Asset Management Plan

Township of Chapple

October 2024

psdcitywide

This Asset Management Program was prepared by:

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

Key Statistics

$34.1M	2023 Replacement Cost of Asset Portfolio
$102.6K	Replacement Cost of Infrastructure Per Household
58%	Percentage of Assets in Fair or Better Condition
32%	Percentage of Assets with Assessed Condition Data
$437K	Annual Capital Infrastructure Deficit
2.5%	Target Investment Rate
1.2%	Actual Investment Rate

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Executive Summary

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

The overall replacement cost of the asset categories owned by Chapple total $34.1 million. 58% of all assets analysed are in fair or better condition. Assessed condition data was available for all bridges and culverts assets. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation.

The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. Using a combination of proactive lifecycle strategies (roads) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service, a sustainable financial plan was developed.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent future infrastructure backlogs, and achieve long-term sustainability, the Township's average annual capital requirement totals $853,000. Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately $416 thousand towards capital projects per year. As a result, the Township is funding 49% of its annual capital requirements. This creates a total annual funding deficit of $437 thousand.

Addressing annual infrastructure funding shortfalls is a difficult and long-term endeavour for municipalities. To close annual deficits for capital contributions from tax revenues for asset needs, it is recommended the Township review the feasibility of implementing a 1.1% annual increase in revenues over a 5-year phase-in period.

To close annual deficits for capital contributions from water and sanitary revenues for asset needs, it is recommended the Township review the feasibility of implementing a 4.8% and 12.2% annual increase respectively in revenues over a 20-year phase-in period.

In addition to annual needs, there is also an infrastructure backlog of $1.8 million, comprising assets that remain in service beyond their estimated useful life. It is highly unlikely that all such assets are in a state of disrepair, requiring immediate replacements or full reconstruction. This makes targeted and consistent condition assessments integral to refining long-term replacement and backlog estimates.

Risk frameworks and levels of service targets can then be used to prioritize projects and help select the right lifecycle intervention for the right asset at the right time—including replacement or full reconstruction. The Township has developed preliminary risk models which are integrated with its asset register. These models can produce risk matrices that classify assets based on their risk profiles.

Most municipalities in Ontario, and across Canada, continue to struggle with meeting infrastructure demands. This challenge was created over many decades and will take many years to overcome. To this end, several recommendations should be considered, including:

- Continuous and dedicated improvement to the Township's infrastructure datasets, which form the foundation for all analysis, including financial projections and needs.
- Continuous refinements to the risk and lifecycle models as additional data becomes available. This will aid in prioritizing projects and creating more strategic long-term capital budgets.
- Development of key performance indicators for all infrastructure programs to establish benchmark data to calibrate levels of service targets for 2025 regulatory requirements.
- Continue conducting network-wide assessments to ensure condition information remains reliable.

The Township has taken important steps in building its asset management program, including developing a more complete and accurate asset register—a substantial initiative. Continuous improvement to this inventory will be essential in maintaining momentum, supporting long-term financial planning, and delivering affordable service levels to the community.

About this Document

The Chapple Asset Management Plan was developed in accordance with Ontario Regulation 588/17 ("O. Reg 588/17"). It contains a comprehensive analysis of Chapple's infrastructure portfolio. This is a living document that should be updated regularly as additional asset and financial data becomes available.

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. Along with creating better performing organizations, more livable 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.

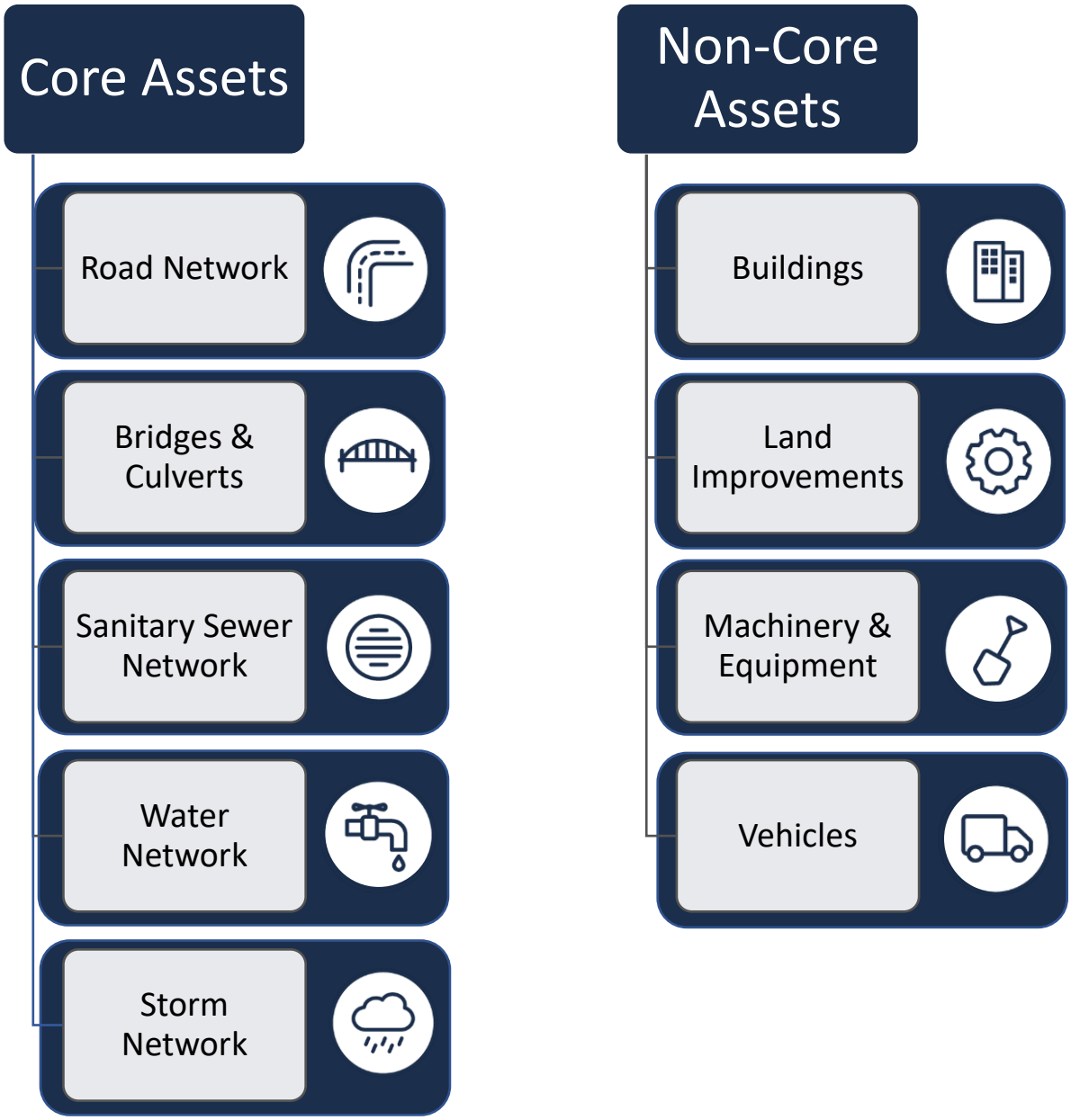
Table 1 Ontario Regulation 588/17 Requirements and Reporting Deadlines

Requirement	2019	2022	2024	2025
Asset Management Policy	●		●	
Asset Management Plans		●	●	●
State of infrastructure for core assets		●		
State of infrastructure for all assets			●	●
Current levels of service for core assets		●		
Current levels of service for all assets			●	
Proposed levels of service for all assets				●
Lifecycle costs associated with current levels of service		●	●	
Lifecycle costs associated with proposed levels of service				●
Growth impacts		●	●	●
Financial strategy				●

Scope

The scope of this document is to identify the current practices and strategies that are in place to manage the public infrastructure and to make 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 services.

The following asset categories are addressed in further detail in the Appendix.



Limitations and Constraints

The asset management program development required substantial effort by staff, it was developed based on best-available data, and is subject to the following broad limitations, constrains, and assumptions:

- The analysis is highly sensitive to several critical data fields, including an asset's estimated useful life, replacement cost, quantity, and in-service date. Inaccuracies or imprecisions in any of these fields can have substantial and cascading impacts on all reporting and analytics.
- User-defined and unit cost estimates, based typically on staff judgment, recent projects, or established through completion of technical studies, offer the most precise approximations of current replacement costs. When this isn't possible, historical costs incurred at the time of asset acquisition or construction can be inflated to present day. This approach, while sometimes necessary, can produce inaccurate estimates.
- In the absence of condition assessment data, age was used to estimate asset condition ratings. This approach can result in an over- or understatement of asset needs. As a result, financial requirements generated through this approach can differ from those produced by in-field assessments.
- The risk models are designed to support objective project prioritization and selection. However, in addition to the inherent limitations that all models face, they also require availability of important asset attribute data to ensure that asset risk ratings are valid, and assets are properly stratified within the risk matrix. Missing attribute data can misclassify assets.

These limitations have a direct impact on most of the analysis presented, including condition summaries, age profiles, long-term replacement and rehabilitation forecasts, and shorter term, 10-year forecasts that are generated from Citywide, the Township's primary asset management system.

These challenges are quite common and require long-term commitment and sustained effort by staff. As the Township's asset management program evolves and advances, the quality of future AMPs and other core documents that support asset management will continue to increase.

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 and levels of service the community receives from the asset portfolio.

Lifecycle 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 the 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 (AMP).

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents.

Foundational Documents

In the municipal sector, 'asset management strategy' and 'asset management plan' are often used interchangeably. Other concepts such as 'asset management framework', 'asset management system', and 'strategic asset management plan' further add to the confusion; lack of consistency in the industry on the purpose and definition of these elements offers little clarity. To make a clear distinction between the policy, strategy, and the plan see the following sections for detailed descriptions of the document types.

Strategic Plan

The strategic plan has a direct, and cascading impact on asset management planning and reporting, making it a foundational element. At the beginning of each term, Council holds strategic planning exercises and discussions to identify major initiatives and administrative improvements it wishes to achieve during its tenure. Staff then identify the scope, resources, timing & other logistical matters associated with proposed initiatives.

Asset Management Policy

An asset management policy represents a statement of the principles guiding the Township's approach to asset management activities as well as their commitment. It aligns with the organization and provides clear direction to municipal staff on their roles and responsibilities.

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 its asset management objectives through planned activities and decision-making criteria.

Asset Management Plan

The asset management plan is often identified as a key output within the strategy. The AMP has a sharp focus on the current state of the Township's asset portfolio, and its approach to managing and funding individual asset groups. It is tactical in nature and provides a snapshot in time.

Key Technical Concepts

Effective asset management integrates several key components, including data management, lifecycle management, risk management, and levels of service.

Asset Hierarchy and Data Classification

Asset hierarchy illustrates the relationship between individual assets and their components, and a wider, more expansive network and system. How assets are grouped in a hierarchy structure can impact how data is interpreted. Key category details are summarized at the asset segment level.

Table 2 Asset Hierarchy

•Gravel Roads •Paved Roads •Sidewalks **Road Network**	•Bridges •Structural Culverts **Bridges & Culverts**	•Water Mains & Hydrants •Water Meters •Water Treatment Plant •Wells **Water Network**
•Lagoons •Pumphouse •Sewage Lift Station •Sewer Equipment •Sewer Mains **Sanitary Sewer Network**	•Culverts •Drains **Stormwater Network**	•General Government •Protection Services •Recreation & Cultural Services •Transportation Services **Buildings**
•Fields & Rinks •Outdoor Structures •Parks •Play Structures **Land Improvements**	•Protective Services •Transportation Services **Vehicles**	•General Government •Protection Services •Recreation & Cultural Services •Transportation Services **Machinery & Equipment**

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. The two methodologies are:

- 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.

Estimated Useful Life and Service Life Remaining

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 was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

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

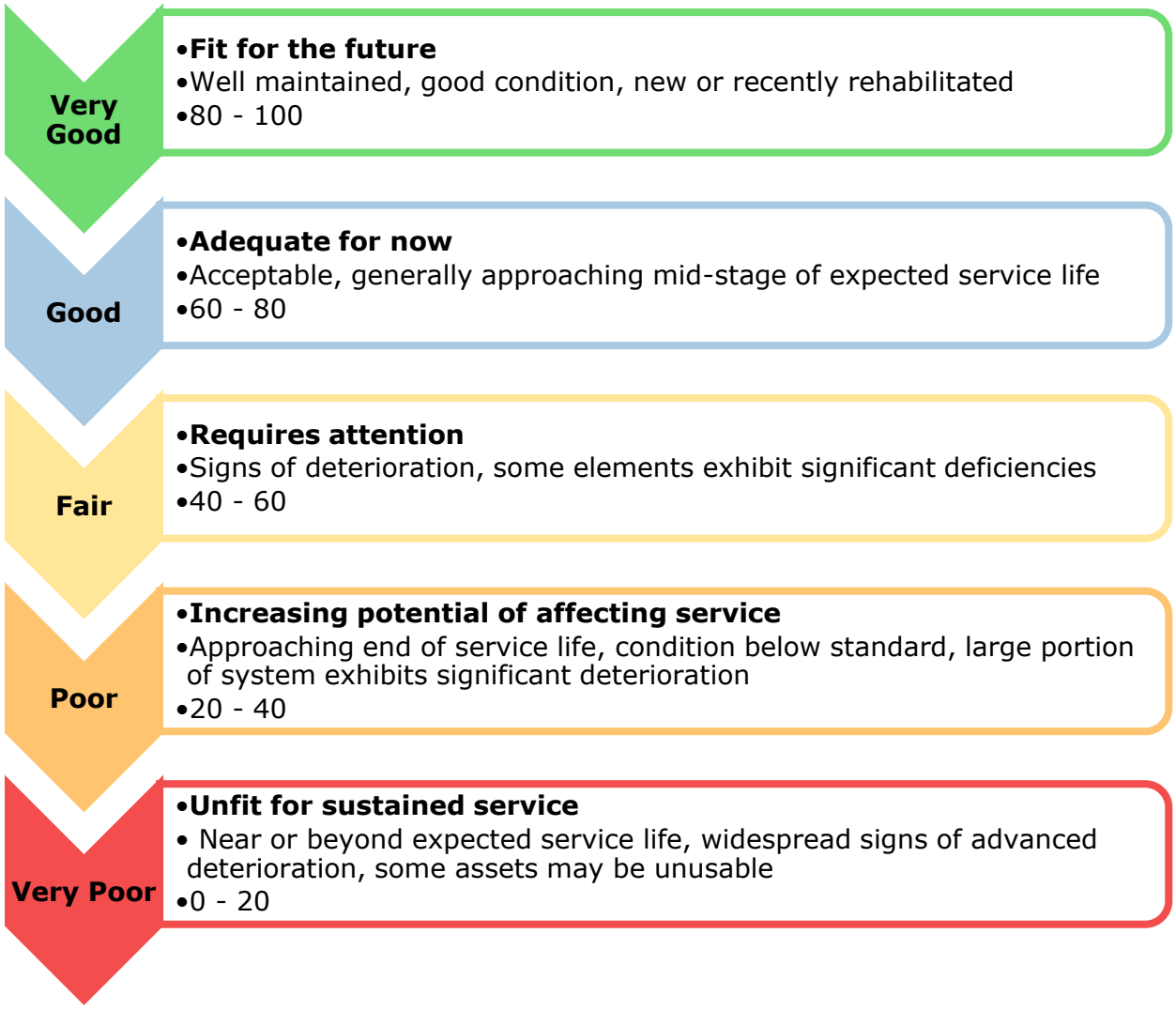
Figure 1: Service Life Remaining Calculation

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 figure below outlines the condition rating system used to determine asset condition for all assets in Chapple.

Figure 2: Standard Condition Rating Scale



The analysis 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 L: Condition Assessment Guidelines includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

Lifecycle Management Strategies

The condition or performance of 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. Figure 3 provides a description of each type of activity and the general difference in cost.

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. 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.

Figure 3: Lifecyle Management Typical Interventions

Maintenance

- General level of cost is **$**
- All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal. Maintenance does not increase the service potential of the asset
- It slows down deterioration and delays when rehabilitation or replacement is necessary.

Rehabilitation / Renewal

- General level of cost is **$$$**
- Works to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification.
- Generally involves repairing the asset to deliver its original level of service (i.e. milling and paving of roads) without resorting to significant upgrading or replacement, using available techniques and standards.

Replacement

- General level of cost is **$$$$$**
- The complete replacement of an asset that has reached the end of its life, so as to provide a similar, or agreed alternative, level of service.
- Existing asset disposal is generally included.

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. For example, a road with a high volume of traffic that provides access to critical services poses a higher risk than a

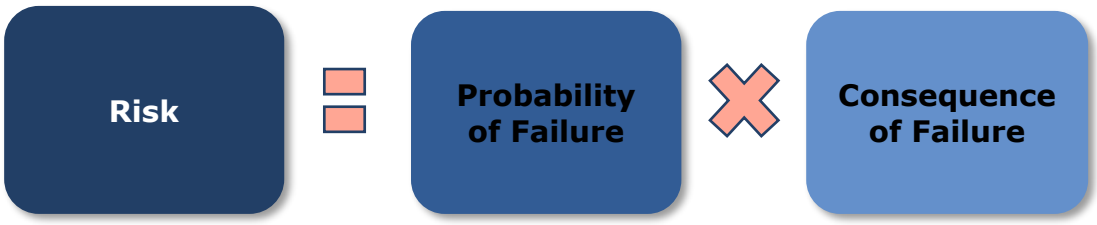
low volume rural road. These high-value assets should receive funding before others.

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.

A high-level evaluation of asset risk and criticality was performed. 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.

Risk is a product of two variables: the probability that an asset will fail, and the resulting consequences of that failure event. It can be a qualitative measurement, (low, medium, high) or quantitative measurement (1-5), that can be used to rank assets and projects, identify appropriate lifecycle strategies, optimize short- and long-term budgets, minimize service disruptions, and maintain public health and safety.

Figure 4: Risk Equation



Probability of Failure

Several factors can help decision-makers estimate the probability or likelihood of an asset's failure, including its condition, age, previous performance history, and exposure to extreme weather events, such as flooding and ice jams—both a growing concern for municipalities in Canada.

Consequence of Failure

Estimating criticality also requires identifying the types of consequences that the organization and community may face from an asset's failure, and the magnitude of those consequences. Consequences of asset failure will vary across the infrastructure portfolio; the failure of some assets may result primarily in high direct financial cost but may pose limited risk to the community. Other assets may have a relatively minor financial value, but any downtime may pose significant health and safety hazards to residents. See Appendix M: Risk Rating Criteria for definitions and the developed risk models.

Levels of Service

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

At this stage, three strategic levels of service are measured for every asset category, and they are:

- Financial –targeted reinvestment rate compared to the actual current reinvestment rate.
- Performance – this is the condition breakdown for the asset category.
- Risk – this is the risk profile for the asset category.

Only those LOS that are required under O. Reg for core asset categories are included in addition to the strategic LOS.

Community Levels of Service

Community LOS are a simple, plain language description or measure of the service that the community receives. For core asset categories, the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required. For non-core asset categories, the Township must determine the qualitative descriptions that will be used. The community LOS can be found in the Levels of Service subsection within each asset category section.

Technical Levels of Service

Technical LOS 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, the Province, through O. Reg. 588/17, has provided technical metrics that are required. For non-core asset categories, the Township determined the technical metrics that will be used. The metrics can be found in the LOS subsection within each asset category.

Current and Proposed Levels of Service

Chapple is focused on measuring the current LOS provided to the community. Once current LOS have been measured and trended, the Township plans to establish their proposed LOS 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 LOS have been established, and prior to July 2025, the Township must identify lifecycle management and financial strategies which allow these targets to be achieved.

Climate Change

Climate change can cause severe impacts on human and natural systems around the world. The effects of climate change include increasing temperatures, higher levels of precipitation, droughts, and extreme weather events. In 2019, Canada's Changing Climate Report (CCCR 2019) was released by Environment and Climate Change Canada (ECCC).

The report revealed that between 1948 and 2016, the average temperature increase across Canada was 1.7°C; moreover, during this time period, Northern Canada experienced a 2.3°C increase. The temperature increase in Canada has doubled that of the global average. If emissions are not significantly reduced, the temperature could increase by 6.3°C in Canada by the year 2100 compared to 2005 levels. Observed precipitation changes in Canada include an increase of approximately 20% between 1948 and 2012. By the late 21st century, the projected increase could reach an additional 24%. During the summer months, some regions in Southern Canada are expected to experience periods of drought at a higher rate. Extreme weather events and climate conditions are more common across Canada. Recorded events include droughts, flooding, cold extremes, warm extremes, wildfires, and record minimum arctic sea ice extent.

The changing climate poses a significant risk to the Canadian economy, society, environment, and infrastructure. The impacts on infrastructure are often a result of climate-related extremes such as droughts, floods, higher frequency of freeze-thaw cycles, extended periods of high temperatures, high winds, and wildfires. Physical infrastructure is vulnerable to damage and increased wear when exposed to these extreme events and climate variabilities. Canadian Municipalities are faced with the responsibility to protect their local economy, citizens, environment, and physical assets.

Chapple Climate Profile

The Township of Chapple is located in Northwestern Ontario within the Rainy River District. The Township is expected to experience notable effects of climate change which include higher average annual temperatures, an increase in total annual precipitation, and an increase in the frequency and severity of extreme events. According to Climatedata.ca – a collaboration supported by Environment and Climate Change Canada (ECCC) – the Township of Chapple may experience the following trends:

Higher Average Annual Temperature:

- Between the years 1971 and 2000 the annual average temperature was 2.8 ºC
- Under a high emissions scenario, the annual average temperatures are projected to increase by 4.8ºC by the year 2050 and over 6.8 ºC by the end of the century.

Increase in Total Annual Precipitation:

- Under a high emissions scenario, Chapple is projected to experience an 8% increase in precipitation by the year 2051 and a 1% increase by the end of the century.

Increase in Frequency of Extreme Weather Events:

- It is expected that the frequency and severity of extreme weather events will change.

Integration Climate change and Asset Management

Asset management practices aim to deliver sustainable service delivery - the delivery of services to residents today without compromising the services and well-being of future residents. Climate change threatens sustainable service delivery by reducing the useful life of an asset and increasing the risk of asset failure. Desired levels of service can be more difficult to achieve as a result of climate change impacts such as flooding, high heat, drought, and more frequent and intense storms.

In order to achieve the sustainable delivery of services, climate change considerations should be incorporated into asset management practices. The integration of asset management and climate change adaptation observes industry best practices and enables the development of a holistic approach to risk management.

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.

Portfolio Overview

Community Profile

Census Characteristic	Township of Chapple	Ontario
Population 2021	763	14,223,942
Population Change 2016-2021	18.7%	5.8%
Total Private Dwellings	332	5,929,250
Population Density	1.4/km^2	15.9/km^2
Land Area	558.15km^2	892,411.76 km^2

The Township of Chapple is a single-tier Township and part of the Rainy River District within Northwestern Ontario, known for its rich natural resources and a strong sense of community. Chapple borders the north side of Minnesota, United States and is located south to the Lake of the Woods.

The Township of Chapple was formed in 1907. This formation was part of a broader wave of municipal organization and restructuring occurring in Ontario in the early 20th century, particularly in the rural and northern parts of the province. The establishment of the Township during this period was driven by the growth of agricultural settlements, the expansion of the railroad and logging industries, and the increasing need for local governance structures to manage these growing communities.

The Township is predominantly rural, with a landscape characterized by its natural beauty. The area includes forests, lakes, and rivers, offering scenic views and opportunities for outdoor recreation. The surrounding forests and natural resources play a vital role in the local economy and lifestyle. Agriculture, forestry and mining are significant aspects of Chapple's character. The region's fertile land supports various types of farming, including crops and livestock. The agricultural heritage is an essential part of the community's identity. Additionally, the area has seen active mining exploration, particularly with the New Gold goldmine, which is poised to bring substantial job creation and economic growth. This project not only enhances local employment but also contributes to the Township’s tax base, supporting community services and infrastructure.

Barwick serves as the urban settlement area within Chapple, providing essential services and amenities for residents. The Township's natural environment, particularly if it is close to water bodies or features appealing landscapes, also promotes tourism. This in turn boosts demand for outdoor recreational activities, including fishing, hunting, camping, and hiking.

Chapple is committed to maintaining and improving its infrastructure to support community growth. Ongoing investments in roads, utilities, and public services aim to enhance the quality of life for residents and facilitate economic development.

