



Asset Management Plan

Township of Essa

2020

This Asset Management Program was prepared by:



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

Key Statistics

Replacement cost of
asset portfolio
\$392.9 million

Replacement cost of
infrastructure per
household
\$47,000 (2021)

Percentage of assets in fair
or better condition
93%

Percentage of assets with
assessed condition data
63%

Annual capital
infrastructure deficit
\$10 million

Recommended timeframe
for eliminating annual
infrastructure deficit
5-20 Years

Target reinvestment
rate
3.5%

Actual reinvestment
rate
1.0

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

Scope

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

This AMP include the following asset categories:



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

Findings

The overall replacement cost of the asset categories included in this AMP totals \$392.9 million. 93% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 63% of assets. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.

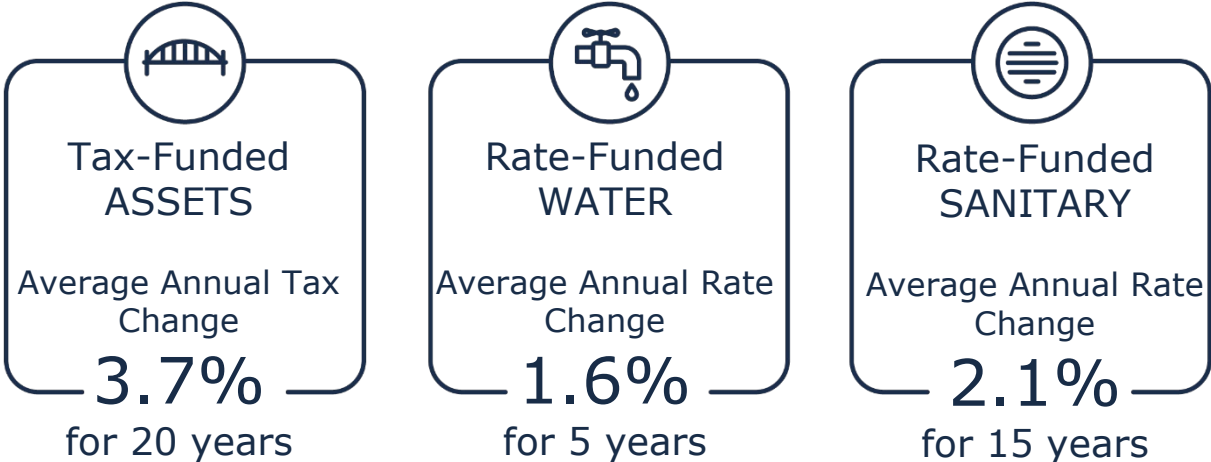
The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads, bridges & culverts and storm assets) and replacement-only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Township's average annual capital requirement totals \$13.6 million. Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately \$3.4 million towards capital projects or reserves per year. As a result, there is currently an annual funding deficit of \$10.1 million.

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

Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax/rate change required to eliminate the Township’s infrastructure deficit:



Recommendations to guide continuous refinement of the Township’s asset management program. These include:

- Review and update data regularly to maintain a complete and accurate inventory
- Develop a data governance framework, along with a condition assessment strategy, to ensure consistency and standardization of asset management (AM) program
- Conduct a Township-wide needs assessments to assess staffing, software and/or process needs to advance the AM program
- Continue to track current levels of service and identify achievable target levels of service

1 Introduction & Context

Key Insights

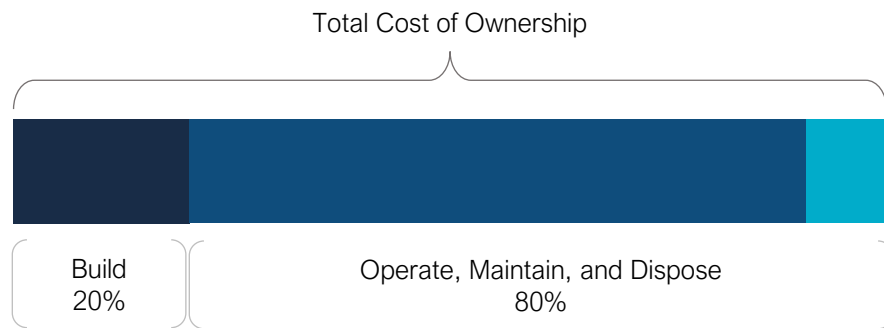
The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio

- The Township's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management
- An asset management plan is a living document that should be updated regularly to inform long-term planning
- Ontario Regulation 588/17 outlines several key milestone and requirements for asset management plans in Ontario between July 1, 2022 and 2025

1.1 An Overview of Asset Management

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

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



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

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

1.1.1 Asset Management Policy

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

The Township is currently following their strategic asset management policy in accordance with Ontario Regulation 588/17 requirements.

1.1.2 Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the Township plans to achieve asset management objectives through planned activities and decision-making criteria. The Township’s Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

1.1.3 Asset Management Plan

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

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

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

1.2 Key Concepts in Asset Management

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

1.2.1 Lifecycle Management Strategies

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

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

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

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

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

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

1.2.2 Risk Management Strategies

Municipalities generally take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important than others, and their failure or disrepair poses more risk to the community than that of others. For example, a road with a high volume of traffic that provides access to critical services poses a higher risk than a low volume rural road. These high-value assets should receive funding before others.

By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

This AMP includes a high-level evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize maintenance, rehabilitation and replacement strategies for critical assets.

1.2.3 Levels of Service

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

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

Community Levels of Service

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

Technical Levels of Service

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

For core asset categories (roads, bridges and culverts, water, wastewater, stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP. For non-core asset categories, the Township has determined the technical metrics that will be used to determine the technical level of service provided. These metrics can be found in the Levels of Service subsection within each asset category.

Current and Proposed Levels of Service

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

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

1.3 Ontario Regulation 588/17

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

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

2019

Strategic Asset Management Policy

2022

Asset Management Plan for Core Assets with the following components:

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

2024

Asset Management Plan for Core and Non-Core Assets (same components as 2022) and Asset Management Policy Update

2025

Asset Management Plan for All Assets with the following additional components:

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

1.3.1 O. Reg. 588/17 Compliance Review

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

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

2 Scope and Methodology

Key Insights

- This asset management plan includes 9 asset categories and is divided between tax-funded and rate-funded categories
- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation
- Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life

2.1 Asset Categories Included in this AMP

This asset management plan for the Township of Essa is produced in compliance with Ontario Regulation 588/17. The July 2024 deadline under the regulation—the second of three AMPs—requires analysis of all assets.

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

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

2.2 Deriving Replacement Costs

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

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

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

2.3 Estimated Useful Life

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

2.4 Reinvestment Rate

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

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

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

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

2.5 Deriving Asset Condition

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

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

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

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

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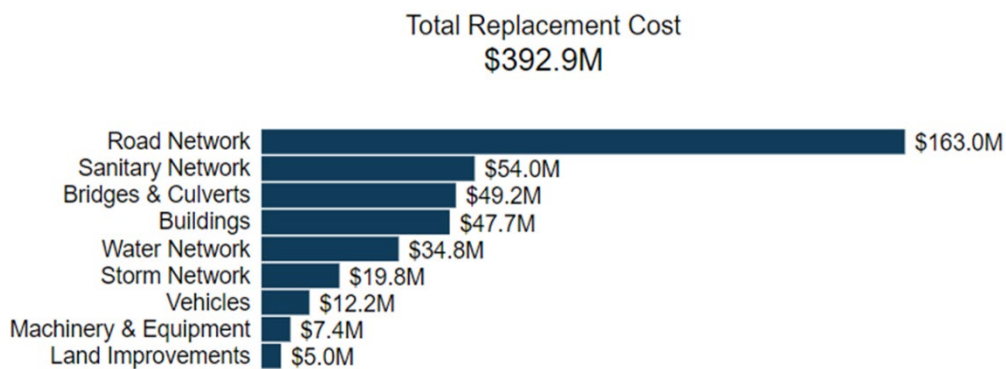
Portfolio Overview

Key Insights

- The total replacement cost of the Township's asset portfolio is \$392.9 million
- The Township's target re-investment rate is 3.5%, and the actual re-investment rate is 1.0%, contributing to an expanding infrastructure deficit
- 93% of all assets are in fair or better condition
- Average annual capital requirements total \$13.6 million per year across all assets

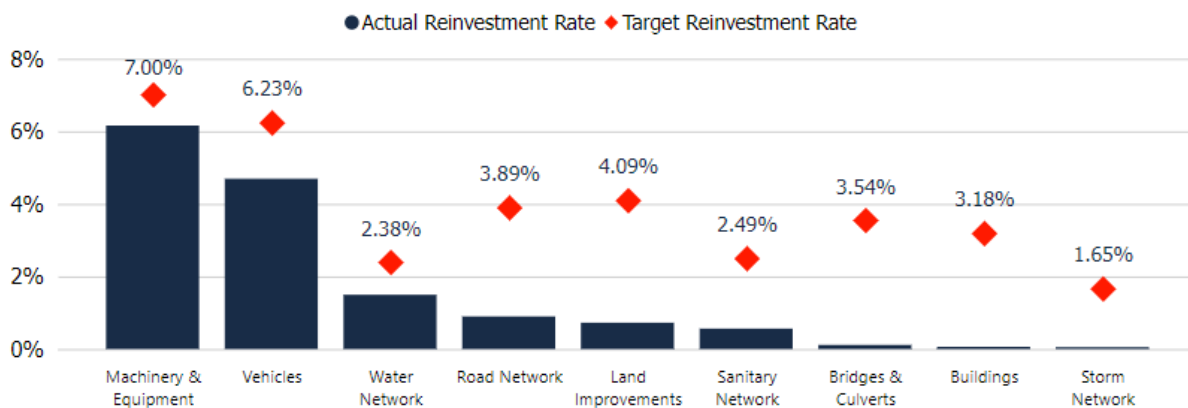
3.1 Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of \$392.9 million based on inventory data from 2020. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.



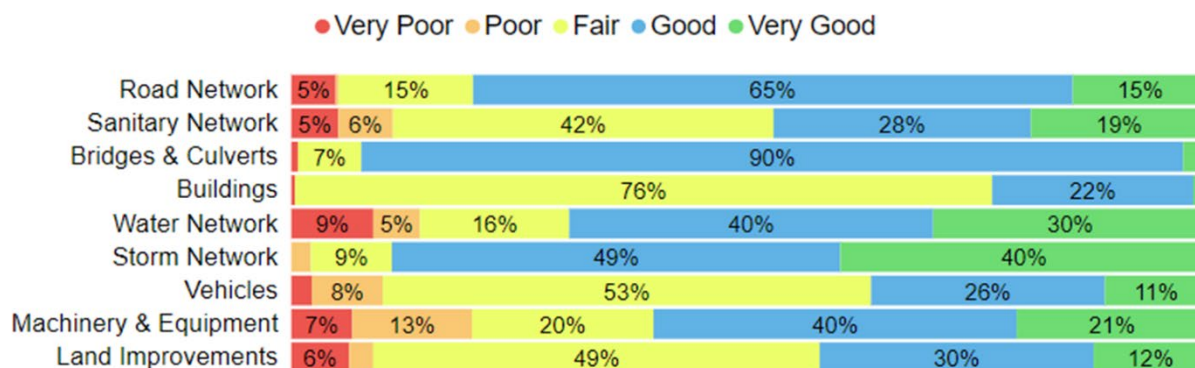
3.2 Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Township should be allocating approximately \$13.6 million annually, for a target reinvestment rate of 3.5%. Actual annual spending on infrastructure totals approximately \$3.4 million, for an actual reinvestment rate of 1.0%.



3.3 Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 93% of assets in Essa are in fair or better condition. This estimate relies on both age-based and field condition data.



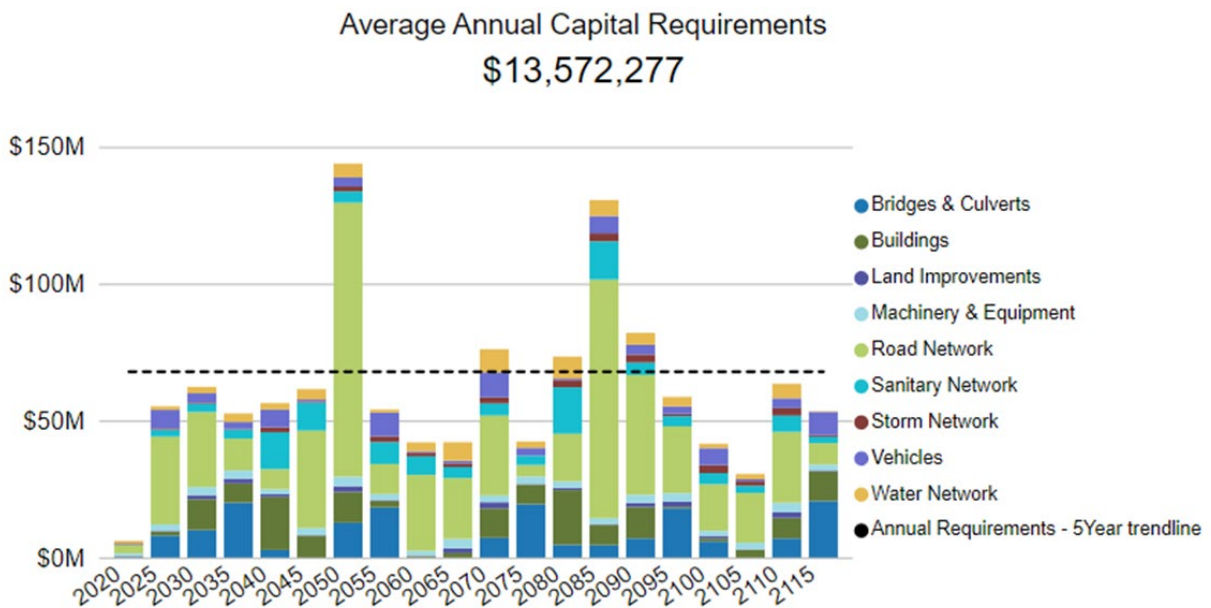
This AMP relies on assessed condition data for 63% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	% of Assets with Assessed Condition	Source of Condition Data
Road Network	Paved Roads	100%	2022 Roads Assessments
Bridges & Culverts	Bridges	99%	2021 Bridge Inspections
	Structural Culverts	95%	
Storm Network	All	0%	Age-Based
Buildings	All	95%	Staff Assessments
Machinery & Equipment	All	5%	Staff Assessments
Vehicles	All	62%	Staff Assessments
Land Improvements	All	58%	Staff Assessments
Water Network	All	0%	Age-Based
Sanitary Network	All	13%	Staff Assessments
Total		63%	

3.4 Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the Township can produce an accurate long-term capital forecast. The following graph identifies capital requirements over the next 95 years.

This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



4 Analysis of Tax-funded Assets

Key Insights

- Tax-funded assets are valued at \$304.2 million
- 97% of tax-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately \$11.4 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

4.1 Road Network

The road network is a critical component of the provision of safe and efficient transportation services and represents the highest value asset category in the Township’s asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure.

