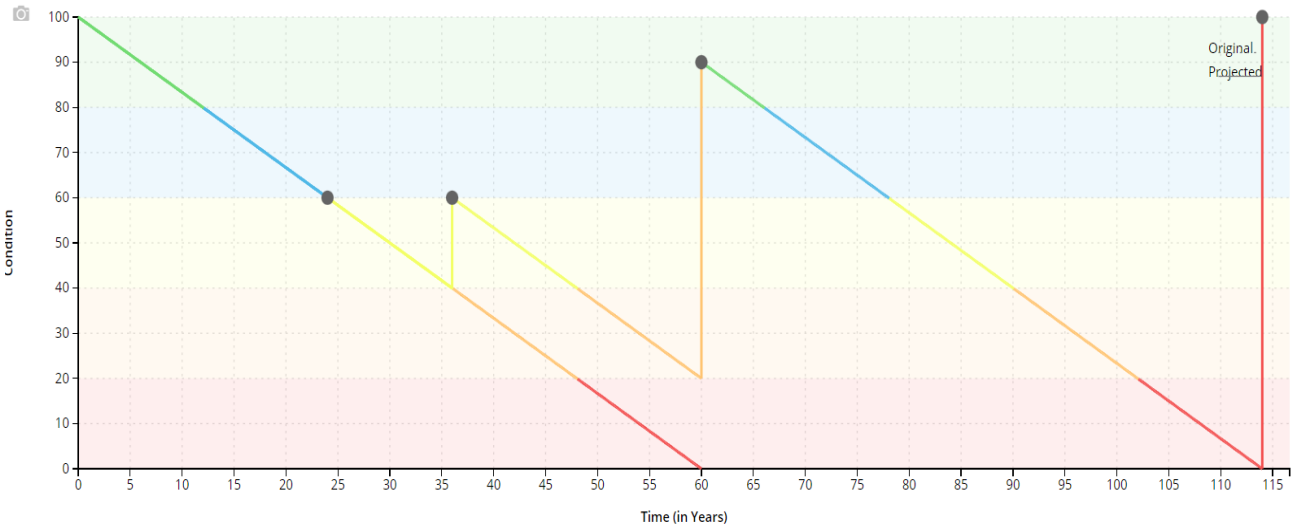
- Full replacement is the most common method for collapsed or heavily deteriorating pipe.
- Look for clusters of poor condition rated sewers and apply high priority.
- Coordinate with water, roads projects and through UCC.
- Facilities are replaced based on facility inspection reports, engineering judgement and are carried on the components within the facility rather than the replacement of an entire wastewater treatment plant such as replace pump station, tankage, incinerator refurbishments, etc.

- More stringent effluent criteria, new technology and the fact that major components of many wastewater facilities are approaching the end of their service life may drive the replacement of much of the existing wastewater infrastructure over the next 20-40 years.

Disposal: Activities associated with disposing of an asset once it has reached the end of its useful life or is otherwise no longer needed by the municipality.

- Dispose of assets under the applicable regulation and environmental standards.
- Assessment of material type and special considerations of health and safety concerns is part of disposal process.

24 Years	Minor Maintenance		Maintenance	$0.00 (Fixed)	60 to 80 Condition	No Impact	0 Months	$0.00	
36 Years	Major Maintenance		Maintenance	$0.00 (Fixed)	40 to 60 Condition	Set to 60 Condition	12 Years	$0.00	
60 Years	Rehabilitation		Rehabilitation	$0.00 (Fixed)	20 to 40 Condition	Adds 70 Condition	42 Years	$0.00	
114 Years	<Asset Replacement>	End of life replacement	Replacement	$0.00 (Fixed)	0 to 0 Condition	Set to 100 Condition	60 Years	$0.00	Automatic



DATA QUALITY

Wastewater Network

Table 3.5.7: Data Quality

	Level 1	Level 2	Level 3	Level 4
Inventory	Inventory data is incomplete.	Reliable inventory data exists for critical assets	Inventory data is complete for all assets in this asset class.	Inventory data is complete, accurate, and in a centralized, accessible format.
Condition	Condition data is incomplete.	Condition data is complete for critical assets.	Condition data is complete and accurate for all assets.	Condition data is complete, accurate, and regularly updated. Data is centralized and accessible.
Levels of Service	Services provided by this asset class are understood by departmental staff.	Current levels of service have been defined and performance metrics are used to measure progress.	Current levels of services are defined, tracked, and reported on a regular basis.	Proposed levels of service have been defined, and funding impacts are assessed. Trends in performance are tracked.
Risk	Critical assets and services are understood by department staff.	Risk is estimated according to remaining service life.	Risk models exist for assets in this asset class. Critical assets have been identified, and risk management strategies exist.	Risk management strategies are documented for all assets, including level of resilience and risk tolerance.
Lifecycle Maintenance Strategy	Lifecycle activities required to maintain current levels of service are understood.	Lifecycle activities required to maintain current levels of service are understood and documented.	Costs of lifecycle activities and risks associated with deferred maintenance are documented.	Projected lifecycle maintenance needs are defined, funding shortfalls are identified, and risks associated with inadequate funding are documented.
Financial Sustainability Strategy	Budgets are based on prior year spending.	Prior year spending is adjusted to account for inflation and other variables.	Asset replacement schedules have been built into the long-term capital forecast.	Full lifecycle costs have been built into long-term forecasts. Demand forecasts inform the budget.

Chapter 4: Financial Summary

This section contains the financial requirements resulting from the information presented in the previous sections of this AM Plan. The financial projections will be improved as the discussion on desired levels of service and asset performance matures.

Financial Sustainability and Projections

Sustainability of service delivery

There are two key indicators of sustainable service delivery that are considered in the AM Plan for this service area. The two indicators are the:

- asset renewal funding ratio (NPV of Planned Capital Renewals over 10 years / NPV of Required Capital Expenditure over 10 years), and
- medium term forecast costs/proposed budget (over 10 years of the planning period).

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio 60.7%

The Asset Renewal Funding Ratio is an important indicator and illustrates that over the next 10 years we expect to have 60.7% of the funds required for the optimal renewal of assets.

The forecast renewal work along with the proposed renewal budget, and the cumulative shortfall, is illustrated in each asset category, financial sections

Medium term – 10-year financial planning period

This AM Plan identifies the forecast operations, maintenance and renewal costs required to provide an agreed level of service to the community over a 10 year period. This provides input into 10 year financial and funding plans aimed at providing the required services in a sustainable manner.

This forecast work can be compared to the proposed budget over the first 10 years of the planning period to identify any funding shortfall.

The forecast operations, maintenance and renewal costs over the 10 year planning period is $18,932,646 on average per year.

The existing (budget) operations, maintenance and renewal funding is $9,948,313 on average per year giving a 10 year funding shortfall of $8,984,333 per year. This indicates that 53% of the forecast costs needed to provide the services documented in this AM Plan are accommodated in the proposed budget. Note, these calculations exclude acquired assets.

Providing sustainable services from infrastructure requires the management of service levels, risks, forecast outlays and financing to achieve a financial indicator of approximately 1.0 for the first years of the AM Plan and ideally over the 10 year life of the Long-Term Financial Plan.

Forecast Costs (outlays) for the long-term Financial Plan

Table 4.1 shows the forecast costs (outlays) required for consideration in the 10 year long-term financial plan.

Providing services in a financially sustainable manner requires a balance between the forecast outlays required to deliver the agreed service levels with the planned budget allocations in the long-term financial plan.

A gap between the forecast outlays and the amounts allocated in the financial plan indicates further work is required on reviewing service levels in the AM Plan (including possibly revising the long-term financial plan).

We will manage the 'gap' by developing this AM Plan to provide guidance on future service levels and resources required to provide these services in consultation with the community.

Forecast costs are shown in 2022-dollar values.

Table 4.1: Forecast Costs (Outlays) for the Long-Term Financial Plan

Year	Acquisition	Operation	Maintenance	Renewal	Disposal
2022	$6,700,000	$ 1,032,562	$ 2,948,697	$ 2,417,000	$0
2023	$0	$ 1,112,069	$ 3,175,747	$ 3,610,922	$0
2024	$0	$ 1,134,311	$ 3,239,262	$ 4,004,250	$0
2025	$0	$ 1,156,997	$ 3,304,047	$ 7,928,351	$0
2026	$0	$ 1,180,137	$ 3,370,128	$ 13,904,612	$0
2027	$0	$ 1,203,740	$ 3,437,530	$ 42,116,868	$0
2028	$0	$ 1,227,814	$ 3,506,281	$ 16,121,847	$0
2029	$0	$ 1,252,371	$ 3,576,407	$ 23,016,588	$0
2030	$0	$ 1,277,418	$ 3,647,935	$ 6,377,389	$0
2031	$0	$ 1,302,966	$ 3,720,893	$ 18,194,722	$0
2032	$0	$ 1,329,026	$ 3,795,311	$ 19,634,905	$0

Note*: At this time of AMP, we do not have any assets with disposal plan. If we come up with any new disposal, we will update it in the new version of the Asset Management Plan.