State of the Infrastructure

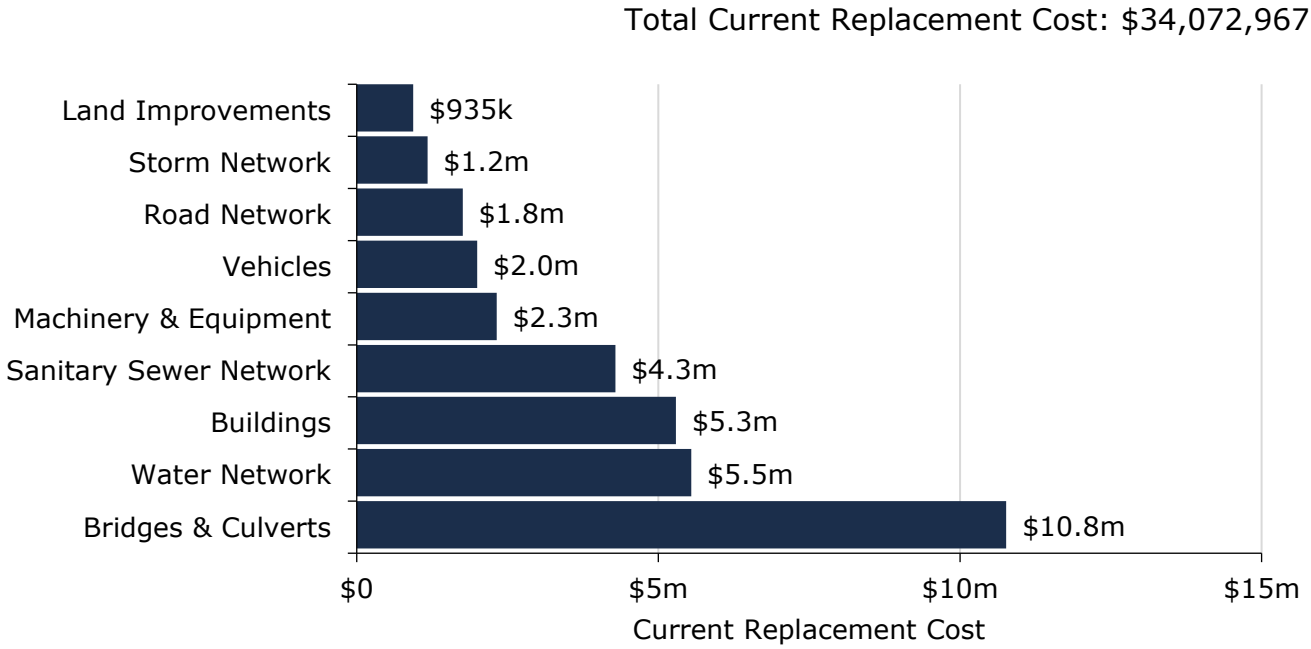
Table 3 Chapple State of the Infrastructure

Asset Category	Replacement Cost	Asset Condition	Financial Capacity	
Road Network	$1,757,133	Very Poor (7%)	Annual Requirement:	$17,000
			Funding Available:	$-
			Annual Deficit:	$17,000
Bridges & Culverts	$10,764,600	Good (88%)	Annual Requirement:	$154,000
			Funding Available:	$246,973
			Annual Deficit:	$(92,973)
Storm Network	$1,173,848	Very Poor (18%)	Annual Requirement:	$29,000
			Funding Available:	$-
			Annual Deficit:	$29,000
Buildings	$5,293,196	Poor (23%)	Annual Requirement:	$106,000
			Funding Available:	$-
			Annual Deficit:	$106,000
Land Improvements	$935,174	Fair (56%)	Annual Requirement:	$39,000
			Funding Available:	$53,527
			Annual Deficit:	$(14,527)
Vehicles	$1,995,848	Fair (53%)	Annual Requirement:	$135,000
			Funding Available:	$40,172
			Annual Deficit:	$94,828
Machinery & Equipment	$2,319,493	Poor (32%)	Annual Requirement:	$156,000
			Funding Available:	$75,470
			Annual Deficit:	$80,530
Water Network	$5,545,146	Poor (30%)	Annual Requirement:	$128,000
			Funding Available:	$-
			Annual Deficit:	$128,000
Sanitary Sewer Network	$4,288,529	Poor (29%)	Annual Requirement:	$89,000
			Funding Available:	$-
			Annual Deficit:	$89,000
Overall	**$34,072,967**	**Fair (48%)**	**Annual Requirement:**	**$853,000**
			Funding Available:	**$301,142**
			Annual Deficit:	**$436,858**

Replacement Cost

All Chapple's asset categories have a total replacement cost of $34.1 million based on available inventory data. 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.

Figure 5: Portfolio Replacement Value

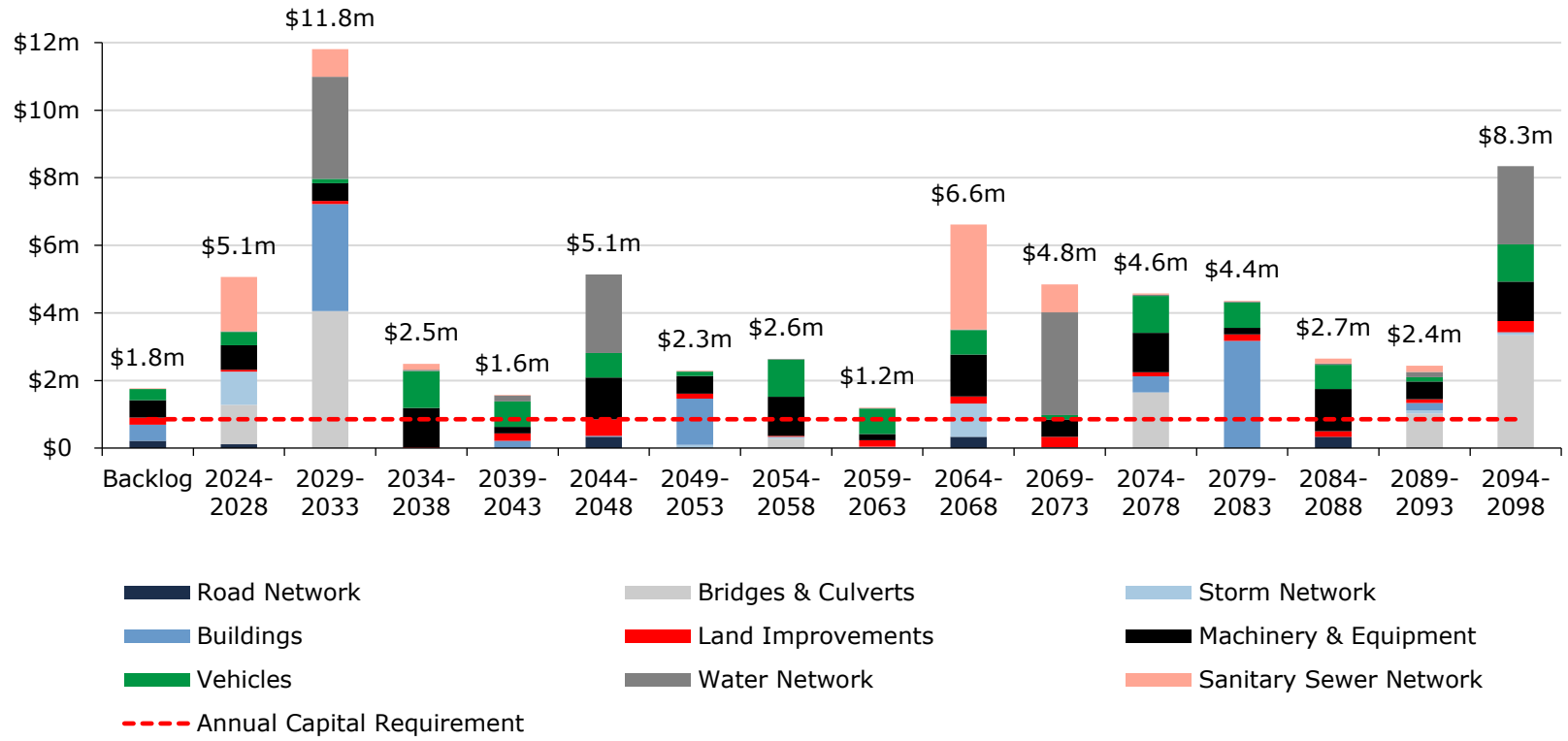


Forecasted Capital Requirements

Aging assets require maintenance, rehabilitation, and replacement. Figure 6 below illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for all asset categories analyzed. On average, $853,000 is required each year to remain current with capital replacement needs for Chapple's asset portfolio (red dotted line).

Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. This figure relies on age and available condition data. Based on the current replacement cost of the portfolio, estimated at $34.1 million, this represents an annual target reinvestment rate of 2.5%.

Figure 6: Forecasted Capital Requirements



The chart also illustrates a backlog of $1.8 million, comprising assets that remain in service beyond their estimated useful life. It is unlikely that all such assets are in a state of disrepair, requiring immediate replacements or major renewals. This makes targeted and consistent condition assessments integral.

Risk frameworks, proactive lifecycle strategies, and levels of service targets can then be used to prioritize projects, continuously refine estimates for backlogs and ongoing capital needs and help select the right treatment for each asset.

Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 58% of assets in Chapple are in fair or better condition. This estimate relies on both age-based and field condition data.

Assessed condition data is available for bridges and culverts; 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.

Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 57% of the Township's assets will require rehabilitation/replacement within the next 10 years. Details of the capital requirements are identified in each asset section.

Risk & Criticality

Chapple has noted key trends, challenges, and risks to service delivery that they are currently facing:

Organizational Capacity and Cognizance

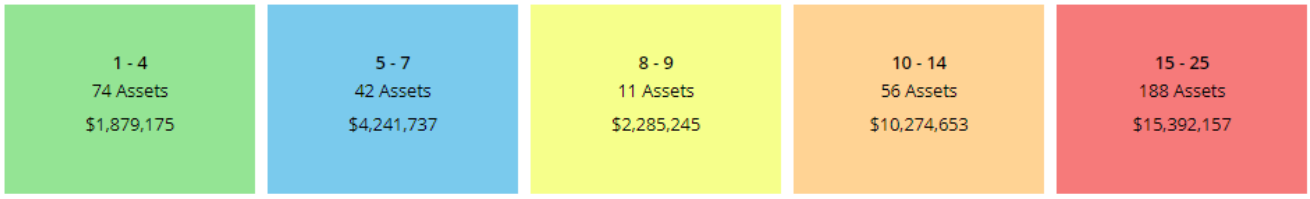
Both short- and long-term planning requires the regular collection of infrastructure data to support asset management decision-making. If organizational stakeholders, including management, staff, and relevant departments, lack a clear understanding of the principles, processes, and importance of asset management, it can lead to inadequate resource allocation and decision-making. Securing commitment and buy-in from organizational leadership to prioritize asset management as a strategic initiative can enable the Township to foster a culture of effective asset management.

Asset Data & Information

There is a lack of confidence in the available inventory data, particularly concerning the in-service dates of certain infrastructure asset categories. Staff plan to prioritize data refinement efforts to increase the accuracy and reliability of asset data and information. Once completed staff can confidently develop data-driven strategies to address infrastructure needs.

The overall asset risk breakdown for Chapple's asset inventory is portrayed in the figure below.

Figure 7: Overall Asset Risk Breakdown

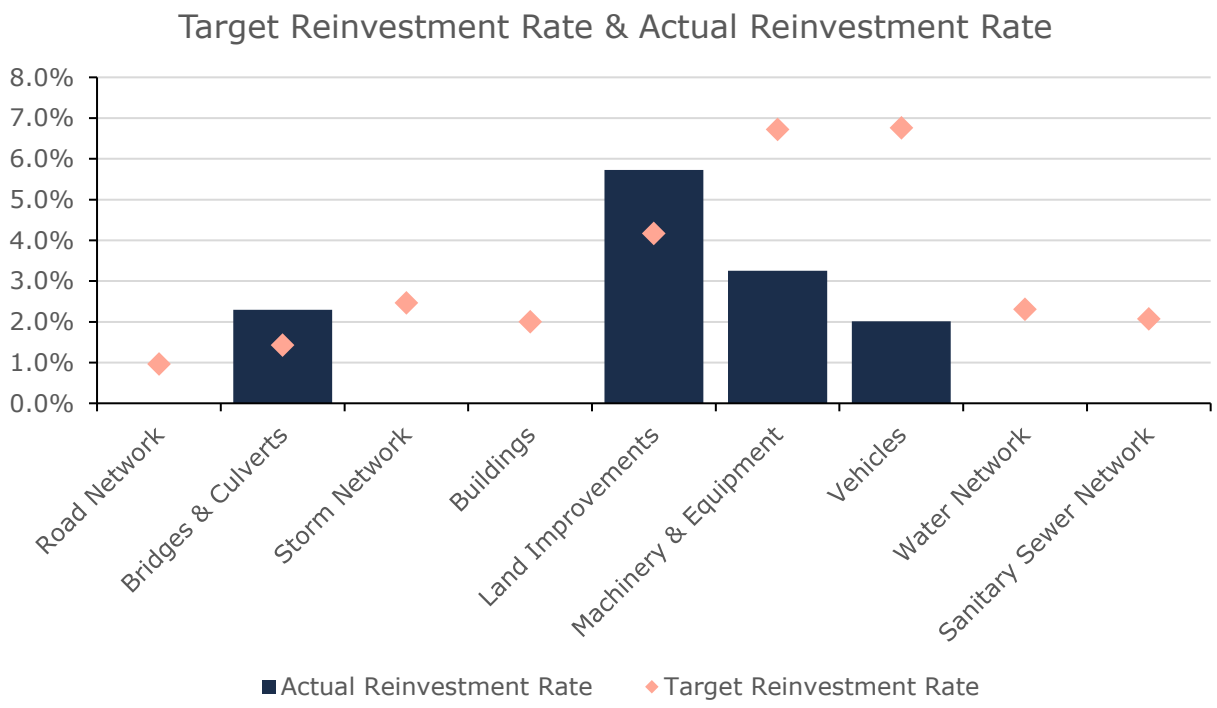


Reviewing the list of very high-risk assets to evaluate how best to mitigate the level of risk the Township is experiencing will help advance Chapple's asset management program.

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 is recommended to be allocating approximately $853 thousand annually, for a target reinvestment rate of 2.5%. Actual annual spending on infrastructure totals approximately $416 thousand, for an actual reinvestment rate of 1.2%.

Figure 8: Target vs Actual Reinvestment Rates



Financial Strategy

Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow Township of Chapple 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. Debt
    d. 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. CCBF
    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.

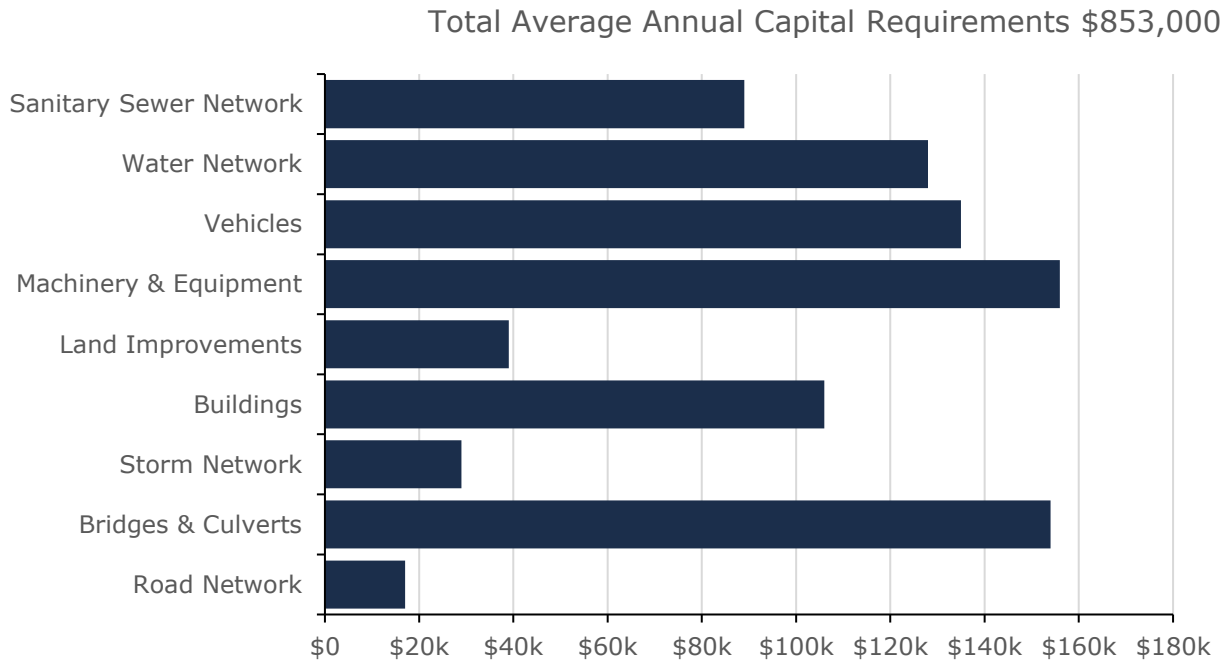
If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Township's approach to the following:

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.

Annual Requirements & Capital Funding

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 $853 thousand annually to address capital requirements for the assets included in this AMP.



For all 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.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Township is committing approximately $416 thousand towards capital projects per year. Given the annual capital requirement of $853 thousand, there is currently a funding gap of $437 thousand annually.

Funding Objective

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

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

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

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

Financial Profile: Tax Funded Assets

Current Funding Position

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

Table 4: Taxes: Required Funding vs Current Funding Position

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Taxes	Gas Tax	OCIF	Total Available	
Road Network	16,647					16,647
Stormwater Network	29,346					29,346
Bridges & Culverts	154,100	131,973		115,000	246,973	-92,873
Buildings	105,864					105,864
Machinery & Equipment	155,766	75,470			75,470	80,296
Land Improvements	38,543	53,527			53,527	-14,984
Vehicles	135,409	40,172			40,172	95,237
	635,675	**301,142**		**115,000**	**416,142**	**219,533**

The average annual investment requirement for the above categories is $636 thousand. Annual revenue currently allocated to these assets for capital purposes is $416 thousand leaving an annual surplus of $220 thousand. Put differently, these infrastructure categories are currently funded at 65.5% of their long-term requirements.

Full Funding Requirements

In 2024, the Township of Chapple has budgeted annual tax revenues of $2.6 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
Road Network	0.6%
Storm Water Network	1.1%
Bridges & Culverts	No increase required
Buildings	4.0%
Machinery & Equipment	3.1%
Land Improvements	No increase required
Vehicles	3.6%
	8.3%

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

- Chapple's formula-based Ontario Community Infrastructure Fund (OCIF) grant is scheduled to grow from $115,000 in 2023 to $116,970 in 2024.
- Chapple's debt payments for these asset categories will be decreasing by $84,375 over the next 5 to 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				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	219,533	219,533	219,533	219,533	219,533	219,533	219,533	219,533
Change in Debt Costs	N/A	N/A	N/A	N/A	-84,375	-84,375	-84,375	-84,375
Resulting Infrastructure Deficit:	**219,533**	**219,533**	**219,533**	**219,533**	**135,158**	**135,158**	**135,158**	**135,158**
Tax Increase Required	8.4%	8.4%	8.4%	8.4%	5.2%	5.2%	5.2%	5.2%
Annually:	**1.7%**	**0.9%**	**0.6%**	**0.5%**	**1.1%**	**0.6%**	**0.4%**	**0.3%**

Financial Strategy Recommendations

Considering all the above information, we recommend the 5-year option. This involves full funding being achieved over 5 years by:

a) When realized, reallocating the debt cost reductions of $84,375 to the infrastructure deficit as outlined above.
b) Increasing tax revenues by 1.1% each year for the next 5 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 Canada Community-Building Fund (Formerly known as Gas Tax Fund) 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. Any increase in property tax rates required for future operations would be in addition to the above recommendations.
2. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable, since this funding is a multi-year commitment[1].
3. The Township has also been a beneficiary of Ontario Municipal Partnership Fund grants. Similar to the note above, these grants cannot be incorporated into an AMP and should therefore be used to address the existing infrastructure backlog.
4. Historically, the Township of Chapple has partially funded infrastructure replacement using returns from their goldmine investment. These returns are expected to end in 2031, and the remaining balance of the reserves can be used to address the existing infrastructure backlog

Although this option achieves full funding on an annual basis and provides financial sustainability over the next twenty years, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $218,000 for the Road Network, $475,000 for Buildings, $212,000 for Land Improvements, $515,000 for Machinery & Equipment, and $330,000 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.

[1] 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.

Financial Profile: Rate Funded Assets

Current Funding Position

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

Table 5: Rates: Required Funding vs Current Funding Position

Asset Category	Avg. Annual Requirement	Annual Funding Available				Annual Deficit
		Rates	To Operations	OCIF	Total Available	
Water Network	128,266	85,000	-85,000		0	128,266
Sanitary Sewer Network	88,618	10,000	-10,000		0	88,618
	216,884	95,000	-95,000	**0**	**0**	216,884

The average annual investment requirement for the above categories is $216,884. Annual revenue currently allocated to these assets for capital purposes is $0, leaving an annual deficit of $216,884. Put differently, these infrastructure categories are currently funded at 0% of their long-term requirements.

Full Funding Requirements

In 2024, the Township of Chapple has budgeted annual water revenues of $85,000 and annual sanitary revenues of $10,000. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Rate Change Required for Full Funding
Water Network	150.9%
Sanitary Sewer Network	886.2%

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:

Table 6: Phasing in Annual Rate Increases

	Water Network				Sanitary Sewer Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	128,266	128,266	128,266	128,266	88,618	88,618	88,618	88,618
Change in OCIF Grants	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit:	128,266	128,266	128,266	128,266	88,618	88,618	88,618	88,618
Rate Increase Required	150.9%	150.9%	150.9%	150.9%	886.2%	886.2%	886.2%	886.2%
Annually:	20.2%	9.7%	6.4%	4.8%	58.1%	25.8%	16.5%	12.2%

Financial Strategy Recommendations

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

a) increasing rate revenues by 4.8% for water services and 12.2% for sanitary services 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.
b) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
2. We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.
3. Any increase in rates required for operations would be in addition to the above recommendations.
4. Historically, the Township of Chapple has partially funded infrastructure replacement using returns from their goldmine investment. These returns are

expected to end in 2031, and the remaining balance of the reserves can be used to address the existing infrastructure backlog.

Although this option achieves full 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 $16,000 for the Sanitary Sewer Network.

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

Use of Debt

Debt can be strategically utilized as a funding source with in the long-term financial plan. The benefits of leveraging debt for infrastructure planning include:

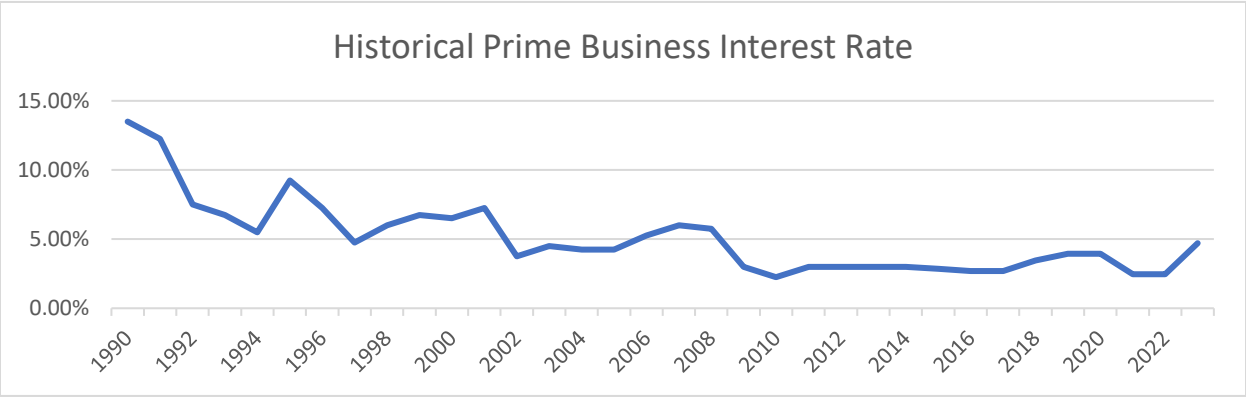
a) the ability to stabilize tax & user rates when dealing with variable and sometimes uncontrollable factors

b) equitable distribution of the cost/benefits of infrastructure over its useful life

c) a secure source of funding

d) flexibility in cash flow management

Debt management policies and procedures with limitations and monitoring practices should be considered when reviewing debt as a funding option. In efforts to mitigate increasing commodity prices and inflation, interest rates have been rising. Sustainable funding models that include debt need to incorporate the now current realized risk of rising interest rates. The following graph shows the historical changes to the lending rates:



A change in 15-year rates from 5% to 7% would change the premium from 45% to 65%. Such a change would have a significant impact on a financial plan.

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%[2] over 15 years would result in a 26% premium or $260 thousand 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%

The following tables outline how Chapple has historically used debt for investing in the asset categories as listed. There is currently $83,151 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $83,151, well within its provincially prescribed maximum of $8,518,242.