4.1.1 Asset Inventory & Replacement Cost

The table below includes the quantity, total replacement cost and annual capital requirements of each asset segment in the Township’s road network inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
Culverts	33	\$1,485,000	\$51,800
Ditches	215 kms	\$18,614,000	\$901,000
Paved Roads	223 kms	\$124,904,000	\$4,829,000
Road Appurtenances ¹	47 kms	\$3,920,000	\$157,000
Sidewalks	64 km ²	\$8,614,000	\$180,000
Slope Stabilization	4	\$315,000	\$8,700
Streetlights	1,572	\$4,402,000	\$179,000
Traffic Signals	2	\$727,000	\$30,000
Unpaved Roads	12 kms	Not Planned for Replacement ²	
		\$162,980,000	\$6,337,000

Total Replacement Cost
\$163.0M



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

¹ Road appurtenances includes curb and guardrails.

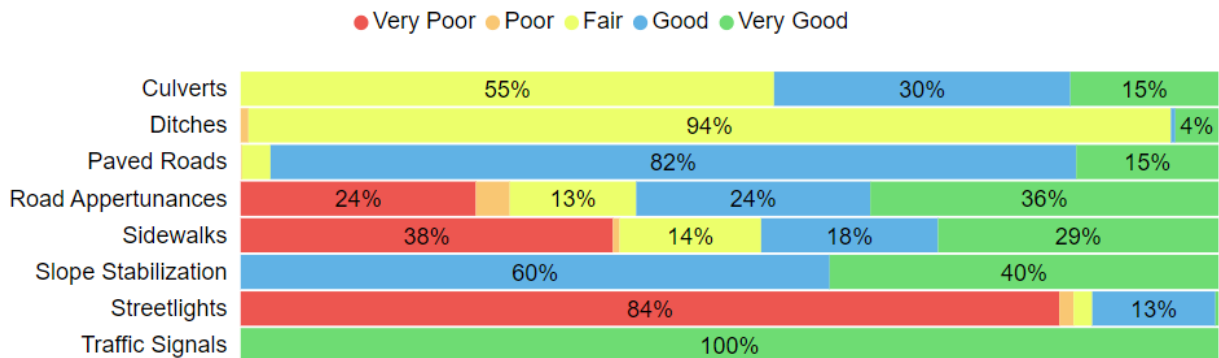
² Unpaved roads have been included as they comprise a significant portion of the Township’s road network. However, the lifecycle management strategies for these assets consist of perpetual maintenance activities and do not typically require capital costs.

4.1.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Culverts	20-30	11.0	Good (62%)
Ditches	20-60	30.1	Fair (51%)
Paved Roads	15-25	18.1	Good (73%)
Road Appurtenances	25	10.3	Fair (56%)
Sidewalks	30-50	25.4	Fair (46%)
Slope Stabilization	30-60	8.2	Good (73%)
Streetlights	20-25	19.4	Poor (22%)
Traffic Signals	25	0.6	Very Good (98%)
		20.9	Good (68%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

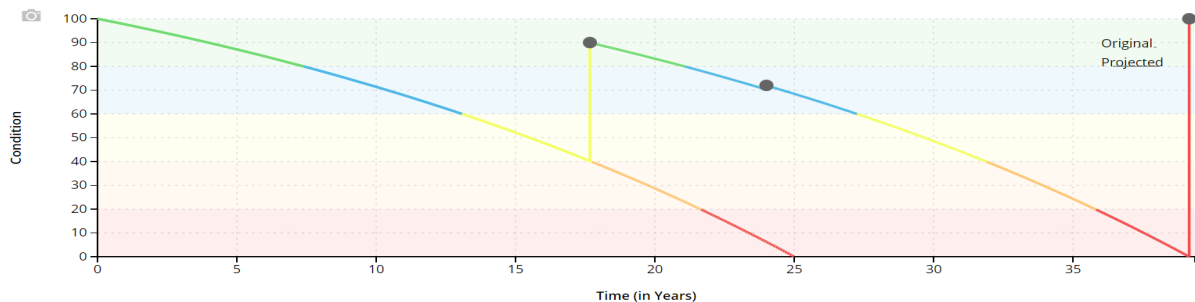
- A road needs study is completed every 5-7 years for the paved and unpaved roads in the Township. Between studies, staff assess and update road conditions during road patrols.
- Annual inspections of the sidewalks are performed by staff based on Minimum Maintenance Standards requirements.
- Road appurtenances are inspected on an as-needed basis by staff.

4.1.3 Lifecycle Management Strategy

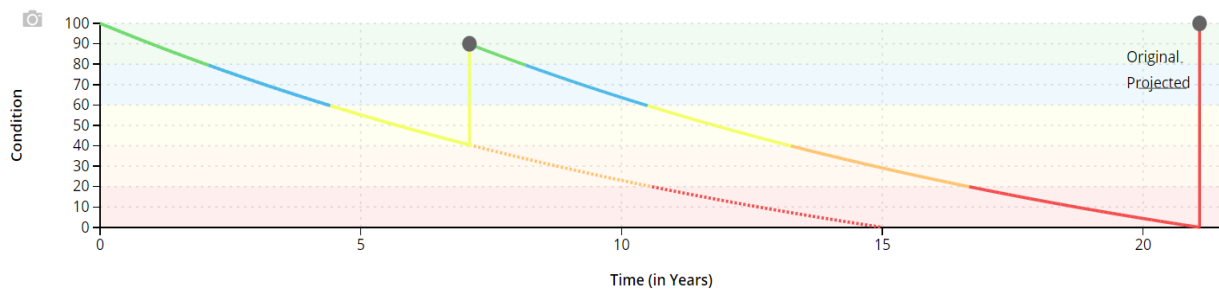
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of Low Class Bituminous (LCB) and High Class Bituminous (HCB) roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Paved Roads (HCB)		
Event Name	Event Class	Event Trigger
Crack Sealing	Maintenance	70 to 90 Condition
Mill & Pave	Rehabilitation	40 to 70 Condition
Full Reconstruction	Replacement	0 to 40 Condition



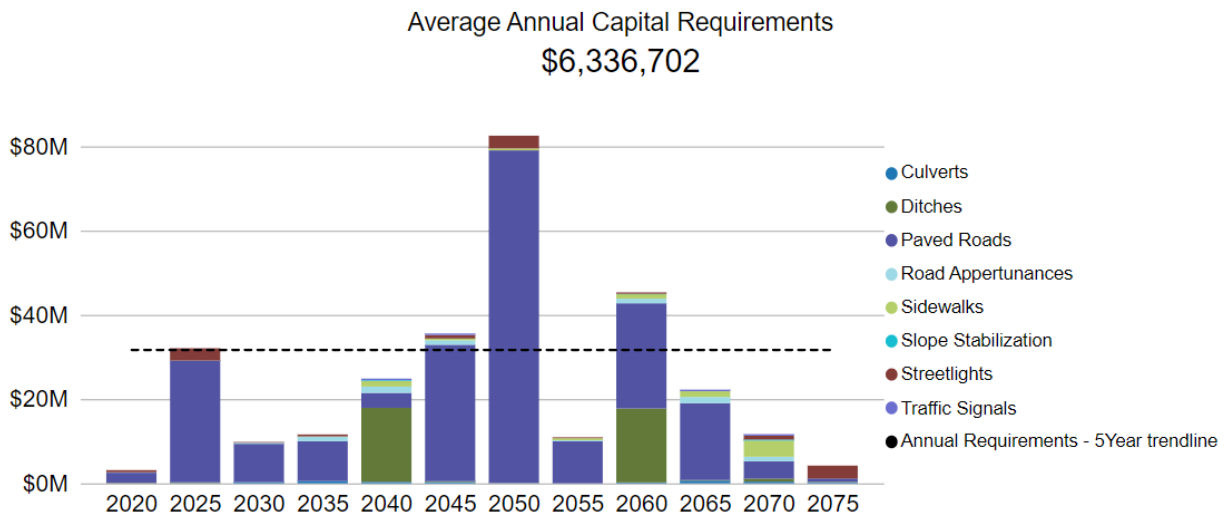
Paved Roads (LCB)		
Event Name	Event Class	Event Trigger
Double Surface Treatment	Rehabilitation	40 to 70 Condition
Full Reconstruction	Replacement	0 to 40 Condition



Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for paved roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the road network.

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 55 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.1.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the road network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Road Classification (Operational)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Climate Change & Extreme Events

An increase in the frequency and intensity of precipitation events can result in flooding of sections of the road network. Further issues can arise because of flooding and poor drainage including accelerated deterioration caused by freeze/thaw cycles. To improve asset resiliency, Staff should identify problem areas and improve drainage through enhanced lifecycle strategies.

4.1.5 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	<p>Township staff conduct road condition assessments on a regular basis. Every road section received a surface condition rating (1-100).</p> <p>(1-60) Road surface exhibits moderate to significant deterioration and requires renewal or full replacement within 1-5 years</p> <p>(60-100) Road surface is in good condition or has been recently re-surfaced. Renewal or reconstruction is not required for 6-10+ years</p>

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km ²)	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km ²)	0.18
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km ²)	1.4
Quality	Average pavement condition index for paved roads in the municipality	73%
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Good
Performance	Current vs. Target Reinvestment Rate	3.9% vs 1.0%

4.1.6 Recommendations

Asset Inventory

- Review road culverts and sidewalk inventory to determine whether all municipal assets within these asset segments have been accounted for.
- Further disaggregate the road network inventory to include critical attributes such as streets to and from, road class and surface type.

Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for HCB and LCB roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of the Township's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

Risk Management Strategies

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

Levels of Service

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

4.2 Bridges & Culverts

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

4.2.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
Bridges	16	\$45,319,000	\$1,622,000
Structural Culverts	6	\$3,930,000	\$122,000
		\$49,248,000	\$1,744,000

Total Replacement Cost
\$49.2M



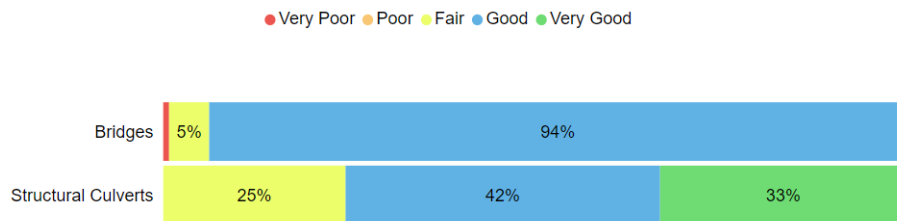
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

4.2.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Bridges	20-75	51.2	Good (69%)
Structural Culverts	20-75	56.8	Good (69%)
		52.4	Good (69%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Condition assessments of all structural bridges and culverts with a span greater than or equal to 3 meters are completed every 2-4 years in accordance with the Ontario Structure Inspection Manual (OSIM)

4.2.3 Lifecycle Management Strategy

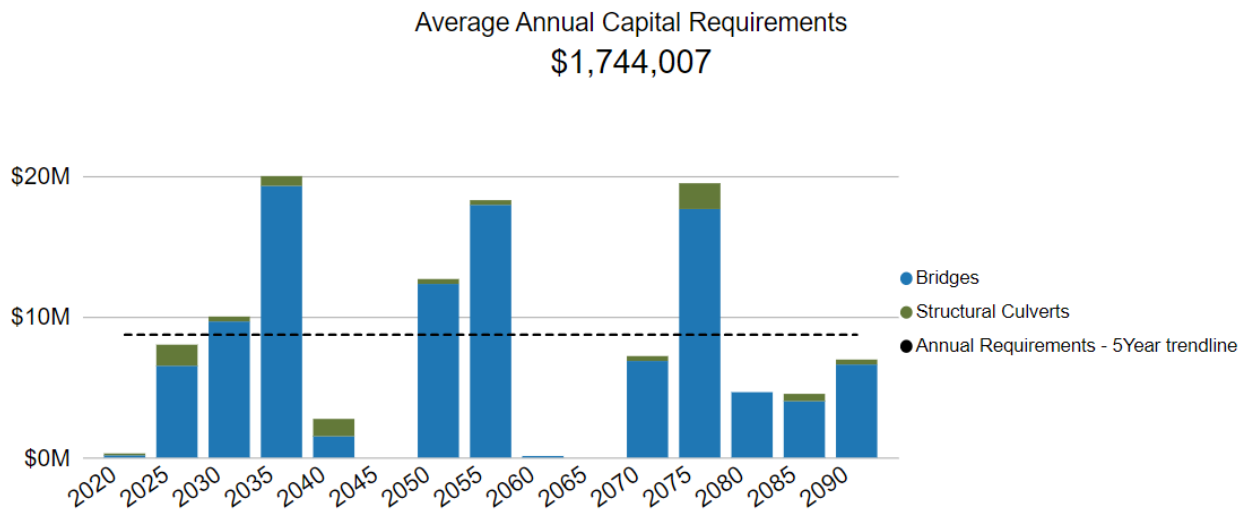
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation and Replacement	All lifecycle activities are driven by the results of mandated structural inspections completed according to the Ontario Structure Inspection Manual (OSIM) <hr/> Rehabilitation activities identified in the OSIM Report are used to maintain the current condition of the bridge, and not improve the condition. If the condition of the bridge is 65%, the strategy is to let the bridge continue to deteriorate until the end of its lifecycle then full replacement.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 70 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.2.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of bridges and culverts are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Number of Lanes (Social)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Capital Funding Strategies

The Township has a large inventory of bridges which require regular maintenance and assessment. Major capital rehabilitation projects for bridges and culverts may be deferred depending on the availability of grant funding opportunities. A long-term capital funding strategy can reduce dependency on grant funding and help prevent deferral of necessary capital works.

4.2.5 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the municipal transportation network. Most types of vehicles, including heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction.
Quality	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	Bridges and structural culverts receive a bridge condition index (BCI) during OSIM inspections. BCI values range from 0 to 100 and are broken into the following ranges:

70-100 BCI: Considered to be in good/excellent condition and only routine maintenance is recommended.

50-70 BCI: Considered to be in fair condition and rehabilitation is recommended within the next 5 years.

<50 BCI: Considered to be in poor/very poor condition with imminent replacement required in the next 1-3 years.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges and structural culverts in the Township with loading or dimensional restrictions	4%
Quality	Average bridge condition index value for bridges in the Township	69%
	Average bridge condition index value for structural culverts in the Township	69%
Performance	Current vs. Target Reinvestment Rate	3.5% vs 0.1%

4.2.6 Recommendations

Data Review

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2-4 years.

Risk Management Strategies

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

Lifecycle Management Strategies

- Update and schedule lifecycle events, those recommended from OSIMs as well, into Citywide database to improve capital forecasting.

Levels of Service

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

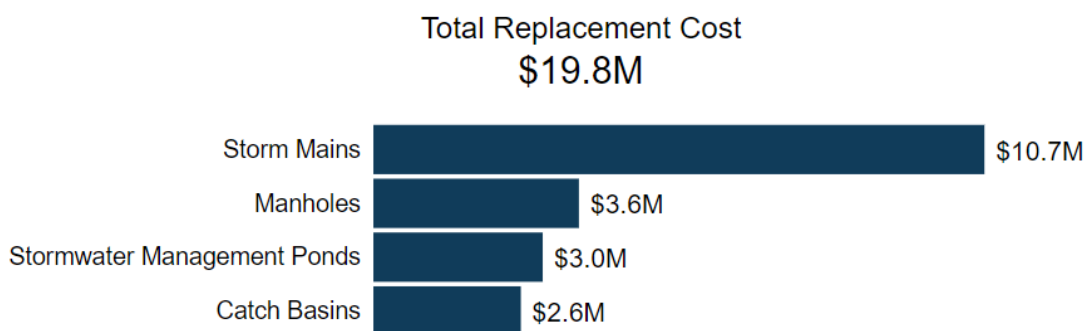
4.3 Storm Network

The Township is responsible for owning and maintaining a storm network of 29 kms of storm sewer mains, catch basins, stormwater management ponds, and other supporting infrastructure. Presently, the storm network inventory for the Township is in a basic state. Staff are actively working towards developing a more comprehensive inventory for the storm network.