Funding Strategy

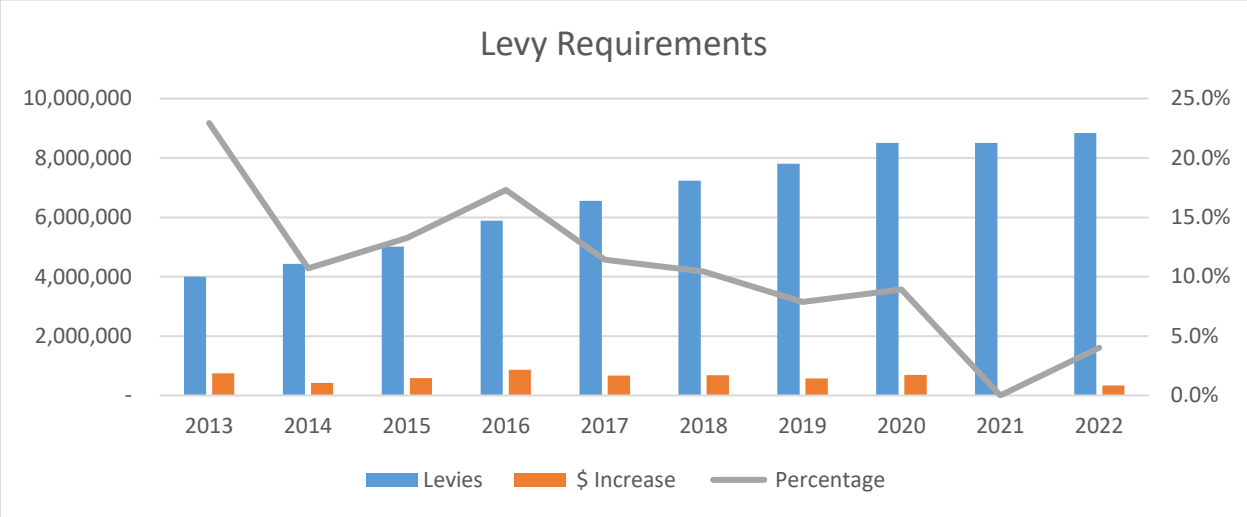
The proposed funding for assets is outlined in the Township of Mapleton's budget and Long-Term financial plan.

The financial strategy of the Township of Mapleton determines how funding will be provided, whereas the AM Plan communicates how and when this will be spent, along with the service and risk consequences of various service alternatives.

Budget Overview & Background

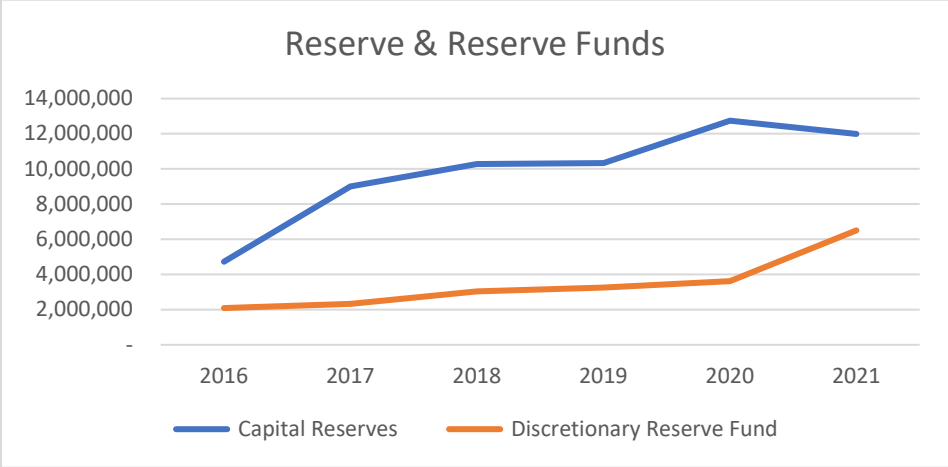
The Township Long-term Financial strategy is designed to ensure that it can withstand the financial pressures that services and programs place upon its citizens. Built into the Township's Multi-year operating budgets and 10-year capital forecasts is a strategy that promotes financial sustainability, limits financial vulnerability, and enables financial flexibility.

Since 2013, the Townships levy requirements has steadily increased while the year over year percentage increases has fallen.



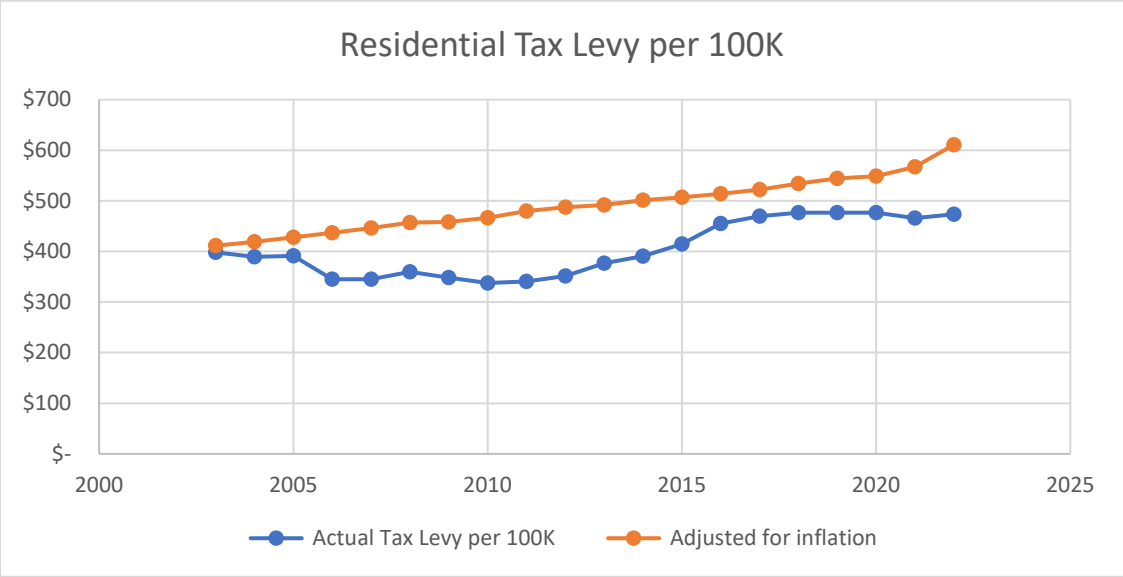
This strategy was respectful to taxpayers, and it helped ensured a sustainable capital plan. Further, the Township's debt burden has been improving as the Township could now assume an additional $10 million in debenture debt and still not exceed its Annual Debt Repayment Limit.

The Townships main Funding Reserve for infrastructure and its Discretionary Reserve Fund for its water and wastewater expenditures are in a healthy position.



At issue, is a Funding Gap has now been identified in this Asset Management Plan. The Asset Management Plan is based upon known costs and stated in 2022 dollars. In this past year, there has been significant inflationary impacts in the construction industry. The Drayton Water Tower estimated by engineers to cost no more than $4 million was tendered a few months later at $6.7 million.

By 2027, forecasted lifecycle costs will exceed the Township planned budget and likely deplete its reserves. The impact of inflationary adjustments is significant. Looking back historically , the chart below measures the residential tax levy per 100K and tracks the variance from the actual levies that were raised with a theoretical levy had the actuals been adjusted for inflation.



In the coming budget, Staff will present and offer options on how to deal with the funding gap.

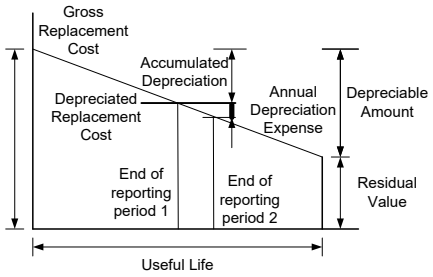
Valuation Forecasts

Asset valuations

The best available estimate of the value of assets included in this AM Plan are shown below. The assets are valued at a unit cost replacement method :

Replacement Cost (Current/Gross)	$ 434,709,397
Depreciable Amount	$ 289,451,277
Depreciated Replacement Cost[2]	$ 142,248,120
Depreciation	$ 3,853,567

[2] Also reported as Written Down Value, Carrying or Net Book Value.



Rate of Annual Asset Consumption .89%

Long Term – Lifecycle Costs

Lifecycle Forecast [average 10 years forecast ops, maint and depreciation]	$8,483,717
Lifecycle Planned Budget [average 10 years planned budget ops, maint & depreciation]	$9,948,313
Lifecycle Gap [lifecycle planned budget - lifecycle forecast (-ve = gap)]	$1,464,596
Lifecycle Indicator [lifecycle planned budget / lifecycle forecast]	117.26%

Having a meaningful Useful Life becomes very important in financial reporting, long term financial planning, and sustainability indicators. This is because depreciation is based on the Useful Life. The Useful Life is also necessary at the beginning of an asset life to predict total Useful Life, especially for long lived assets. This is generally based off the Useful Life of similar assets in similar conditions

Forecasts

Assets values are forecast to increase as additional assets are added

Additional assets will generally add to the operations and maintenance needs in the longer term. Additional assets will also require additional costs due to future renewals. Any additional assets will also add to future depreciation forecasts.