[2] Current municipal Infrastructure Ontario rates for 15-year money is 4.03%.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2018	2019	2020	2021	2022
Road Network						
Stormwater Network						
Bridges & Culverts	83,151			84,375	84,375	84,375
Buildings & Facilities						
Machinery & Equipment						
Land Improvements						
Vehicles						
Total Tax Funded:	**83,151**	**0**	**0**	**84,375**	**84,375**	**84,375**
Water Network						
Sanitary Sewer Network						
Total Rate Funded:	**0**	**0**	**0**	**0**	**0**	**0**

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2023	2024	2025	2026	2027	2028	2033
Road Network							
Stormwater Network							
Bridges & Culverts	84,375						
Buildings & Facilities							
Machinery & Equipment							
Land Improvements							
Vehicles							
Total Tax Funded:	**84,375**	**0**	**0**	**0**	**0**	**0**	**0**

Water Network							
Sanitary Sewer Network							
Total Rate Funded:	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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

Use of Reserves

Available Reserves

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

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

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

Asset Category	Balance at December 31, 2022
Road Network	
Storm Water Network	
Bridges & Culverts	74,331
Buildings	174,421
Machinery & Equipment	113,406
Land Improvements	36,694
Vehicles	103,737
Total Tax Funded:	**502,589**
Water Network	213,142
Sanitary Sewer Network	
Total Rate Funded:	**213,142**

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 take into account 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 Chapple's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

Recommendation

In 2025, Ontario Regulation 588/17 will require the Township of Chapple 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.

Recommendations

Asset Data

- Asset management planning is highly sensitive to replacement costs. Periodically update replacement costs based on recent projects, invoices, or estimates, or any other technical reports and studies. Material and labour costs can fluctuate due to local, regional, and broader market trends, and substantially so during major world events. Accurately estimating the replacement cost of like-for-like assets can be challenging. Ideally, several recent projects over multiple years should be used.
- Review and correct the quantities of storm culverts listed in this plan to ensure accuracy. Accurate data is crucial for effective asset management and planning.
- Distinguish and list pooled assets separately in the AMP, particularly for the water network and sanitary sewer network. This separation will improve clarity and facilitate more precise tracking and management of individual asset categories.
- To enhance the management of sanitary and water mains, it is recommended that the Township incorporate additional attributes, such as asset material, diameter and length, into the inventory system. This addition will refine condition assessments and enable more targeted maintenance efforts, while also improving planning and budgeting processes. By integrating these attributes, the Township can achieve more effective and efficient management of its infrastructure resources.

Condition Assessment Strategies

- Implement condition assessments for additional asset categories to ensure that condition information remains reliable. Regular evaluations are crucial for maintaining an effective asset management plan, as they provide essential insights into the health and performance of various assets over time. By expanding condition assessments to more asset categories, the Township can better prioritize maintenance and repair efforts, optimize resource allocation, and extend the lifespan of its infrastructure and equipment. This proactive approach will support the efficient and cost-effective management of assets, contributing to the overall operational success of the Township's infrastructure.
- Ontario Clean Water Agency provided the Township with the 2022 Asset Management Plan for Water and Wastewater Systems, which serves as the latest formal documentation of asset conditions for the Water and Wastewater Networks. There are no additional formal strategies or frameworks in place for ongoing assessments of these networks. This reliance on a single source highlights the need for a more systematic approach to monitoring and evaluating the condition of the infrastructure to ensure effective management and service delivery.

Lifecycle Management Strategies

- Evaluate the efficacy of the Township's current lifecycle management strategies at regular intervals to determine the impact cost, condition, and risk. Although the Township manages approximately 4.5 kilometers of paved roads compared to a larger network of gravel roads, lifecycle models are still relevant for maintaining these roads in good condition. Currently, the Township conducts maintenance on an as-needed basis without extensive lifecycle interventions. It is recommended that the Township consider adopting a formal lifecycle management strategy to ensure systematic maintenance and optimal resource use for its paved roads.

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.

Appendix A: Road Network

State of the Infrastructure

Chapple's Road Network comprises the largest share of its infrastructure portfolio, with a current replacement cost of $1.8 million, distributed primarily between paved (HCB) and gravel roads.

The Township also owns and manages other supporting infrastructure and capital assets, including sidewalks.

The state of the infrastructure for the road network is summarized below.

Replacement Cost	Condition	Financial Capacity	
$1,757,000	Very Poor (7%)	Annual Requirement:	$17,000
		Funding Available:	$-
		Annual Deficit:	$17,000

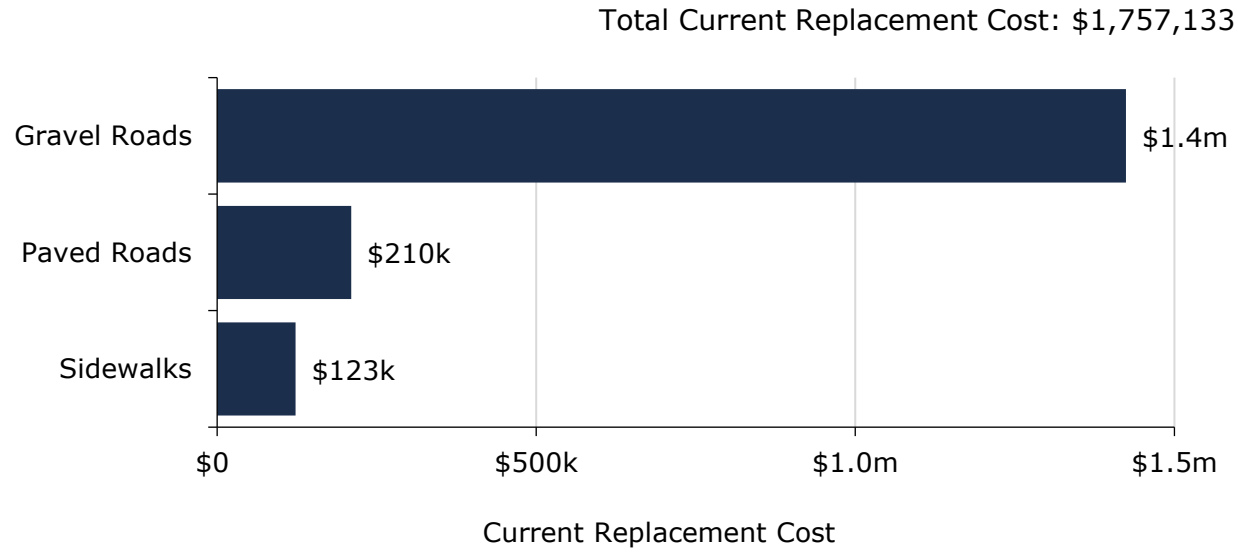
Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Gravel Roads	242.15	Kilometers	CPI	$1,424,000
Paved Roads (HCB)	4.53	Kilometers	CPI	$210,000
Sidewalks	0.65	Kilometers	CPI	$123,000
Total	**247.34**	**Kilometers**		**$1,757,000**

The figure below displays the replacement cost of each asset segment in the Township's road inventory.

Figure 9: Road Network Replacement Value

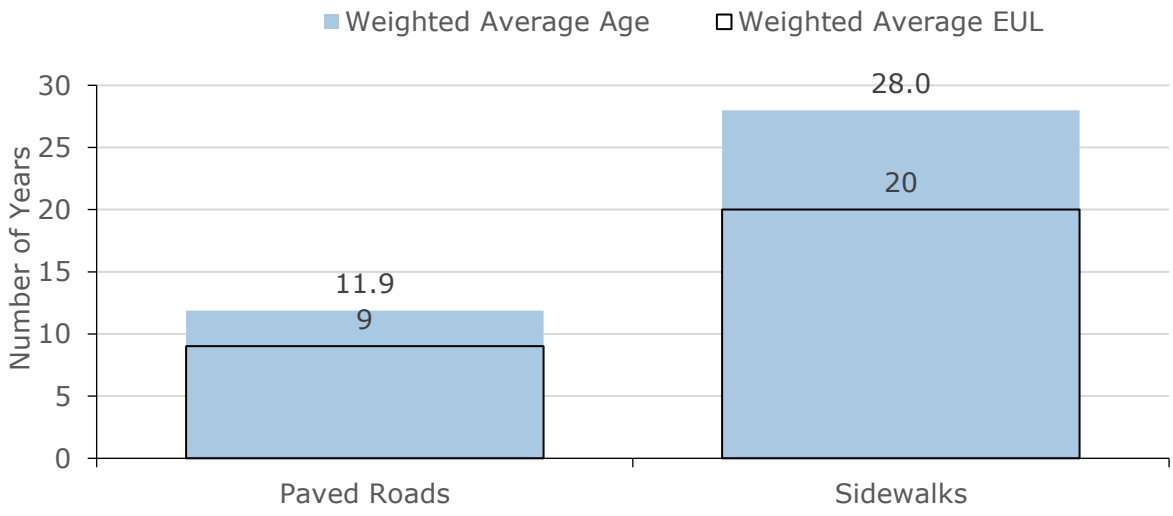


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

The graph below identifies the average age, and the estimated useful life for each asset segment[3]. It is all weighted by replacement cost.

Figure 10: Road Network Average Age vs Average EUL

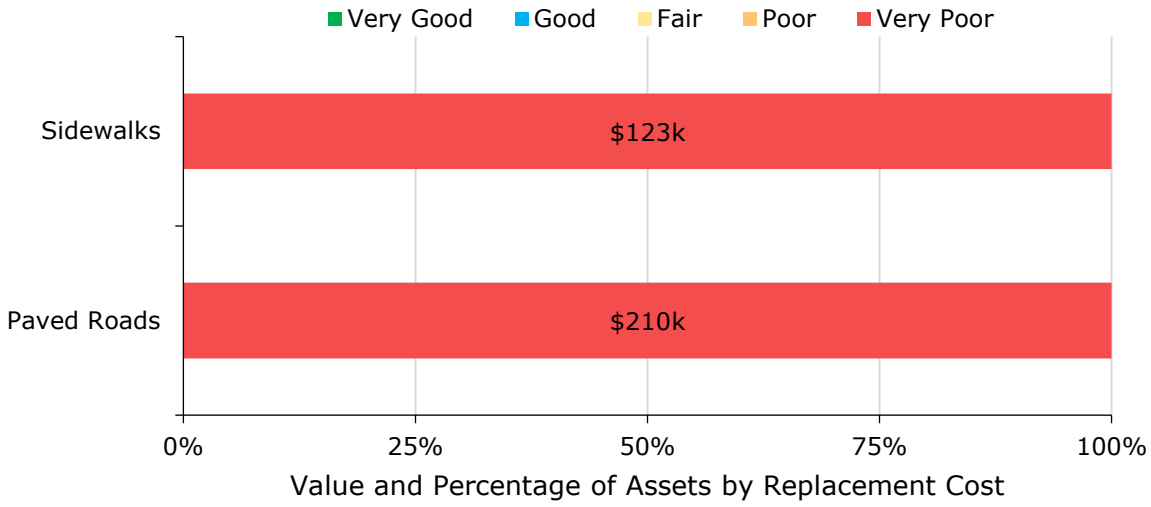


[3] Gravel roads undergo perpetual operating and maintenance activities. If maintained properly, they can theoretically have a limitless service life.

The analysis shows that, based on in-service dates, roads continue to remain in operation beyond their expected useful life. This is due to the life cycle management strategies currently being utilized.

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

Figure 11: Road Network Condition Breakdown



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 determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The Township performs internal annual assessments of road network assets, including streetlights and sidewalks, to ensure timely maintenance and effective budget allocation. These evaluations are conducted primarily by the Public Works department with occasional assistance from external contractors. This systematic assessment aids in planning for gravel resurfacing, dust suppression, and ensuring the safety and functionality of sidewalks and streetlights. The collected condition data is crucial for prioritizing safety improvements and optimizing resource allocation in the annual budgeting process.

Lifecycle Management Strategy

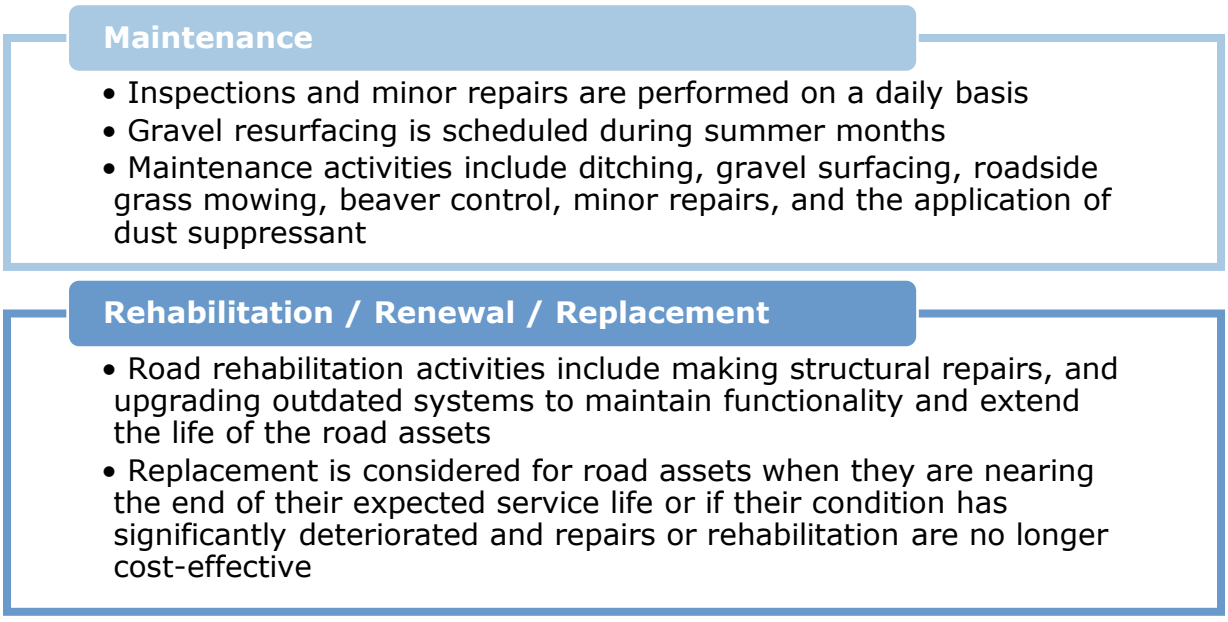
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment.

The following lifecycle strategies shown in

Figure 12 have been developed as a proactive approach to managing the lifecycle of municipally owned 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.

Figure 12: Road Network Current Lifecycle Strategy



Forecasted Capital Requirements

Figure 13 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Township's road network. Assuming the end-of-life replacement of assets in this category, the following graph forecasts capital requirements for the road network. This analysis was run until 2083 to capture at least one iteration of replacement for the longest-lived asset in the asset register.

Chapple's average annual requirements (red dotted line) total $17,000 for all assets in the road network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. The chart illustrates capital needs through the forecast period in 5-year intervals.

The projections are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades. They are based on asset replacement costs, age analysis, and condition data when available, as well as lifecycle modeling (roads only identified above).

Figure 13: Road Network Forecasted Capital Replacement Requirements

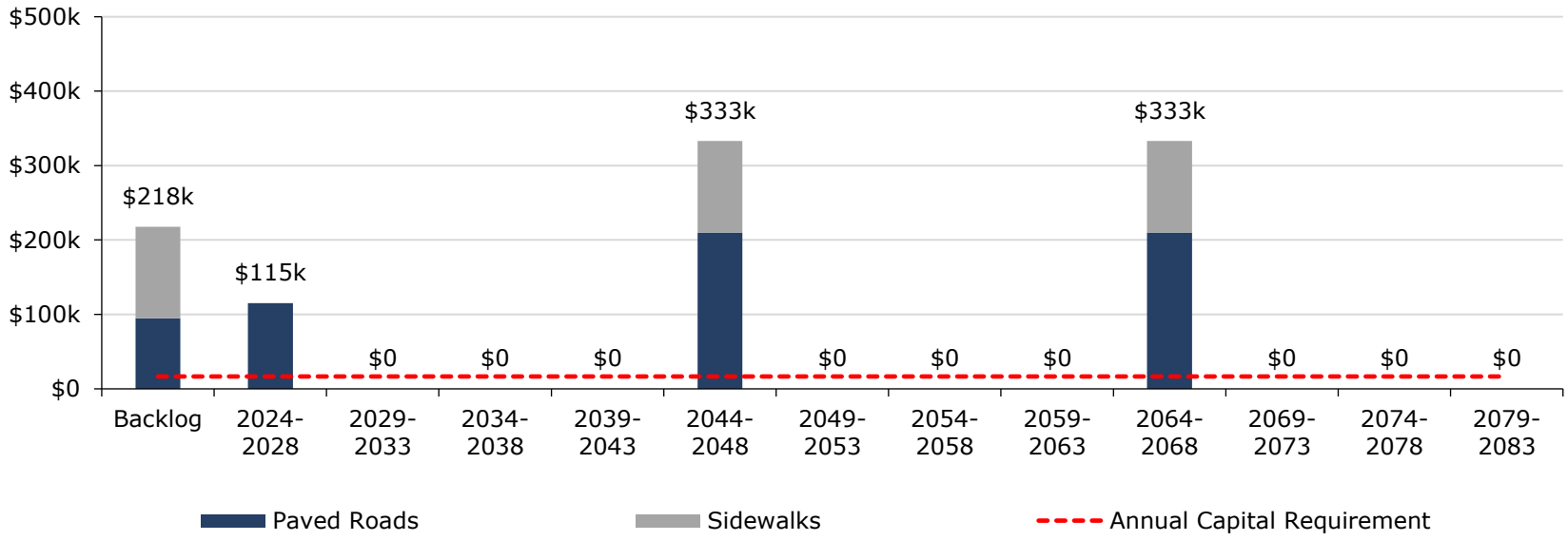


Table 7 below summarizes the projected cost of lifecycle activities (rehabilitation and replacement) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

These projections can be different from actual capital forecasts. Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Township's capital expenditure forecasts.

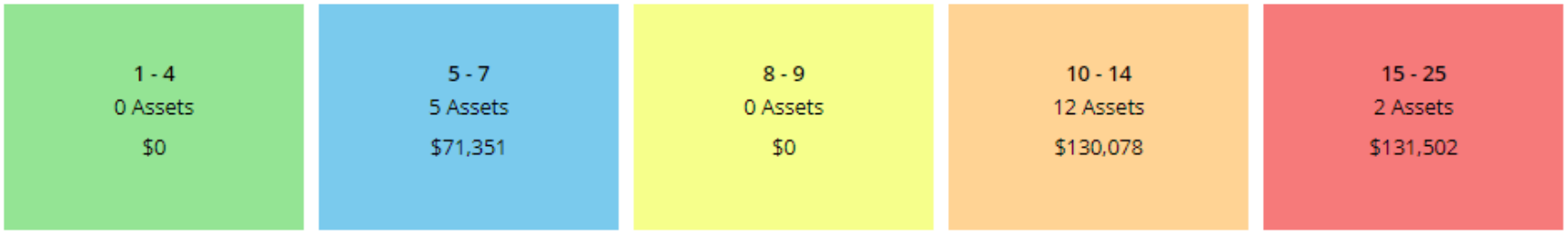
Table 7 Road Network System-generated 10-Year Capital Costs

Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Paved Roads	$115k	$0	$0	$0	$0	$115k	$0	$0	$0	$0	$0
Sidewalks	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$115k**	**$0**	**$0**	**$0**	**$0**	**$115k**	**$0**	**$0**	**$0**	**$0**	**$0**

Risk & Criticality

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

Figure 14: Road Network Risk Matrix



This is a high-level model developed by Township staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

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 Weather Events

Climate change and extreme weather events significantly impact a Township's road network. Increased rainfall necessitates larger culverts to prevent flooding, while drier seasons require more frequent dust suppressant applications to control erosion. Additionally, milder winters increase erosion as gravel is displaced by plowing. These factors complicate road maintenance, increasing costs and challenges in maintaining safety. Additionally, fulfilling public expectations during winter storms and ensuring enough staff to clear roads after significant snowfalls pose further operational challenges.

Lifecycle Management Strategies and Infrastructure Reinvestment

The lack of lifecycle management strategies and insufficient infrastructure reinvestment pose significant risks to a Township's road network. Inaccurate replacement costs that fail to incorporate construction costs, can lead to underfunding, where the allocated budget falls short of the actual financial requirements needed to maintain and renew road infrastructure effectively. Consequently, roads may deteriorate faster than they can be repaired or upgraded, leading to increased safety hazards for users and potential disruptions in connectivity. Over time, the compounding effect of the lack of infrastructure reinvestment not only escalates repair and replacement costs due to more severe damage but also strains the Township's financial capacity to manage its infrastructure sustainably.

Levels of Service

The following tables identify the Township's metrics to identify their current level of service for the roads. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

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

Table 8 Road Network Community Levels of Service

Values	Qualitative Description	Current LOS (2023)
Cost Efficient	Description, which may include maps, of the road network in the Township and its level of connectivity	See Appendix J.
Sustainable	Description or images that illustrate the different levels of road class pavement condition	See Figure 2 for the description of road condition

Technical Levels of Service

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

Table 9 Road Network Technical Levels of Service

Service Attribute	Technical Metric	Curent LOS (2022)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area in the municipality (km/km^2)	TBD
	Lane-km of collector roads (MMS classes 3 and 4) per land area in the municipality (km/km^2)	TBD
	Lane-km of local roads (MMS classes 5 and 6) per land area in the municipality (km/km^2)	TBD
	Average Risk Rating	13.67 (High)
Quality	Average pavement condition index for paved roads in the municipality	11%
	Average surface condition for unpaved roads in the municipality	2%
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	0% - 1.0%

Appendix B: Bridges & Culverts

State of the Infrastructure

Bridges and culverts (B&C) represent a critical portion of the transportation services provided to the community. The state of the infrastructure for bridges and culverts is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$10,765,000	Good (88%)	Annual Requirement:	$154,000
		Funding Available:	$246,973
		Annual Deficit:	$(92,973)

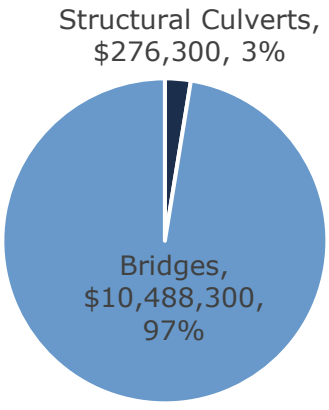
Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Bridges	10	Assets	User-Defined	$10,488,000
Structural Culverts	1	Assets	User-Defined	$276,000
Total	**11**	**Assets**	**User-Defined**	**$10,765,000**

Figure 15 below displays the replacement cost of each asset segment in the Township's bridges and culverts inventory.

Figure 15: Bridges & Culverts Replacement Cost



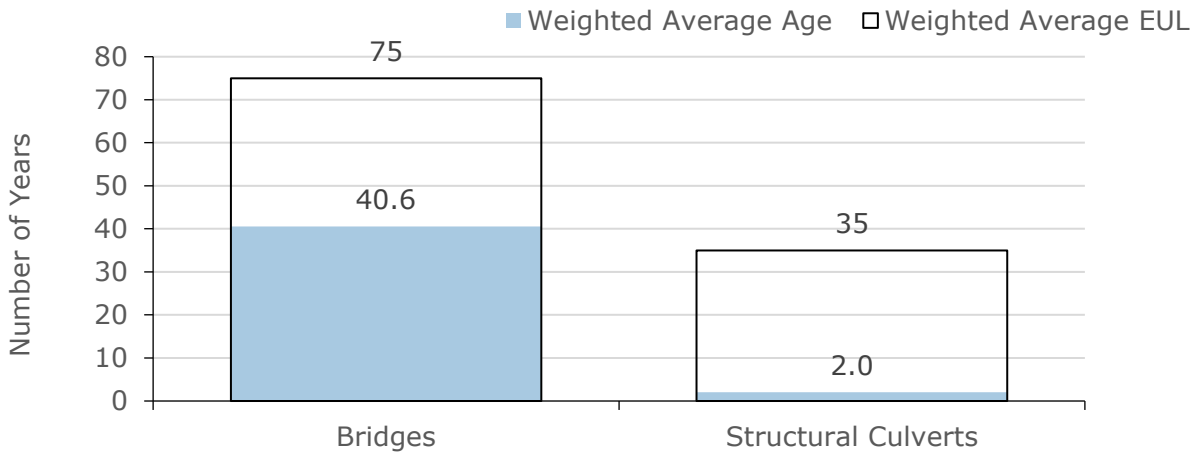
Total Current Replacement Cost: $10,764,600

Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed. This can be included in the Ontario Structures Inspection Manual (OSIM) inspections as the replacement cost is part of the calculation for the bridge condition index (BCI).