4.3.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
Catch Basins	798	\$2,571,000	\$51,000
Headwalls	8	Not Planned for Replacement	
Manholes	450	\$3,583,000	\$72,000
Storm Mains	29,429	\$10,653,000	\$133,000
Stormwater Management Ponds	10 ³	\$2,952,000	\$71,000
		\$19,758,000	\$327,000



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

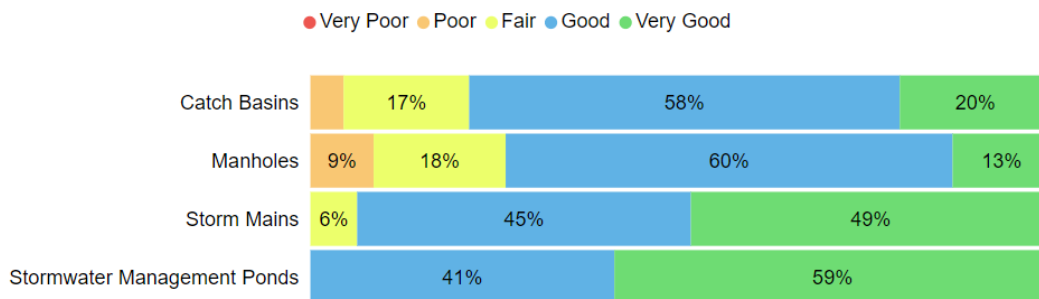
³ Staff are currently reviewing and developing a comprehensive inventory of all stormwater ponds.

4.3.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Catch Basins	50	17.3	Good (68%)
Manholes	50	17.5	Good (64%)
Storm Mains	80	17.9	Good (78%)
Stormwater Management Ponds	60	9.6	Very Good (83%)
		17.5	Good (75%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Storm mains are inspected through CCTV inspections on a project-by-project basis.
- Stormwater point assets are inspected on an as-needed basis, in coordination with other water and sanitary assets.

4.3.3 Lifecycle Management Strategy

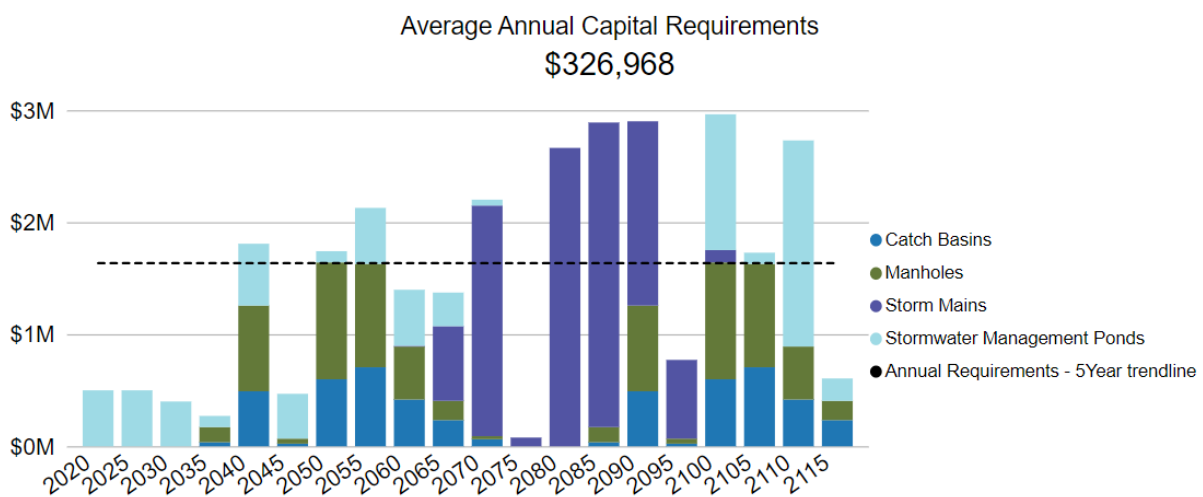
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance & Rehabilitation	Catch basin cleaning occurs on an annual basis Manholes are rehabilitated and replaced as needed
Replacement	Replacement is prioritized based on available condition information, criticality and in coordination with other underground replacement projects. Storm mains are typically replaced with polyvinyl chloride (PVC) pipes because of their durability.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 95 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.3.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the storm network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Pipe Diameter (Operational)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Asset Data & Information

There is a lack of confidence in the available inventory data for storm sewers. Staff hope to develop better defined strategies that will extend the network’s lifecycle, increase capacity for growth, and the lower total cost. Once completed there will be greater confidence in the development of data-driven strategies to address infrastructure needs.

4.3.5 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system	See Appendix B

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties in municipality resilient to a 100-year storm	TBD ⁴
	% of the municipal stormwater management system resilient to a 5-year storm	100%
Performance	Current vs. Target Reinvestment Rate	1.6% vs 0.1%

⁴ Data is not presently available to determine the percent of properties in the municipality resilient to a 100-year storm. Staff are working to identify this metric in future AMP iterations

4.3.6 Recommendations

Asset Inventory

- The Township's storm network inventory remains at a basic level of maturity. The development of a comprehensive inventory of the stormwater network should be priority.
- The Township should continue to work towards including all storm water management ponds in their Citywide inventory.

Condition Assessment Strategies

- The development of a comprehensive inventory should be accompanied by a system-wide assessment of the condition of all assets in the storm network.

Risk Management Strategies

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

Lifecycle Management Strategies

- Document and review lifecycle management strategies for the stormwater network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.

Levels of Service

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

4.4 Buildings

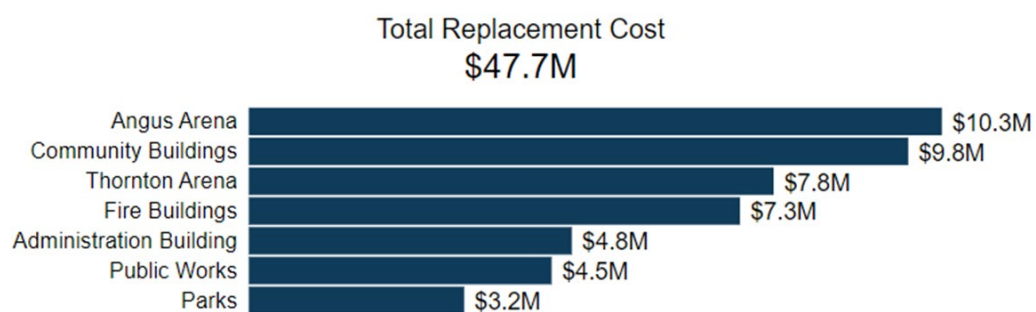
The Township of Essa owns and maintains several facilities and recreation centres that provide key services to the community. These include:

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

4.4.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity (Components)	Replacement Cost	Annual Capital Requirements
Administration Building	1 (4)	\$4,800,000	\$137,000
Angus Arena	1 (15)	\$10,300,001	\$342,000
Community Buildings	4 (12)	\$9,799,998	\$290,000
Fire Buildings	2 (7)	\$7,300,000	\$198,000
Parks	1 (16)	\$3,200,000	\$79,000
Public Works	2 (9)	\$4,500,000	\$130,000
Thornton Arena	1 (18)	\$7,800,001	\$341,000
		\$47,700,000	\$1,517,000



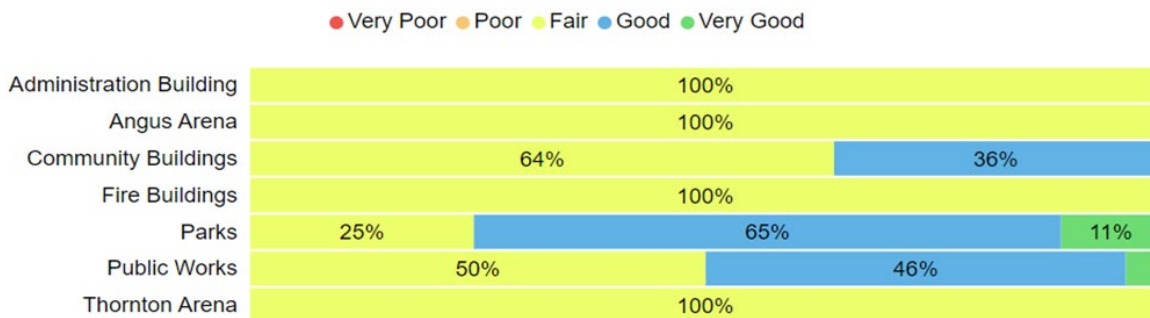
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

4.4.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Administration Building	20-40	14.1	Fair (50%)
Angus Arena	13-40	12.8	Fair (50%)
Community Buildings	20-40	13.8	Fair (59%)
Fire Buildings	20-40	25.9	Fair (45%)
Parks	20-50	9.1	Good (70%)
Public Works	15-40	20.2	Fair (65%)
Thornton Arena	15-40	9.8	Fair (50%)
		13.6	Fair (54%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Visual inspections are completed by staff on a regular basis.
- A third-party contractor conducts required health and safety inspections on a monthly basis in accordance with Technical Standards and Safety Authority (TSSA).
- Structural inspections are completed by an external contractor, primarily on the recreation buildings, every 4-5 years, with the most recent being in 2018
- Specific components such as elevators, HVAC, and generators are inspected as required by manufacturer recommendations and/or Building Code Act requirements.

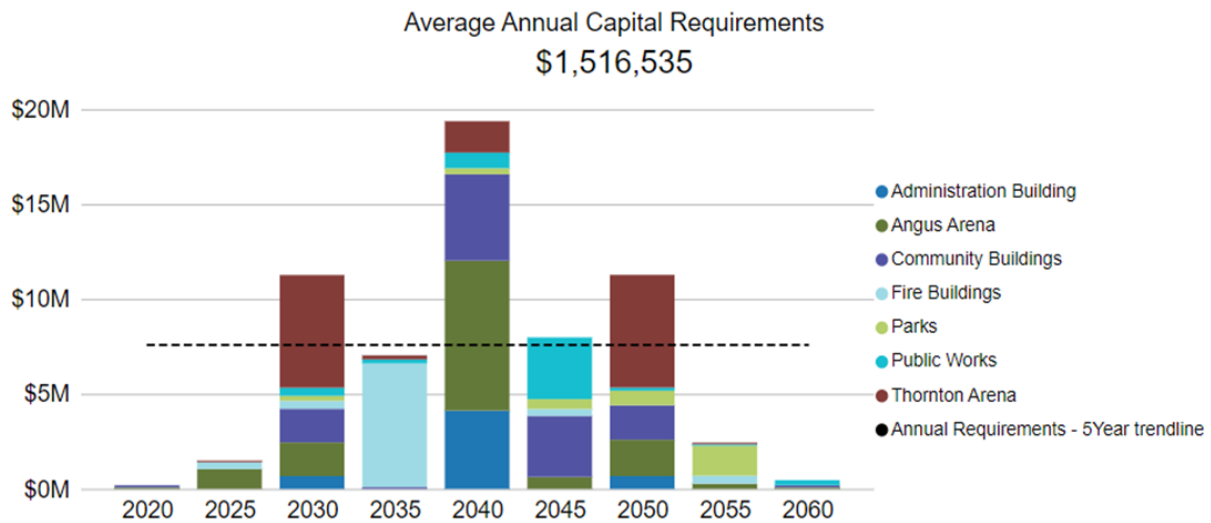
4.4.3 Lifecycle Management Strategy

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Municipal buildings are subject to regular inspections to identify health & safety requirements as well as structural deficiencies that require additional attention
	Regular maintenance is performed on the buildings based on staff expertise, and recommendations that arise from external structural inspections
Replacement	Recommendations from assessments are taken into consideration as buildings approach their end-of-life to determine whether replacement or rehabilitation is appropriate

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 40 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.4.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of buildings and facilities are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Department (Health and Safety)
	Natural Disaster Management Facility (Health and Safety)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Climate Change & Extreme Events

Extreme heat experienced in the Township due to climate change has begun to affect the refrigeration capabilities in the Arena, making it difficult to ensure the Arena is functional during hockey season to meet the Township’s needs. Additionally, rain and extreme weather has had an impact on the condition of the buildings, leading to an increased rate of deterioration.



Community Growth

As the Township’s population continues to grow, the buildings and facilities in the Township no longer have sufficient capacity to meet community needs and expectations. In particular, the Arena does not meet the growing communities needs due to capacity

4.4.5 Levels of Service

The following tables identify the Township’s current level of service for buildings. These metrics include the technical and community level of service metrics that the Township has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of municipal facilities and the plans that are in place to maintain or improve the provided level of service	The overall condition of the buildings in the Township is fair. The Township staff plan to continue to perform condition assessments for their buildings to identify required maintenance and rehabilitation activities to ensure the state of the buildings remains in adequate condition

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of facilities that are in good or very good condition	17%
	% of facilities that are in poor or very poor condition	0%
Performance	% of buildings that meet AODA compliance	TBD ⁵
	Current vs. Target Reinvestment Rate	3.2% vs 0.1%

⁵ Staff are working towards measuring this metric in future iterations of the AMP

4.4.6 Recommendations

Asset Inventory

- The Township's asset inventory is presently broken out into components for some facilities but can be further componentized. Facilities consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a component-based inventory of all facilities to allow for component-based lifecycle planning.
- Gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

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

4.5 Vehicles

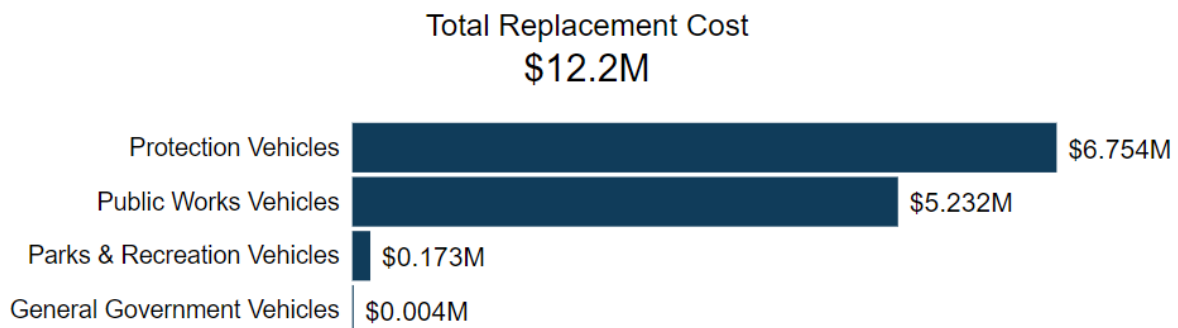
Vehicles allow staff to efficiently deliver municipal services and personnel. Municipal vehicles are used to support several service areas, including:

- fire rescue vehicles
- pick-up trucks
- backhoes, bulldozers and graders

4.5.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
General Government Vehicles	2	\$4,000	\$400
Parks & Recreation Vehicles	4	\$173,000	\$15,000
Protection Vehicles	13	\$6,754,000	\$379,000
Public Works Vehicles	28	\$5,232,000	\$363,000
		\$12,163,000	\$757,000



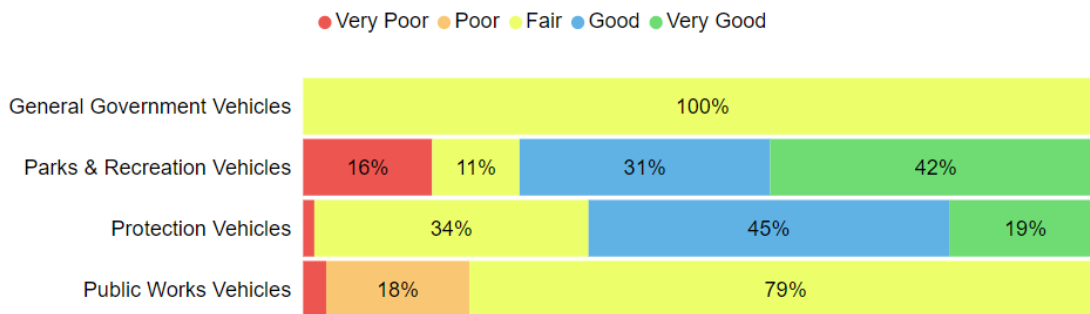
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

4.5.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
General Government Vehicles	10	10.0	Fair (49%)
Parks & Recreation Vehicles	10-15	6.7	Good (66%)
Protection Vehicles	8-20	6.3	Good (66%)
Public Works Vehicles	7-20	10.7	Fair (44%)
		9.1	Fair (56%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Staff complete daily visual inspections of vehicles to ensure they are in state of adequate repair prior to operation and document deficiencies
- Annual Commercial Vehicle Operators Registration (CVOR) inspections are completed for applicable vehicles, including vehicles with Z designation (air brakes)
- Fire vehicles are assessed annually in compliance with the National Fire Protection Association (NFPA).