Key Assumptions Made in Financial Forecasts

In compiling this AM Plan, it was necessary to make some assumptions. This section details the key assumptions made in the development of this AM plan and should provide readers with an understanding of the level of confidence in the data behind the financial forecasts.

Key assumptions made in this AM Plan are:

- Asset Register, consultant's reports, and technical estimates was used for all capital renewals.
- Depreciated values assumed based on current replacement cost of assets and percentage currently consumed
- Assumed function and capacity were the same as condition in the asset register
- Does not account for work that should be completed but are being deferred due to budget.

CAPITAL AND OPERATING HISTORICAL EXPENDITURES

In the past five years, the Township has invested approximately $3,769,856 toward the construction of new infrastructure and larger, more capital-intensive rehabilitation and replacement projects of existing infrastructure on an annual basis. (Capital)

Asset Category	2017	2018	2019	2020	2021	Average
Roads	$1,880,331	$657,860	$3,242,722	$1,024,935	$2,131,455	$1,787,471
Sidewalks	$17,447	$-	$152,128	$103,046	$62,778	$67,080
Traffic Signs	$-	$-	$1,200	$-	$-	$240
Street Signs/Lights	$-	$10,998	$-	$-	$498,641	$101,928
Bridges	$1,301,452	$466,014	$3,333	$751,387	$622,386	$628,914
Culverts	$196,737	$440,065	$325,839	$103,189	$181,135	$249,393
Stormwater	$35,136	$-	$214,779	$86,707	$218,804	$111,085
Water	$388,610	$139,328	$204,753	$116,676	$1,803,014	$530,476
Wastewater	$738,640	$410,940	$88,021	$55,756	$172,987	$293,269

In the past five years, the Township has invested approximately $1,454,768 toward the maintenance of existing infrastructure on an annual basis. (Operating)

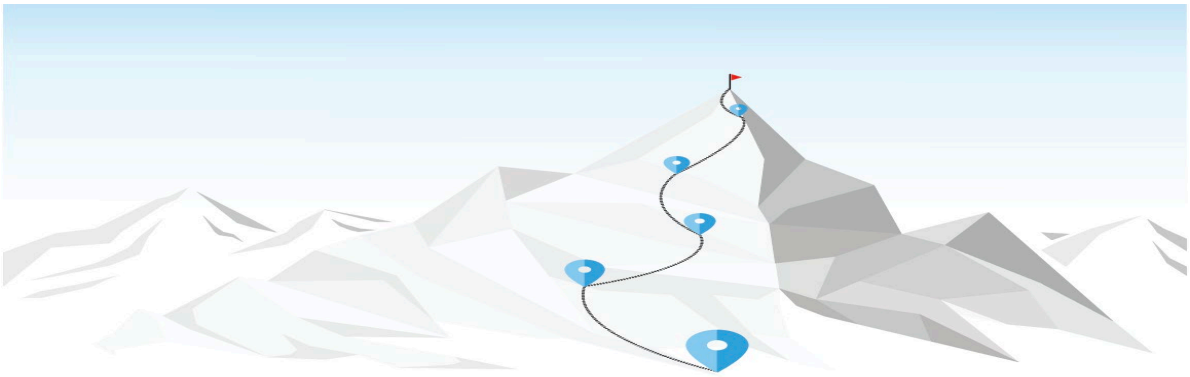
Asset Category	2017	2018	2019	2020	2021	Average
Roads	$669,067	$759,437	$735,179	$747,547	$785,708	$739,388
Sidewalks	$5,925	$11,609	$12,554	$67,030	$59,574	$31,338
Traffic Signs	$-	$-	$-	$-	$-	$-
Street Signs/Lights	$50,976	$44,389	$45,777	$52,359	$58,184	$50,377
Bridges	$44,179	$44,043	$25,015	$105,792	$65,253	$56,856
Culverts	$6,678	$41,591	$66,204	$14,529	$18,991	$29,598
Stormwater	$40,308	$67,723	$109,628	$45,794	$67,050	$66,100
Water	$275,787	$246,272	$247,717	$276,879	$354,389	$280,209
Wastewater	$187,262	$188,111	$167,934	$198,450	$262,751	$200,902

Chapter 5: Monitoring and Improvement Plan

The Township of Mapleton is a participant in the Asset Management Ontario (AMONTario) and Federation of Canadian Municipalities FCM's asset management technical assistance program that is helping to build asset management capacity and provide training to municipal staff.

An advanced asset management program consists of:

1. Knowing what we own, where it is, and having confidence in our inventory data.
2. Accurately reflecting the levels of service expected by our residents, and their willingness to pay for these services. Ensuring that we provide the best services in the most cost-effective manner.
3. Ability to predict future demand, so that the impact on assets and future investment requirements can be planned for.
4. Knowledge of physical condition of assets, to predict future maintenance and renewal requirements, costs, liabilities, and risks.
5. Knowledge of the performance of our assets, and how reliable they are: being able to track the type of asset failure, the number of customers affected, and being able to predict when performance will drop to an unacceptable level so that we can intervene.
6. Knowledge of current utilization and ultimate capacity: knowing when to upgrade or augment existing assets
7. Ability to analyze alternative options to address performance gaps.
8. Being able to set priorities that suit available budgets
9. Ability to optimize operations and maintenance activities, and implement cost-effective asset operations strategies



As an organization, our AM capacity is at an intermediate level, with informal AM practices in each department. While these practices varied in completeness and complexity, the common theme across the organization was the need to improve the degree of consistency in data collection and management practices, formalize risk assessment procedures, and work toward improving data quality.

Ongoing improvement

This AM plan is a living document. As AM practices and data quality evolve and improve, the completeness and quality of future AM plans will improve, as will our capacity to plan for future infrastructure investment needs. A comprehensive update of the AMP will take place every five years, and annual reports will be submitted to Council to summarize the state of our assets and asset management-related activities throughout the year.

- Data quality is critical to asset management. Having an up to date, comprehensive asset data inventory is critical for making informed, timely decisions regarding optimal investments in our infrastructure. In addition to detailed technical data, the data that we collect for each of our assets includes:
- Valuation data that allows us to value the assets and calculate their replacement costs, record and track depreciation, and understand the financial useful lives of our assets;
- Maintenance data that identifies work that needs to be completed on each asset, and the cost and frequency of that work. It gives us the ability to predict future maintenance costs;
- Condition data, which is used to determine the current condition of our assets and better understand the rate of deterioration of our assets;
- Performance data, which tracks demand and capacity performance, to provide us with an idea of service levels provided by our assets;

- Risk data is used to define the probability of an asset failing, as well as the consequences of the failure of that asset, so that we can prioritize our investments and identify critical infrastructure;
- Lifecycle data, which provides us with the scheduled maintenance activities for each asset and helps us build an estimate of the cost of owning and maintaining an asset throughout its useful life.
- Each asset section in this Asset Management Plan contains a data maturity scale, which gives an idea of the confidence we have in our modeling, based on the quality of the data available. It also gives us an idea of key data gaps, and the priorities for ongoing improvement. Some assets, like our road network, have had regular condition assessment data for a number of years, and the investment needs of the network are based on reliable data. Other assets, such as our underground stormwater infrastructure, do not have complete condition data. As a result, we rely on our best estimate of the condition of those assets, including inferring condition from the age of the asset, to build our financial models.

We have committed to a set of short/medium-term targets and longer-term targets in the development of our corporate Asset Management Programme, to ensure that we continuously improve the quality of the data that forms the backbone of this Plan.

Improvement Plan

Table 5.1: Improvement Plan

Task	Description	Responsibility	Resources Required	Timeline
1	Integration of the Township strategic documents, including master plans and growth projections into future AM Plans	All Departments	Staff Time and Updated Policy	Ongoing
2	Improving the confidence level on the asset register by developing well organized asset hierarchy and attributes	Finance & Public Works	Staff Time, Trainings	2023
3	Improving the Risk Mapping by increasing the confidence in attributes contributing for probability of failure and confidence of the failure	Finance & Public Works	Staff Time, Trainings and workshops and budget.	2023
4	Identifying the KPI reflecting both community and technical levels of service from Township perspective consulting with citizen	SMT, AM Committee and consulting services	Funding, Staff time	2024
5	Develop a methodology for calculating replacement costs for all Township assets	Finance & Public Works	Staff time	1-2 years
6	Knowledge sharing on the whole lifecycle costing process and bringing it in financial planning	SMT, AM committee and Finance team	Staff timing, hands out on best practices	2024

7	Review the expenditure thresholds for the capitalization of assets	Finance & Public Works	Staff time	1-5 years
8	Preparing the Asset Management Plan for all assets in compliance with Ontario Regulation 588/17, reflecting current levels of service and cost for it.	Finance & Public Works	Staff time	2024
9	Incorporation of recommendations for the Township Greenhouse (GHG) emission reduction plan	All Departments	Funding, Staff time	1-5 years
10	Develop a standardized approach for data maintenance	All Departments	Staff time	1-5 years
11	Integration of projected levels of service in the financial model.	All Departments	Staff time	1-2 years
12	Refine the funding models to reflect better data available	Finance Department	Staff time	1-2 years
13	Further implementation and ongoing use of Citywide work orders to better understand operational, maintenance requirements	Public Works	Staff time	Ongoing
14	Establish a lifecycle maintenance framework for all assets	All Departments	Staff time	1-5 years

Collaboration with Member Municipalities

Asset management activities at the Township are not conducted in a vacuum. In establishing the Township's Asset Management Program, the Township has collaborated with the County of Wellington and all its member municipalities, to share best practices and resources. The County and all member municipalities have all implemented a common Asset Management software to aid in tracking asset management activities and enabling predictive analyses relating to infrastructure investment.

Components of lifecycle management, including condition assessment scales, risk models, and performance measurement have been reviewed to determine the potential for commonalities in measurement and reporting.

The Township of Mapleton is working in collaboration with a neighboring municipality to share resources and technical expertise to develop lifecycle costing for its assets.

APPENDIX A: REGULATORY COMPLIANCE

The following chart represents the Township's position with respect to the asset management requirements identified in O.Reg. 588/17.

The state of assets column refers to the asset inventory, including condition data. The levels of service columns reflect the performance metrics required to be tracked by the regulation, as listed in each of the asset sections. The asset management strategy relates to the existence of a lifecycle management strategy, and the funding strategy relates to our plans to fund the asset management strategy.

	Phase 1 (Current Levels of Service) July 1, 2022			Phase 2 (Proposed Levels of Service) July 1, 2024			
	State of Assets	Current Levels of Service	Asset Mgmt Strategy	State of Assets	Proposed Levels of Service	Asset Mgmt Strategy	Funding Strategy
Core Assets							
Roads	Compliant (page. 32,36,37)	Compliant (page. 40)	Compliant (page. 42)	Compliant (page. 32,36,37)	In Progress	Compliant (page. 42)	In Progress
Bridges & Culverts	Compliant (page 42, 48, 49)	Compliant (page 51)	Compliant (page 53, 54)	Compliant (page 42, 48, 49)	In Progress	Compliant (page 53, 54)	In Progress
Stormwater	Compliant (page 57, 58,59)	Compliant (page 61)	Compliant (page 62,63)	Compliant (page 57, 58,59)	In Progress	Compliant (page 62,63)	In Progress
Water & Wastewater	Compliant (page 65,66,68,75, 76,77)	Compliant (page 70, 79)	Compliant (page 72,73,81,82)	Compliant (page 65,66,68,75, 76,77)	In Progress	Compliant (page 72,73,81,82)	In Progress
Other Assets							
Fleet	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equipment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pooled Assets	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B: RISK CALCULATION

Probability of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value /Range	Probability of Failure Score
Roads Networks	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value /Range	Consequence of Failure Score
Roads Networks	Replacement cost	100%	$1000001 and above	5
			$1000000 and below	4
			$500000 and below	3
			$250000 and below	2
			$100000 and below	1

Probability of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Brides and Culverts	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value /Range	Consequence of Failure Score
Brides and Culverts	Replacement cost	100%	$1000001 and above	5
			$1000000 and below	4
			$500000 and below	3
			$250000 and below	2
			$100000 and below	1

Probability of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Storm Networks	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value /Range	Consequence of Failure Score
Storm Networks	Replacement cost	100%	$1000001 and above	5
			$1000000 and below	4
			$500000 and below	3
			$250000 and below	2
			$100000 and below	1

Probability of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
Water Networks	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value /Range	Consequence of Failure Score
Water Networks	Replacement cost	100%	$1000001 and above	5
			$1000000 and below	4
			$500000 and below	3
			$250000 and below	2
			$100000 and below	1

Probability of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Probability of Failure Score
wastewater Networks	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure:

Asset Category	Risk Criteria	Criteria Weighting	Value /Range	Consequence of Failure Score
Wastewater Networks	Replacement cost	100%	$1000001 and above	5
			$1000000 and below	4
			$500000 and below	3
			$250000 and below	2
			$100000 and below	1

APPENDIX C: GLOSSARY

Asset – An asset is an item, thing, or entity that has potential or actual value to the Township. Examples include bridges, roads, buildings, vehicles, and equipment.

Asset Maintenance – Actions required to keep an asset as near to its original condition as possible, to provide service over its useful life. This includes both corrective and preventative maintenance and excludes renewal or replacement.

Asset Management – The coordinated activities of an organization to realize value from its assets. It is an integrated set of processes and practices that minimize lifecycle costs of owning, operating, and maintaining assets, at an acceptable level of risk, while continuously delivering established levels of service.

Asset Management Plan – A document that states how a group of assets is to be managed over a period. Asset management Plans describe the following for all asset groups:

1. The condition, characteristics, and values of the assets.
2. Expected Levels of Service.
3. Action Plan to ensure assets are providing the Level of Service.
4. Financial Strategies to implement the Action Plans.

The Asset Management Plan is reviewed every five years. Some information within the plan, such as the condition assessment of some assets, characteristics, and asset values, may be updated and reported on an annual basis.

Asset Register – Provides a complete list of assets owned by the Township of Mapleton. Components of the register may reside in several locations, depending on whether the assets are tracked at the corporate or departmental level.

Betterments – Subsequent expenditures on tangible capital assets that fulfill one or more of the following requirements:

1. Increase service potential (i.e., capacity, output).
2. Lower associated operating cost.
3. Extend the useful life of the asset.
4. Improve the quality of output of the asset

Capital Budget – A multi-year financial plan for the construction, acquisition, and financing of capital works. A capital budget should provide for the planning of future financial resources required to finance projects and identify the future financial resources to be allocated from the operating budget to operate and maintain the capital asset once it is acquired. An operating budget normally provides for the day-to-day expenditures of a municipality for items such as salaries, wages, benefits, heat, hydro, maintenance of buildings and infrastructure, etc., whereas the capital budget plans for the acquisition or rehabilitation of capital assets.

Capital Expenditure – Any significant expenditure incurred to acquire, improve, or rehabilitate land, buildings, engineering structures, facilities, machinery or equipment, and all associated items to bring the foregoing into function operation. The work typically confers a benefit lasting beyond one year (and as such is non-recurring in nature) and results in the acquisition or extension of the life of a fixed asset. Capital expenditures also include the cost of studies undertaken in connection with acquiring land or constructing infrastructure and facilities.

Capitalization – The practice of spreading the cost of an asset over its useful life.

Capitalization Threshold – The value of an asset above which the Township will capitalize the value of the asset. See TCA Policy for threshold values.

Components – Specific parts of an asset having independent physical or functional identity, and having specific attributes such as different life expectancy, maintenance regimes, risk, or criticality. Complex assets, such as buildings, are often broken down into components for asset management purposes, to reflect the differing needs of various components.

Condition – The physical state of the asset.

Condition-Based Preventative Maintenance – Preventative maintenance initiated because of an asset reaching a specific condition. Differs from age-based preventative maintenance, which schedules maintenance based on asset age and may not accurately reflect the maintenance needs of the asset.

Condition Assessment – The inspection, assessment, measurement, and interpretation of the resultant data, to indicate the condition of a specific asset or component, to determine the need for preventative or remedial action.

Corrective Maintenance – Activities undertaken to return an asset to working order after a deficiency has been identified. These activities are typically unplanned or reactive in nature.

Corporate Asset Management Program – The application of asset management strategies and best practices on a corporate level to ensure consistency across all departments and asset groups. The Corporate Asset Management Program consists of the following:

1. Strategic Plans and Documents
2. Strategic Asset Management Policy
3. Asset Management Framework
4. Asset Management Governance
5. Asset Management Plans
6. Operational Strategies and Plans

Cost – The gross amount of consideration given up acquiring, construct, develop, or better a tangible capital asset, and includes all costs directly attributable to acquisition, construction, development, or betterment of the tangible capital asset, including installing the asset at the location and in the condition necessary for its intended use.

Cost-Benefit Analysis – A decision technique that quantifies the full benefits and costs, including opportunity costs, of a potential investment. The analysis can be financial or expanded to include multiple criteria (multi-criteria cost-benefit analysis).

Critical Assets – Those assets that are likely to result in a more significant financial, environmental, and social impact should they fail. The maintenance of these assets is a priority. Risk assessment piece.

Decision Support System – A Decision Support System assists in business and capital planning, project prioritization, and tracking the overall performance of Township assets. Township decision support system includes FMW, etc., feeding into capital program via specialized program (Work Tech).

Decommission – Removing an asset from service typically because it has reached the end of its useful life.

Deferred Maintenance – The shortfall in maintenance work required to maintain the service potential of an asset.

Demand Management – Actions taken to influence demand for services and assets, often undertaken as part of sustainability initiatives and/or to avoid or defer required asset investment. It includes forecasting future demand, and proactively taking action to mitigate the risk of service disruptions by enhancing capacity to meet demand.

Amortization / Depreciation – An accounting method of allocating the cost of a tangible capital asset over its useful life or life expectancy. Depreciation represents how much of an asset's useful life has been used up. Also referred to as ____.

Deterioration Curve – The rate at which an asset approaches the end of its useful life, represented by a curve. With no intervention (e.g., repair or rehabilitation), the rate of deterioration increases as assets near the end of their useful life. The deterioration curve differs for each asset class and can differ for assets within the same class, based on usage, construction materials, weather, etc.