Asset Condition & Age

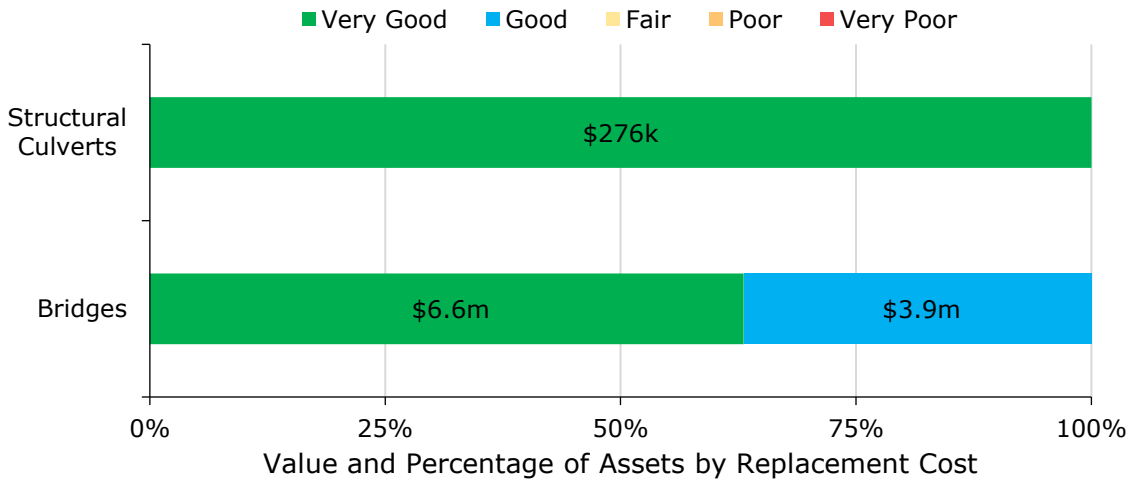
The graph below identifies the average age and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 16: B&C Average Age vs Average EUL



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

Figure 17: B&C Condition Breakdown



To ensure that the Township's bridges and culverts continue to provide an acceptable level of service, the staff should monitor the average condition of all assets. 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 determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Chapple's current approach is to assess the bridges and structural culverts every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM). The most recent assessment was completed in November 2023.

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. Figure 18 outlines Chapple's current lifecycle management strategy.

Figure 18: B&C Current Lifecycle Strategy

Maintenance

- Routine maintenance of bridges and culverts includes monthly inspections, grading surfaces as needed, annual sweeping of paved surfaces, minor repairs on an as-needed basis, and roadside grass mowing annually

Rehabilitation / Renewal / Replacement

- Rehabilitation activities, including structural repairs and seismic upgrades, are initiated based on wear and tear or recommendations from biennial OSIMs.
- Replacement is considered for bridges and culverts when their condition has significantly deteriorated and rehabilitation is no longer cost-effective. Assets nearing the end of their service life or requiring frequent, costly repairs are prioritized for replacement.

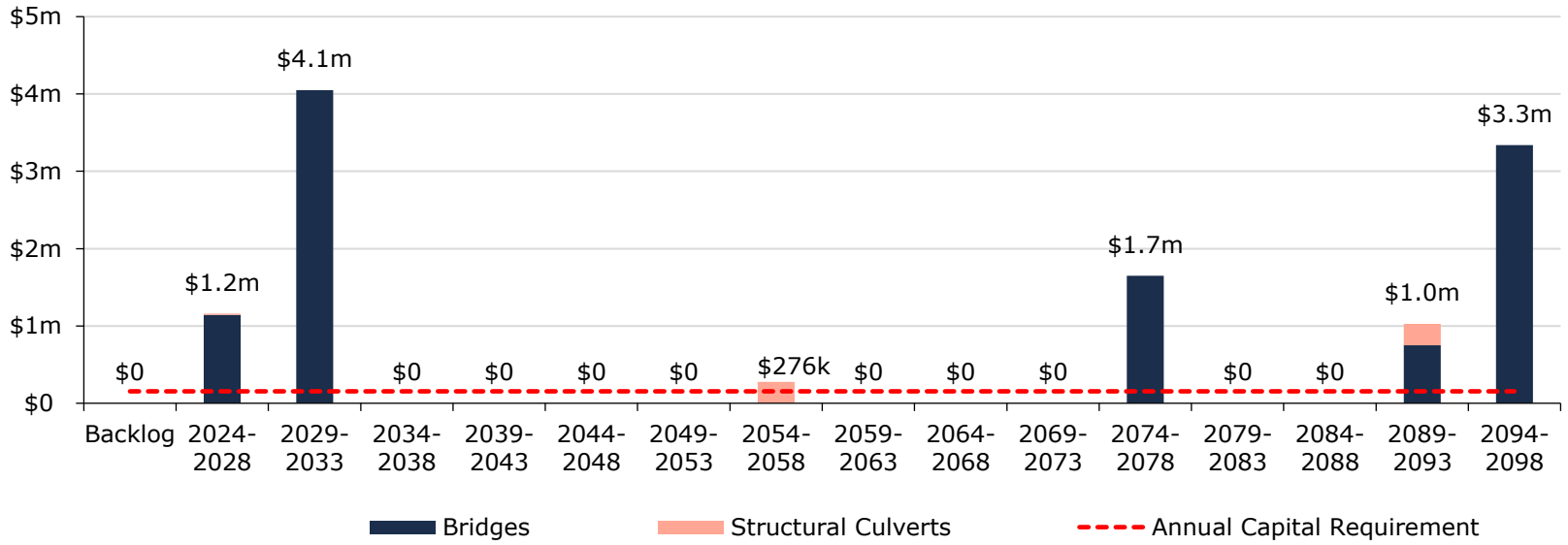
Forecasted Capital Requirements

Figure 19 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Township's bridges and culverts. These projections are based on asset replacement costs, age analysis, and condition data. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

The following analysis was run until 2098, and the resulting graph identifies capital requirements over the next 75 years. Chapple's average annual requirements (red dotted line) for bridges and culverts total $154,000. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

OSIM condition assessments and a robust risk framework will ensure that high-criticality assets receive proper and timely lifecycle intervention, including rehabilitation and replacement activities.

Figure 19: B&C Forecasted Capital Replacement Requirements



These are represented at the major asset level.

Table 10 below summarizes the projected cost of lifecycle activities (as previously described) that may need to be undertaken over the next 10 years to support current levels of service. These are represented at the major asset level.

Table 10 B&C System-generated 10-Year Capital Costs

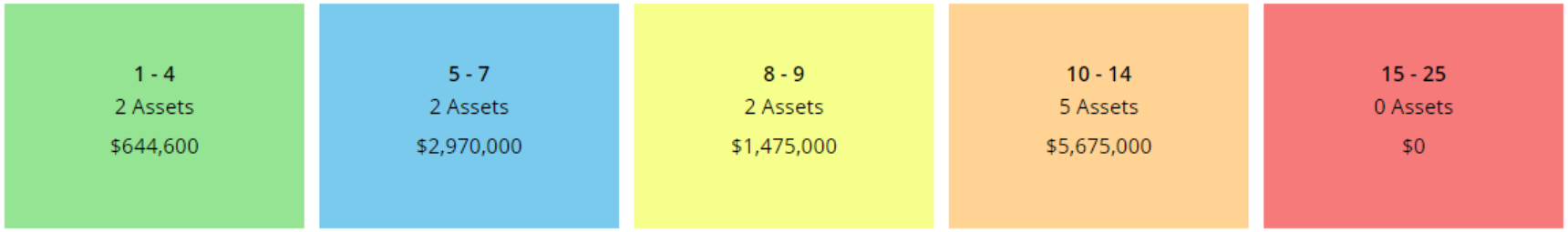
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Bridges	$5.2m	$735k	$0	$0	$0	$410k	$0	$25k	$0	$0	$4.0m
Structural Culverts	$15k	$15k	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$5.2m**	**$750k**	**$0**	**$0**	**$0**	**$410k**	**$0**	**$25k**	**$0**	**$0**	**$4.0m**

These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for bridges and structural culverts.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 20: B&C Risk Matrix



This is a high-level model developed by municipal staff and should be reviewed and adjusted 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 (Economic)
Service Life Remaining (%)	

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 Weather Events

Climate change and extreme weather events like intense flooding pose significant risks to a Township's bridges and culverts. Infrastructure will be increasingly vulnerable to damage from higher water flows and erosion. As such events become more frequent, the potential for severe damage escalates, threatening safety and transportation efficiency.

Capital Funding Strategies and Public Expectations

Financial constraints can challenge a Township's ability to meet public expectations, especially when funds are insufficient to replace or upgrade bridges and culverts. If a bridge requires load restrictions due to deterioration, it can lead to public dissatisfaction and safety concerns, disrupting traffic and impeding emergency services. This situation highlights the importance of proactive communication and planning to align community expectations with the realities of infrastructure management and available resources.

Levels of Service

The following tables identify the Township's metrics to identify their current level of service for the bridges and culverts.

Community Levels of Service

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

Table 11 B&C Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport, motor, emergency vehicles, pedestrians, cyclists)	The municipal bridges support a diverse range of traffic, serving as crucial conduits within the Township and also for travel between communities. They accommodate a wide array of vehicles, from large agricultural equipment and heavy transport vehicles to motor and emergency vehicles, as well as cyclists and pedestrians.
Quality	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	See Appendix J.

Technical Levels of Service

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

Table 12 B&C Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	% of bridges in the Township with loading or dimensional restrictions	30%[4]
	Average Risk Rating	9.36 (Moderate)
Quality	Average bridge condition index value for bridges in the municipality	88%
	Average BCI value for structural culverts in the municipality	99%
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	2.3% - 1.4%

[4] Irvine Bridge, McCulloch Bridge, and Woosley Bridge have loading restrictions, representing 3 out of the total 10 bridges.

Appendix C: Water Network

State of the Infrastructure

The Urban Settlement Area of Barwick in the Township of Chapple receives water services, which are managed and maintained through a partnership with the Ontario Clean Water Agency (OCWA). The Barwick Drinking Water System is comprised of four non-GUDI groundwater wells, one drinking water treatment plant and approximately 3 kilometers of watermains.

The state of the infrastructure for the water network is summarized in the following table:

Replacement Cost	Condition	Financial Capacity	
$5,545,000	Poor (30%)	Annual Requirement:	$128,000
		Funding Available:	$-
		Annual Deficit:	$128,000

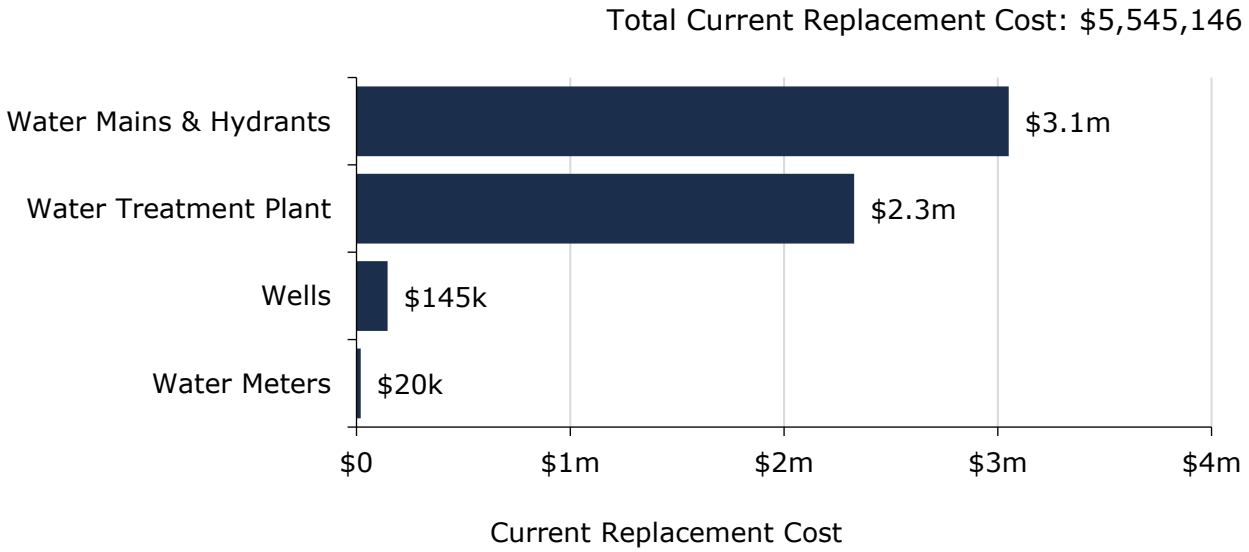
Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Water Mains & Hydrants	2,830	Meters	User-Defined	$3,051,000
Water Meters	1	Assets	CPI	$20,000
Water Treatment Plant	7	Assets	CPI	$2,329,000
Wells	5	Assets	CPI	$145,000
Total				**$5,545,000**

The graph below displays the total replacement cost of each asset segment in Chapple's water network inventory.

Figure 21: Water Network Replacement Cost

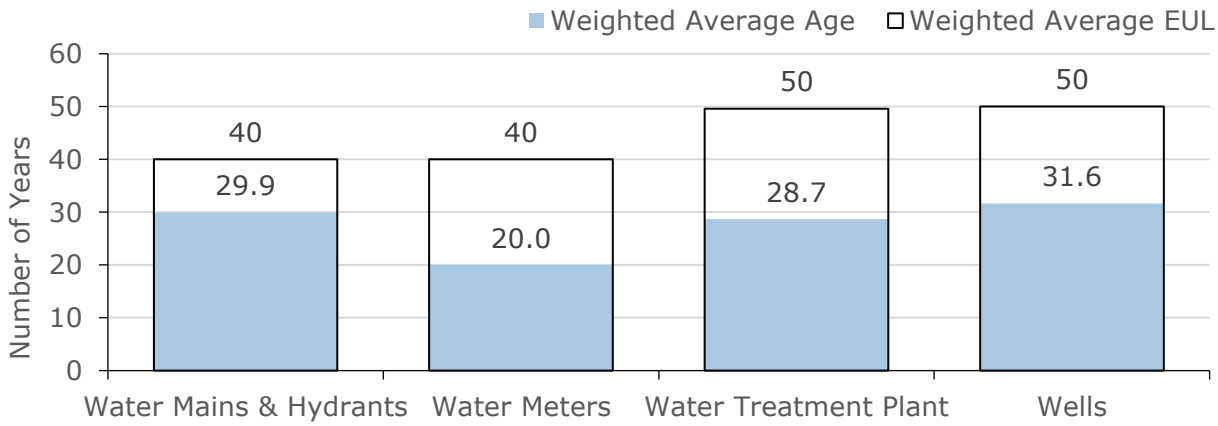


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

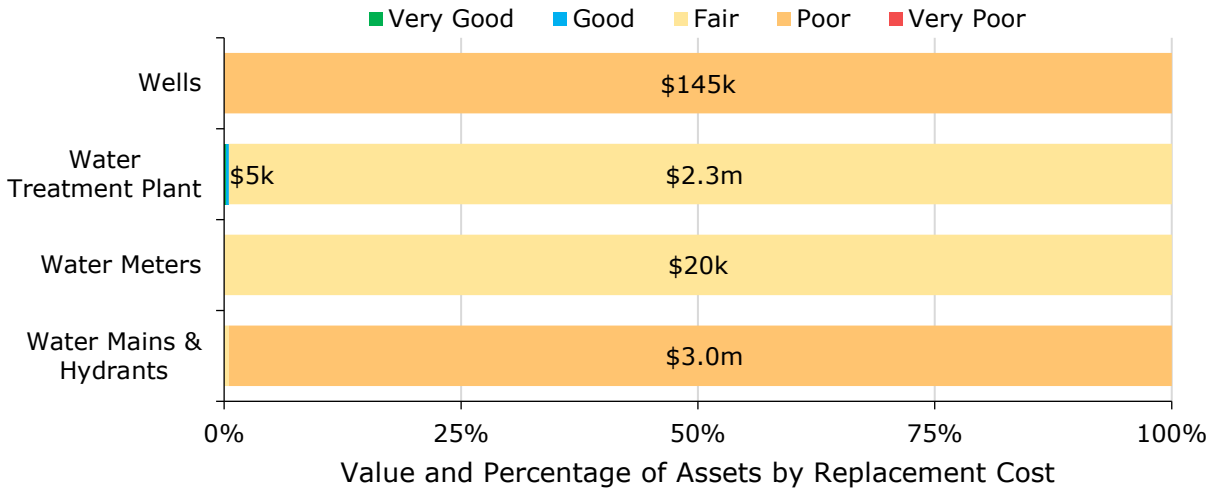
The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Figure 22: Water Network Average Age vs Average EUL



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

Figure 23: Water Network Condition Breakdown



To ensure that the municipal 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 also be reviewed to determine whether adjustments need to be made to better align with the observed service life.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets.

Ontario Clean Water Agency provided the Township with the 2022 Asset Management Plan for Water and Wastewater Systems, which serves as the latest formal documentation of asset conditions for the Water Network. However, there are no additional formal strategies or frameworks in place for ongoing assessments of these networks.

Lifecycle Management Strategy

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

Figure 24: Water Network Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Routine maintenance activities for the Water Network are conducted by the Township's service provider, Ontario Clean Water Agency.
- Rehabilitation of the Water Network is outlined by the service provider. These reports detail all non-routine maintenance activities, capital project forecasting, and estimated costs. The Township utilizes grant funding for prioritized projects whenever funding opportunities are available.
- Replacement is considered when an asset has significantly deteriorated or failed, and when continued rehabilitation is no longer cost-effective. Assets that require frequent and costly repairs are prioritized for replacement to ensure efficiency and reliability of the storm network.

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Chapple should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 25 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 capital requirement of $128,000.

Figure 25: Water Network Forecasted Capital Replacement Requirements

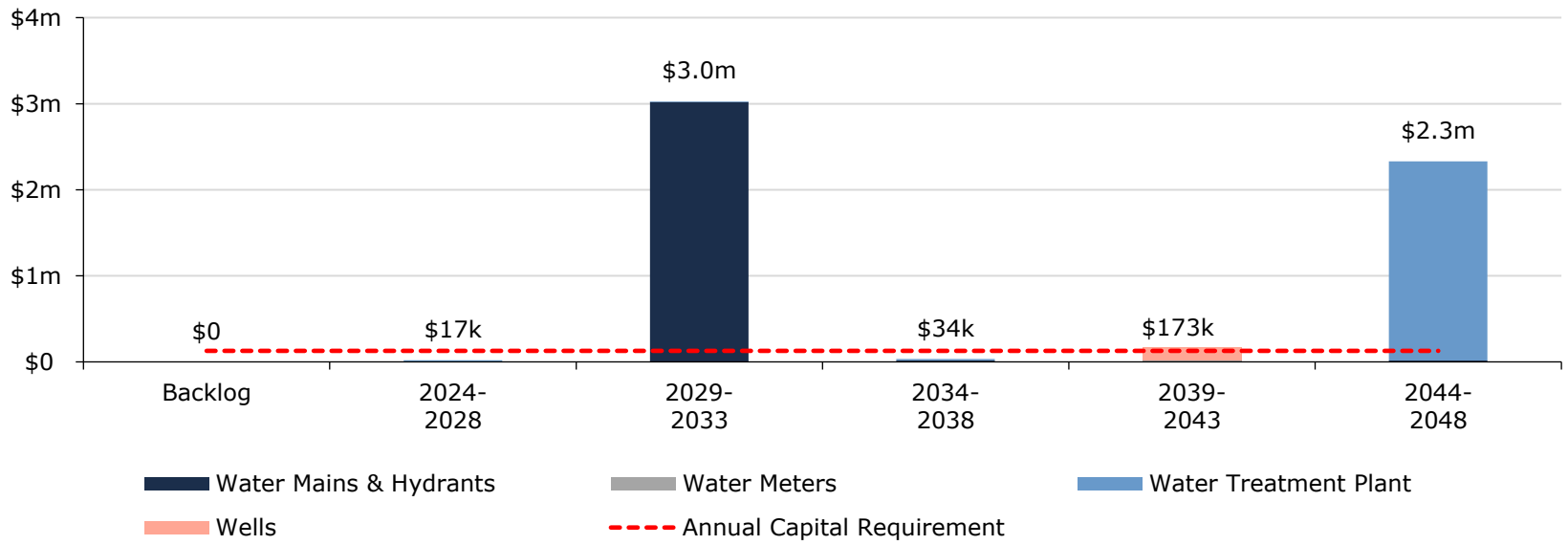


Table 13 Water Network System-Generated 10-Year Capital Costs below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service.

Table 13 Water Network System-Generated 10-Year Capital Costs

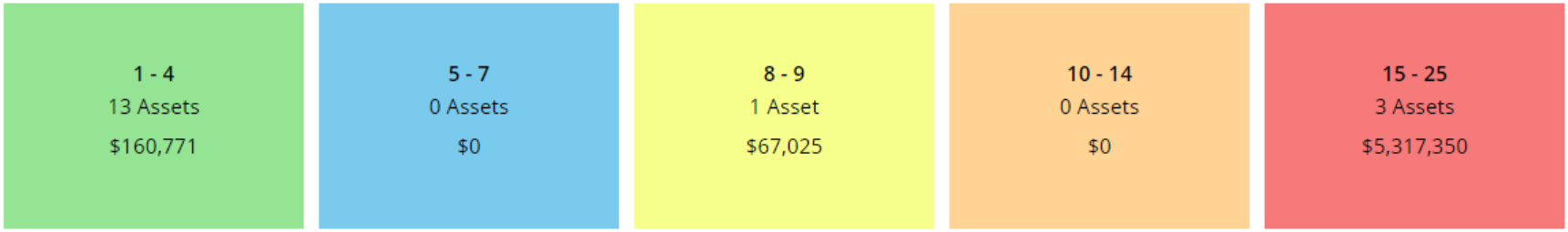
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Water Mains & Hydrants	$3.0m	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3.0m
Water Meters	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Treatment Plant	$25k	$0	$0	$0	$0	$17k	$3k	$5k	$0	$0	$0
Wells	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$3.0m**	**$0**	**$0**	**$0**	**$0**	**$17k**	**$3k**	**$5k**	**$0**	**$0**	**$3.0m**

These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for water network assets.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 26: Water Network Risk Matrix



This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted 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 water assets are documented below:

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

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 sanitary service delivery that the Municipality is currently facing:

Capital Funding Strategies

Major capital projects for rehabilitation and replacement of Water Network is heavily dependent on grant funding. When grants are unavailable, these critical projects may be deferred, leading to aging infrastructure and increased repair costs. Developing an annual capital funding strategy would reduce reliance on grants and help ensure timely investment in asset renewal, minimizing the risk of deferred maintenance and service disruptions.

Levels of Service

The following tables identify the Township's metrics to identify their current level of service for the Water Network. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

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

Table 14 Water Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	In the Township of Chapple, the Urban Settlement Area of Barwick is integrated into the municipal water system, encompassing approximately 16% of the population.
Reliability	Description of boil water advisories and service interruptions	On September 8th, 2023, a single boil water advisory was issued. Immediate measures were undertaken to rectify the situation and restore regular water service within the same day.

Technical Levels of Service

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

Table 15 Water Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2023)
Scope	% of properties connected to the municipal water system	18%[5]
	% of properties where fire flow is available	18%
	Average Risk Rating	16.39 (Very High)
Reliability	# of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system	0 : 59
	# 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	1 : 59[6]
	Average Condition Rating	Poor (30%)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	0% - 2.3%

[5] 59 out of 332 households are connected to the municipal water system.
[6] One BWA was issued in 2023 on September 8th and the issue was corrected.

Appendix D: Sanitary Sewer Network

State of the Infrastructure

The Urban Settlement Area of Barwick in the Township of Chapple receives sanitary services, which are managed and maintained through a partnership with the Ontario Clean Water Agency (OCWA).