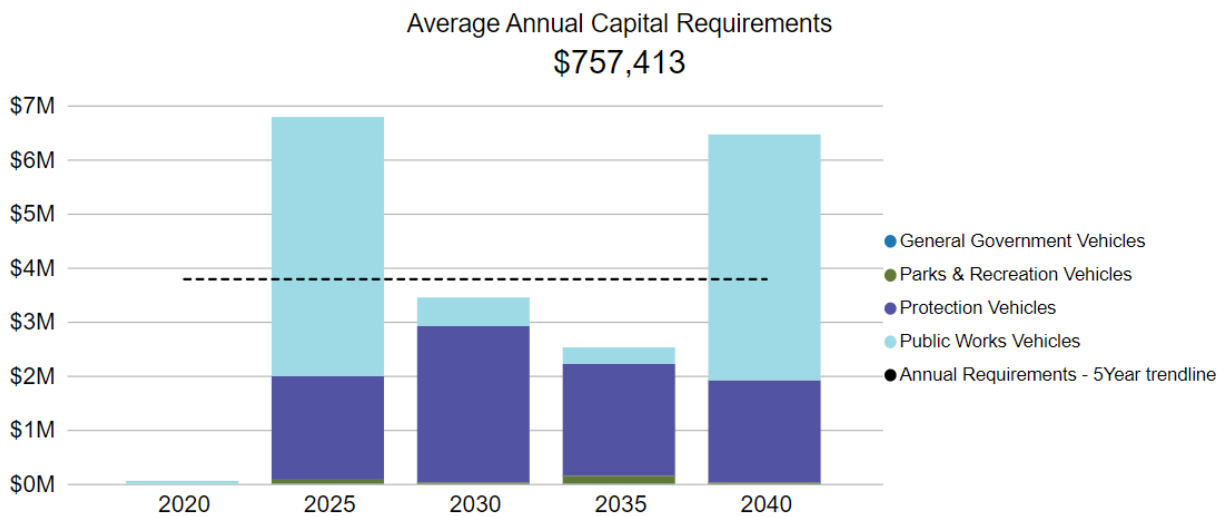
4.5.3 Lifecycle Management Strategy

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

Activity Type	Description of Current Strategy
Maintenance / Rehabilitation	Visual inspections are completed and documented daily
	Annual preventative maintenance activities include rusting spray completed by contractors for all vehicles
Replacement	Vehicle age, kilometres and annual repair costs are taken into consideration when determining appropriate treatment options
	Fire vehicles have a replacement schedule based on National Fire Protection Association (NFPA) guidelines

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 20 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.5.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of vehicles are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Function (Health and Safety)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Organizational Cognizance/Capacity

Both short- and long-term planning requires the regular collection of infrastructure data to support asset management decision-making. Staff find it a continuous challenge to dedicate resources and time towards data collection and condition assessments to ensure that vehicle condition and asset attribute data is regularly reviewed and updated.



Capital Funding Strategies

Capital rehabilitation and replacement projects can be costly for the Township, and there is sometimes not sufficient funding to complete the required rehabilitation or replace a vehicle when needed.

4.5.5 Levels of Service

The following tables identify the Township’s current level of service for vehicles. These metrics include the technical and community level of service metrics that the Township has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of municipal vehicles and the plans that are in place to maintain or improve the provided level of service	The overall condition of the vehicles in the Township is fair. The daily inspections completed by Township staff have been effective in identifying required maintenance and rehabilitation activities to ensure the state of the vehicles remain in adequate condition

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of vehicles that are in good or very good condition (excluding fire vehicles)	2.3%
	% of fire vehicles that are in good or very good condition	64%
	% of vehicles that are in poor or very poor condition (excluding fire vehicles)	21%
	% of fire vehicles that are in poor or very poor condition	1.4%
	Lead time for replacement of light duty vehicles	6 month
	Lead time for replacement of heavy duty vehicles	18 months
	Lead time for replacement of fire vehicles	2 Years
	% of vehicles that are fuel efficient	TBD ⁶
Performance	Annual current vs. target reinvestment rate for vehicles	6.2% vs 4.7%

⁶ Staff are interested in tracking the fuel efficiency of their vehicles moving forward.

4.5.6 Recommendations

Replacement Costs

- Gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

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

4.6 Machinery & Equipment

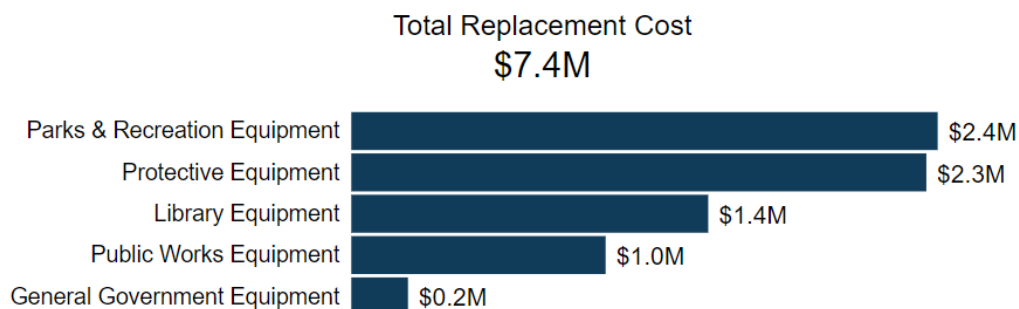
In order to maintain the high quality of public infrastructure and support the delivery of core services, Township staff own and employ various types of machinery and equipment. This includes:

- Landscaping equipment
- Fire equipment
- Library collections

4.6.1 Asset Inventory & Replacement Cost

The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the Township’s machinery and equipment inventory.

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
General Government Equipment	4	\$228,000	\$14,000
Library Equipment	741	\$1,435,000	\$127,000
Parks & Recreation Equipment	91	\$2,357,000	\$130,000
Potective Equipment	900	\$2,312,000	\$176,000
Public Works Equipment	20	\$1,022,000	\$67,000
		\$7,354,000	\$515,000



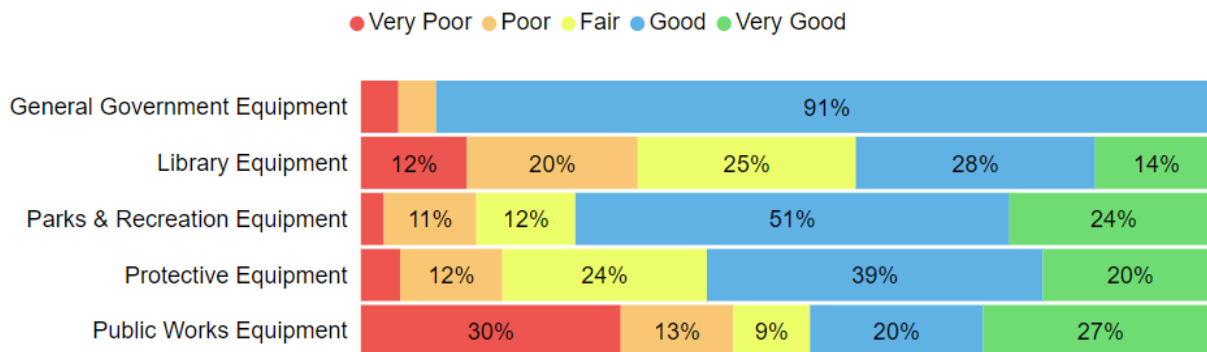
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

4.6.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
General Government Equipment	5-20	5.7	Good (65%)
Library Equipment	5-40	5.1	Fair (54%)
Parks & Recreation Equipment	5-30	13.2	Good (66%)
Potective Equipment	5-35	5.1	Good (61%)
Public Works Equipment	10-50	8.7	Fair (46%)
		6.2	Fair (59%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Fire equipment is inspected in accordance with national fire protection association (NFPA). Self-contained breathing apparatuses (SCBAs) also undergo hydrostatic testing annually.
- Annual fire hose testing is completed and given a pass/fail
- Specific components such as generators, HVAC, and elevators are assessed on a cyclical basis as is required by the Building Code Act and manufacturer recommendations.
- Playground equipment is assessed by certified staff based on Canadian Standards Association (CSA) guidelines

4.6.3 Lifecycle Management Strategy

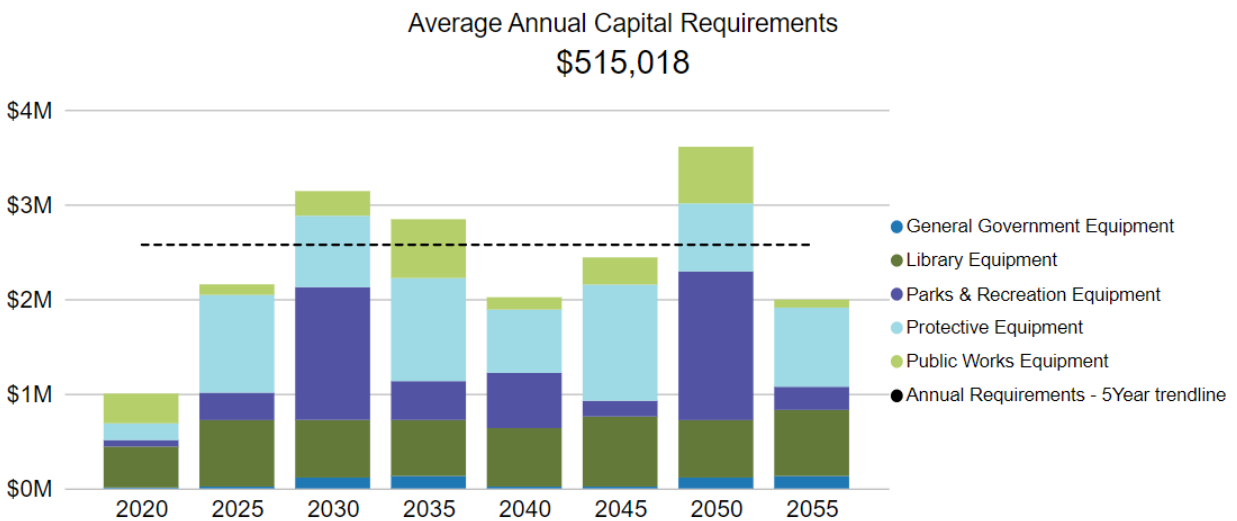
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance/ Rehabilitation	Maintenance program varies by department
	Fire Protection Services equipment is subject to a much more rigorous inspection and maintenance program compared to most other departments
	Machinery and equipment is maintained according to manufacturer recommended actions and supplemented by the expertise of municipal staff
Replacement	The replacement of machinery and equipment depends on deficiencies identified by operators that may impact their ability to complete required tasks, and identified standards for fire and playground equipment

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 35 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.6.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of machinery and equipment are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Department (Health and Safety)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Regulatory Requirements

Regulatory requirements and standards mandate the replacement of many municipally owned machinery, particularly fire assets. While an asset may still be in good condition, it must be replaced based regulatory requirements due to its age. A concern for the Township is aging assets, risking fire elements not meeting safety requirements. Although this is not a concern currently, it may become critical over time if fire assets are not managed proactively.



COVID 19 & Asset Availability

The Township has identified that they are experiencing very long lead times to get equipment, particularly public works and fire equipment. The COVID 19 pandemic has increased lead time and caused issues with availability of equipment for many municipalities. Due to the strict replacement requirements for fire equipment, it is necessary for the Township to be even more proactive when considering replacement date of assets, to ensure the assets will be available when their service life has expired.

4.6.5 Levels of Service

The following tables identify the Township’s current level of service for machinery & equipment. These metrics include the technical and community level of service metrics that the Township has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of machinery & equipment and the plans that are in place to maintain or improve the provided level of service	The overall condition of machinery & equipment in the Township is fair. Township staff work to ensure all machinery & equipment assets remain in an adequate state of repair, with particular emphasis on fire and playground equipment, which is dictated by safety standards.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of machinery & equipment that is in good or very good condition	61%
	% of machinery & equipment where asset age exceeds useful life (excludes fire assets)	6%
	Lead time for Fire equipment	1 Year
	% of machinery & equipment that is in poor or very poor condition	22%
Performance	Annual current vs. target reinvestment rate for machinery & equipment	7.0% vs 6.2%

4.6.6 Recommendations

Asset Inventory

- The Township's machinery and equipment inventory contains many pooled assets. The Township should work towards pooling more of their machinery and equipment assets to streamline and simplify their inventory. Asset should then be subcategorized by functionality.

Replacement Costs

- Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

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

4.7 Land Improvements

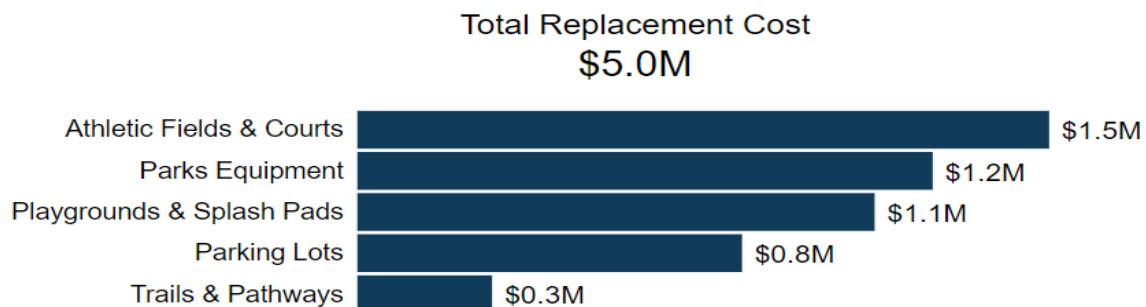
The Township of Essa owns a small number of assets that are considered land improvements. This category includes:

- Parking lots for municipal facilities
- Trails and Pathways
- Athletic fields and courts
- Recreational facilities including parks equipment, playgrounds and splashpads

4.7.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
Atheltic Fields & Courts	31	\$1,491,000	\$51,000
Parking Lots	16	\$829,000	\$29,000
Parks Equipment	28	\$1,240,000	\$53,000
Playgrounds & Splash Pads	16	\$1,115,000	\$56,000
Trails & Pathways	15.4 kms	\$290,000	\$15,000
		\$4,965,000	\$203,000



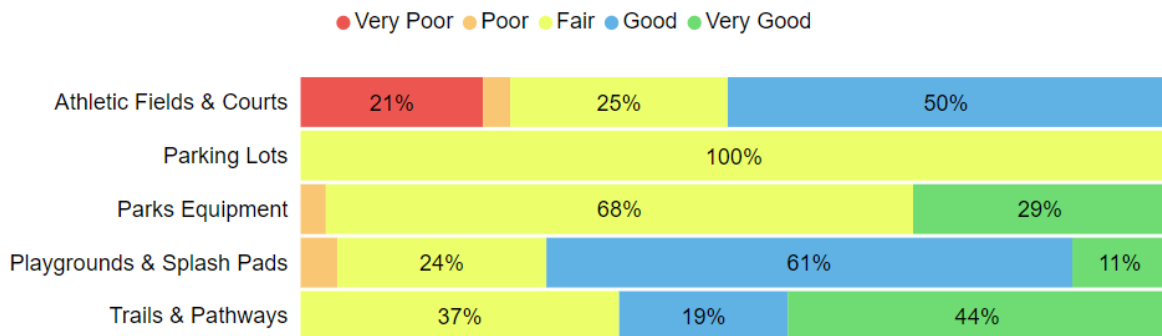
Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

4.7.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Atheltic Fields & Courts	10-50	18.4	Fair (50%)
Parking Lots	15-30	14.8	Fair (50%)
Parks Equipment	10-30	10.5	Good (65%)
Playgrounds & Splash Pads	20	8.7	Good (64%)
Trails & Pathways	20	4.6	Good (75%)
		13.3	Fair (58%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Staff complete regular visual inspections of land improvements assets to ensure they are in state of adequate repair
- The Health Unit inspects all splash pads prior to opening
- Playground equipment is inspected based on Canadian Standards Association (CSA) and Technical Standards and Safety Authority (TSSA) guidelines

4.7.3 Lifecycle Management Strategy

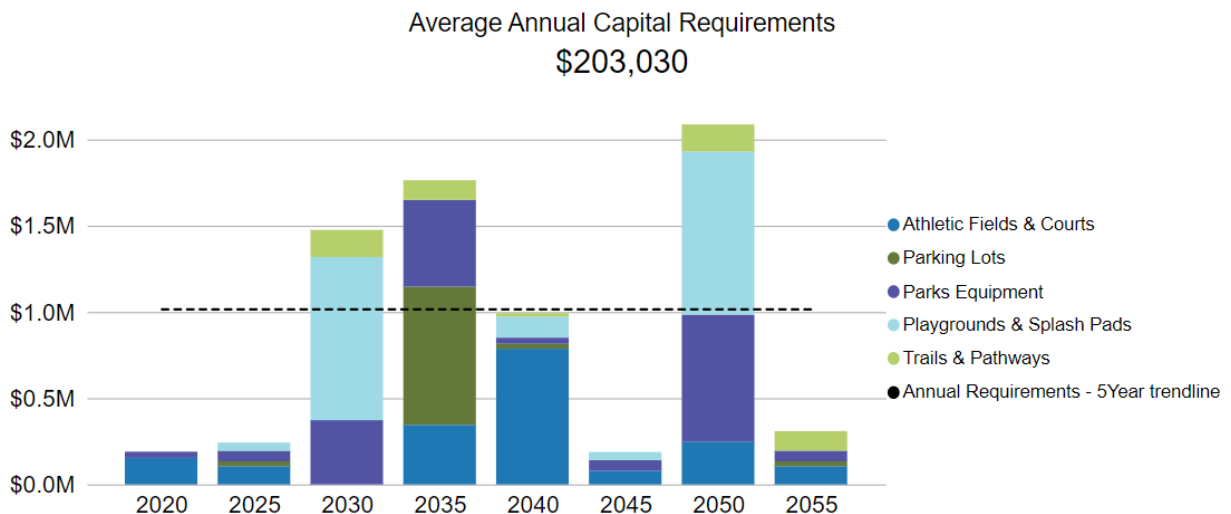
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance, Rehabilitation & Replacement	Land Improvement maintenance, rehabilitation, and replacement is driven by community complaints and any deficiencies noted by staff during their regular assessments

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 35 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

4.7.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of land improvements are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Community Expectations

Community expectations are very high for land improvement assets, including parks, playgrounds, athletic courts, etc. Township staff are finding it difficult to prioritize community wants due to budget capacity constraints and available funding.

4.7.5 Levels of Service

The following tables identify the Township’s current level of service for land improvements. These metrics include the technical and community level of service metrics that the Township has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the current condition of land improvement assets and the plans that are in place to maintain or improve the provided level of service	The overall condition of land improvements in the Township is fair. Regular inspections performed by the Township ensure that Land Improvement assets remain in an adequate state of repair.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of land improvement assets that are in good or very good condition	42%
	% of land improvement assets that are in poor or very poor condition	9%
Performance	Annual Current vs. Target Reinvestment Rate	4.1% vs 0.7%

4.7.6 Recommendations

Replacement Costs

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

Condition Assessment Strategies

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

Risk Management Strategies

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

Levels of Service

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

5

Analysis of Rate-funded Assets

Key Insights

- Rate-funded assets are valued at \$89 million
- 85% of rate-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately \$2.2 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

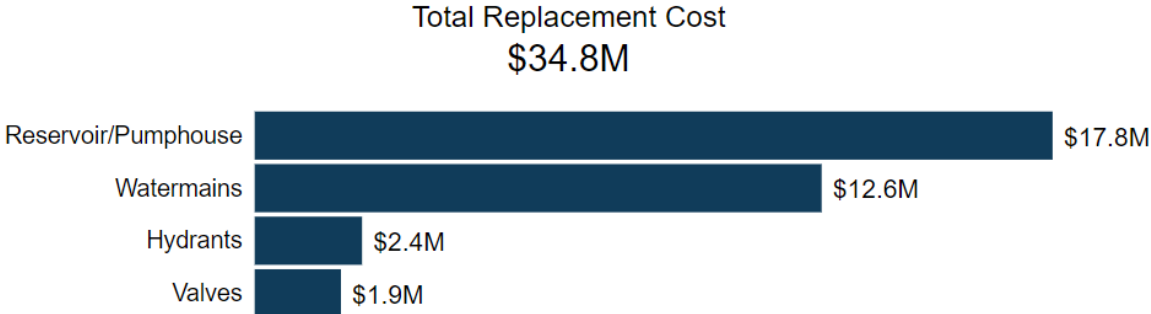
5.1 Water Network

The Township works in conjunction with the Ontario Clean Water Association (OCWA) to provide water services. Water services provided by the Township include a network of 74 km of watermains, hydrants, reservoirs and pumphouses, and valves.

5.1.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity	Replacement Cost	Annual Capital Requirements
Hydrants	413	\$2,395,000	\$40,000
Reservoir/Pumphouse	6 (111)	\$17,800,000	\$546,000
Valves	606	\$1,925,000	\$85,000
Watermains	74 kms	\$12,648,000	\$158,000
		\$34,768,000	\$829,000



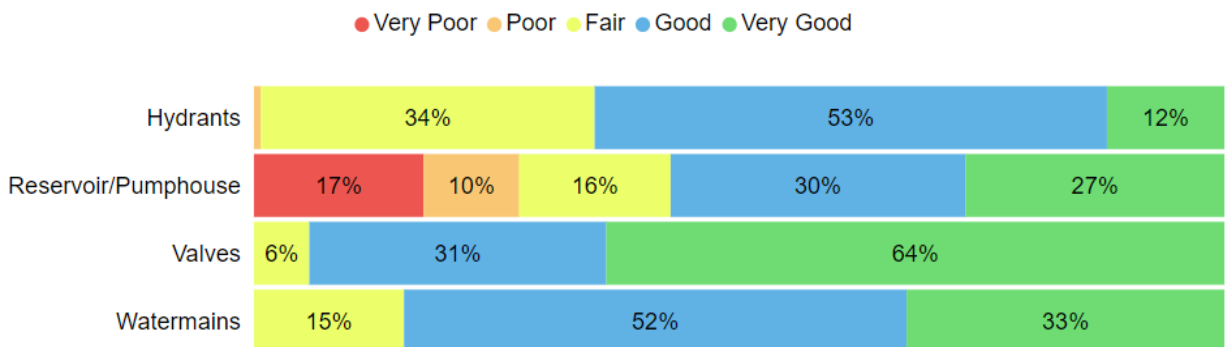
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

5.1.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Hydrants	60	20.7	Good (66%)
Reservoir/Pumphouse	10-80	22.2	Fair (56%)
Valves	10-80	21.5	Very Good (86%)
Watermains	80	20.9	Good (74%)
		21.1	Good (65%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- Staff primarily rely on the age, pipe material, and breaks per segment of water mains to determine the projected condition.
- Reservoirs are inspected annually in the spring, based on a schedule provided by the ministry. Each component of the reservoirs have their own schedule that dictate when inspection should occur.
- Water point assets are inspected on an as-needed basis by staff.

5.1.3 Lifecycle Management Strategy

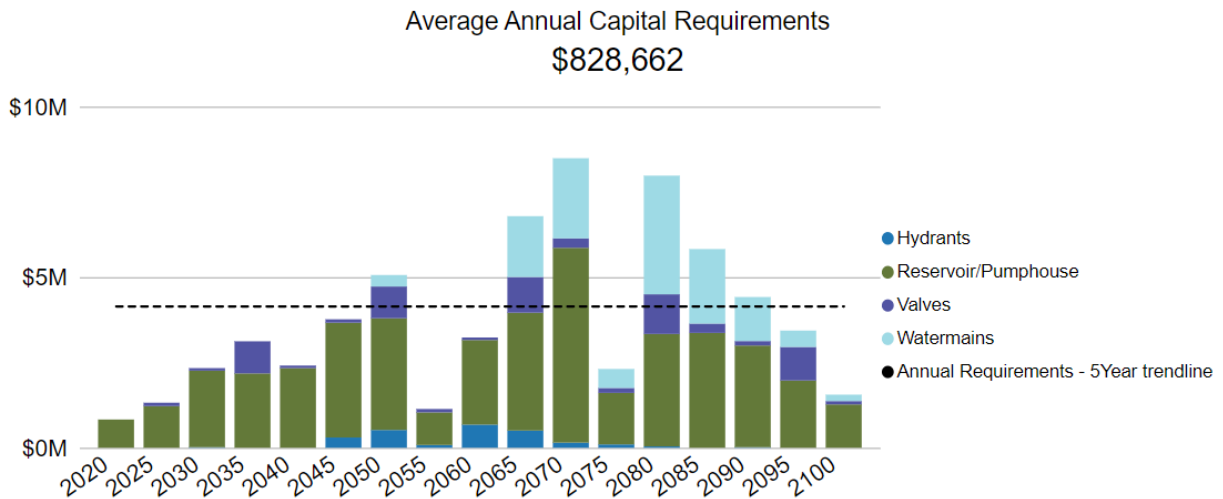
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Main flushing and swabbing is completed annually Leak detection is completed once every 2 years, with the most recent having been completed in 2020
Rehabilitation	Trenchless re-lining of water mains presents significant challenges and is not always a viable option
Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life.

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.



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

5.1.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the water network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Pipe Diameter (Operational)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:



Infrastructure Design

The coating applied to the Township’s watermains was anticipated to last 10 years however, it usually only lasts roughly 6-7 years, failing much earlier than anticipated. As a result, staff are having to perform emergency repairs to the water system and struggle to find funding for these repairs. The shorter than anticipated service life of the watermains makes it very difficult for staff to proactively plan for rehabilitation and replacement of the water network.

5.1.5 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Appendix B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	Hydraulic modelling was completed in 2021 for the Township. The urban areas in the Township have sufficient fire flow, while fire flow is available to rural areas on case by case basis.
Reliability	Description of boil water advisories and service interruptions	The Township did not experience any boil water advisories or service interruptions in 2020

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal water system	70%
	% of properties where fire flow is available	100% ⁷
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0 : 5,762
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0 : 5,762
Performance	Current vs. Target Reinvestment Rate	2.4% vs 1.5%

⁷ 100% of the properties connected to the municipal water system have adequate fire flow protection.

5.1.6 Recommendations

Asset Data

- Gather accurate replacement costs and update on a regular basis to ensure the accuracy of capital projections.
- Update critical attribute information such as node to and from, asset material, size, and criticality.

Risk Management Strategies

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

Levels of Service

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

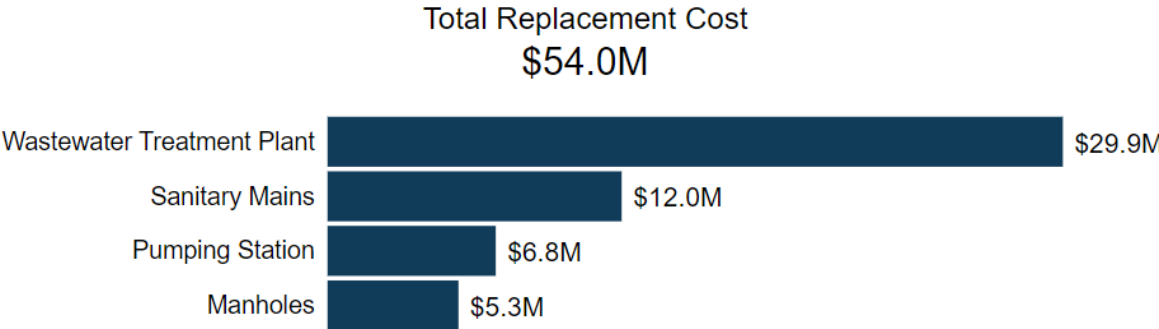
5.2 Sanitary Network

The sewer services provided by the Township include 51 kms of sanitary mains, manholes, pumping stations, and a Wastewater Treatment Plant. The Township works with the Ontario Clean Water Association (OCWA) to manage and maintain these assets.

5.2.1 Asset Inventory & Replacement Cost

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

Asset Segment	Quantity (Components)	Replacement Cost	Annual Capital Requirements
Manholes	666	\$5,323,000	\$106,000
Pumping Station	40	\$6,839,000	\$232,000
Sanitary Mains	51 kms	\$11,956,000	\$149,000
Wastewater Treatment Plant	1 (115)	\$29,890,000	\$856,000
		\$54,008,000	\$1,344,000



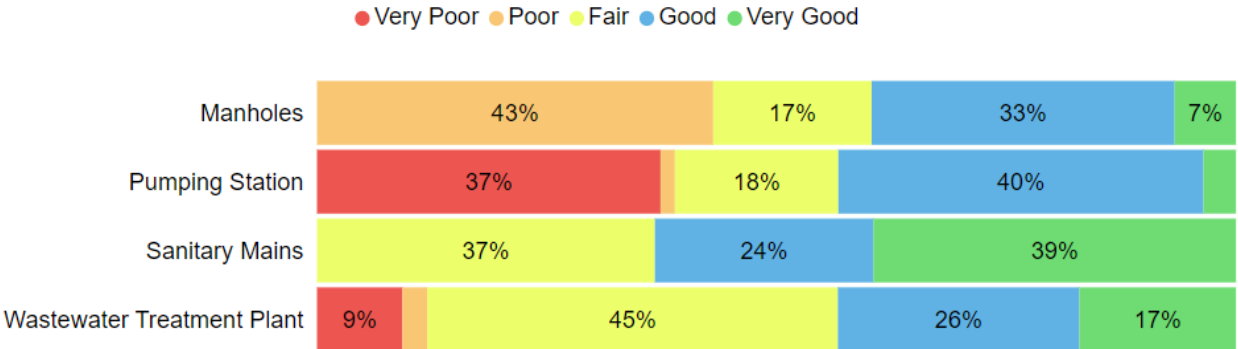
Each asset’s replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurately represent realistic capital requirements.

5.2.2 Asset Condition & Age

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

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Condition
Manholes	50	27.8	Fair (47%)
Pumping Station	10-75	24.5	Poor (39%)
Sanitary Mains	80	26.5	Good (70%)
Wastewater Treatment Plant	10-75	20.5	Fair (55%)
		25.9	Fair (55%)

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.



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

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

Current Approach to Condition Assessment

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

- CCTV inspections are completed for sanitary mains annually. The areas targeted are based on community complaints, and if any related capital projects are underway. Roughly 10% of the system is inspected each year
- OCWA performed inspection on the Wastewater Treatment Plant. All facilities are inspected annually and OCWA provides a report of the findings and any required rehabilitation

5.2.3 Lifecycle Management Strategy

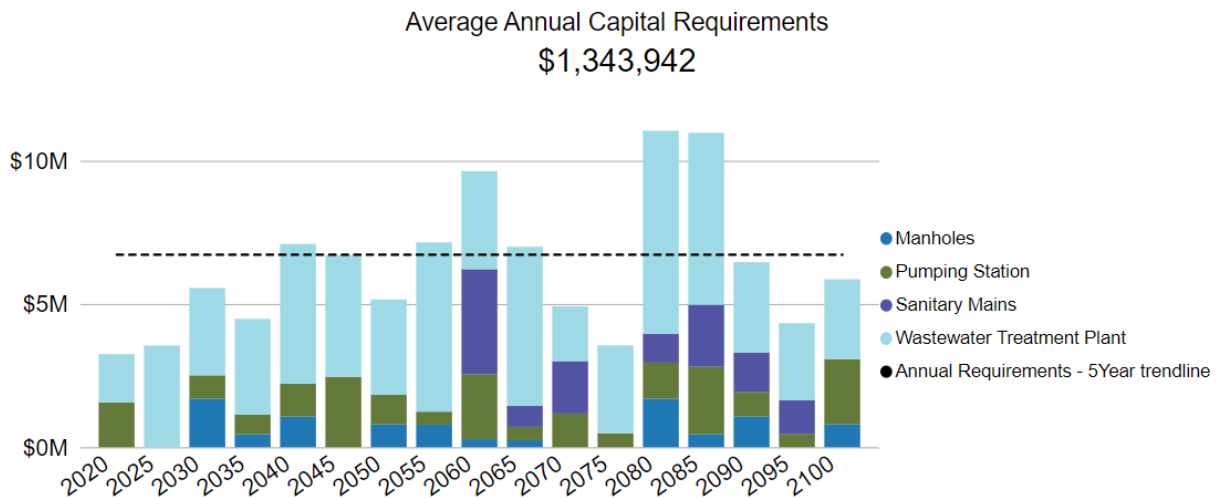
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

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

Activity Type	Description of Current Strategy
Maintenance	Periodic pressure testing may be employed to identify deficiencies and potential leaks on an as-needed basis based on user complaints
Rehabilitation	Trenchless re-lining has not been completed based on any formal plan, but staff intend to start utilizing a plan to complete trenchless re-lining.
Replacement	In the absence of mid-lifecycle rehabilitative events, most mains are simply maintained with the goal of full replacement once it reaches its end-of-life. OCWA recommendations based on Wastewater Treatment Plant are budgeted for and completed in the following year, unless any emergency repairs are required

Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Township should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 80 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average 5-year capital requirements.

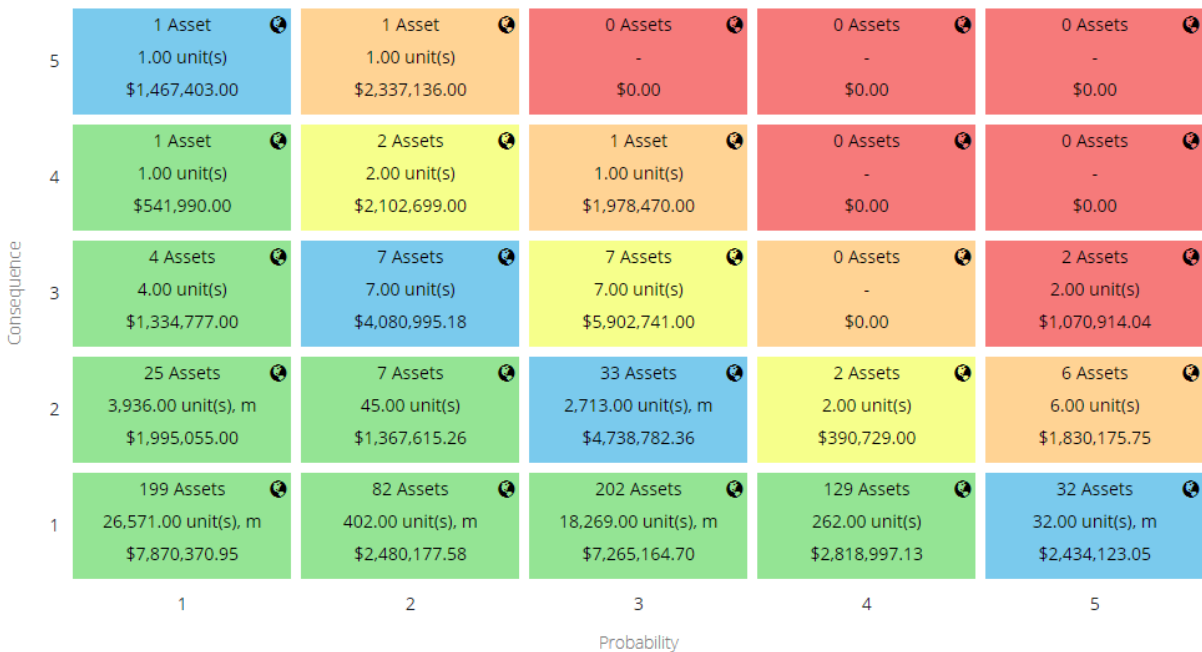


The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix A.

5.2.4 Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data.



This is a high-level model developed for the purposes of this AMP and Township staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The asset-specific attributes that municipal staff utilize to define and prioritize the criticality of the sanitary network are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Financial)
	Pipe Diameter (Operational)

The identification of critical assets allows the Township to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Township is currently facing:

Asset Data & Information



There is a lack of confidence in the available inventory data for the sanitary network. Staff plan to prioritize data refinement efforts to increase confidence in the accuracy and reliability of asset data and information. Staff hope to improve the accuracy of condition data by advancing their CCTV inspection program and utilizing the information to provide a condition rating for underground assets. Once completed there will be greater confidence in the development of data-driven strategies to address infrastructure needs.

Capital Funding Strategies



The Township does not presently have sufficient funds to complete all required life cycle management activities for the Sanitary Network. An annual capital funding strategy can help prevent deferral of capital works.

5.2.5 Levels of Service

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

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	See Appendix B
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	The Township does not own any combined sewers
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter into sanitary sewers due to cracks in sanitary mains or through indirect connections (e.g. weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed

Service Attribute	Qualitative Description	Current LOS (2020)
		<p>capacity. In some cases, this can cause water and/or sewage to overflow backup into homes. the disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits directing storm water to the storm drain system can help to reduce the chance of this occurring.</p>
	<p>Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration</p>	<p>The municipality follows a series of design standards that integrate servicing requirements and land use considerations when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups.</p>
	<p>Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system</p>	<p>Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants.</p>

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal wastewater system	50%
	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	Not Applicable.
Reliability	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0 : 4,116
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	3 : 4,116
Performance	Current vs. Target Reinvestment Rate	2.5% vs 0.6%

5.2.6 Recommendations

Asset Data

- Identify condition assessment strategies for high value and high-risk sanitary network assets. Develop a standard condition assessment frequency for underground linear assets and critical vertical assets.
- Update critical asset attribute information to improve risk modelling and strategic planning.

Risk Management Strategies

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

Lifecycle Management Strategies

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

Levels of Service

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

6

Impacts of Growth

Key Insights

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

6.1 Description of Growth Assumptions

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

6.1.1 Official Plan of the Township of Essa (July 2001)

The Township adopted an Official Plan in July 2001 to address matters of local planning interest. The Official Plan is a planning document for the purpose of guiding the future development of the Township of Essa for a period of 20 years. The Official Plan was put into effect by the Ontario Municipal Bard on July 6, 2001.

The Settlement Area of Township are intended to be the areas of the Township where growth will be focused in order to optimize the use of public services and infrastructure, and to allow for continued compatible growth within the Township which protects the natural environment, protects the agricultural base, and ensures the rural character and quality of life of the Township. The Settlement Areas in the Township of Essa have been identified as the communities of Angus, Thornton, and Baxter.

In The Township of Essa Growth Strategy (November 2012), it was identified that Angus is the only fully service Settlement Area, therefore making it the Township's primary Settlement Area to direct future growth. Additional limited development may occur through in filling, estate residential development, vacant lot development, and severance activity.

6.1.2 County of Simcoe Official Plan (November 2016)

The Official Plan of the County of Simcoe provides a policy context for land use planning, and basis for exercising the approval authorities for local municipal official plans. The Plan is designed to assist with growth management in the county in accordance with the Growth Plan for the Greater Golden Horseshoe.

Population and employment projections were provided in the County of Simcoe Official Plan for Municipalities in the County in accordance with the projects of the Growth Plan for the Greater Golden Horseshoe. The following table outlines the population and employment forecasts allocated to Essa.

Employment Forecasts	2011	2031	
Total Place of Work Employment Forecasts	7,710	9,000	
Population Forecasts	2016	2019	2031
Forecast Total Population	21,857	23,916	28,096

The population project above does not align with 2016 and 2021 Census data for the Township. In 2016, the population was recording as 21,083. In 2021, the population was 22,970. As the 2021 population is slightly lower than the population projection for the year 2019, it is likely that the population and employment forecasts for 2031 will be slightly lower than anticipated.

6.2 Impact of Growth on Lifecycle Activities

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

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

7

Financial Strategy

Key Insights

- The Township is committing approximately \$3.4 million towards capital projects per year from sustainable revenue sources
- Given the annual capital requirement of \$13.6 million, there is currently a funding gap of \$10.1 million annually
- For tax-funded assets, we recommend increasing tax revenues by 3.7% each year for the next 20 years to achieve a sustainable level of funding
- For the Water Network, we recommend increasing rate revenues by 1.6% annually for the next 5 years to achieve a sustainable level of funding
- For the Wastewater Network, we recommend increasing rate revenues by 2.1% annually for the next 15 years to achieve a sustainable level of funding

7.1 Financial Strategy Overview

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

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

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

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

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

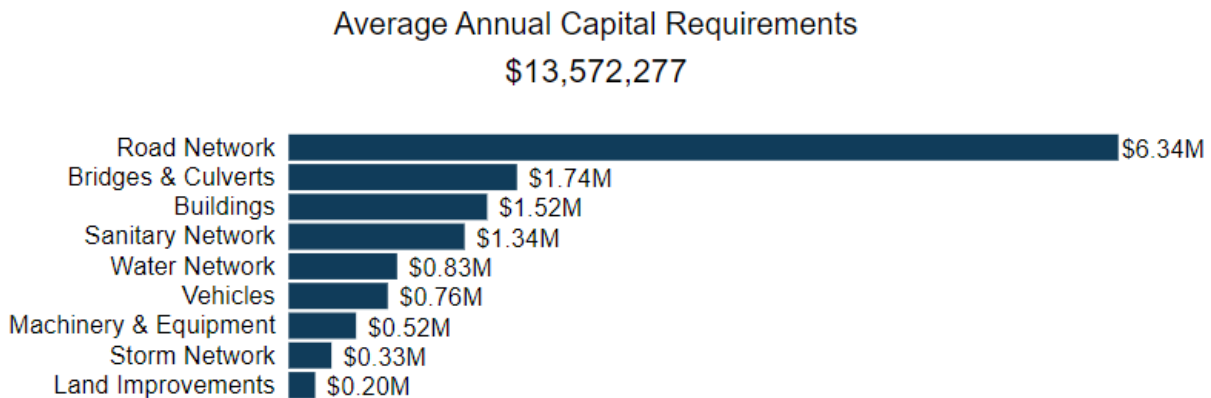
1. In order to reduce financial requirements, consideration has been given to revising service levels downward.
2. All asset management and financial strategies have been considered. For example:
 - a. If a zero-debt policy is in place, is it warranted? If not the use of debt should be considered.

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

7.1.1 Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the Township should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs, and achieve long-term sustainability. In total, the Township must allocate approximately \$13.6 million annually to address capital requirements for the assets included in this AMP.



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

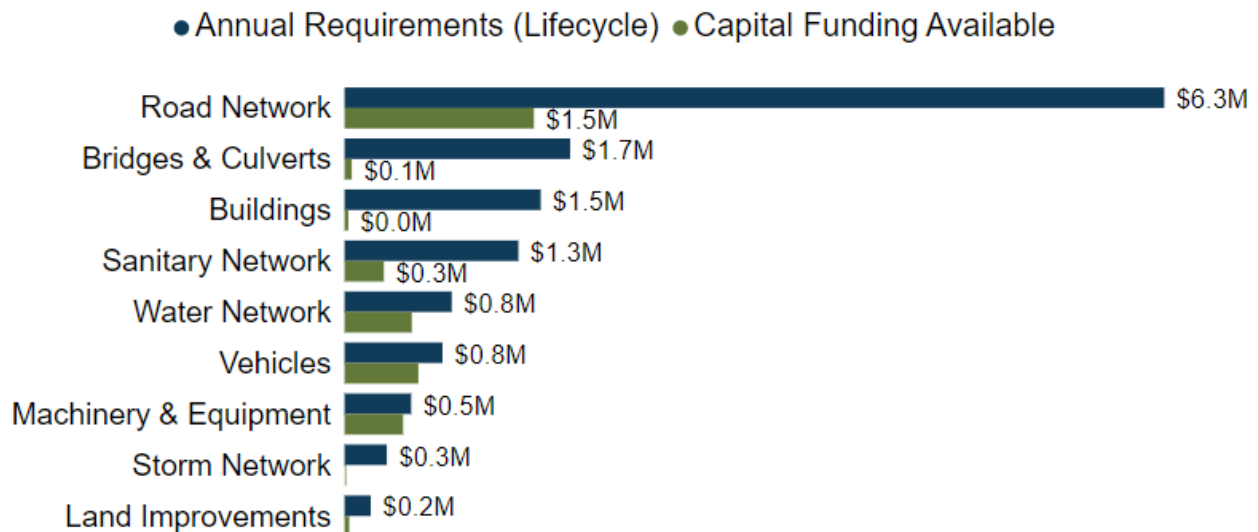
Replacement Only Scenario: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.

Lifecycle Strategy Scenario: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required

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

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately \$3.4 million towards capital projects per year. Given the annual capital requirement of \$13.6 million, there is currently a funding gap of \$10.1 million annually.



7.2 Funding Objective

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

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

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

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

7.3 Financial Profile: Tax Funded Assets

7.3.1 Current Funding Position

The following tables show, by asset category, Essa's average annual capital expenditure requirements, current funding positions, and funding increases required to achieve full funding on tax-funded assets.

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit	
		Taxes	Gas Tax	OCIF	Reserves to Cap		
Buildings	1,517,000	0			29,000	29,000	1,488,000
Land Improvements	203,000	28,000			8,000	36,000	167,000
Machinery & Equipment	515,000	437,000			16,000	453,000	62,000
Vehicles	757,000	547,000			24,000	571,000	186,000
Road Network	6,337,000	25,000	669,000	570,000	200,000	1,464,000	4,873,000
Bridges & Culverts	1,744,000	0			56,000	56,000	1,688,000
Storm Network	327,000	0			10,000	10,000	317,000
Total	11,400,000	1,037,000	669,000	570,000	343,000	2,619,000	8,781,000

The average annual capital expenditure requirement for the above categories is \$11.4 million. Annual revenue currently allocated to these assets for capital purposes is \$2.6 million leaving an annual deficit of \$8.8 million. Put differently, these infrastructure categories are currently funded at 23% of their long-term requirements.

7.3.2 Full Funding Requirements

In 2021, Township of Essa has annual tax revenues of \$8.2 million As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Buildings	18.2%
Land Improvements	2.0%
Machinery & Equipment	0.8%
Vehicles	2.3%
Road Network	59.6%
Bridges & Culverts	20.7%
Storm Network	3.9%
Total	107.5%

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

- a) Essa's debt payments for these asset categories will be decreasing by \$9,000 over the next 5 years and \$156,000 over the next 20 years.

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

Without Capturing Changes				
	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	8,781,000	8,781,000	8,781,000	8,781,000
Change in Debt Costs	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit	8,781,000	8,781,000	8,781,000	8,781,000
Tax Increase Required	107.5%	107.5%	107.5%	107.5%
Annually	15.8%	7.6%	5.0%	3.8%

With Capturing Changes				
	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	8,781,000	8,781,000	8,781,000	8,781,000
Change in Debt Costs	-9,000	-156,000	-156,000	-156,000
Resulting Infrastructure Deficit	8,772,000	8,625,000	8,625,000	8,625,000
Tax Increase Required	107.4%	105.6%	105.6%	105.6%
Annually	15.8%	7.5%	5.0%	3.7%

7.3.3 Financial Strategy Recommendations

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

- a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
- b) increasing tax revenue by 3.7% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- c) allocating the current gas tax and OCIF revenue as outlined previously.
- d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
- e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
- f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included any applicable OCIF formula-based funding since this funding is a multi-year commitment⁸.
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be challenging to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full capital expenditure funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of \$4.5 million for the Road Network, \$355,000 for Bridges & Culverts, \$0 for the Storm Network, \$0 for the Buildings, \$214,000 for Machinery & Equipment, and \$218,000 for Vehicles.

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

⁸ The Township should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. Depending on the outcome of this review, there may be changes that impact its availability.

7.4 Financial Profile: Rate Funded Assets

7.4.1 Current Funding Position

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

Asset Category	Avg. Annual Requirement	Annual Funding Available			Annual Deficit
		Rates	To Operations	Total Available	
Water Network	829,000	1,917,000	-1,397,000	520,000	309,000
Sanitary Network	1,344,000	1,917,000	-1,613,000	304,000	1,040,000
Total	2,173,000	3,834,000	-3,010,000	824,000	1,349,000

The average annual capital expenditure requirement for the above categories is \$2.2 million. Annual revenue currently allocated to these assets for capital purposes is \$824 thousand, leaving an annual deficit of \$1.3 million. Put differently, these infrastructure categories are currently funded at 38% of their long-term requirements.

7.4.2 Full Funding Requirements

In 2021, Essa had annual budgeted sanitary revenues of \$1.9 million and annual budgeted water revenues of \$1.9 million. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Rate Change Required for Full Funding
Water Network	16.1%
Sanitary Network	54.3%
Total	35.2%

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

Water Network (Without Capturing Changes)				
	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	309,000	309,000	309,000	309,000
Change in Debt Costs	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit	309,000	309,000	309,000	309,000
Rate Increase Required	16.1%	16.1%	16.1%	16.1%
Annually	3.1%	1.6%	1.1%	0.8%

Water Network (With Capturing Changes)				
	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	309,000	309,000	309,000	309,000
Change in Debt Costs	-153,000	-153,000	-153,000	-153,000
Resulting Infrastructure Deficit	156,000	156,000	156,000	156,000
Rate Increase Required	8.1%	8.1%	8.1%	8.1%
Annually	1.6%	0.8%	0.6%	0.4%

Sanitary Network (Without Capturing Changes)				
	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,040,000	1,040,000	1,040,000	1,040,000
Change in Debt Costs	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit	1,040,000	1,040,000	1,040,000	1,040,000
Rate Increase Required	54.3%	54.3%	54.3%	54.3%
Annually	9.1%	4.5%	3.0%	2.2%

Sanitary Network (With Capturing Changes)				
	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,040,000	1,040,000	1,040,000	1,040,000
Change in Debt Costs	0	-174,000	-347,000	-347,000
Resulting Infrastructure Deficit	1,040,000	866,000	693,000	693,000
Rate Increase Required	54.3%	45.2%	36.2%	36.2%
Annually	9.1%	3.8%	2.1%	1.6%

7.4.3 Financial Strategy Recommendations

Considering the above information, we recommend the 5-year option for the Water Network and 15-year option for the Sanitary Network. This involves full CapEx funding being achieved over 15 years by:

- a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
- b) increasing rate revenues by 1.6% for the Water Network each year for the next 5 years, and 1.6% for the Sanitary Network each year for the next 20 years.
- c) these rate revenue increases are solely for the purpose of phasing in full funding to the respective asset categories covered in this AMP.
- d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

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

Although this strategy achieves full CapEx funding for rate-funded assets over 15 years, the recommendation does require prioritizing capital projects to fit the annual funding available. Current data shows a pent-up investment demand of \$1.7 million for the Water Network and \$2.6 million for the Sanitary Network.

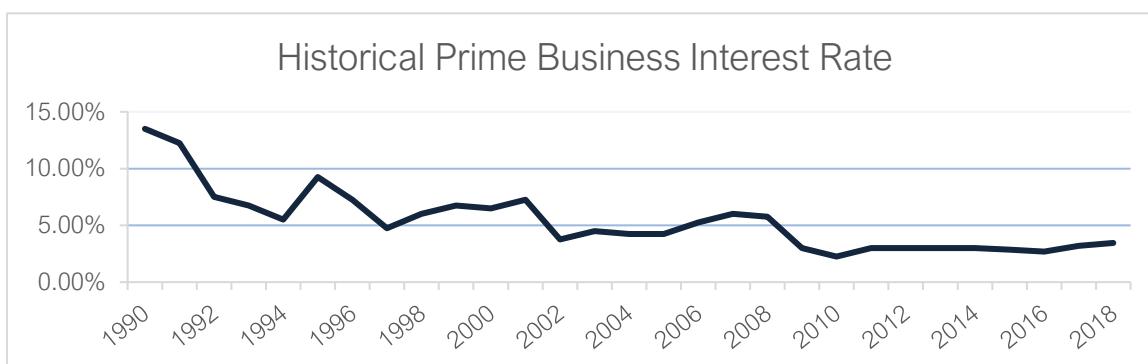
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

7.5 Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a \$1 million project financed at 3.0%⁹ over 15 years would result in a 26% premium or \$260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

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

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



⁹ Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

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

The following tables outline how Essa has historically used debt for investing in the asset categories as listed. There is currently \$4.2 million of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of \$656 thousand, within its provincially prescribed maximum of \$3.6 million.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2017	2018	2019	2020	2021
Buildings	0	0	0	0	0	0
Land Improvements	1,244,000	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Road Network	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Storm Network	0	0	0	0	0	0
Total Tax Funded	1,244,000	0	0	0	0	0
Water Network	368,000	0	0	0	0	0
Sanitary Network	2,624,000	0	0	0	0	0
Total Rate Funded	2,992,000	0	0	0	0	0

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2021	2022	2023	2024	2025	2026	2031
Buildings	0	0	0	0	0	0	0
Land Improvements	156,000	154,000	152,000	150,000	149,000	147,000	0
Machinery & Equipment	0	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0	0
Road Network	0	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Storm Network	0	0	0	0	0	0	0
Total Tax Funded	156,000	154,000	152,000	150,000	149,000	147,000	0
Water Network	153,000	153,000	153,000	76,000	0	0	0
Sanitary Network	347,000	347,000	347,000	347,000	347,000	347,000	173,000
Total Rate Funded	500,000	500,000	500,000	423,000	347,000	347,000	173,000

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

7.6 Use of Reserves

7.6.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include:

- a) the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
- b) financing one-time or short-term investments
- c) accumulating the funding for significant future infrastructure investments
- d) managing the use of debt
- e) normalizing infrastructure funding requirement

By asset category, the table below outlines the details of the reserves currently available to Essa.

Asset Category	Balance at December 31, 2021
Buildings	435,000
Land Improvements	927,000
Machinery & Equipment	455,000
Vehicles	567,000
Road Network	417,000
Bridges & Culverts	417,000
Storm Network	417,000
Total Tax Funded	3,635,000
Water Network	4,038,000
Sanitary Network	1,050,000
Total Rate Funded	5,088,000

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

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

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

7.6.2 Recommendation

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

8 Appendices

- Appendix A identifies projected 10-year capital requirements for each asset category
- Appendix A includes several maps that have been used to visualize the current level of service

Appendix A: 10-Year Capital Requirements

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

Road Network											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Culverts	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$90,000
Ditches	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$52,654	\$0	\$95,885	\$0
Paved Roads	\$0	\$0	\$51,014	\$62,310	\$45,627	\$2,284,459	\$1,802,876	\$5,436,760	\$6,561,965	\$8,684,272	\$6,438,605
Road Appurtenances	\$852,244	\$79,406	\$0	\$11,085	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sidewalks	\$3,279,285	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Slope Stabilization	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Streetlights	\$322,000	\$305,200	\$75,600	\$128,800	\$0	\$0	\$2,853,200	\$0	\$14,000	\$50,400	\$0
Traffic Signals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$4,453,529	\$384,606	\$126,614	\$202,195	\$45,627	\$2,284,459	\$4,656,076	\$5,489,414	\$6,575,965	\$8,830,557	\$6,528,605

Bridges & Culverts											
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges	\$354,834	\$0	\$0	\$36,000	\$50,000	\$70,000	\$789,000	\$821,000	\$110,000	\$3,966,400	\$835,500
Structural Culverts	\$0	\$0	\$0	\$130,000	\$0	\$0	\$0	\$0	\$1,497,500	\$0	\$0
	\$354,834	\$0	\$0	\$166,000	\$50,000	\$70,000	\$789,000	\$821,000	\$1,607,500	\$3,966,400	\$835,500

Storm Network

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Catch Basins	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Manholes	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Storm Mains	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Stormwater Management Ponds	\$0	\$400,000	\$0	\$100,000	\$0	\$0	\$0	\$0	\$400,000	\$0	\$100,000
	\$0	\$400,000	\$0	\$100,000	\$0	\$0	\$0	\$0	\$400,000	\$0	\$100,000

Buildings

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Administration Building	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Angus Arena	\$0	\$0	\$0	\$0	\$0	\$48,894	\$0	\$0	\$149,926	\$106,966	\$383,822
Community Buildings	\$0	\$0	\$0	\$0	\$0	\$49,118	\$0	\$0	\$0	\$0	\$0
Fire Buildings	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$43,864
Parks	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public Works	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Thornton Arena	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$60,094	\$0
	\$0	\$0	\$0	\$0	\$0	\$98,012	\$0	\$0	\$149,926	\$167,060	\$427,686

Machinery & Equipment

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Government Equipment	\$10,000	\$0	\$0	\$10,000	\$0	\$0	\$10,000	\$0	\$10,000	\$0	\$0
Library Equipment	\$0	\$0	\$0	\$8,965	\$134,085	\$114,612	\$277,062	\$146,532	\$208,264	\$127,438	\$112,403
Parks & Recreation Equipment	\$43,499	\$0	\$0	\$16,744	\$2,886	\$49,214	\$67,616	\$0	\$104,159	\$78,383	\$39,936
Potective Equipment	\$50,000	\$0	\$30,381	\$25,598	\$26,397	\$94,665	\$428,428	\$154,985	\$255,012	\$83,725	\$110,824
Public Works Equipment	\$110,096	\$155,000	\$0	\$0	\$0	\$159,055	\$15,702	\$20,373	\$48,450	\$0	\$27,050
	\$213,595	\$155,000	\$30,381	\$61,307	\$163,368	\$417,547	\$798,808	\$321,890	\$625,885	\$289,546	\$290,213

Vehicles

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
General Government Vehicles	\$0	\$0	\$0	\$0	\$0	\$0	\$4,000	\$0	\$0	\$0	\$0
Parks & Recreation Vehicles	\$28,000	\$0	\$0	\$0	\$0	\$0	\$19,000	\$0	\$54,380	\$0	\$0
Protection Vehicles	\$95,000	\$0	\$0	\$0	\$0	\$0	\$23,716	\$0	\$0	\$1,795,000	\$95,000
Public Works Vehicles	\$95,000	\$0	\$56,000	\$0	\$0	\$0	\$1,245,387	\$0	\$340,000	\$3,210,972	\$0
	\$218,000	\$0	\$56,000	\$0	\$0	\$0	\$1,292,103	\$0	\$394,380	\$5,005,972	\$95,000

Land Improvements

Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Atheltic Fields & Courts	\$94,558	\$0	\$8,054	\$0	\$64,424	\$81,279	\$65,422	\$0	\$35,745	\$0	\$4,445
Parking Lots	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$28,130	\$0
Parks Equipment	\$0	\$0	\$0	\$0	\$0	\$36,133	\$61,722	\$0	\$0	\$0	\$0
Playgrounds & Splash Pads	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$20,000	\$0	\$27,133	\$0
Trails & Pathways	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$94,558	\$0	\$8,054	\$0	\$64,424	\$117,412	\$127,144	\$20,000	\$35,745	\$55,263	\$4,445

Water Network

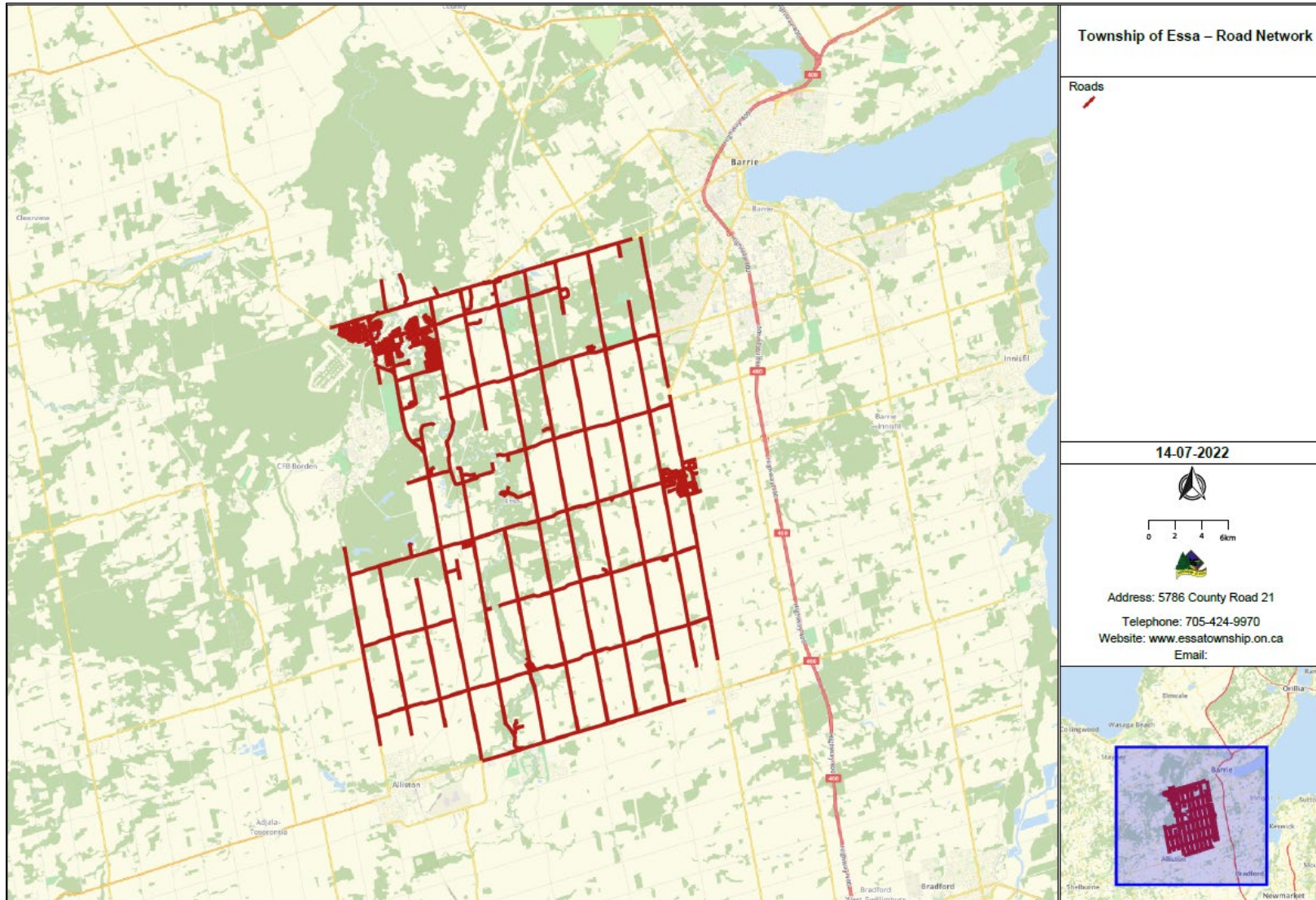
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Hydrants	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Reservoir/Pumphouse	\$1,735,112	\$50,816	\$217,659	\$78,214	\$378,003	\$103,568	\$143,979	\$468,209	\$81,083	\$363,464	\$164,771
Valves	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$99,403	\$0	\$0
Watermains	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	\$1,735,112	\$50,816	\$217,659	\$78,214	\$378,003	\$103,568	\$143,979	\$468,209	\$180,486	\$363,464	\$164,771

Sanitary Network

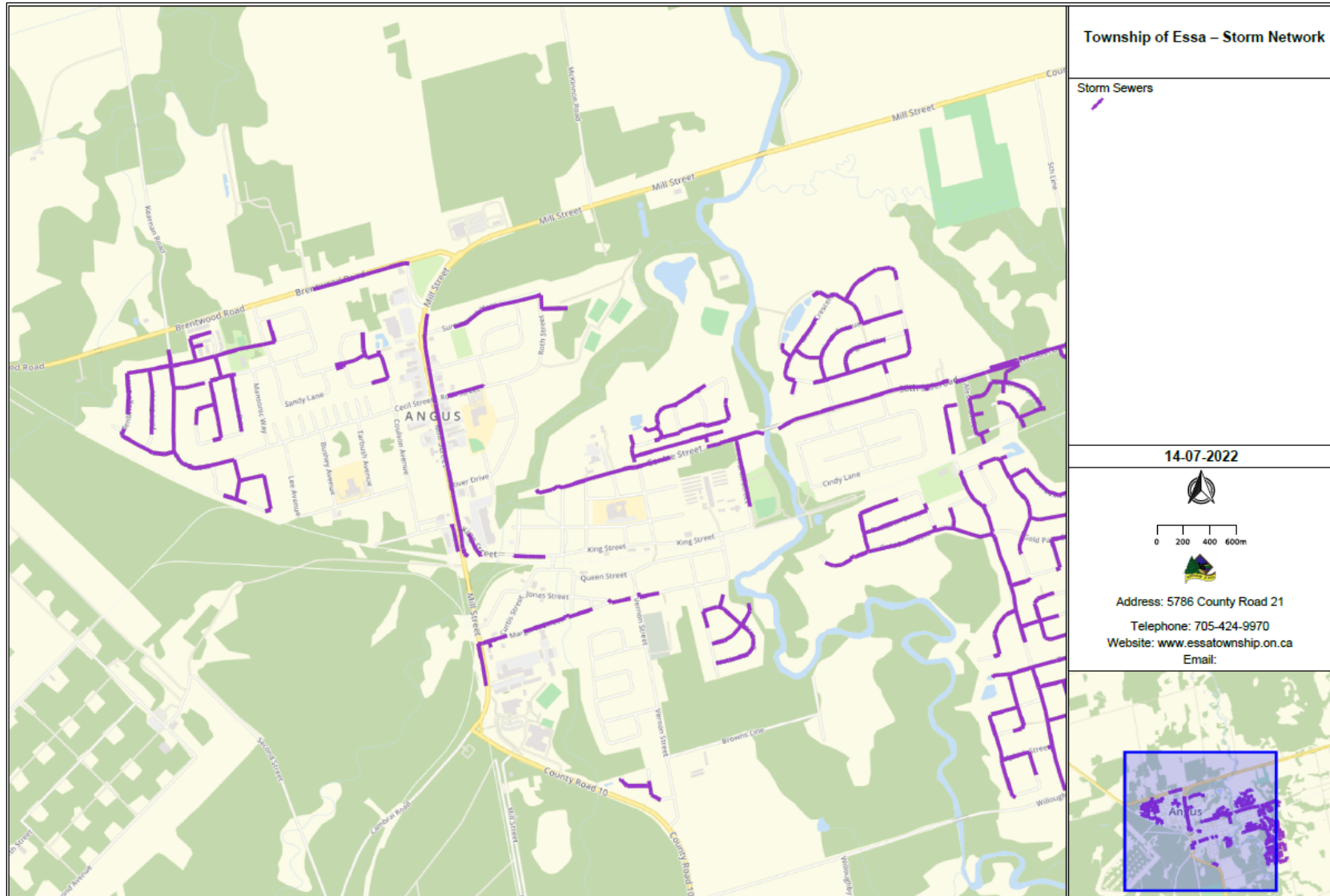
Asset Segment	Backlog	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Manholes	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Pumping Station	\$989,962	\$119,613	\$545,203	\$0	\$901,451	\$0	\$0	\$0	\$0	\$0	\$0
Sanitary Mains	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Wastewater Treatment Plant	\$2,618,198	\$134,508	\$0	\$50,000	\$0	\$1,500,000	\$50,000	\$500,000	\$1,500,000	\$0	\$1,500,000
	\$3,608,160	\$254,121	\$545,203	\$50,000	\$901,451	\$1,500,000	\$50,000	\$500,000	\$1,500,000	\$0	\$1,500,000

Appendix B: Level of Service Maps

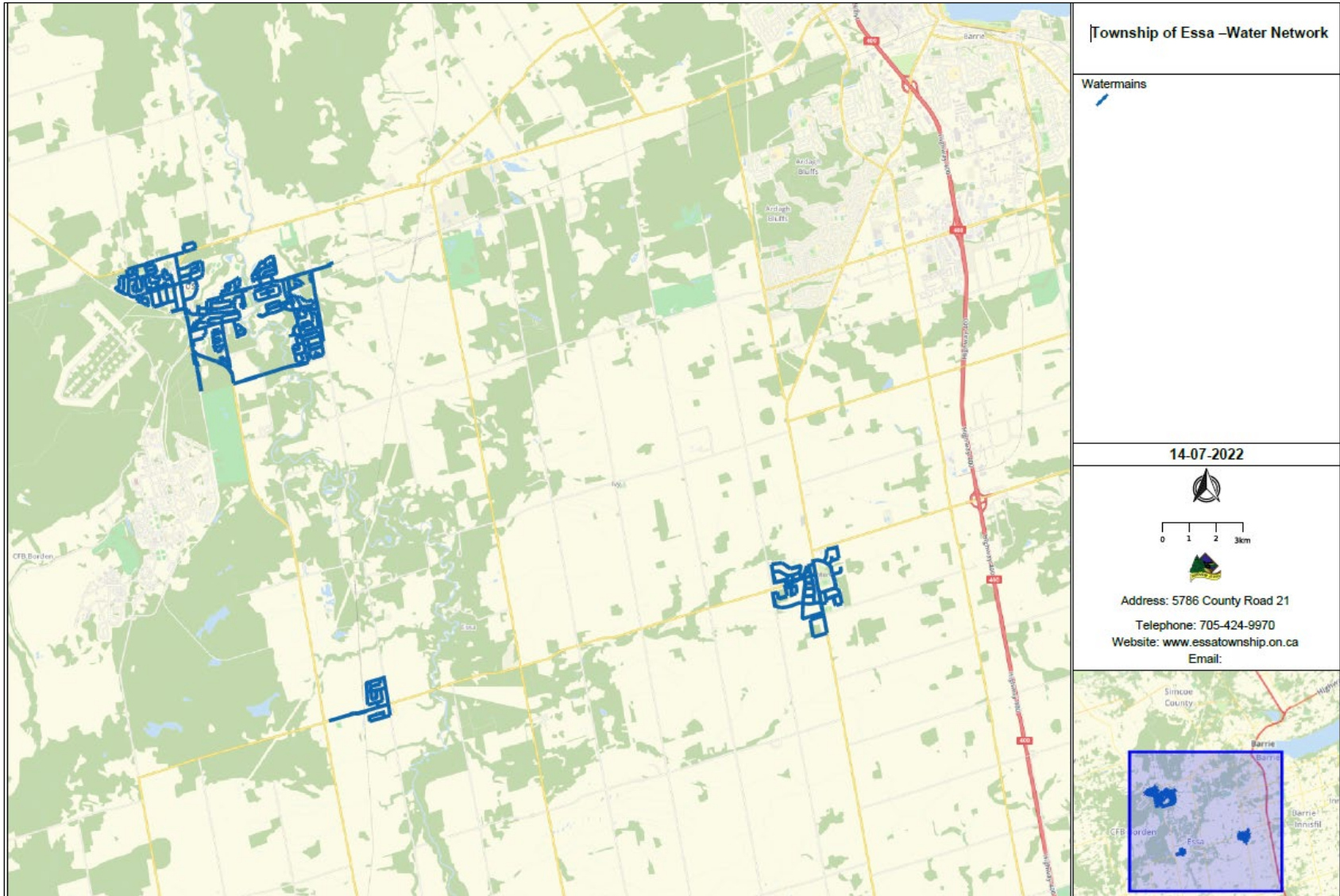
Road Network Map



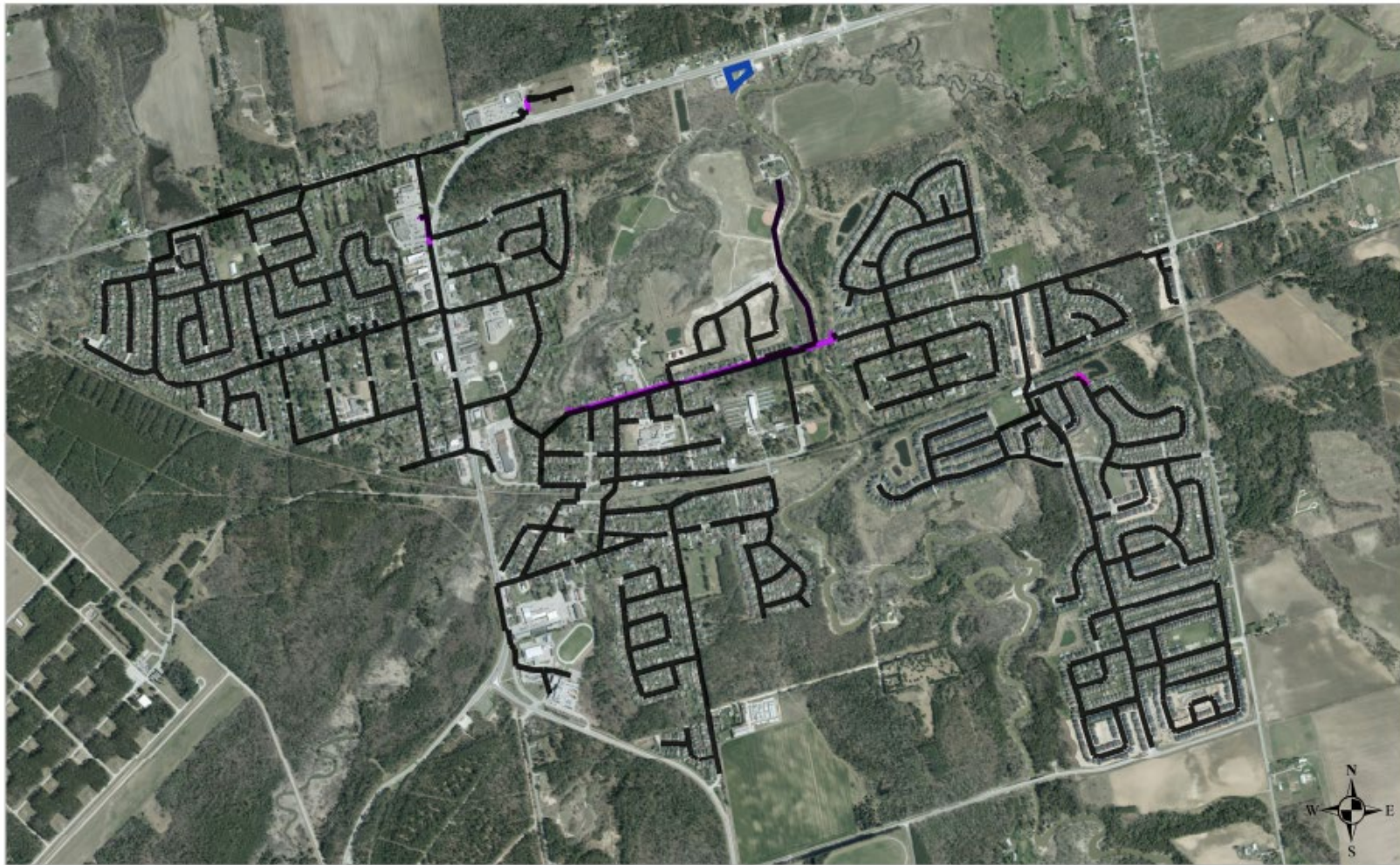
Storm Network Map



Water Network Map

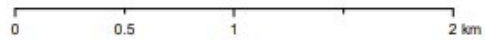


Sanitary Network Map



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July 21, 2022