Disposal – Disposals result when the ownership of a tangible capital asset is relinquished. Disposals reduce the cost of tangible capital assets and accumulated amortization to zero.

Estimated Useful Life –

The estimate of either:

1. The period over which a tangible capital asset is expected to be used, or
2. The number of production or similar units that can be obtained from the tangible capital asset.

The life of a tangible capital asset may extend beyond the useful life of a tangible capital asset. The life of a tangible capital asset, other than land, is finite, and is normally recorded as the shortest of the physical, technological, commercial, or legal life.

Fair Value – The amount of consideration that would be agreed upon in an arm's length transaction between knowledgeable, willing parties who are under no compulsion to act.

Financial Flexibility – The ability to issue debt responsibly without impacting the credit rating or ability to generate required revenues. It is the ability to change debt or tax levels to meet the Township's obligations.

Financial Sustainability – The ability to provide and maintain service and infrastructure levels without resorting to unplanned increases in rates or cuts to service. It is the ability to meet present needs without compromising the ability to meet future needs.

Geographic Information System (GIS) – A computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. It can show many kinds of data on one map. This enables people to see, analyze, and understand patterns and relationships more easily.

Historical Cost – The original purchase price of the asset.

Impact – How severe the consequence(s) of an event will be. (consequence)

Infrastructure Gap – The cumulative shortfall of required asset renewal. This gap represents the cumulative deferred maintenance and investment needs for the Township.

Key Performance Indicator (KPI) – A metric that is used in alignment with a business objective. It is often used as a comparator with a range of thresholds that identify a desirable or undesirable state.

Levels of Service – Describe the outputs or objectives that an organization or activity intends to deliver to customers. This includes commonly measured attributes such as quality, reliability, responsiveness, sustainability, timeliness, accessibility, and cost.

Lifecycle – The cycle of activities that an asset goes through over its useful life. These activities can be categorized into the following broad categories: planning, design, construction, acquisition, operation, maintenance, rehabilitation, renewal, and disposal

Lifecycle Cost – The total cost of an asset throughout its useful life. This includes costs related to planning, design, construction, acquisition, operation, maintenance, rehabilitation, renewal, and disposal.

Likelihood – The probability of an event occurring. (Risk)

Maintenance – Actions required to keep an asset as near to its original condition as possible to provide service over its useful life. Includes both corrective and preventative maintenance but excludes renewal or replacement.

Mitigation – Measures taken in advance of negative events or disasters, to reduce their impacts.

Net Book Value – The historical cost of the asset, less the accumulated amortization expense and the amount of any write-downs. This is a financial interpretation of the remaining useful life of the asset.

Preventative Maintenance – Activities undertaken on a regular basis to ensure, and asset is able to provide the expected service. These activities are typically planned and are intended to reduce the likelihood of failure or breakdown.

Performance Measure – A qualitative or quantitative measure used to measure actual performance against a standard or other target. Performance measures are used to indicate how the organization is doing in relation to delivering levels of service.

Pooled (Grouped) Assets – Assets that have a unit value below the capitalization threshold but have a material value as a group. Such assets shall be "pooled" as a single asset with one combined value. Although recorded in the financial systems as a single asset, each unit may be recorded in the asset sub-ledger for monitoring and control of its use and maintenance. Examples include computers, furniture, and fixtures.

Rehabilitation / Refurbishment – Work to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modifications. Generally, involves repairing the asset to deliver its original levels of service without resorting to significant upgrading or renewal.

Remaining Useful Life – The time remaining until an asset cease to provide the required service levels.

Renewal – The restoration of the service potential of the asset. Asset renewal is required to sustain service beyond the original life of the asset. Asset renewal prolongs the useful life of the asset. Type of betterment.

Repair – Action to restore an item to its previous condition after failure or damage.

Replacement – The complete replacement of an asset that has reached the end of its useful life.

Replacement Cost - The cost that would be incurred to replace the asset with a new modern equivalent asset (not a second hand one) with the same economic benefits (gross service potential).

Reserve – A reserve is an allocation of accumulated net revenue set aside for a designated purpose. Funds held in a reserve can be utilized at the discretion of Council. Reserves do not earn interest on their own, although interest may be allocated to reserves if desired.

Reserve Fund – A reserve fund is established based on a statutory requirement or defined liability payable in the future and is usually prescriptive as to the basis for collection and use of monies in the fund. All earnings derived from reserve fund investments form part of the reserve fund. There are two types of reserve funds: discretionary reserve funds and obligatory reserve funds.

1. Discretionary reserve funds: established whenever Council wishes to set aside a certain portion of any year's revenues to finance a future expenditure for which it has the authority to spend money, or to provide for a specific contingent liability.
2. Obligatory reserve funds: created whenever a statute or legislation requires that revenue received for special purposes is to be segregated from the general revenues of the municipality. Obligatory reserve funds are created solely for the purpose prescribed for them.

Residual Value – The amount the entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal.

Risk – The relationship between the likelihood of an event happening, and the consequences of that event.

Risk Management – The process of identifying and assessing risks, identifying, and evaluating actions that can be taken to reduce risk, and implementing the appropriate actions to mitigate risk.

Risk Tolerance – The capacity to accept a level of risk, dependent on the likelihood and severity of consequences, and the existence of other priorities that require more immediate investment.

Service Potential – The output or service capacity of a tangible capital asset and is normally determined by reference to attributes such as physical output capacity, quality of output, associated operating costs, and useful life.

Strategic Action Plan – The Township of Mapleton's Strategic Action Plan identifies key challenges and opportunities for the Township and sets the strategic direction for Township program and investments.

Strategic Asset Management Policy – A policy developed and approved at the Township of Mapleton which outlines the objectives of Asset Management and the processes and procedures that enable the realization of those objectives.

Strategic Risk – The risk of a change occurring that impedes the Township's ability to achieve its overarching strategic goals.

Tangible Capital Asset: Non-financial assets having physical substance that:

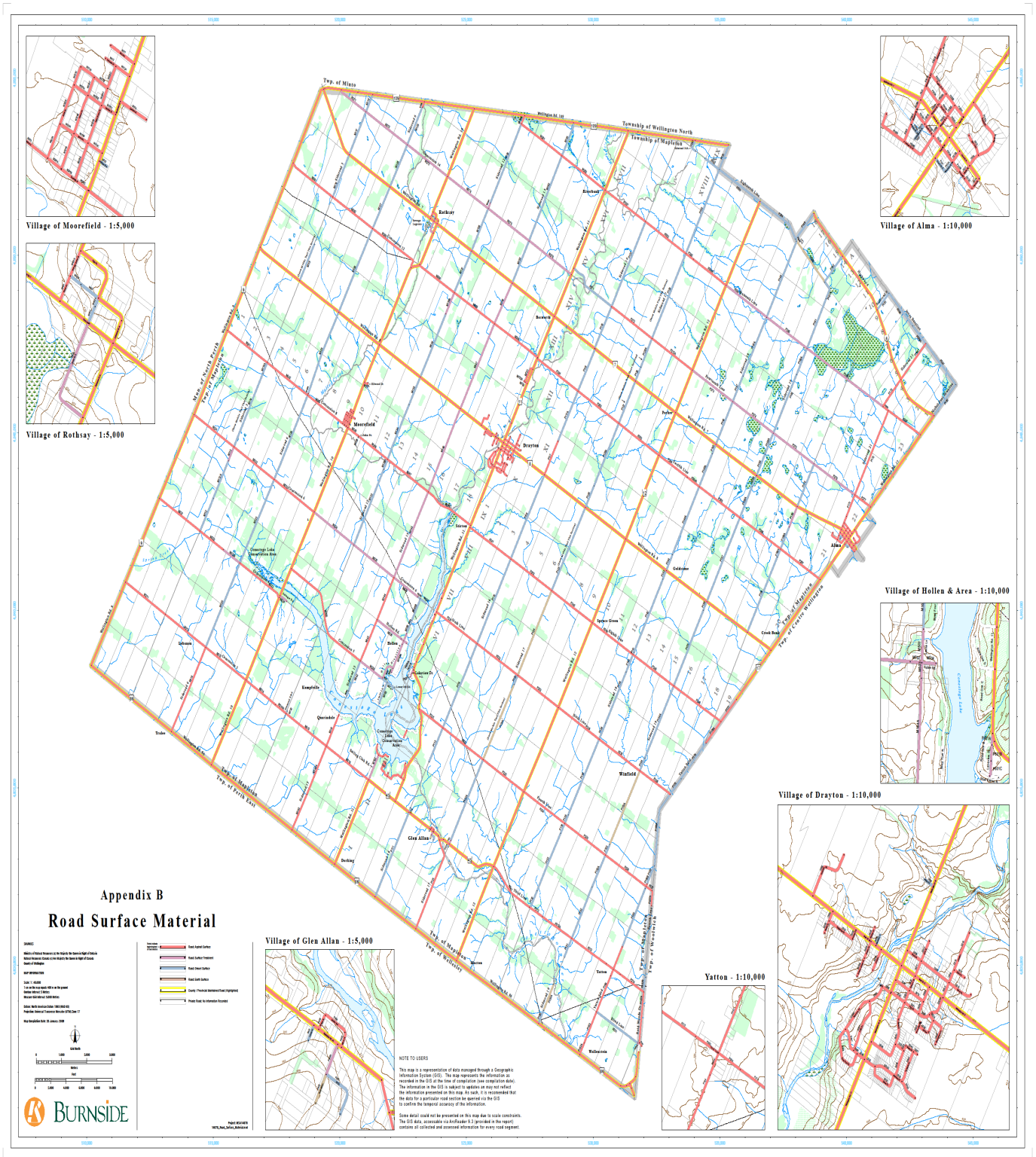
1. Are held for use in the production or supply of goods and services, for rental to others, for administrative purposes, or for the development, construction, maintenance, or repair of other tangible capital assets;
2. Have useful economic lives extending beyond one year;
3. Are to be used on a continual basis;
4. Are not for sale in the ordinary course of operations.

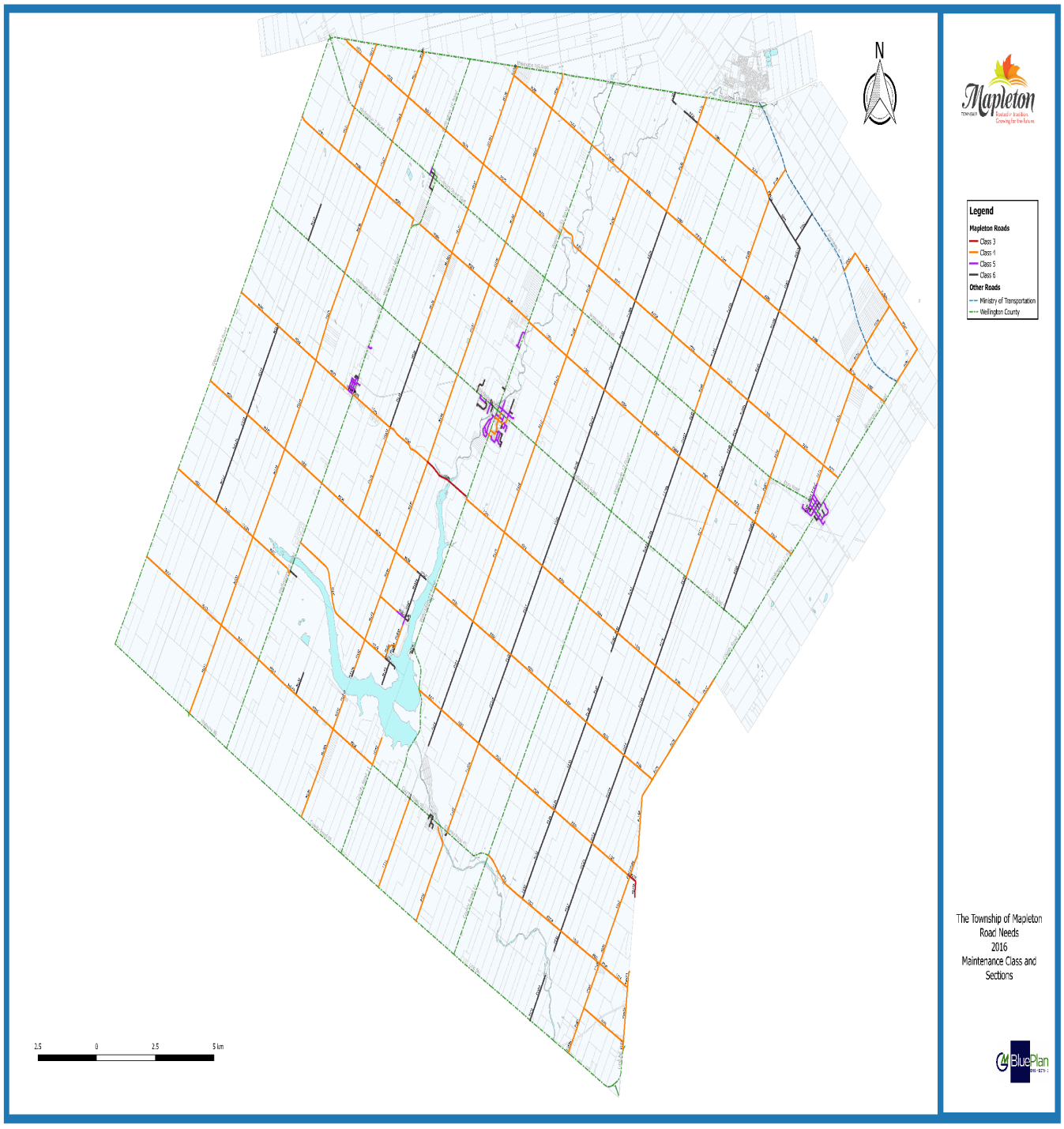
Useful Life – See Estimated Useful Life

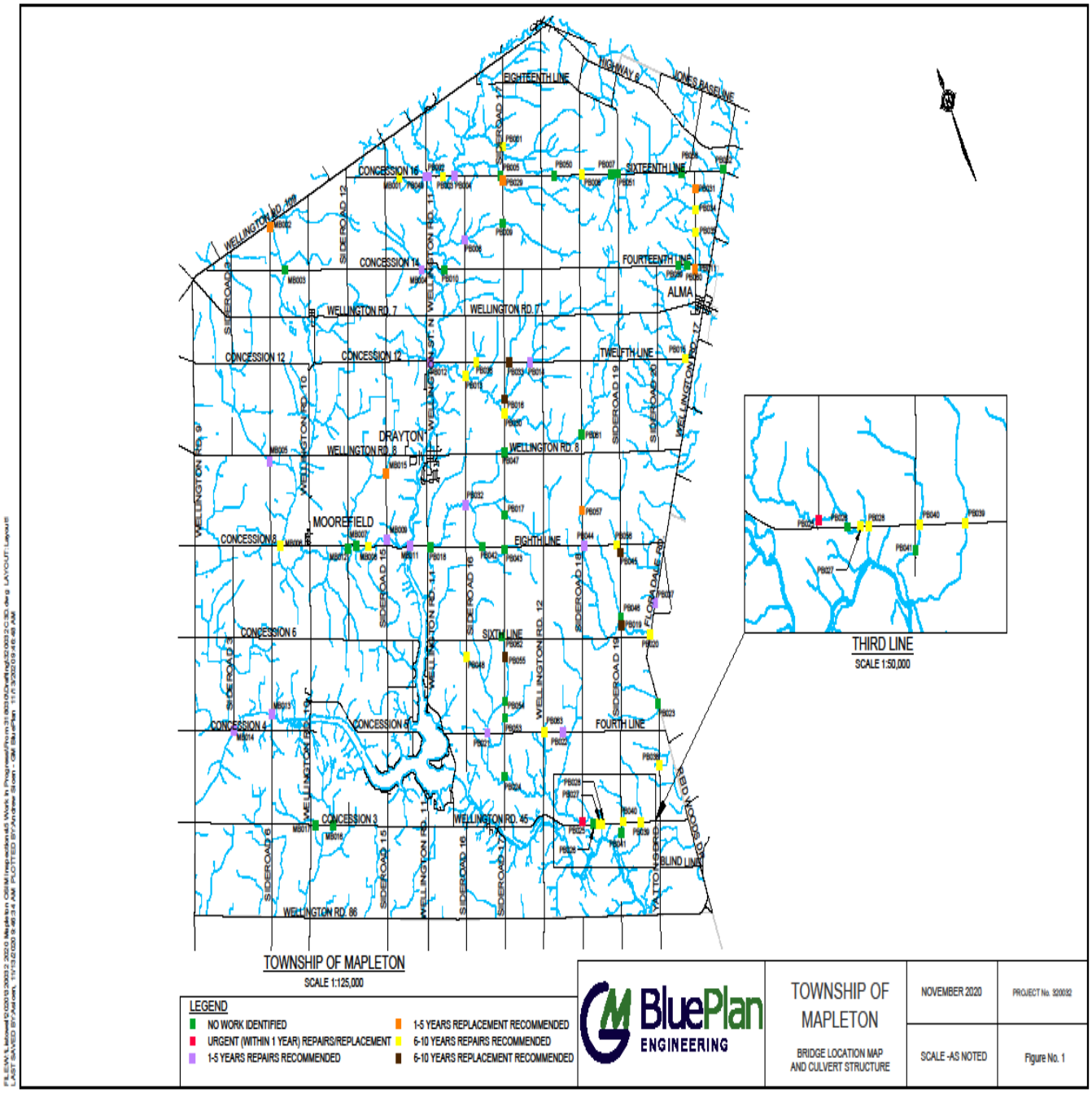
User Fee – Fee or charge to individuals or groups and/or businesses for the provision of a service, activity, or product, or for conferring certain rights and privileges, which grant authorization or special permission to a person, or group of persons to access Township-owned resources (including property) or areas of activity.

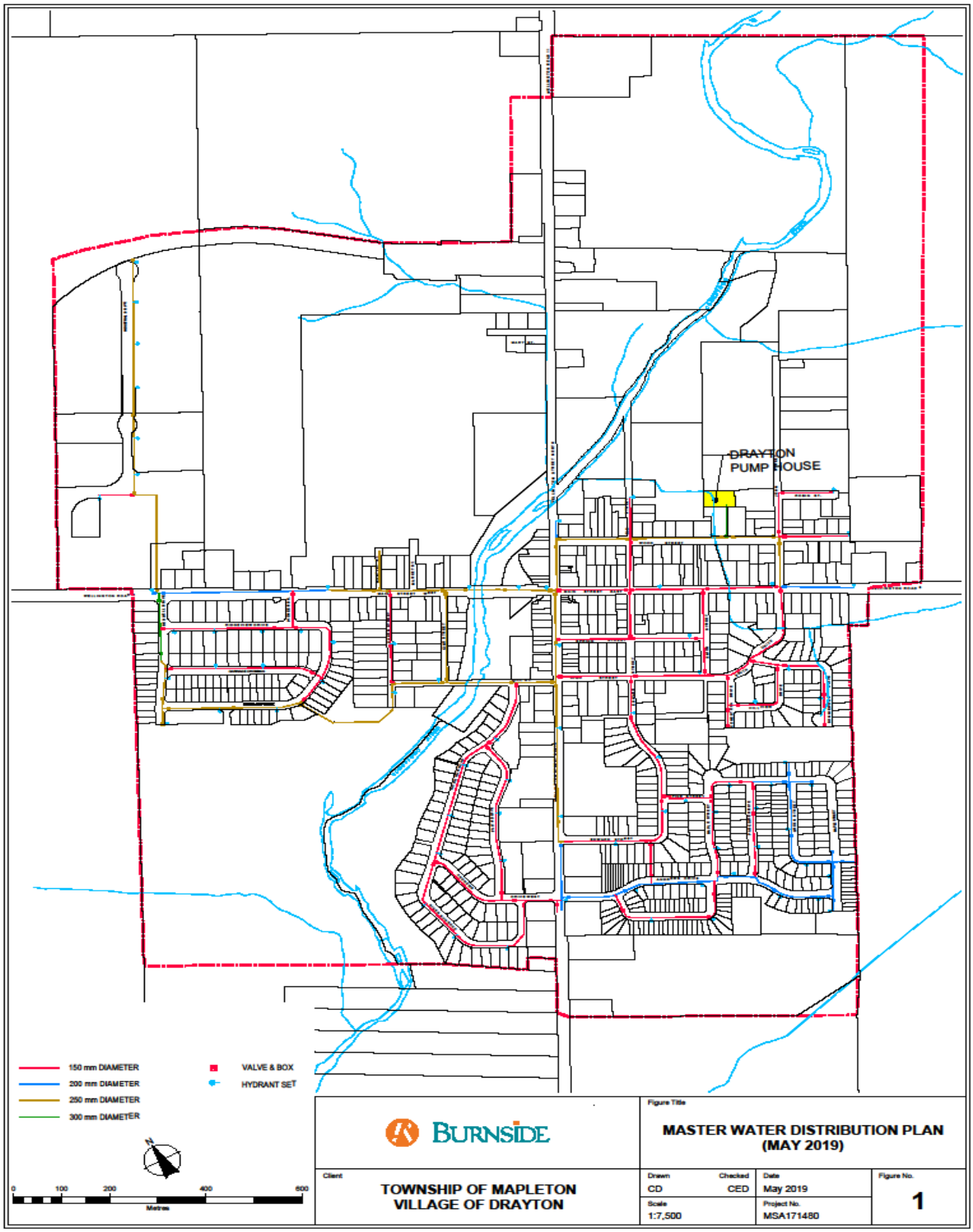
Work Management System – Used to plan, generate, track, and monitor the day-to-day activities required to operate and maintain Township assets. Examples of Work Management Systems include the financial accounting software used to track the investments in Township assets, and the work management systems used to track work orders associated with Township assets.