The state of the infrastructure for the Sanitary Sewer Network is summarized in the following table:

Replacement Cost	Condition	Financial Capacity	
$4,289,000	Poor (29%)	Annual Requirement:	$89,000
		Funding Available:	$-
		Annual Deficit:	$89,000

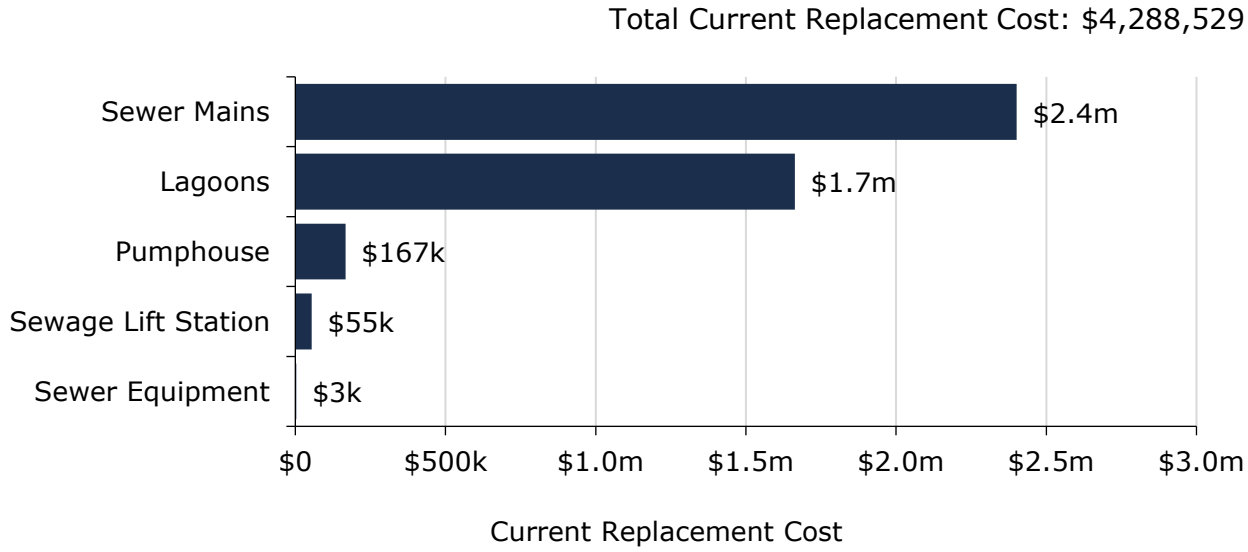
Inventory & Valuation

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment for the Township's Sanitary Network.

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Lagoons	1	Assets	User-Defined	$1,663,000
Pumphouse	1	Assets	CPI	$167,000
Sewage Lift Station	1	Assets	CPI	$55,000
Sewer Equipment	1	Assets	CPI	$3,000
Sewer Mains	4	Assets	CPI	$2,401,000
Total	**14**	**Assets**		**$4,289,000**

The graph below displays the total replacement cost of each asset segment in Chapple's Sanitary Sewer Network inventory.

Figure 27: Sanitary Sewer Network Replacement Cost

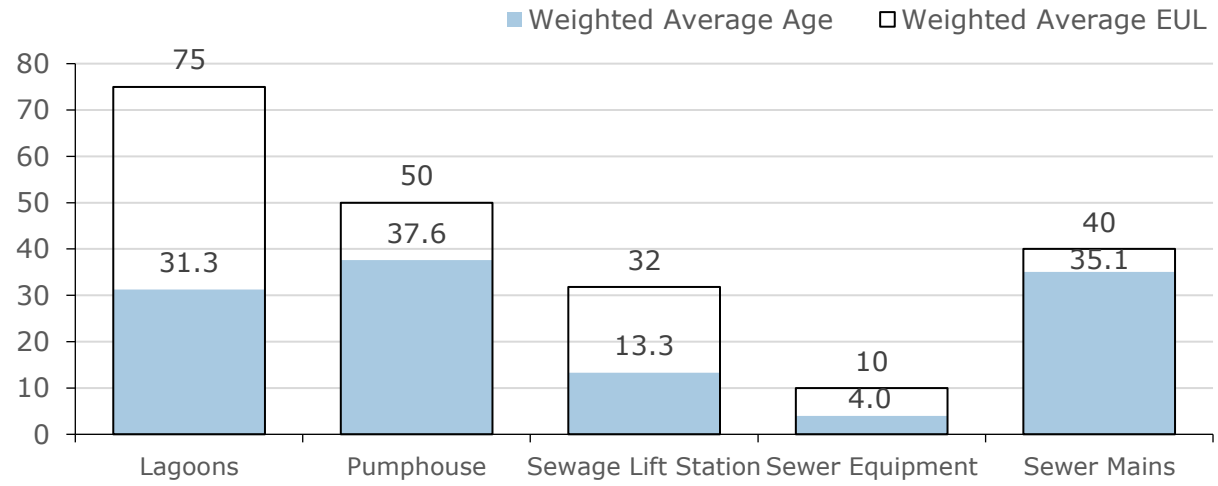


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

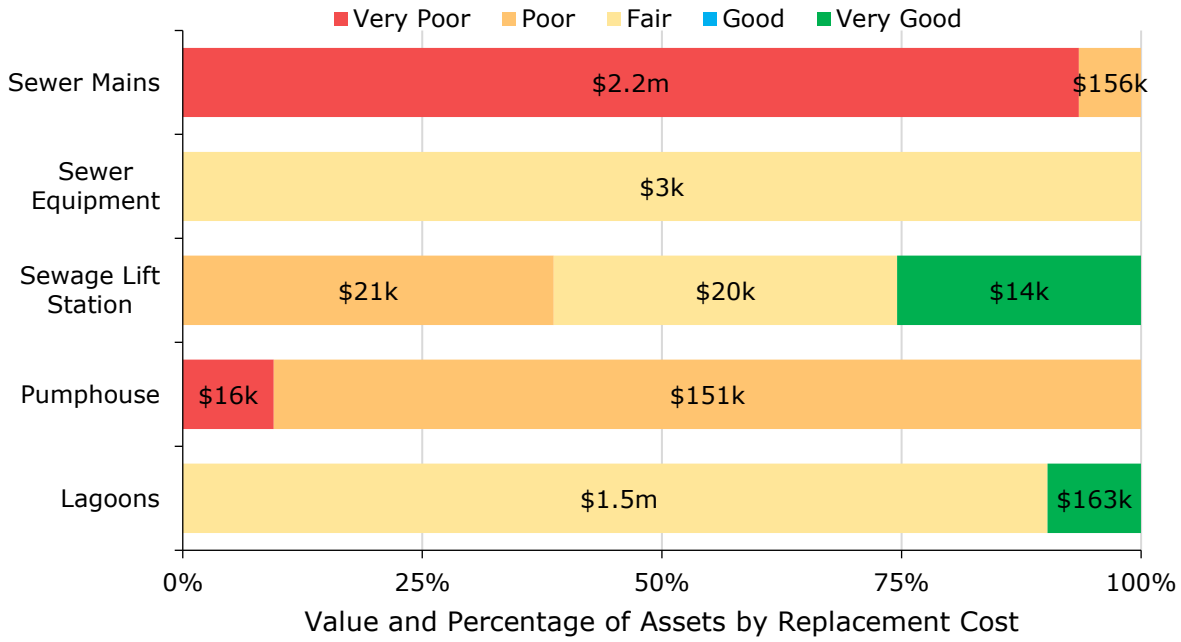
The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Figure 28: Sanitary Sewer Network Average Age vs Average EUL



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

Figure 29: Sanitary Sewer Network Condition Breakdown



To ensure that the municipal Sanitary Sewer 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 sewer network.

Each asset's estimated useful life should also be reviewed to determine whether adjustments need to be made to better align with the observed service life.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets.

Ontario Clean Water Agency provided the Township with the 2022 Asset Management Plan for Water and Wastewater Systems, which serves as the latest formal documentation of asset conditions for the Sanitary Sewer Network. However, there are no additional formal strategies or frameworks in place for ongoing assessments of these networks.

Lifecycle Management Strategy

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

Figure 30: Sanitary Sewer Network Current Lifecycle Strategy

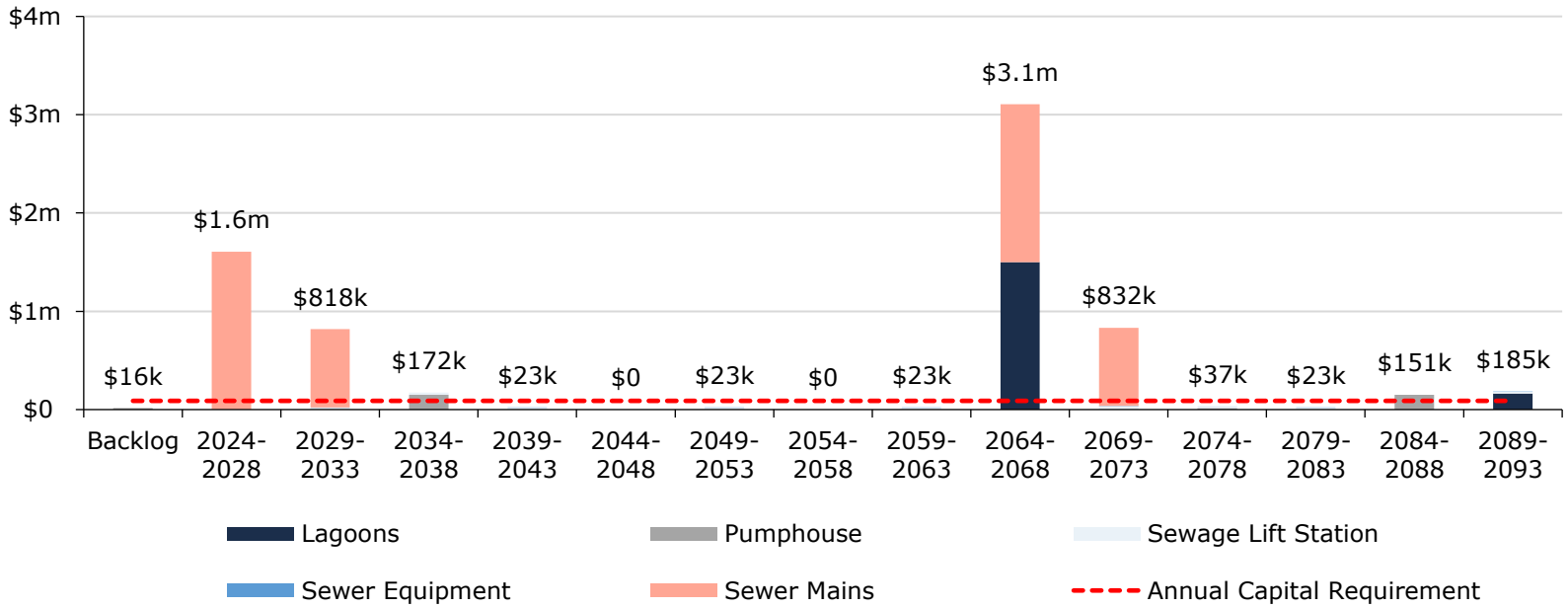
Maintenance / Rehabilitation / Replacement

- Routine maintenance activities for the Sanitary Sewer Network are conducted by the Township's service provider, Ontario Clean Water Agency.
- Rehabilitation of the Sanitary Sewer Network is outlined by the service provider. These reports detail all non-routine maintenance activities, capital project forecasting, and estimated costs. The Township utilizes grant funding for prioritized projects whenever funding opportunities are available.
- Replacement is considered when an asset has significantly deteriorated or failed, and when continued rehabilitation is no longer cost-effective. Assets that require frequent and costly repairs are prioritized for replacement to ensure efficiency and reliability of the storm network.

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Chapple 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 capital requirements at $89,000.

Figure 31: Sanitary Sewer Network Forecasted Capital Replacement Requirements



The Table below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service.

Table 16 Sanitary Sewer Network System-Generated 10-Year Capital Costs

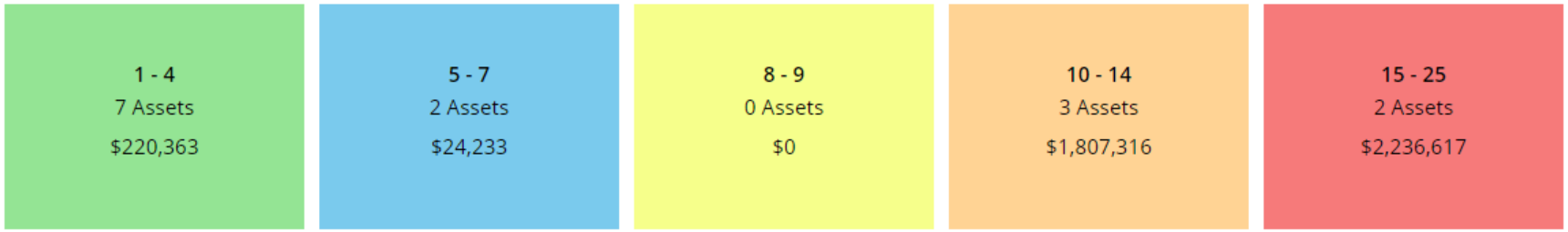
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Lagoons	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pumphouse	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sewage Lift Station	$20k	$0	$0	$0	$0	$0	$20k	$0	$0	$0	$0
Sewer Equipment	$3k	$0	$0	$0	$0	$0	$3k	$0	$0	$0	$0
Sewer Mains	$2.4m	$0	$8k	$0	$1.6m	$0	$639k	$0	$0	$0	$156k
Total	**$2.4m**	**$0**	**$8k**	**$0**	**$1.6m**	**$0**	**$662k**	**$0**	**$0**	**$0**	**$156k**

These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for sanitary network assets.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 32: Sanitary Sewer Network Risk Matrix



This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted 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 water assets are documented below:

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

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 sanitary service delivery that the Municipality is currently facing:

Capital Funding Strategies

Major capital projects for rehabilitation and replacement of Water Network are heavily dependent on grant funding. When grants are unavailable, these critical projects may be deferred, leading to aging infrastructure and increased repair costs. Developing an annual capital funding strategy would reduce reliance on grants and help ensure timely investment in asset renewal, minimizing the risk of deferred maintenance and service disruptions.

Levels of Service

The following tables identify the Township's metrics to identify their current level of service for the Water Network. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

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

Table 17 Sanitary Sewer Network Community Levels of Service

Values	Qualitative Description	Current LOS (2023)
Scope	Description, which may include maps, areas of the municipality that are connected to the municipal wastewater system	In the Township of Chapple, the Urban Settlement Area of Barwick is integrated into the municipal water system, encompassing approximately 16% of the population.
	Average Risk Rating	17.53 – (Very High)
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 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 stormwater to the storm drain system help to reduce the chance of overflow.

Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid stormwater infiltration	The municipality adheres to design standards that incorporate appropriate overflows when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups.
Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system.	Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants.

Technical Levels of Service

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

Table 18 Sanitary Sewer Network Technical Levels of Service

Values	Technical Metric	Current LOS (2022)
Scope	% of properties connected to the municipal wastewater systems	16%
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	Not Applicable
	# of connection-days per year with sanitary main backups compared to the total number of properties connected to the municipal wastewater system	0 : 59[7]
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	1 : 59[8]
	Average Condition Rating	Poor (29%)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	0% - 2.1%

[7] 2023 data was not available at the time of reporting.
[8] 2023 data was not available at the time of reporting.

Appendix E: Storm Network

State of the Infrastructure

The Township is responsible for owning and maintaining a storm network consisting of drains and culverts.

The state of the infrastructure for the Storm Network is summarized in the following table:

Replacement Cost	Condition	Financial Capacity	
		Annual Requirement:	$29,000
$1,174,000	Very Poor (18%)	Funding Available:	$-
		Annual Deficit:	$29,000

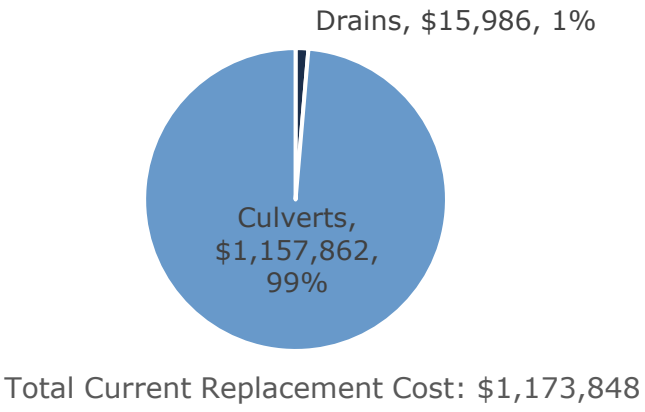
Inventory & Valuation

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment for the Township's Storm Network.

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Culverts	28	Assets	User-Defined	$1,158,000
Drains	3	Assets	CPI	$16,000
Total	**31**	**Assets**		**$1,174,000**

The graph below displays the total replacement cost of each asset segment in Chapple's Storm Network inventory.

Figure 33: Storm Network Replacement Cost



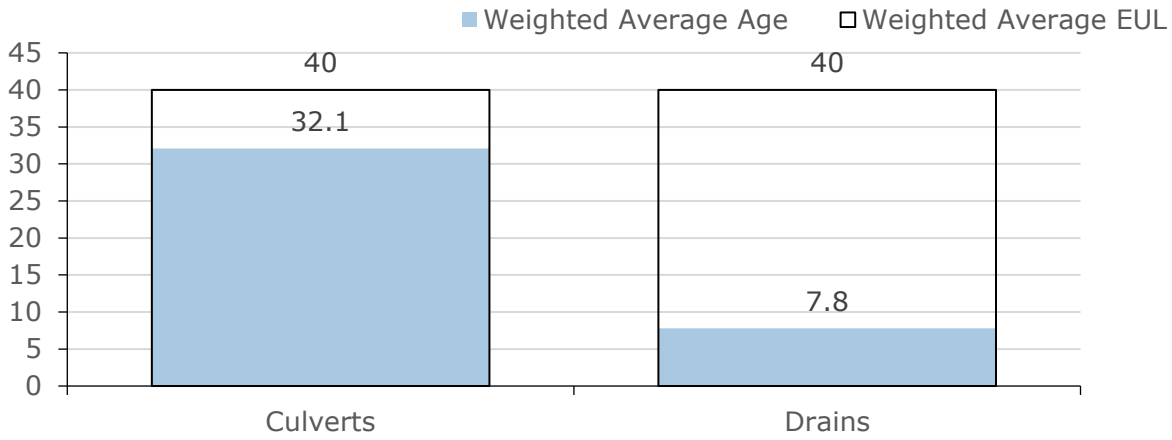
Total Current Replacement Cost: $1,173,848

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

Asset Condition & Age

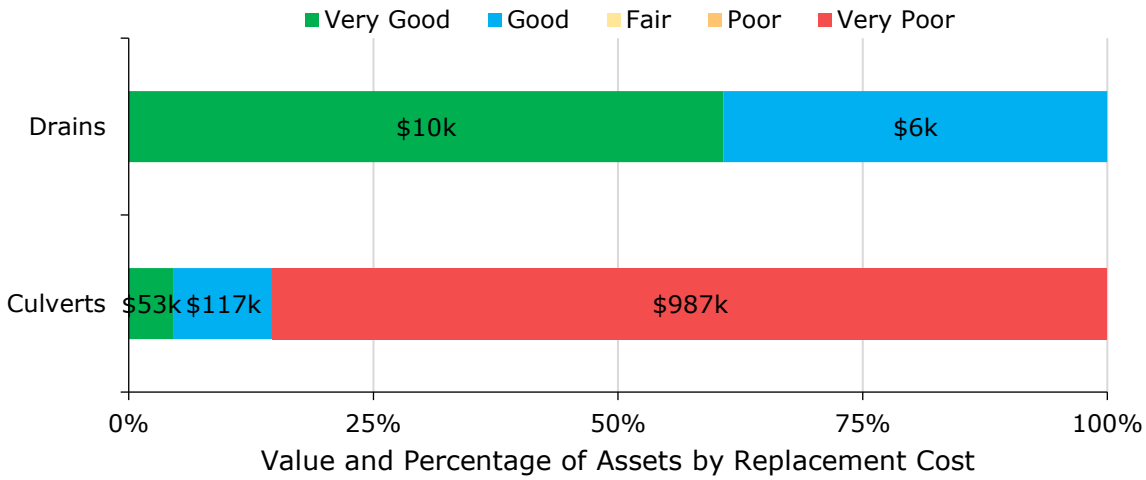
The table below identifies the current average condition, the average age, and the estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Figure 34: Storm Network Average Age vs Average EUL



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

Figure 35: Storm Network Condition Breakdown



To ensure that the municipal 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 Storm network.

Each asset's estimated useful life should also be reviewed to determine whether adjustments need to be made to better align with the observed service life.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Storm sewer lines are inspected on an as-needed basis, in coordination with other water and sanitary assets. Regular inspections of storm ponds are conducted on a regulated schedule.

Lifecycle Management Strategy

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

Figure 36: Storm Network Current Lifecycle Strategy

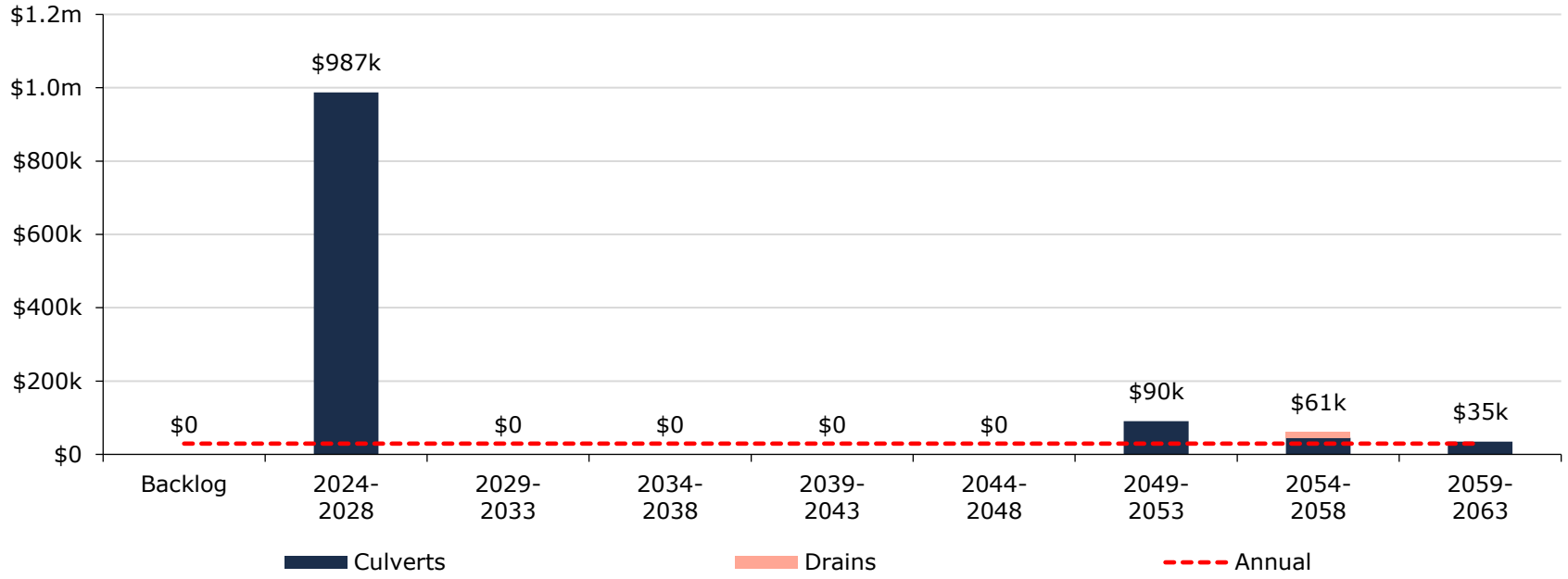
Maintenance / Rehabilitation / Replacement

- Routine maintenance of the storm network includes minor repairs, cleaning, and vegetation control, which are all initiated based on findings from visual inspections conducted semiannually
- Rehabilitation activities include structural repairs

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Chapple 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 capital requirements at $29,000.

Figure 37: Storm Network Forecasted Capital Replacement Requirements



The Table below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service.

Table 19 Storm Network System-Generated 10-Year Capital Costs

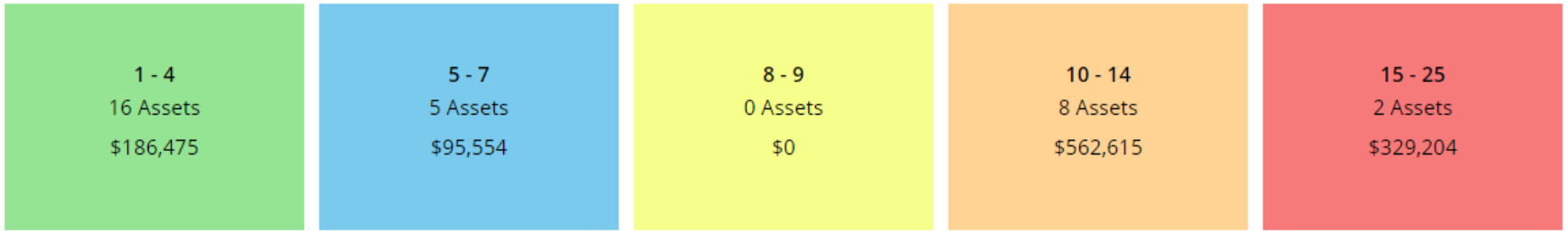
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Culverts	$987k	$0	$0	$0	$987k	$0	$0	$0	$0	$0	$0
Drains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$987k**	**$0**	**$0**	**$0**	**$987k**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

These projections are generated in Citywide and rely on the data available in the asset register. Assessed condition data and replacement costs were used to assist in forecasting replacement needs for storm sewer lines assets.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 38: Storm Network Risk Matrix



This is a high-level model developed by Township staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The asset-specific attributes that Township 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 (Economic)

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 Weather Events

Climate change and extreme weather events significantly strain a Township's storm network by intensifying storm severity, leading to issues such as washouts around manholes. These conditions compromise the system's integrity, increasing the likelihood of failures and overwhelming its capacity. Consequently, this can result in flooding and substantial property damage, highlighting the need for reinforcing the network's infrastructure to better manage these environmental challenges.

Lifecycle Management Strategies and Infrastructure Reinvestment

The lack of effective lifecycle management strategies and insufficient reinvestment in a Township's storm network can lead to risks, despite current investment levels being adequate for routine maintenance. The strategies in place fail to fully account for replacement costs, particularly not reflecting inflation and rising construction costs. This gap can result in underfunded major projects, such as expansions to new subdivisions, which would require additional grant funding to complete. This can lead to delayed replacements and a deteriorating storm network, increasing the risk of failure during severe weather events and leading to potential safety hazards and escalated emergency repair costs.

Levels of Service

The following tables identify the Township's metrics to identify their current level of service for the Water Network. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

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

Table 20 Storm Network Community Levels of Service

Values	Qualitative Description	Current LOS (2023)
Sustainable	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	The Township's protection against flooding extends to various user groups residing in settlement areas, facilitated by the placement of underground linear stormwater assets and associated structures along roadways. Additionally, the inclusion of minor culverts across the township's road network aids in effectively managing stormwater runoff from properties and roadways.

Technical Levels of Service

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

Table 21 Storm Network Technical Levels of Service

Values	Technical Metric	Current LOS (2023)
Scope	% of properties in municipality resilient to a 100-year storm.	TBD[9]
	% of the municipal stormwater management system resilient to a 5-year storm	100%[10]
	Average Risk Rating	9.67 (Moderate)
Reliability	Average Condition Rating	Very Poor (18%)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	0% - 2.5%

[9] Data is not presently available to conclusively 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.

[10] The calculations presented in this report are based on the assumption that the infrastructure is fit for purpose and designed to withstand a 5-year storm event. It is important to note that actual resilience may vary depending on factors such as maintenance, construction quality, and environmental changes.

Appendix F: Buildings

State of the Infrastructure

Chapple owns and maintains several facilities that provide key services to the community. These include:

- General Government buildings such as a mortuary and municipal offices
- Protection buildings such as fire stations and a fire training centre
- Transportation buildings such as municipal garages
- Recreation and cultural facilities such as a museum, lighthouse, church and hall

The state of the infrastructure for the buildings and facilities is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$5,293,000	Poor (23%)	Annual Requirement:	$106,000
		Funding Available:	$-
		Annual Deficit:	$106,000

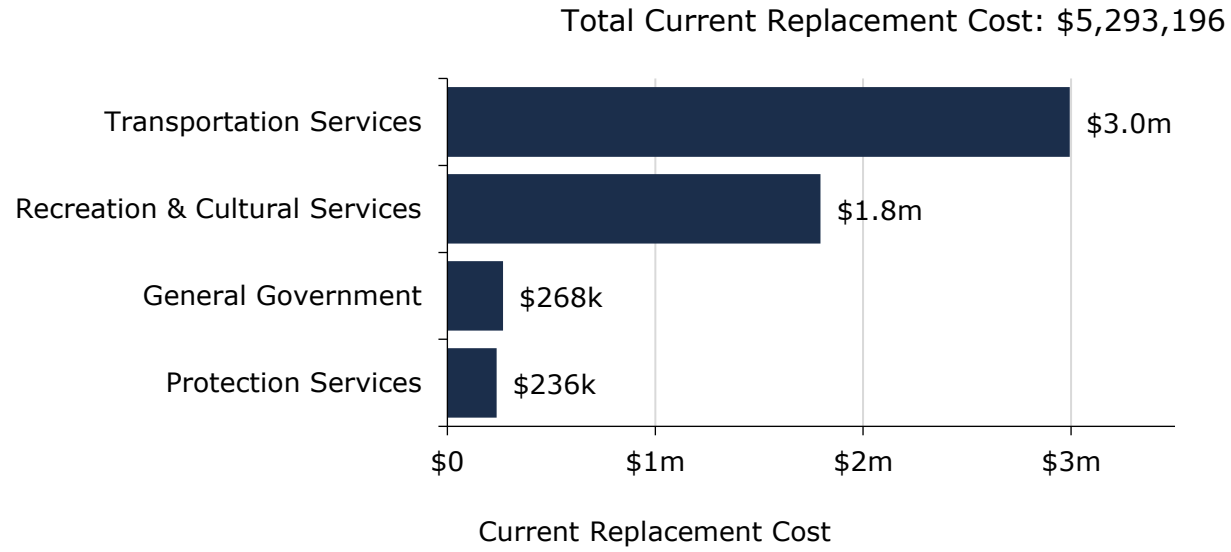
Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
General Government	2	Assets	CPI	$268,000
Protection Services	3	Assets	CPI	$236,000
Recreation & Cultural Services	4	Assets	User-defined	$1,795,000
Transportation Services	3	Assets	CPI	$2,994,000
Total	**12**	**Assets**		**$5,293,000**

The graph below displays the total replacement cost of each asset segment in Chapple's buildings inventory.

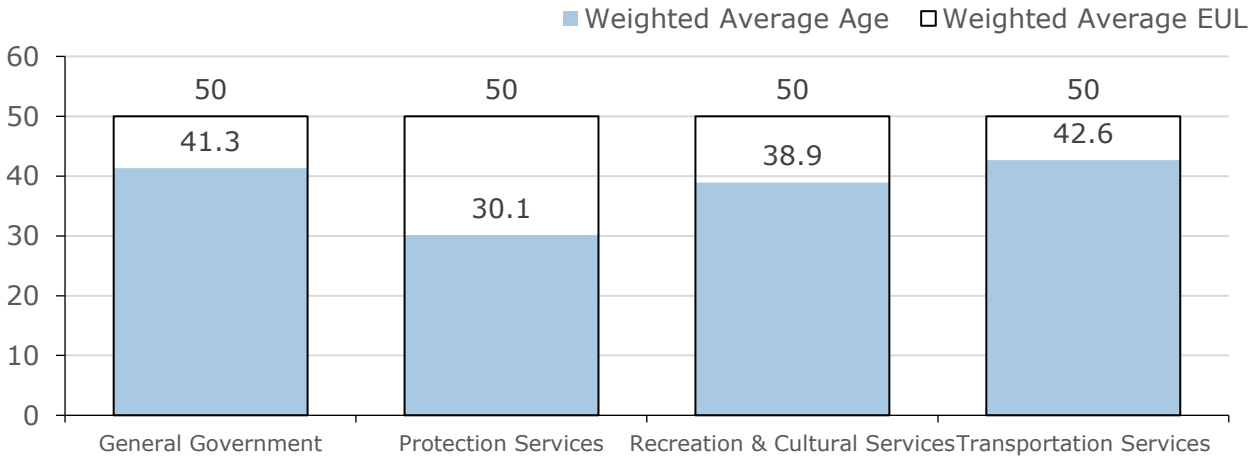
Figure 39: Buildings Replacement Cost



Asset Condition & Age

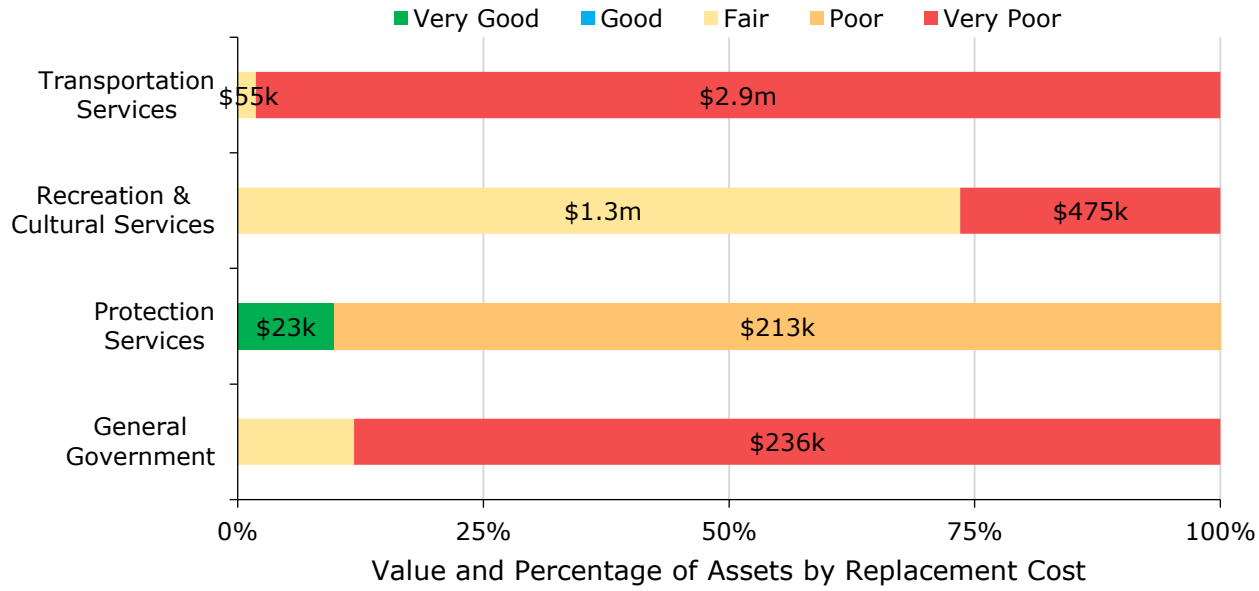
The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 40: Buildings Average Age vs Average EUL



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

Figure 41: Buildings Condition Breakdown



To ensure that the municipal buildings 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 buildings.

Each asset's estimated useful life should also be reviewed to determine whether adjustments need to be made to better align with the observed service life.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Municipal Buildings undergo annual safety inspections to ensure compliance with health and safety standards, with the most recent inspection completed in 2023 which are completed by internal staff. More detailed assessments are carried out by external consultants to provide an in-depth evaluation of the building's condition and safety.

Lifecycle Management Strategy

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

Figure 42: Buildings Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Routine maintenance activities for buildings include shingle repairs, painting or staining, and other minor repairs as necessary
- Regular inspections are conducted to identify and address safety, accessibility, and structural issues
- Rehabilitation activities for buildings may involve roof repairs or replacements and window or door replacements
- Replacement is considered when a building's condition has significantly deteriorated, and when maintenance and rehabilitation efforts are no longer cost-effective. Buildings nearing the end of their expected service life or those requiring frequent and costly repairs are prioritized for replacemen

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Chapple should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 50 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 capital requirements at $106,000.

Figure 43: Buildings Forecasted Capital Replacement Requirements

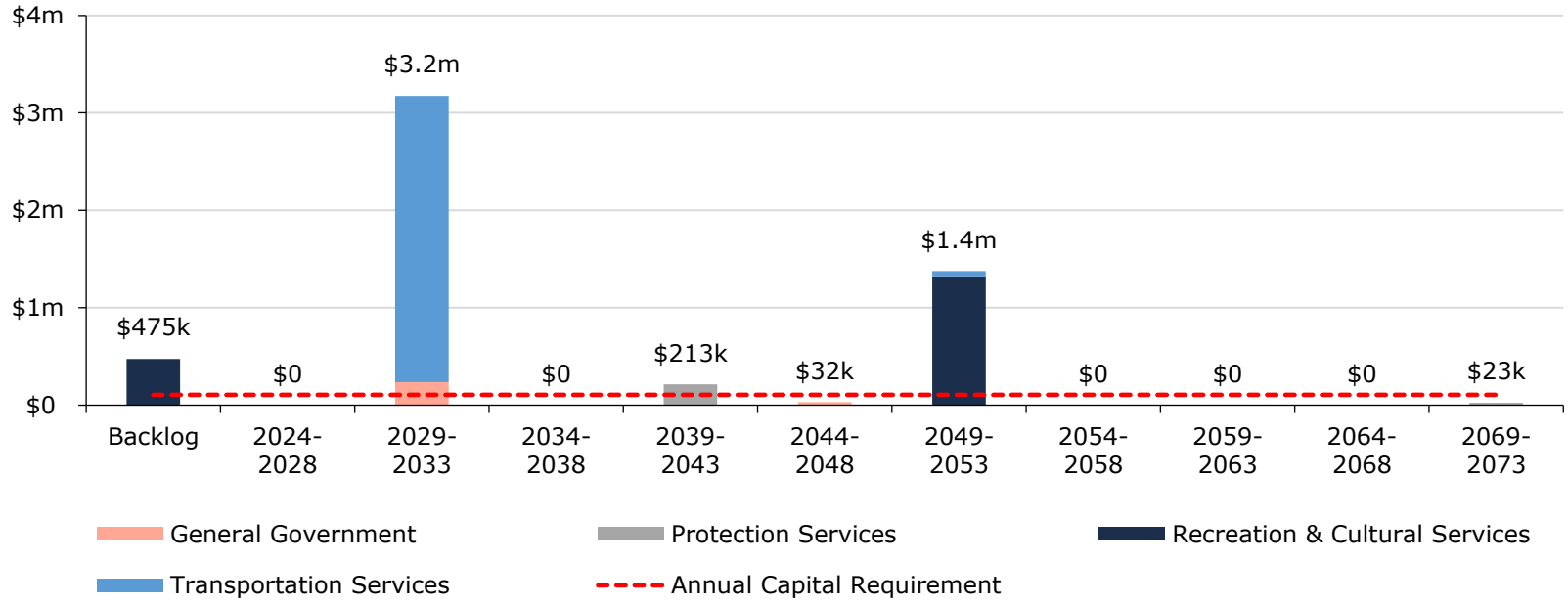


Table 22 below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service.

Table 22 Buildings System-Generated 10-Year Capital Costs

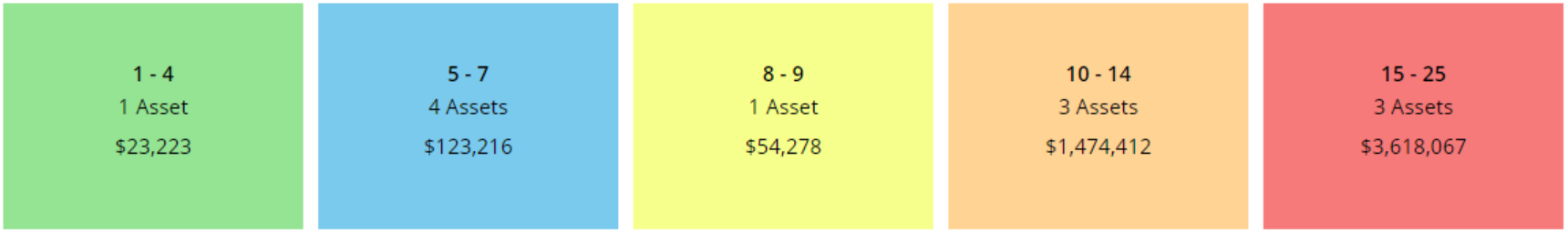
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
General Government	$236k	$0	$0	$0	$0	$0	$0	$236k	$0	$0	$0
Protection Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recreation & Cultural Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transportation Services	$2.9m	$0	$0	$0	$0	$0	$0	$2.9m	$0	$0	$0
Total	**$3.2m**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$3.2m**	**$0**	**$0**	**$0**

These projections are generated in Citywide and rely on the data available in the asset register, which was limited to asset age, replacement cost, and useful life.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 44: Buildings Risk Matrix



This is a high-level model developed by Township staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The asset-specific attributes that Township staff utilize to define and prioritize the criticality of buildings are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
Service Life Remaining (%)	

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 lack of infrastructure reinvestment poses a significant risk to the Township's buildings. As some buildings reach the end of their useful life, they require more extensive maintenance and eventual replacement to continue serving their intended functions safely and effectively. However, the current level of investment in the Township's infrastructure falls short of what is needed to meet lifecycle requirements and maintain a good state of repair. Major projects rely on grant funding for major projects, which can be uncertain and inconsistent. Consequently, the Township faces increased risks of infrastructure failure, potentially leading to higher long-term costs and disruptions in services, all of which could impact the safety and well-being of the community.

Levels of Service

By comparing the cost, performance (average condition) and risk year-over-year, the Township will be able to evaluate how their services/assets are trending. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

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

Table 23 Buildings Community Levels of Service

Values	Technical Metric	Current LOS (2023)
Scope	Description of the current condition of municipal buildings and the plans that are in place to maintain or improve the provided level of service	The overall condition of the buildings in the Township is poor. Township staff are currently in the planning stages of implementing formal building condition assessments to identify required maintenance and rehabilitation activities to ensure the state of the buildings remains in adequate condition

Technical Levels of Service

The quantitative metrics that determine the technical level of service provided by the buildings in Chapple are going to be the analysis of reinvestment rates, asset performance (condition breakdown) and asset risk levels.

Table 24 Buildings Technical Levels of Service

Values	Technical Metric	Current LOS (2023)
Scope	Average Condition Rating	Poor (23%)
	Average Risk Rating	Very High (19.3)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	0% - 2.0%

Appendix G: Land Improvements

State of the Infrastructure

Chapple's land improvement infrastructure is made up of fields and rinks, outdoor structures, parks, and play structures.

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

Replacement Cost	Condition	Financial Capacity	
$935,000	Fair (56%)	Annual Requirement:	$39,000
		Funding Available:	$53,527
		Annual Deficit:	$(14,527)

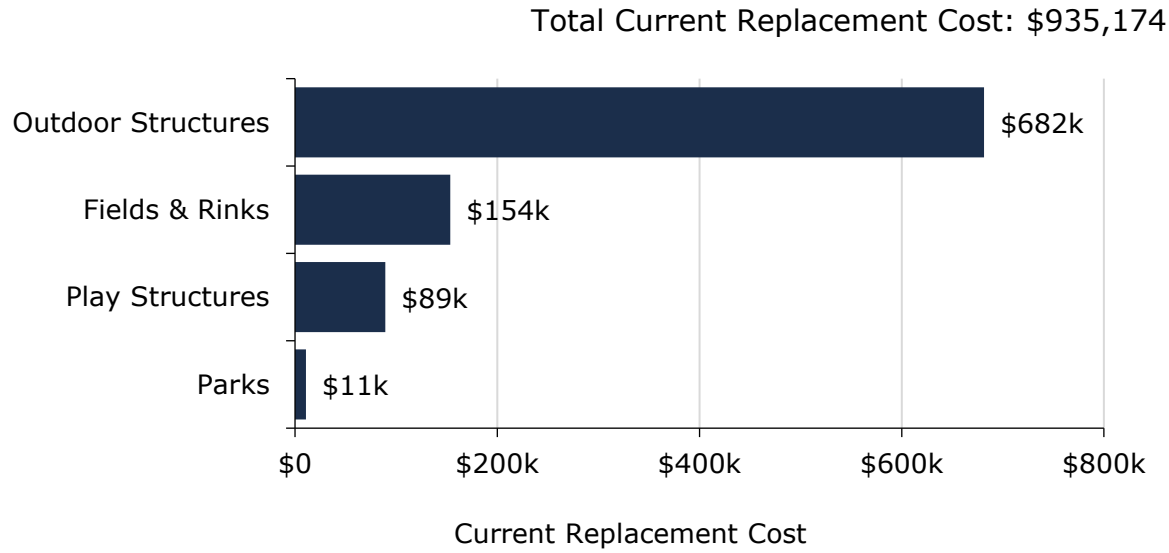
Asset Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Fields & Rinks	4	Assets	CPI	$154,000
Outdoor Structures	17	Assets	CPI	$682,000
Parks	1	Assets	CPI	$11,000
Play Structures	4	Assets	CPI	$89,000
Total	**26**	**Assets**		**$935,000**

The graph below displays the replacement cost of each asset segment in the Township's land improvement inventory.

Figure 45: Land Improvements Replacement Cost

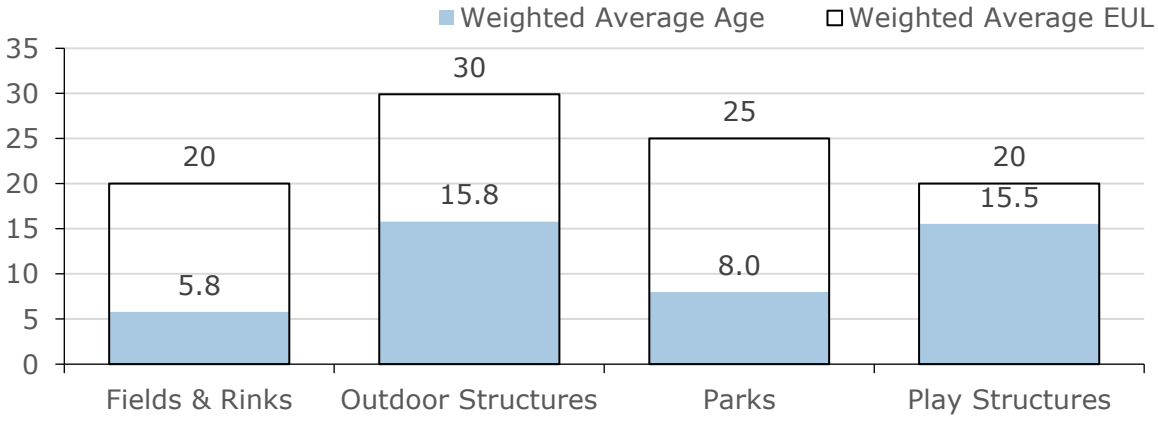


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

Asset Condition & Age

The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

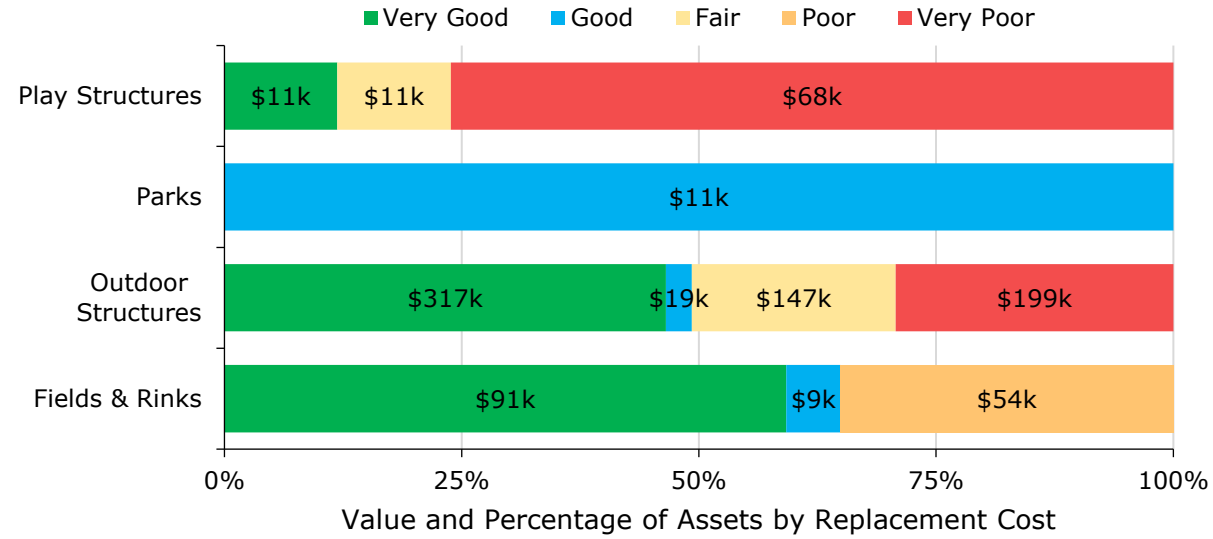
Figure 46: Land Improvements Average Age vs Average EUL



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.

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

Figure 47: Land Improvement Condition Breakdown



To ensure that the Township's land improvements 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 activities is required to increase the overall condition of the land improvements.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets.

Land improvements and parks within the Township are assessed annually to ensure they meet safety and maintenance standards, with the most recent inspection completed in 2023. These assessments are primarily conducted by internal staff, who systematically evaluate the condition and functionality of these areas to maintain their quality and usability for the community.

Lifecycle Management Strategy

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. The following figures outline Chapple's current lifecycle management strategy.