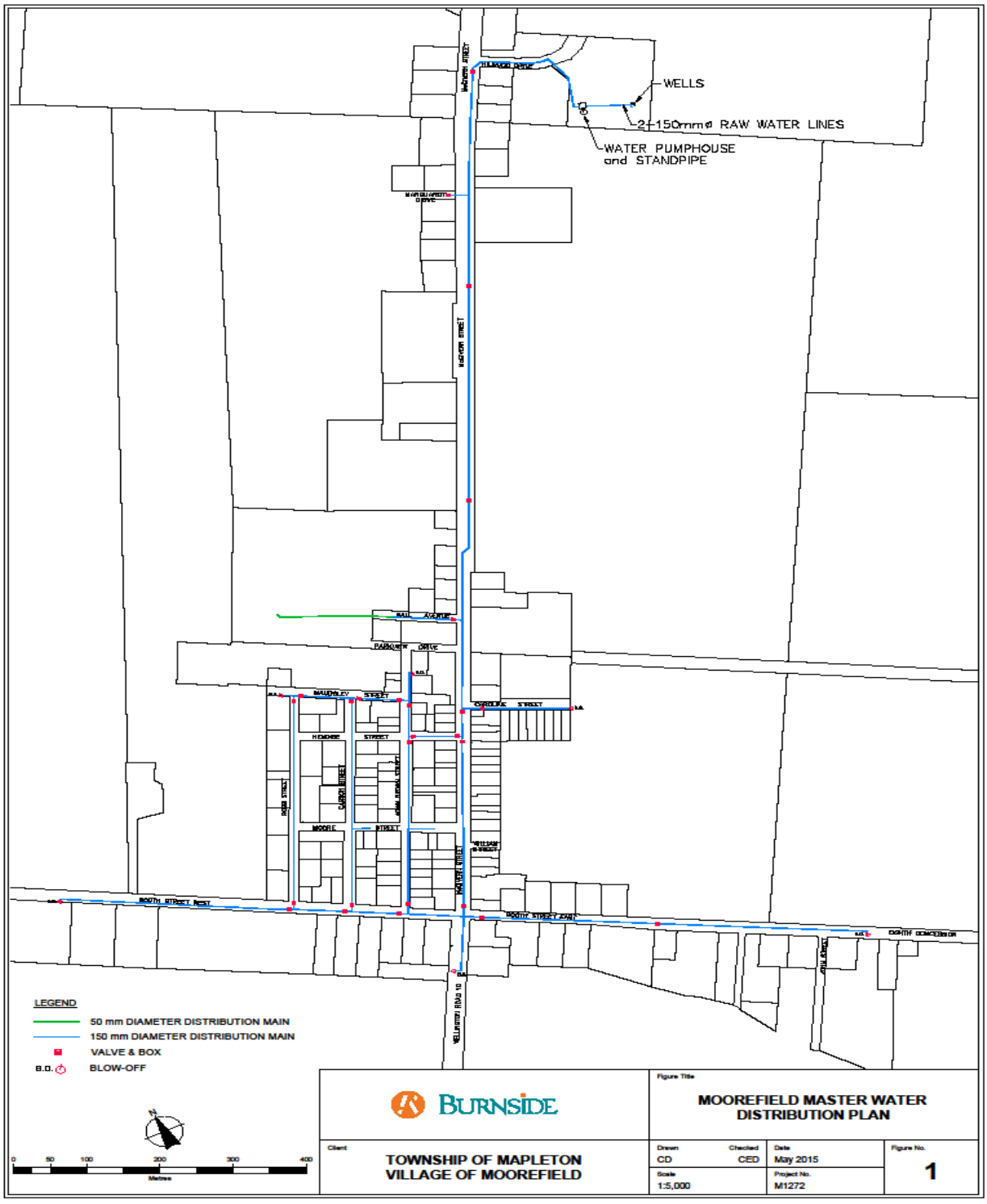
APPENDIX D: MAPS AND CONDITION IMAGES

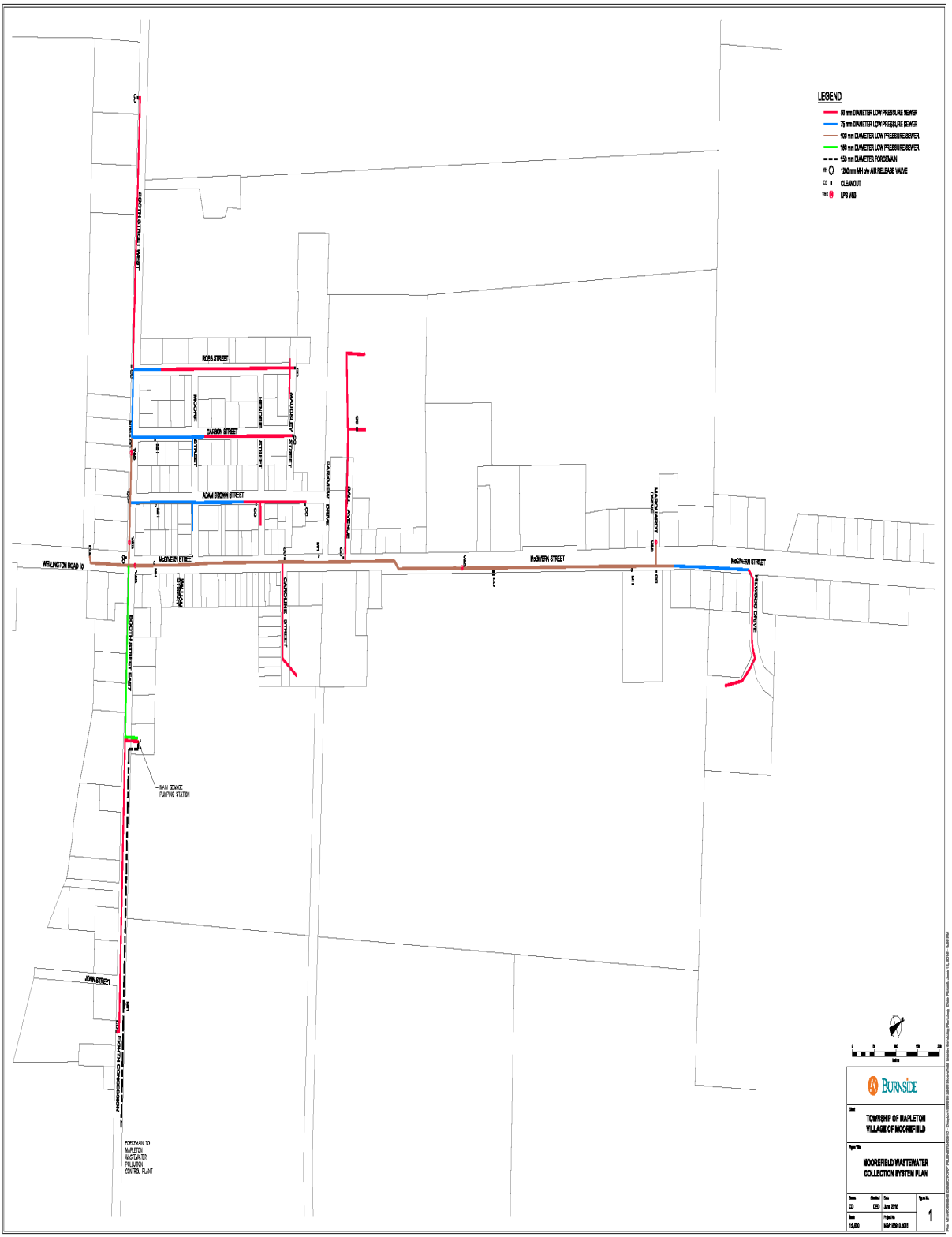



N
Legend
Mapleton Roads
Class 3
Class 4
Class 5
Class 6
Other Roads
Ministry of Transportation
Wellington County
2.5
0
2.5
5 km
The Township of Mapleton
Road Needs
2016
Maintenance Class and
Sections

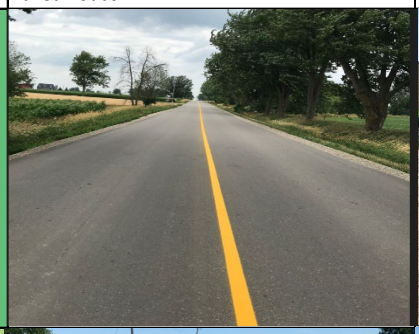
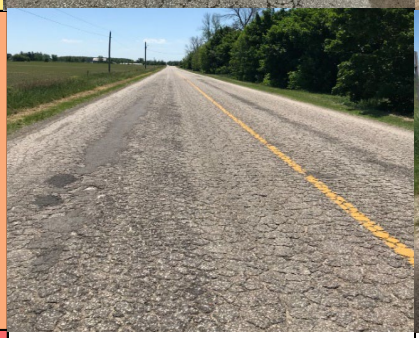
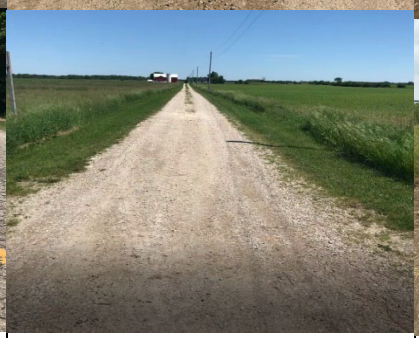
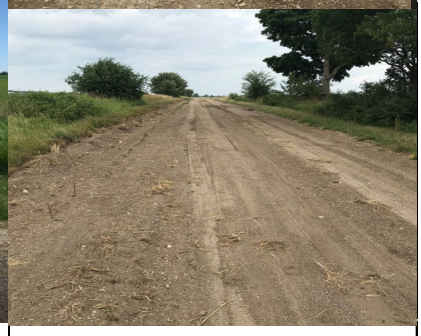

TOWNSHIP OF MAPLETON
SCALE 1:125,000
THIRD LINE
SCALE 1:50,000
LEGEND
NO WORK IDENTIFIED
URGENT (WITHIN 1 YEAR) REPAIRS/REPLACEMENT
1-5 YEARS REPAIRS RECOMMENDED
1-5 YEARS REPLACEMENT RECOMMENDED
6-10 YEARS REPAIRS RECOMMENDED
6-10 YEARS REPLACEMENT RECOMMENDED
BluePlan ENGINEERING
TOWNSHIP OF MAPLETON
BRIDGE LOCATION MAP AND CULVERT STRUCTURE
NOVEMBER 2020
PROJECT No. 320032
SCALE -AS NOTED
Figure No. 1
DRAYTON
MOOREFIELD
ALMA
CONCESSION 16
CONCESSION 14
CONCESSION 12
CONCESSION 8
CONCESSION 6
CONCESSION 4
CONCESSION 3
EIGHTEENTH LINE
SIXTEENTH LINE
FOURTEENTH LINE
TWELFTH LINE
EIGHTH LINE
SIXTH LINE
FOURTH LINE
BLIND LINE
WELLINGTON RD. 7
WELLINGTON RD. 8
WELLINGTON RD. 45
WELLINGTON RD. 86
HIGHWAY 9
JONES BASELINE
FLORADALE RD
YATTON SIDE RD


DRAYTON
PUMP HOUSE
150 mm DIAMETER
200 mm DIAMETER
250 mm DIAMETER
300 mm DIAMETER
VALVE & BOX
HYDRANT SET
0
100
200
400
600
Metres
BURNSIDE
Figure Title
MASTER WATER DISTRIBUTION PLAN
(MAY 2019)
Client
TOWNSHIP OF MAPLETON
VILLAGE OF DRAYTON
Drawn
CD
Checked
CED
Date
May 2019
Scale
1:7,500
Project No.
MSA171480
Figure No.
1


WELLS
2-150mm ø RAW WATER LINES
WATER PUMPHOUSE and STANDPIPE
LEGEND
50 mm DIAMETER DISTRIBUTION MAIN
150 mm DIAMETER DISTRIBUTION MAIN
VALVE & BOX
B.O. BLOW-OFF
0 50 100 200 300 400
Metres
BURNSIDE
Figure Title
MOOREFIELD MASTER WATER DISTRIBUTION PLAN
Client
TOWNSHIP OF MAPLETON
VILLAGE OF MOOREFIELD
Drawn CD
Checked CED
Date May 2015
Scale 1:5,000
Project No. M1272
Figure No. 1


LEGEND
75 mm DIAMETER LOW PRESSURE SEWER
100 mm DIAMETER LOW PRESSURE SEWER
150 mm DIAMETER LOW PRESSURE SEWER
150 mm DIAMETER FORCEMAIN
1200 mm MH c/w AIR RELEASE VALVE
CLEANOUT
LPS VMD
BOOTH STREET WEST
ROSS STREET
MOORE STREET
HENDRIE STREET
MURRAY STREET
CARON STREET
ADAM BROWN STREET
FAIRVIEW DRIVE
RAU AVENUE
MARQUARDT DRIVE
McGIVERN STREET
WELLINGTON ROAD 10
BOOTH STREET EAST
CAROLINE STREET
WILLWOOD DRIVE
MAIN SERVICE PUMPING STATION
JOHN STREET
FIFTH CONCESSION
FORCEMAIN TO MAPLETON WASTEWATER POLLUTION CONTROL PLANT
BURNSIDE
TOWNSHIP OF MAPLETON
VILLAGE OF MOORFIELD
MOORFIELD WASTEWATER COLLECTION SYSTEM PLAN
1

Road Condition Images:

Images	Paved Roads	Gravel Roads	Earth Roads
Very Good (PCI 80+)			
Good (PCI 60- 79)			
Fair (PCI 40 - 59)			
Poor (PCI 20 -39)			
Very Poor (PCI 0 - 19)	N/A	N/A	N/A

Bridges and Culverts Condition Images:

Condition	Bridges	Culverts
Very Good (80-100)	MB003 Concession 14 just east of sideroad 6 	
Good (BCI 60 - 79)	MB006 Sideroad 6 Just south of Wellington Road 8 	
Fair (BCI 40 - 59)	MB005 South of Wellington Road 8 	
Poor (BCI 20 - 39)	PB0037 Yatton Side Road North of Fourth Line 	
Very Poor (BCI 0 - 20)	No Bridges in very poor condition	No culverts in very poor condition