Figure 48: Land Improvements Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

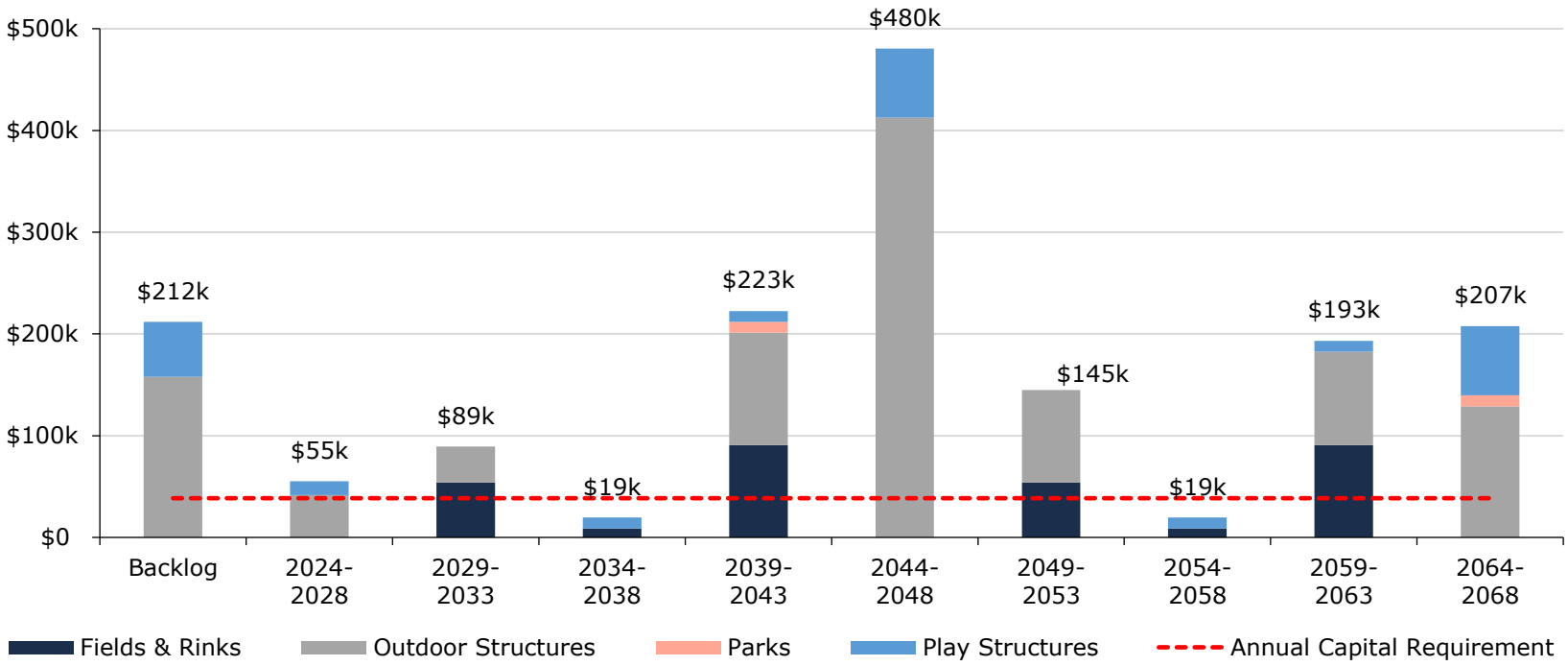
- Routine maintenance of land improvement assets includes cleaning, minor repairs, and vegetation management
- Safety inspections are completed on play structures on a monthly basis
- Rehabilitation activities for land improvement assets include staining structures, applying new shingles to roofs, and replacing boards on structures, and are performed on an as-needed basis
- Replacement is considered when an asset's condition has significantly deteriorated, and ongoing maintenance is no longer cost-effective. Assets nearing the end of their expected service life or requiring frequent and costly repairs are prioritized for replacement

Forecasted Capital Requirements

Figure 51 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Township's land improvement infrastructure. This analysis was run until 2068 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Chapple's average annual requirements (red dotted line) total $39,000 for all land improvement assets. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 49: Land Improvements Forecasted Capital Replacement Requirements



It is unlikely that all land improvements will need to be replaced as forecasted. Coordinated projects may help drive replacements and rehabilitations.

Table 25 below summarizes the projected cost of lifecycle activities (capital replacement only) that will need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register, which was limited to asset age, replacement cost, and useful life.

Table 25 Land Improvements System-Generated 10-Year Capital Costs

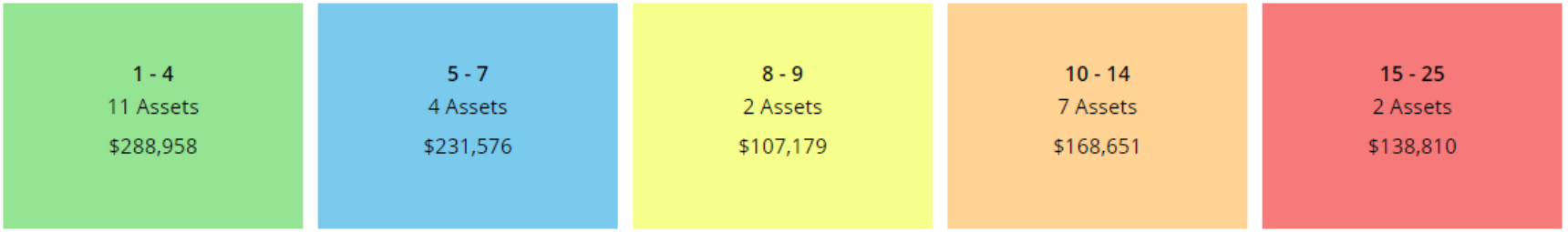
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Fields & Rinks	$54k	$0	$0	$0	$0	$0	$54k	$0	$0	$0	$0
Outdoor Structures	$77k	$24k	$0	$0	$17k	$0	$0	$0	$0	$0	$35k
Parks	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Play Structures	$14k	$0	$0	$0	$0	$14k	$0	$0	$0	$0	$0
Total	**$145k**	**$24k**	**$0**	**$0**	**$17k**	**$14k**	**$54k**	**$0**	**$0**	**$0**	**$35k**

Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Township's capital expenditure forecasts.

Risk & Criticality

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

Figure 50: Land Improvement Risk Matrix



This is a high-level model developed by Township staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The asset-specific attributes that Township 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 (Economic)
Service Life Remaining (%)	

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 Weather Events

Climate change and extreme weather events present a risk to a Township's land improvement assets. The increasing frequency and intensity of storms and fluctuating water levels can rapidly age and deteriorate outdoor structures. These weather conditions not only accelerate the wear and tear on these assets but also pose safety risks to the public and increase maintenance costs. As a result, the Township must consider these impacts and consider upgrades and replacements which mitigate the impacts of these environmental changes on its infrastructure.

Levels of Service

The following tables identify Chapple's metrics to identify the current level of service for the land improvement assets. By comparing the cost, performance (average condition) and risk year-over-year the Township will be able to evaluate how their services/assets are trending. Chapple will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

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

Table 26 Land Improvements Community Levels of Service

Values	Technical Metric	Current LOS (2023)
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 are moderate. Consistent 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 the municipal Land Improvements.

Table 27 Land Improvements Technical Levels of Service

Values	Technical Metric	Current LOS (2023)
Scope	Average Condition Rating	Fair (56%)
	Average Risk Rating	Low (7.3)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	5.7% - 4.2%

Appendix H: Machinery & Equipment

State of the Infrastructure

To maintain the quality stewardship of Chapple's infrastructure and support the delivery of services, municipal staff own and employ various types of equipment. This includes:

- General government equipment to support municipal services
- Equipment for the fire department to effectively respond to emergencies
- Recreation and cultural service equipment to support fitness centres
- Transportation equipment for public works and transportation services

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

Replacement Cost	Condition	Financial Capacity	
$2,319,000	Poor (32%)	Annual Requirement:	$156,000
		Funding Available:	$75,470
		Annual Deficit:	$80,530

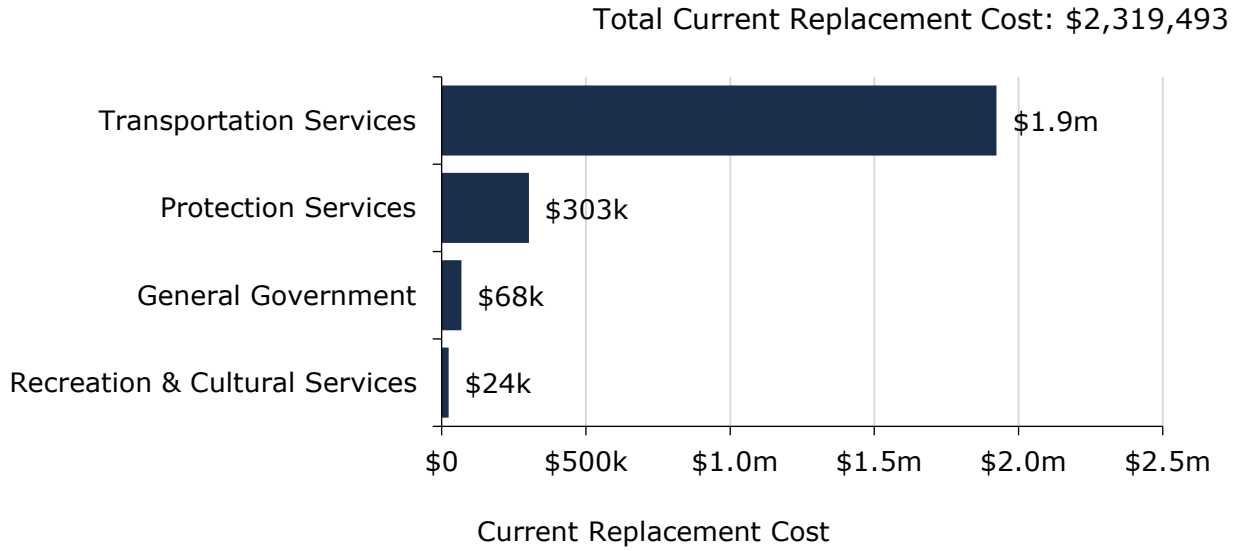
Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
General Government	9	Assets	CPI	$68,000
Protection Services	13	Assets	CPI	$303,000
Recreation & Cultural Services	2	Assets	CPI	$24,000
Transportation Services	24	Assets	CPI	$1,924,000
Total	**48**	**Assets**		**$2,319,000**

The graph below displays the total replacement cost of each asset segment in the Chapple's Machinery & Equipment inventory.

Figure 51: Machinery & Equipment Replacement Costs

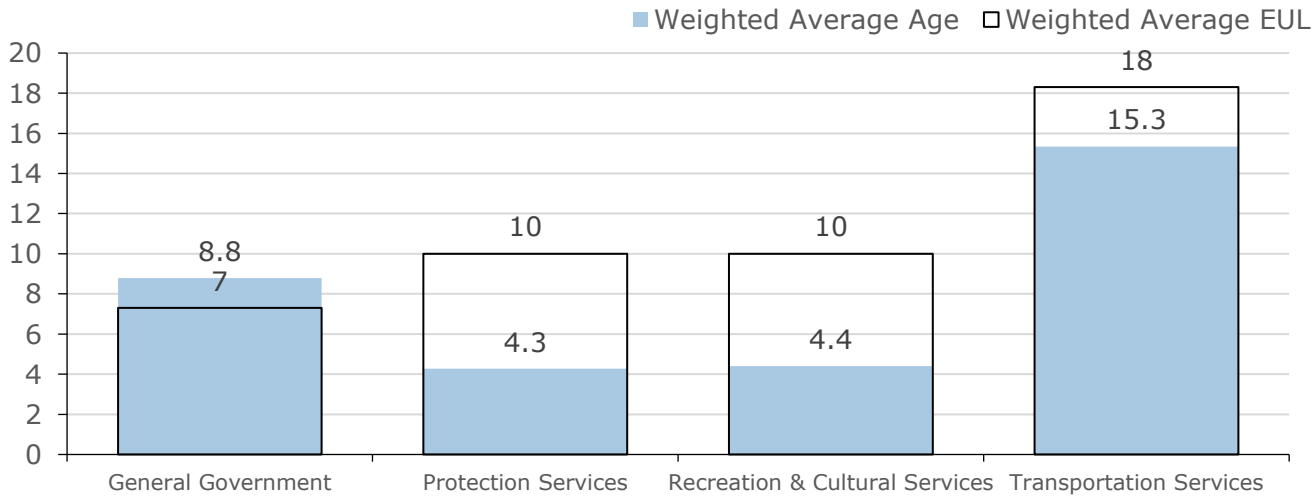


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent capital requirements.

Asset Condition & Age

The graph below identifies the average age and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

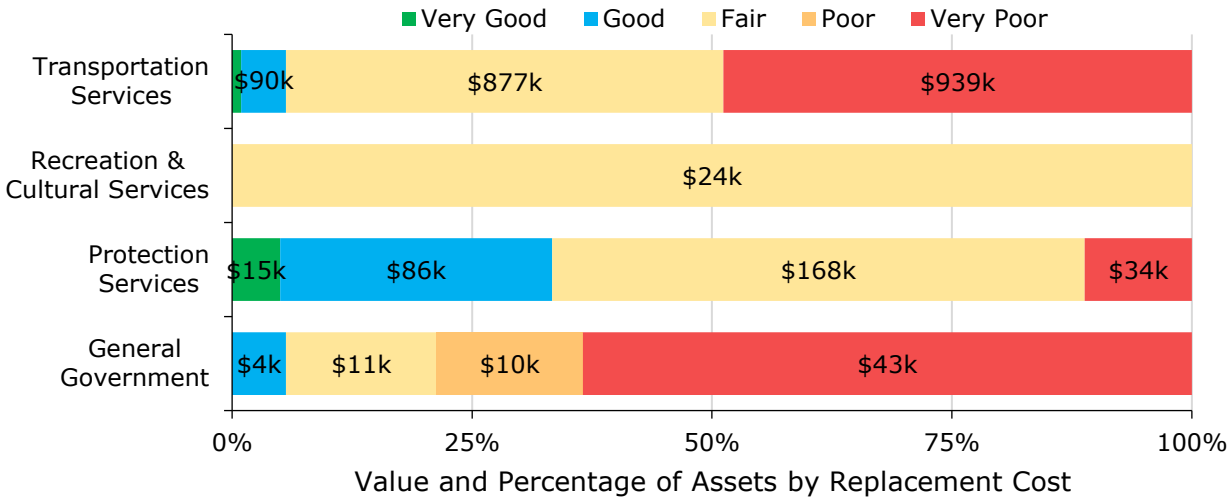
Figure 52: Machinery & Equipment Average Age vs Average EUL



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.

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

Figure 53: Machinery & Equipment Condition Breakdown



To ensure that the Township's equipment continues to provide an acceptable level of service, Chapple should continue to monitor the average condition. 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.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The current approach consists of annual condition assessments based on usage hours to ensure they remain in optimal working condition. These assessments are primarily conducted by internal staff with aim to maintain operational efficiency and prevent breakdowns.

Lifecycle Management Strategy

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

Figure 54: Machinery & Equipment Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Routine maintenance for machinery and equipment minor repairs and oil changes. These activities are initiated based on findings from inspections completed by internal staff that identify safety or structural issues
- Replacement of machinery and equipment is considered when an asset's condition has significantly deteriorated and maintenance is no longer cost-effective. Assets nearing the end of their expected service life or those requiring frequent and costly repairs are prioritized for replacement.

Forecasted Capital Requirements

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 annual capital requirements at $156,000.

Figure 55: Machinery & Equipment Forecasted Capital Replacement Requirements

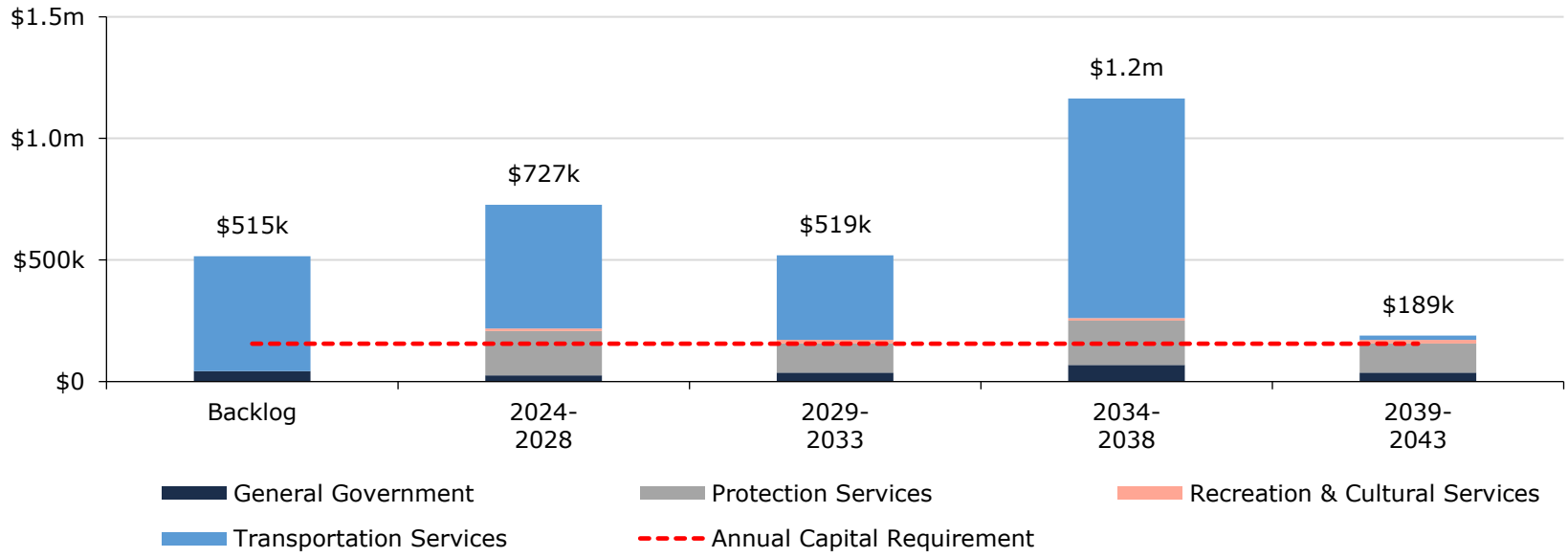


Table 29 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 28 Machinery & Equipment System-Generated 10-Year Capital Costs

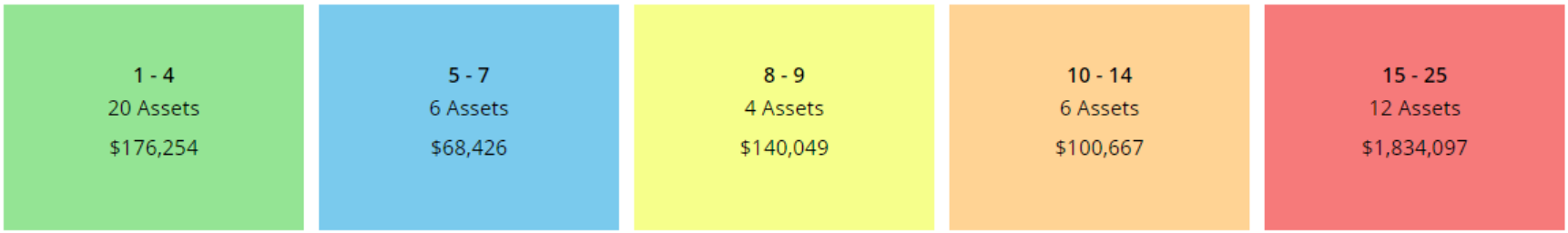
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
General Government	$62k	$0	$10k	$0	$4k	$11k	$23k	$10k	$0	$4k	$0
Protection Services	$303k	$0	$0	$34k	$0	$149k	$19k	$63k	$23k	$0	$15k
Recreation & Cultural Services	$24k	$0	$0	$0	$0	$10k	$15k	$0	$0	$0	$0
Transportation Services	$857k	$0	$119k	$0	$348k	$42k	$0	$0	$0	$343k	$5k
Total	**$1.2m**	**$0**	**$130k**	**$34k**	**$352k**	**$211k**	**$56k**	**$74k**	**$23k**	**$347k**	**$20k**

As no assessed condition data was available for the equipment, only age was used to determine forthcoming replacement needs. These projections can be different from actual capital forecasts. Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Township's capital expenditure forecasts.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 56: Machinery & Equipment Risk Matrix



This is a high-level model developed by Township staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The asset-specific attributes that Township 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 (Economic)
Service Life Remaining (%)	

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 Weather Events

As climate change intensifies and extreme weather events become more frequent, the Township's machinery and equipment are required to operate for extended hours. This increased usage accelerates wear and tear, leading to more frequent breakdowns and higher maintenance costs. Additionally, the prolonged use of machinery and equipment can reduce their lifespan, leading to earlier replacements and increased costs for the Township. This highlights the importance of thorough maintenance practices and the need to invest in durable equipment that can withstand extreme weather conditions.

Levels of Service

By comparing the cost, performance (average condition) and risk year-over-year, Chapple will be able to evaluate how their services/assets are trending. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

The following table outlines the qualitative metrics that determine the community level of service provided by equipment.

Table 29 Machinery & Equipment Community Levels of Service

Values	Technical Metric	Current LOS (2023)
Scope	Description of the current condition of municipal 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 poor. Township staff work to ensure all machinery & equipment assets remain in an adequate state of repair, with particular emphasis on safety.

Technical Levels of Service

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

Table 30 Machinery & Equipment Technical Levels of Service

Values	Technical Metric	Current LOS (2023)
Scope	Average Condition Rating	Poor (32%)
	Average Risk Rating	Very High (16.1)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	3.3% - 6.7%

Appendix I: Vehicles

State of the Infrastructure

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

- Transportation vehicles for road maintenance and winter control activities
- Protection vehicles for emergency services

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

Replacement Cost	Condition	Financial Capacity	
$1,996,000	Fair (53%)	Annual Requirement:	$135,000
		Funding Available:	$40,172
		Annual Deficit:	$94,828

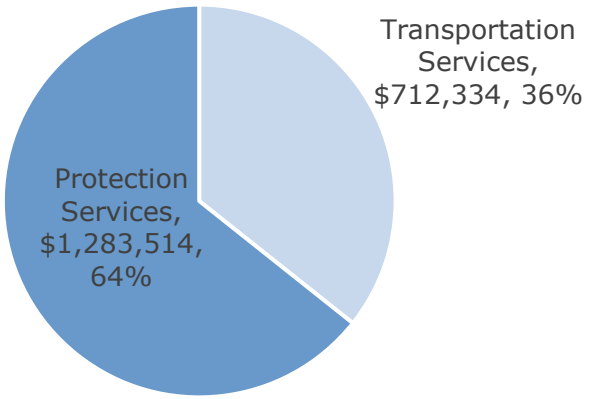
Inventory & Valuation

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

Segment	Quantity	Unit of Measure	Primary Replacement Cost Method	Replacement Cost
Protection Services	4	Assets	CPI	$1,284,000
Transportation Services	6	Assets	CPI	$712,000
Total	**12**	**Assets**		**$1,996,000**

The graph below displays the total replacement cost of each asset segment in the vehicle inventory.

Figure 57: Vehicle Replacement Costs



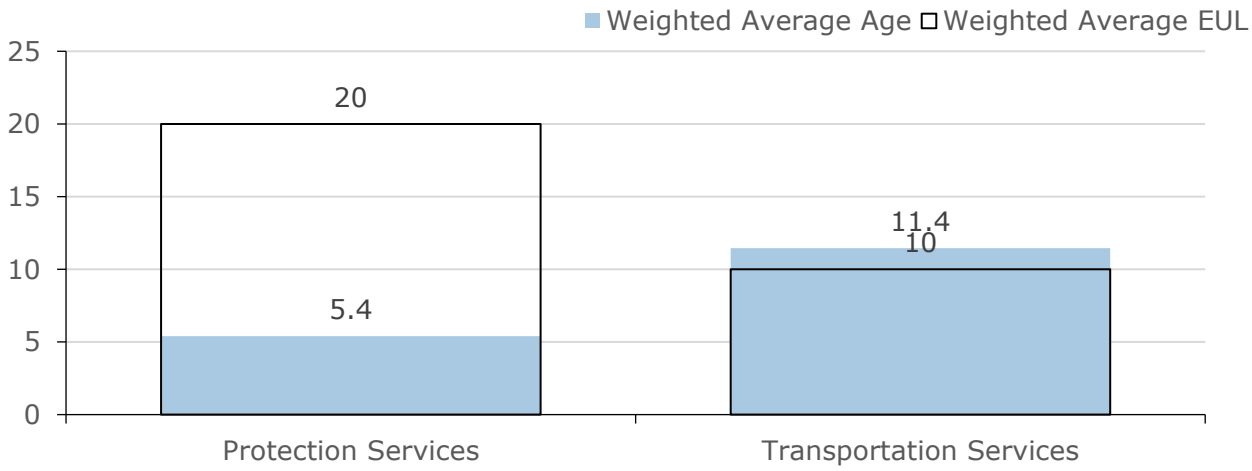
Total Current Replacement Cost: $1,995,848

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

Asset Condition & Age

The graph below identifies the average age and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

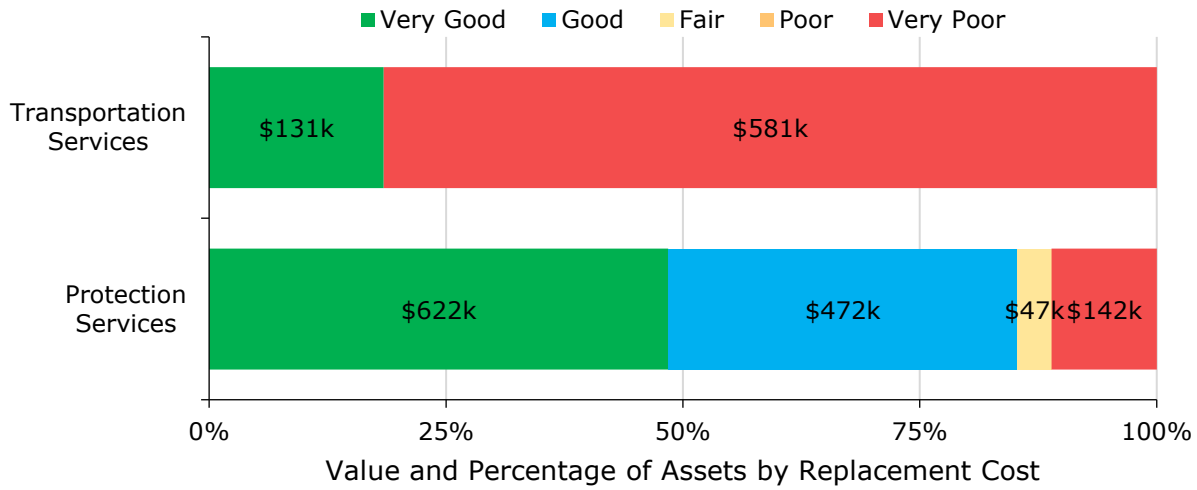
Figure 58: Vehicles Average Age vs Average EUL



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.

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

Figure 59: Vehicles Condition Breakdown



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.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets.

Vehicles within the Township undergo annual inspections, with the most recent Ministry of Transportation (MTO) inspection completed in January 2024. In addition to these annual checks, monthly inspections are performed to ensure ongoing operational safety and efficiency. These monthly inspections are conducted by internal staff, while the annual MTO inspections are carried out by licensed garages, ensuring compliance with transportation regulations and standards.

Lifecycle Management Strategy

The condition or performance of assets will deteriorate over time. To ensure vehicles are performing as expected, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

Figure 61: Vehicles Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Routine maintenance for vehicle assets includes monthly inspections, tire rotations, minor repairs as needed, and oil changes. More significant repairs are scheduled quarterly to ensure vehicles remain in optimal working condition
- Rehabilitation activities are infrequent, except for occasional projects like the rebuilding of the international dump truck
- Replacement of vehicle assets is considered when their condition has significantly deteriorated, making ongoing maintenance no longer cost-effective. Vehicles nearing the end of their expected service life or those requiring frequent and costly repairs are prioritized for replacement.

Forecasted 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 annual capital requirements at $135,000.

Figure 60: Vehicle Forecasted Capital Replacement Requirements

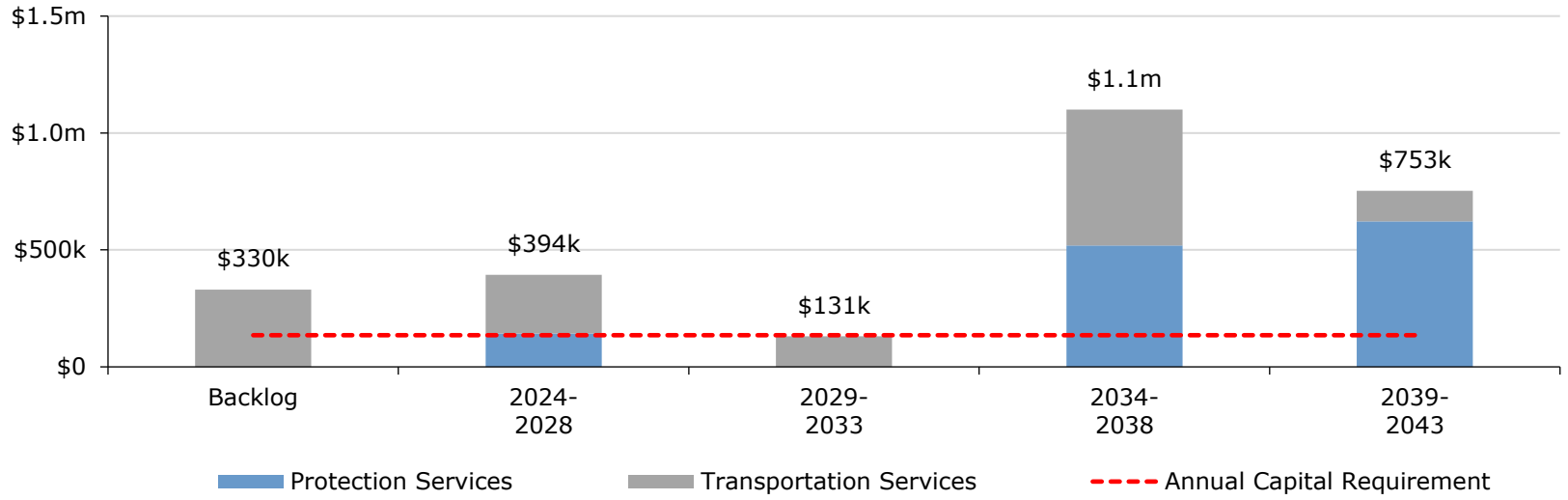


Table 31 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 31 Vehicles System-Generated 10-Year Capital Costs

Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Protection Services	$142k	$0	$0	$142k	$0	$0	$0	$0	$0	$0	$0
Transportation Services	$383k	$0	$35k	$217k	$0	$0	$0	$0	$0	$0	$131k
Total	**$525k**	**$0**	**$35k**	**$359k**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$131k**

As no assessed condition data was available for the vehicles, only age was used to determine forthcoming replacement needs. These projections can be different from actual capital forecasts. Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Township's capital expenditure forecasts.

Risk & Criticality

The 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 available inventory data. See Appendix M: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 61: Vehicles Risk Matrix

This is a high-level model developed by Township staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The asset-specific attributes that Township staff utilize to define and prioritize the criticality of vehicles are documented below:

Probability of Failure (POF)	Consequence of Failure (COF)
Condition	Replacement Cost (Economic)
Service Life Remaining (%)	

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 Weather Events

As extreme weather events become more frequent, vehicles like graders and snowplows in a Township are pushed to operate longer hours. This increased workload accelerates wear and tear, leading to more frequent maintenance and shorter lifespans for these essential vehicles. The rising operational costs and need for early replacements highlight the importance of durable, well-maintained vehicle assets to handle the challenges posed by changing weather patterns effectively.

Levels of Service

By comparing the cost, performance (average condition) and risk year-over-year, the Township will be able to evaluate how their services/assets are trending. The Township will use this data to set a target level of service and determine proposed levels for the regulation by 2025.

Community Levels of Service

The qualitative descriptions that determine the community levels of service provided by municipal vehicles are based on the service usage outlined below:

Table 32 Vehicles Community Levels of Service

Values	Technical Metric	Current LOS (2023)
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 regular inspections conducted 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.

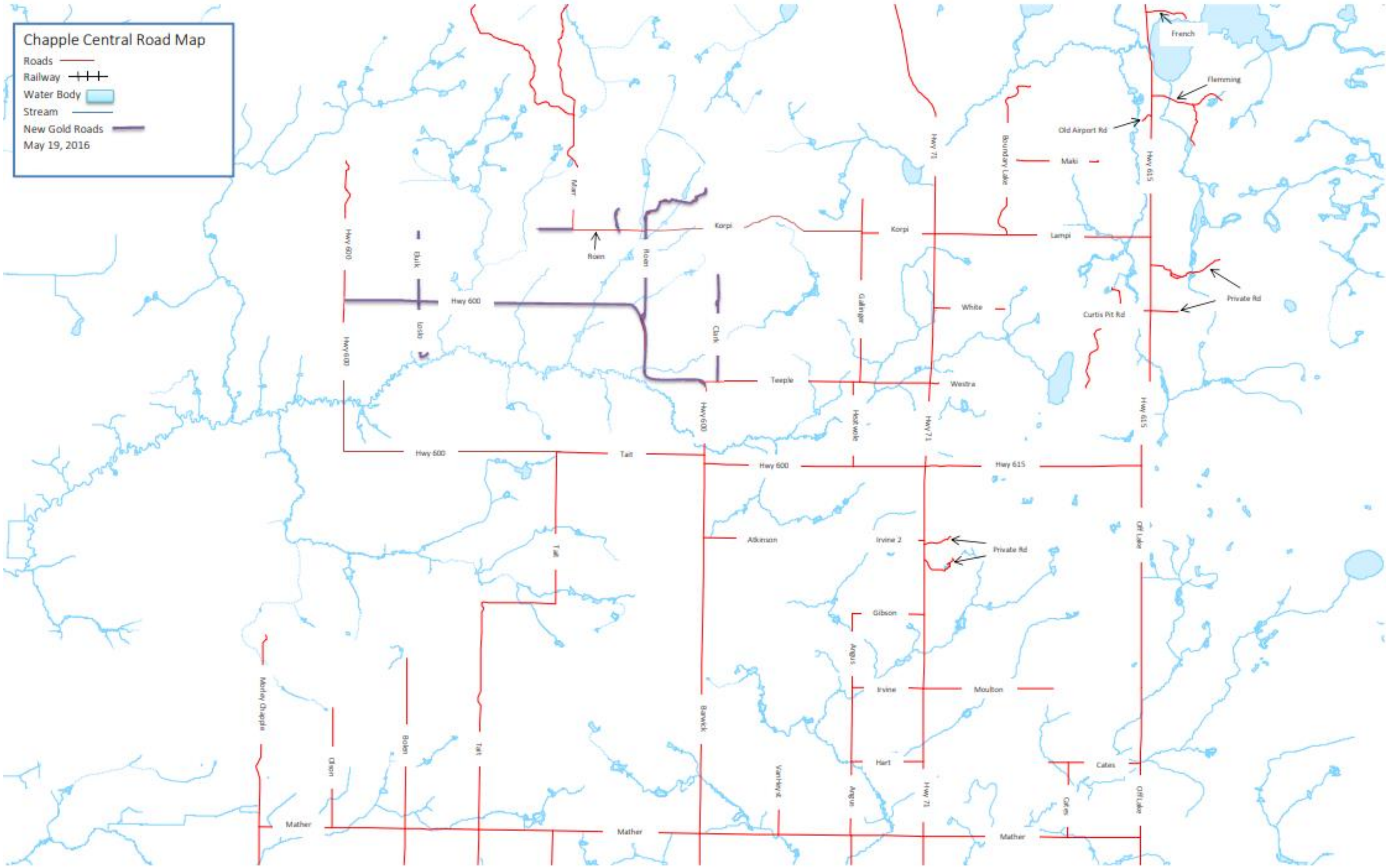
Table 33 Vehicles Technical Levels of Service

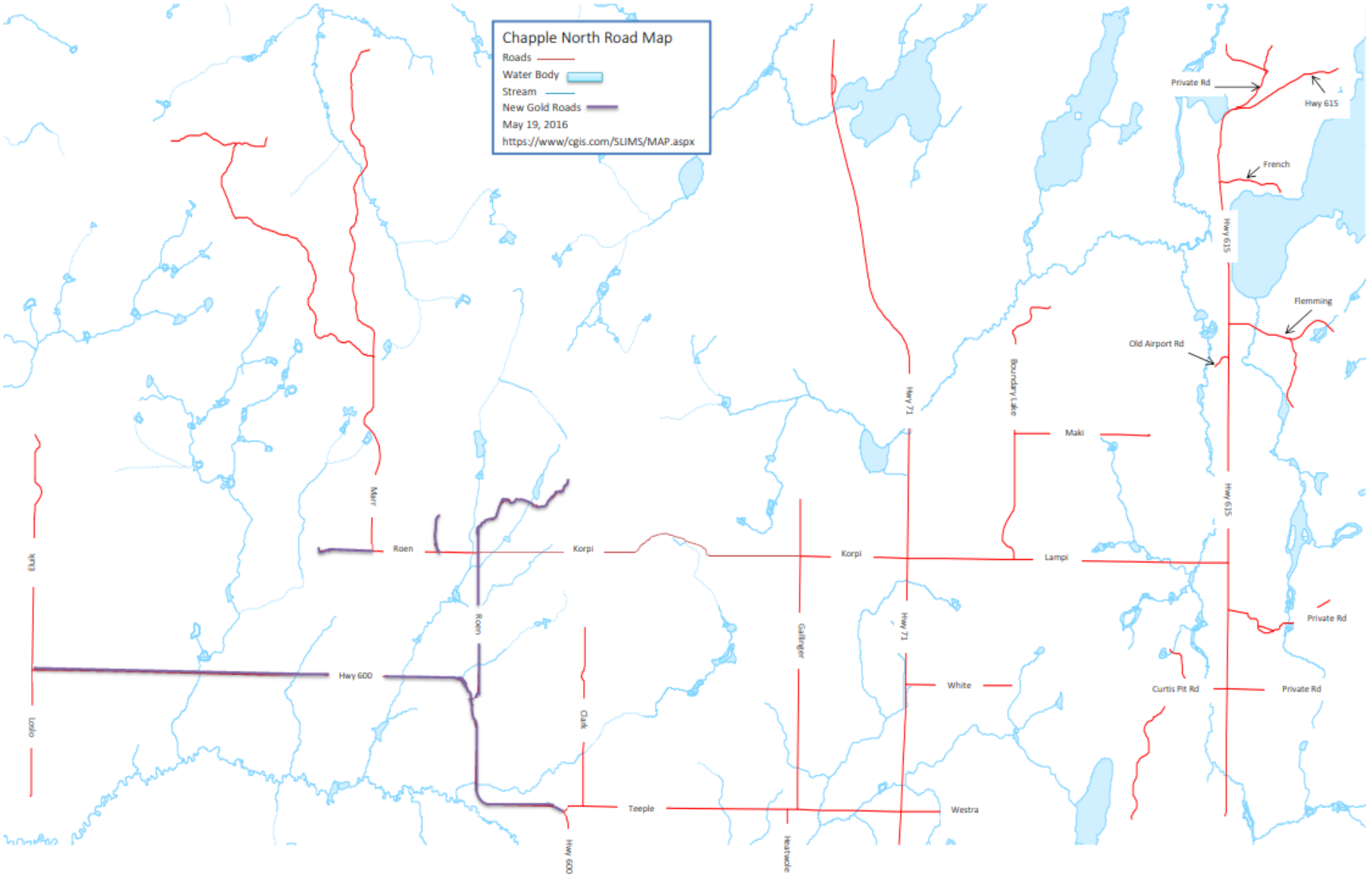
Values	Technical Metric	Current LOS (2023)
Scope	Average Condition Rating	Fair (53%)
	Average Risk Rating	Moderate (9.4)
Performance	Actual Capital Reinvestment Rate (Annual) – Target Reinvestment Rate (Annual)	2.0% - 6.8%

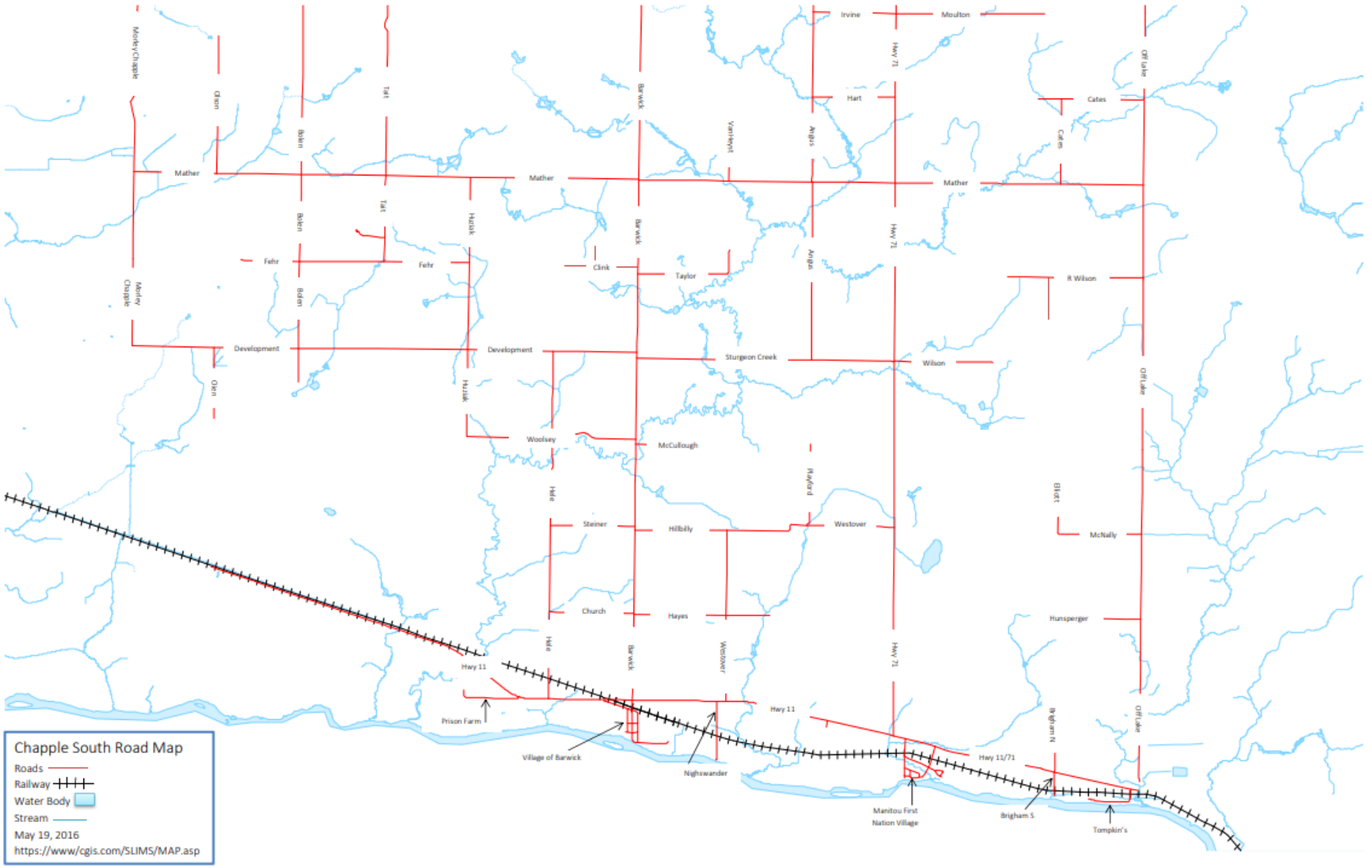
Appendix J: Levels of Service Maps

Road Network Maps

Village of Barwick


Chapple Central Road Map
Roads
Railway
Water Body
Stream
New Gold Roads
May 19, 2016
French
Flemming
Old Airport Rd
Maki
Hwy 71
Boundary Lake
Hwy 615
Marr
Korpi
Korpi
Lampi
Roen
Roen
Hwy 600
Hwy 600
Hwy 600
Gallinger
Clark
White
Curtis Pit Rd
Private Rd
Teeple
Westra
Hwy 600
Hwy 71
Hwy 615
Hwy 600
Tait
Hwy 600
Hwy 615
Atkinson
Irvine 2
Private Rd
Off Lake
Tait
Gibson
Angus
Irvine
Moulton
Morley Chapple
Barwick
Tait
Olsen
Hart
Cates
Angus
Hwy 71
Cates
Off Lake
Mather
Mather
Mather


Chapple North Road Map
Roads
Water Body
Stream
New Gold Roads
May 19, 2016
https://www/cgis.com/SLIMS/MAP.aspx
Private Rd
Hwy 615
French
Hwy 615
Flemming
Old Airport Rd
Boundary Lake
Hwy 71
Maki
Hwy 615
Marr
Roen
Korpi
Korpi
Lampi
Ekuk
Roen
Gallinger
Hwy 71
Private Rd
Hwy 600
White
Curtis Pit Rd
Private Rd
Ioko
Clark
Teeple
Westra
Hwy 600
Heatwole


Chapple South Road Map
Roads
Railway
Water Body
Stream
May 19, 2016
https://www/cgis.com/SLIMS/MAP.asp
Mather
Development
Fehr
Taylor
Clink
Sturgeon Creek
Wilson
R Wilson
Woolsey
McCullough
Steiner
Hillbilly
Westover
McNally
Church
Hayes
Hunsperger
Hart
Irvine
Moulton
Cates
Hwy 11
Hwy 11/71
Hwy 71
Barwick
Village of Barwick
Prison Farm
Nighswander
Manitou First Nation Village
Brigham S
Tompkin's

Bridges & Culverts Images

The condition scale for bridges & culverts utilized is from 0 to 100 from Very Poor to Very Good. See the following images as examples of a bridge and a structural culvert in Very Good condition, as well as a bridge in Good condition.

Nanson Bridge (BCI = 92.6 Very Good)

Off Lake Road Culvert (BCI = 100 Very Good)

Zimmerman Bridge (BCI = 73.2 Good)

Appendix K: Impacts of Growth

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 Town 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.

Chapple Official Plan (September 2013)

The purpose of the Township of Chapple Official Plan aims to create a vision and foundational principles, setting objectives and policies to manage infrastructure development. It seeks to guide the impact of changes on social, cultural, economic, and environmental aspects over a twenty-year planning period (until 2031). The Growth Plan for Northern Ontario also provides additional guidance for local initiatives such as Chapple's Official Plan.

The Township of Chapple encompasses a single designated Settlement Area, known as the Village of Barwick Settlement Area, which is poised to be the primary hub for growth and development. Equipped with municipal water and sewage facilities, Barwick hosts a mix of land uses including residential, commercial, institutional, industrial, and recreational. As a unique serviced settlement, Barwick is home to a variety of functions and is anticipated to continue as the central area for new residential developments, particularly those requiring services. While most of the Township's population resides in rural and agricultural areas, Barwick is also seen as a potential site for community facilities and other developmental projects.

The objective of the Agricultural Area is to promote the preservation of farmland for agricultural use, steer non-farm activities to other parts of the Township, safeguard the area's natural features and rural lifestyle, and foster the development of agricultural-related businesses in suitable locations.

The Industrial Area aims to grow the Township's industrial sector by allocating land for further industrial expansion, minimize the impact of industrial activities on residential areas and the natural environment, and strategically guide the placement of new industrial developments and redevelopments within the Township. It is anticipated that the population growth and employment growth over the duration of the Official Plan will be mainly driven by the New Gold goldmine.

The following tables outlines the recorded population and private dwellings for Chapple, based on 2021 Census data.

Historical Figures	1996	2001	2006	2011	2016	2021
Population	909	910	856	741	643	763
Population Change	N/A	0.1%	-5.9%	-13.4%	-13.3%	18.7%
Private Dwellings	N/A	347	345	376	313	332

Impact of Growth on Lifecycle Activities

By July 1, 2025, the Town'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 Town'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 Town 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.

Appendix L: Condition Assessment Guidelines

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

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

- The role of asset condition data in decision-making
- Guidelines for the collection of asset condition data
- A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

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

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

Guidelines for Condition Assessment

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

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that

should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.

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

Developing a Condition Assessment Schedule

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

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

Appendix M: Risk Rating Criteria

Risk Definitions

Risk	Integrating a risk management framework into your asset management program requires the translation of risk potential into a quantifiable format. This will allow you to compare and analyze individual assets across your entire asset portfolio. Asset risk is typically defined using the following formula: **Risk = Probability of Failure (POF) x Consequence of Failure (COF)**
Probability of Failure (POF)	The probability of failure relates to the likelihood that an asset will fail at a given time. The current physical condition and service life remaining are two commonly used risk parameters in determining this likelihood.
POF - Structural	The likelihood of asset failure due to aspects of an asset such as load carrying capacity, condition or breaks
POF - Functional	The likelihood of asset failure due to its performance
POF - Range	**1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain**
Consequences of Failure (COF)	The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from non-eventful to impactful: a small diameter water main break in a subdivision may cause several rate payers to be without water service for a short time. However, a larger trunk water main may break outside a hospital, leading to significantly higher consequences.
COF - Financial	The monetary consequences of asset failure for the organization and its customers
COF - Social	The consequences of asset failure on the social dimensions of the community
COF - Environmental	The consequence of asset failure on an asset's surrounding environment
COF - Operational	The consequence of asset failure on the Town's day-to-day operations
COF - Health & safety	The consequence of asset failure on the health and well-being of the community
COF - Economic	The consequence of asset failure on strategic planning
COF - Range	**1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe**