2024

FRONTENAC

COUNTY OF FRONTENAC • ONTARIO

Asset Management Plan

This Asset Management Program was prepared by:

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

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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 Frontenac County totals $135 million; 50% of all assets analysed are in fair or better condition and assessed condition data was available for 46% of assets. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation.

The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. Using a combination of proactive lifecycle strategies (buildings) 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 infrastructure backlogs, and achieve long-term sustainability, the county's average annual capital requirement totals $4.6 million. Based on a historical analysis of sustainable capital funding sources, the county is committing approximately $1.6 million towards capital projects or reserves per year. As a result, the county is funding 36% percent of long-term annual capital requirements. This creates a total annual funding deficit of $3 million.

Addressing annual infrastructure funding shortfalls is a difficult and long-term endeavour for municipalities. Considering the county's current funding position, it will require many years to reach full funding for current assets. Short phase-in periods to meet these funding targets may place too high a burden on taxpayers too quickly, whereas a phase-in period beyond 20 years may see a continued deterioration of infrastructure, leading to larger backlogs.

To close annual deficits for capital contributions from tax revenues for asset needs, it is recommended the county review the feasibility of implementing a 1.6% annual increase in revenues over a 15-year phase-in period.

In addition to annual needs, there is also an infrastructure backlog of $5.2 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 county 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 county'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 meet 2024 Ontario Regulation 588/17 requirements, and to establish benchmark data to calibrate levels of service targets for 2025 regulatory requirements.

The county 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 Frontenac County community.

About this Document

The Frontenac County Asset Management Plan was developed in accordance with Ontario Regulation 588/17 ("O. Reg 588/17"). It contains a comprehensive analysis of Frontenac County'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.

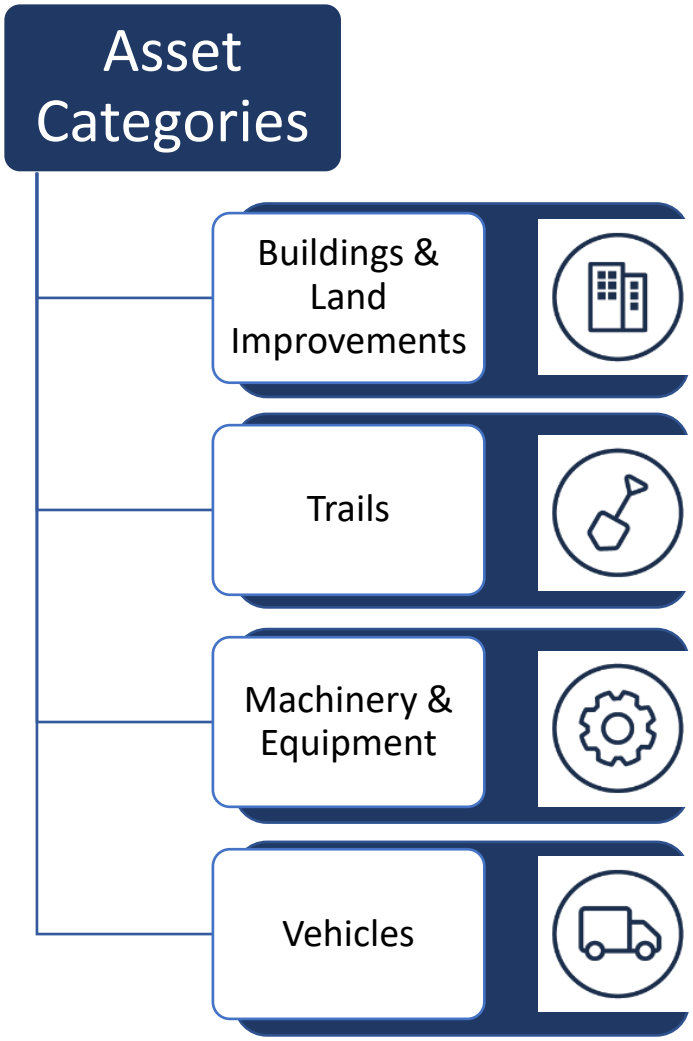
Table 1 Ontario Regulation 588/17 Requirements and Reporting Deadlines

Requirement	2019	2022	2024	2025
1. Asset Management Policy	●		●	
2. 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 public infrastructure and to make recommendations where they can be further refined. Through the implementation of sound asset management strategies, the county can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

The following asset categories are addressed in further sections:



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 highly 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 staff.
- 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 county's primary asset management system.

These challenges are quite common among municipalities and require long-term commitment and sustained effort by staff. As the county'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. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

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 of Council, 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 county's approach to asset management activities. It aligns with the organization and provides clear direction to municipal staff on their roles and responsibilities.

Frontenac county adopted their asset management policy 2019-068 on June 19, 2019, in accordance with Ontario Regulation 588/17. The policy identifies the asset management vision is to proactively manage its assets to best serve the county's objectives, including:

- Provide a consistent framework for implementing asset management throughout the organization
- Provide transparency and accountability to its stakeholders with evidence based decision-making processes that align with strategic plans, budgets, service levels and risk management practices
- Prioritize the need for existing and future assets to effectively deliver services to the community and stakeholders
- Maintain prudent financial planning and decision-making
- Support sustainability and economic development

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 Frontenac County 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 county's asset portfolio, and its approach to managing and funding individual service areas or 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. These concepts are applied throughout this asset management plan and are described below in greater detail.

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. Assets were structured to support meaningful, efficient reporting and analysis. Key category details are summarized at the asset segment level.

Table 2 Asset Classifications

CLASS	AM CATEGORY	AM SEGMENT
General Capital	Buildings & Land Improvements	County Administration Fairmount Home Ambulance Bases
	Trail Network	Trail Trail Bridges Trail Culverts Trail Equipment Trail Parking Lots
	Machinery & Equipment	County Administration Fairmount Home Paramedic Services
	Vehicles	County Administration Ambulances Paramedic (Non-Ambulance)

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

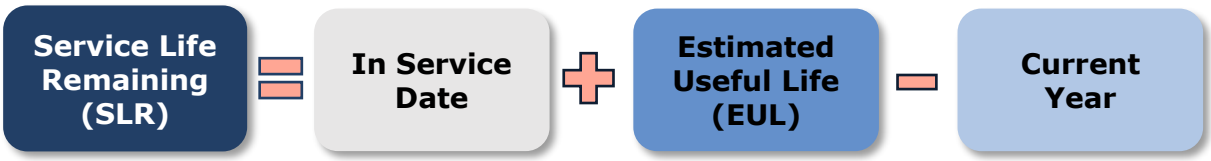
User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the county 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 county 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 county can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the county 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 county's asset portfolio. The table below outlines the condition rating system used to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card.

Figure 2 Standard Condition Rating Scale

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

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

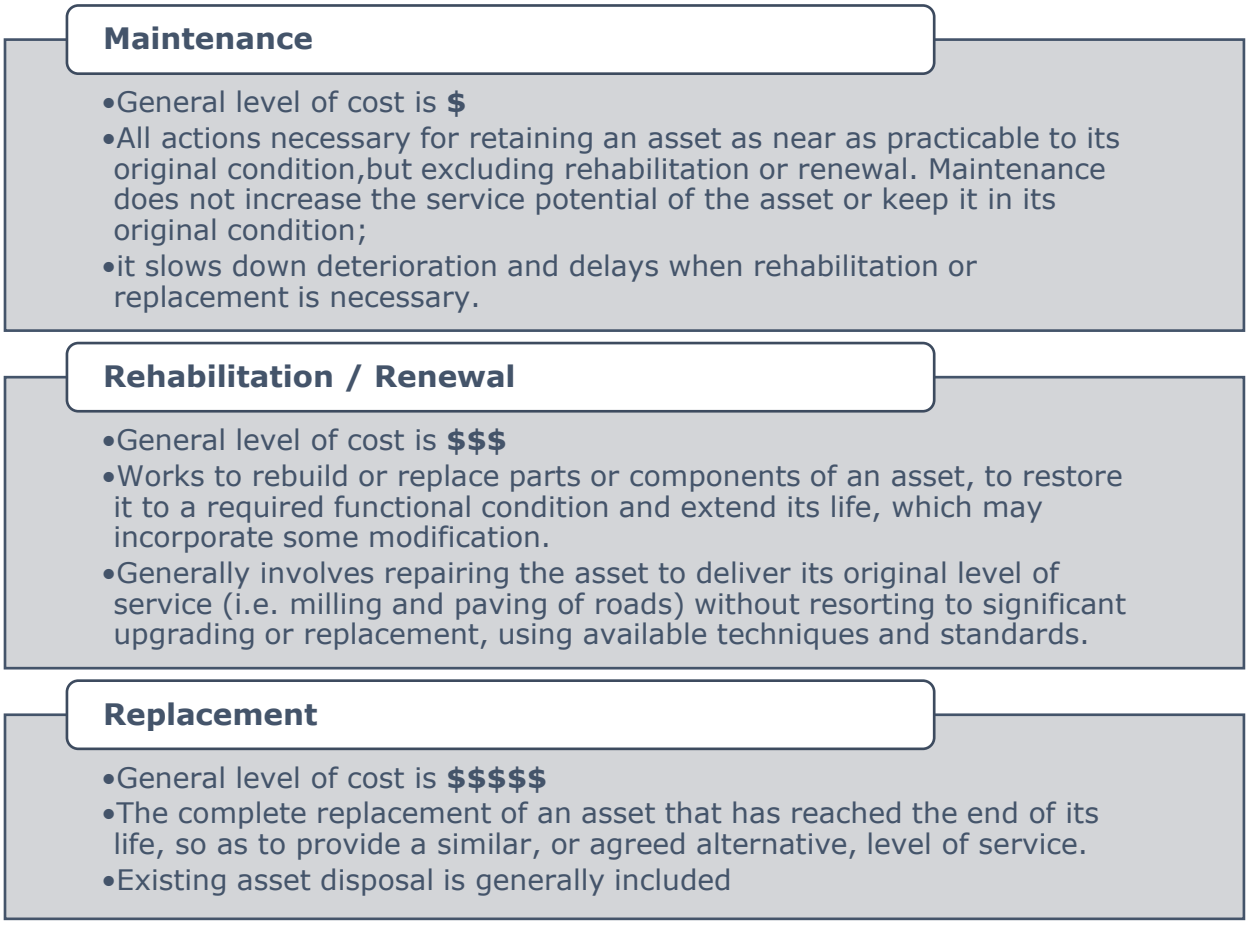
To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration. There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference in cost.

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.

Figure 3 provides a description of each type of activity, the general difference in cost, and typical risks associated with each.

The county'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



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.

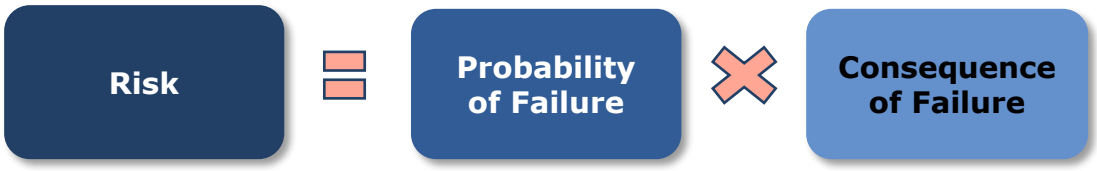
By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

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 for definitions and the developed risk models.

Levels of Service

A level of service (LOS) is a measure of the services that Frontenac County 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 – this is a target 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 county must determine the qualitative descriptions that will be used by July 1, 2024. The community LOS can be found in the Levels of Service subsection within each core 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 county'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 county must determine the technical metrics that will be used by July 1, 2024. The metrics can be found in the LOS subsection within each core asset category.

Current and Proposed Levels of Service

Frontenac County is focused on measuring the current LOS provided to the community. Once current LOS have been measured and trended the county 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 county. 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 county 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 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. 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.

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 because of climate change impacts such as flooding, high heat, drought, and more frequent and intense storms.

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.

Impacts of Growth

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 county to plan for new infrastructure more effectively, 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.

Impact of Growth on Lifecycle Activities

By July 1, 2025, the county'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.

As growth-related assets are constructed or acquired, they should be integrated into Frontenac County's asset management program. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the county 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.

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 county can determine the extent of any existing funding gap.

Portfolio Overview

Community Profile

Frontenac County is an upper tier municipality located along Lake Ontario, southwest of Ottawa. The county is comprised of the townships of North Frontenac, Central Frontenac, South Frontenac, and the Frontenac Islands. The City of Kingston resides within the borders of the Frontenac census division but is not included in the county.

The county has incredible access to natural areas through the nearby provincial park and the Frontenac K&P Trail. This offers tourists and locals the opportunity to fish, bike ride, canoe, and explore. In addition, the county boasts one of the best stargazing locations in the province at the Dark Sky Preserve.

Frontenac County is located near Ottawa, Montreal, and Toronto, allowing local businesses access and exposure to these large markets and opportunities that they offer. The county has full time staff dedicated to continued economic development including one on one business consultations. The county places particular emphasis on supporting brand fortitude, supporting business profitability, and growing the artisan beverage and food sector.

The county has experienced continued growth over the last 15 years. Around 22% of the population is above the age of 65, this is around 4% higher than for Ontario as a whole.

The county generates a total revenue of $11.4 million from taxes and has an annual capital budget of $1.6 million as of 2022. The county's infrastructure priorities include maintaining county facilities, K & P Trail, machinery, equipment, and vehicles.

Table 3 Frontenac County & Ontario Census Information

Census Characteristic	Frontenac County	Ontario
Population 2021	29,255	14,223,942
Population Change 2016-2021	+9.8%	+5.8%
Total Private Dwellings	80,226	5,929,250
Population Density	43.4/km^2	15.9/km^2
Land Area	3,725 km^2	892,411.76 km^2

State of the Infrastructure

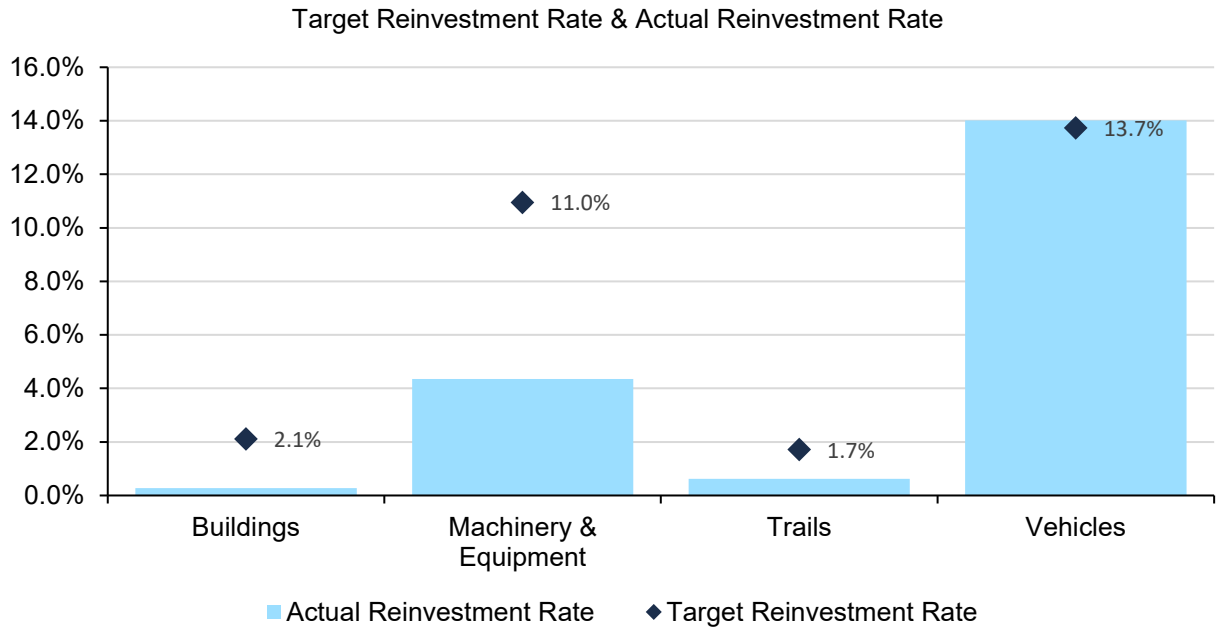
Table 4 Frontenac County State of the Infrastructure Summary

Asset Category	Replacement Cost	Asset Condition	Financial Capacity	
Buildings and Land Improvements	$103,710,000	Fair (56%)	Annual Requirement:	$2,191,000
			Funding Available:	$284,000
			Annual Deficit:	**$1,907,000**
Machinery & Equipment	$14,045,000	Poor (30%)	Annual Requirement:	$1,539,000
			Funding Available:	$612,000
			Annual Deficit:	**$927,000**
Trail Network	$12,646,000	Fair (56%)	Annual Requirement:	$217,000
			Funding Available:	$78,000
			Annual Deficit:	**$139,000**
Vehicles	$4,657,000	Poor (26%)	Annual Requirement:	$640,000
			Funding Available:	$652,000
			Annual Surplus:	**$12,000**
Overall	$135,058,000	Fair (52%)	Annual Requirement:	$4,587,000
			Funding Available:	$1,626,000
			Annual Deficit:	**$2,961,000**

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 county should be allocating approximately $4.6 million annually, for a target reinvestment rate of 3.4%. Actual annual spending on infrastructure totals approximately $1.6 million, for an actual reinvestment rate of 1.2%.

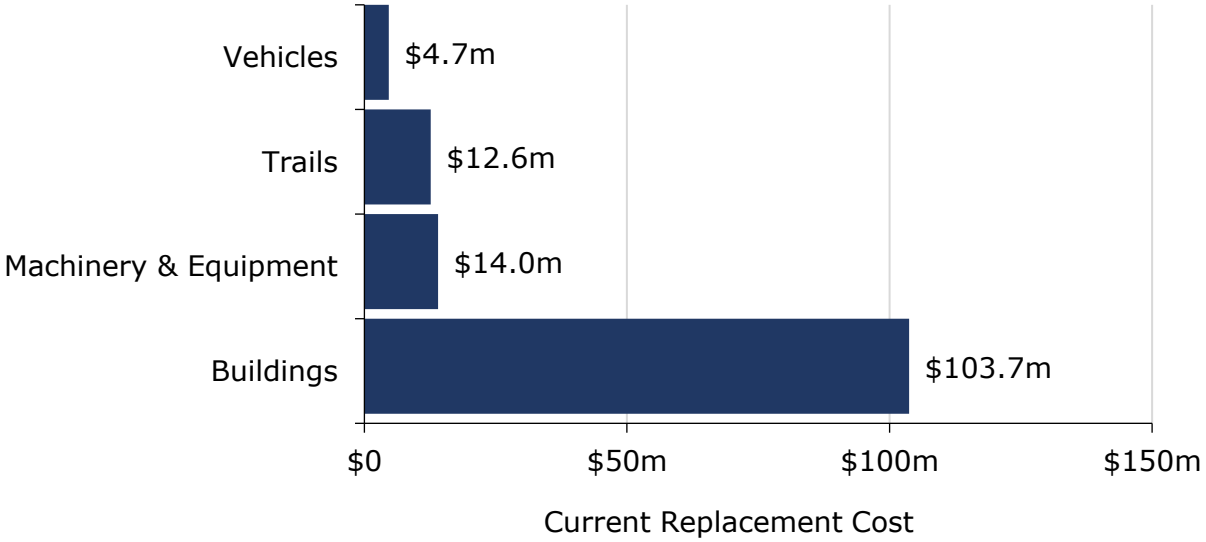
Figure 5 Target vs Actual Reinvestment Rates



Replacement Cost

The asset categories have a total replacement cost of $135.1 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 6: Portfolio Replacement Value

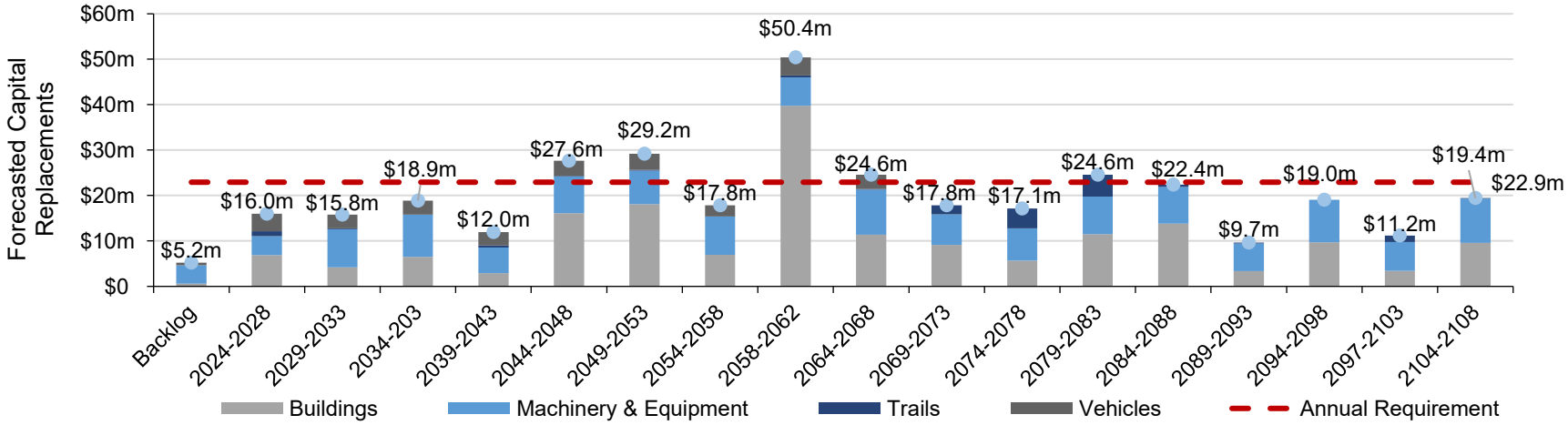


Forecasted Capital Requirements

Aging assets require maintenance, rehabilitation, and replacement. **Error! Not a valid bookmark self-reference.** below illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for all asset categories analyzed. On average, $4.6 million is required each year to remain current with capital replacement needs for Frontenac County's asset portfolio (red dotted line represents the 5yr trend).

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 $135 million, this represents an annual target reinvestment rate of 3.4%.

Figure 7 Forecasted Capital Requirements



The chart also illustrates a backlog of $5.2 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 both backlogs and ongoing capital needs and help select the right treatment for each asset.

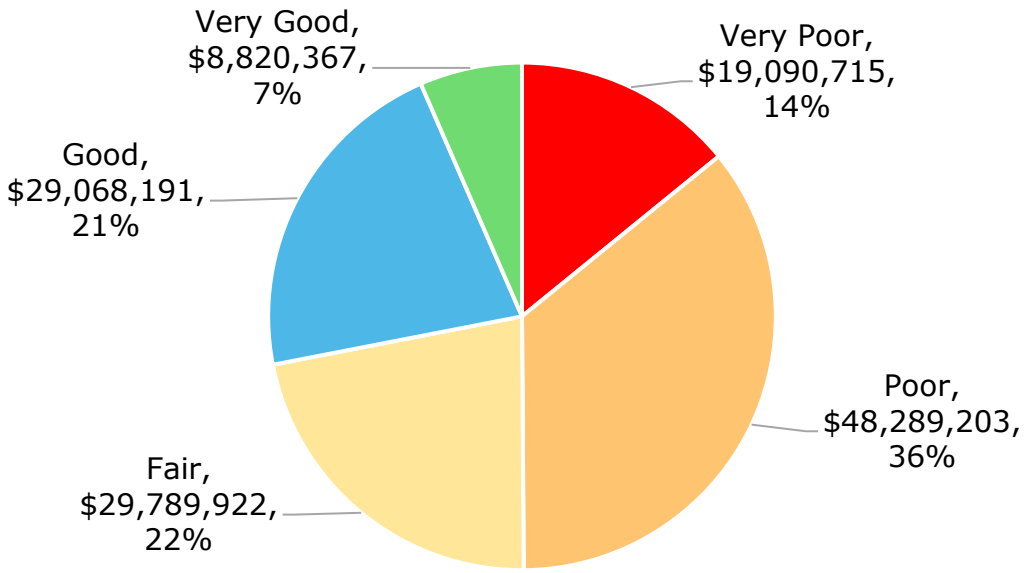
Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 50% of assets in Frontenac County are in fair or better condition. This estimate relies on both age-based and field condition data.

Assessed condition data is available for 46% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data.

Table 5 Assessed Condition Data Sources

Asset Category	Assets with Assessed Condition	Source of Condition Data
Buildings & Land Improvements	53%	2022 ABSI Inc.
Trails	50%	2022 OSIM
Machinery & Equipment	2%	2022 ABSI Inc.
Vehicles	0%	No Condition Data Available



Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 34% of the county's assets will require rehabilitation / replacement within the next 10 years. Details of the capital requirements identified in each asset section.

Risk & Criticality

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

Growth

Frontenac County is experiencing higher than projected growth and it is expected to continue. Population and employment growth will increase the demand on municipal services and potentially decrease the lifecycle of certain assets. As the population continues to grow, the county must prioritize expanding its capacity to serve a larger population.

Funding

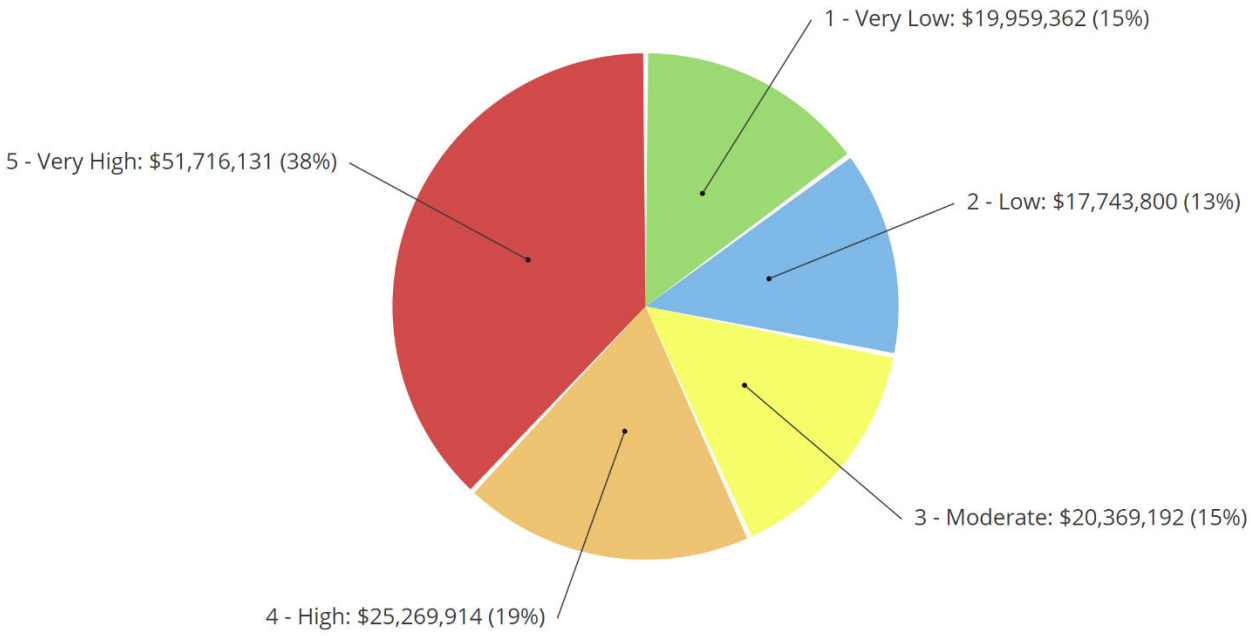
Major capital rehabilitation projects (bridges and culverts in particular) are entirely dependant on the availability of grant funding opportunities. When grants are not available, projects may be deferred.

Aging Infrastructure

Historically, lifecycle management strategies have been reactive. Focusing on replacing poor condition assets at the end of their life expectancy but playing catch up on deferred lifecycle activities is an ongoing issue.

The over all risk breakdown for Frontenac County's asset inventory is portrayed in the figure below.

Figure 8 Overall Asset Risk Breakdown



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

Frontenac County Climate Profile

Frontenac County is located in Eastern Ontario where the St. Lawrence meets Lake Ontario. The county 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 county may experience the following trends:

Higher Average Annual Temperature:

- Between the years 1971 and 2000 the annual average temperature was 5.9 ºC
- Under a high emissions scenario, the annual average temperatures are projected to increase by 2.7ºC by the year 2050 and over 6.5 ºC by the end of the century.

Increase in Total Annual Precipitation:

- Under a high emissions scenario, the county is projected to experience a 12% increase in precipitation by the year 2050 and an 17% 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.
- In some areas, extreme weather events will occur with greater frequency and severity than others, especially those on or near the many bodies of water in the area.

Impacts of Growth

As per O. Reg 588/17, prior to July 1, 2025, the county'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. The 2023-2026 strategic plan for Frontenac County has indicated "Develop a Regional Approach to Overcome Infrastructure Issues and Maximize Infrastructure Development Opportunities" as a strategic goal moving forward. This strategic goal is intermingled with another indicating "Contribute to the Progress of Sustainable Economic Growth and Prosperity Throughout the County". With these two goals together, the county has communicated the readiness and desire to grow sustainably and manage assets efficiently through this process. The commitment to growth will be completed in a matter that maintains or enhances the natural environment and assets of the county.

Frontenac County Population Housing and Employment Projections (2016-2046)

The goal of the projections was to communicate the long-term growth and the drivers for such growth. The report indicated that the Counties population will increase over the next 30 years with an annual growth rate of 0.7%. This would mean a population of 33,200 by 2046. Within this population, the study identified that the aging population is higher than the provincial average. With a projected 35% of the population being older than 65, there will be challenges in employment, housing, and healthcare within the area. The aging population will also lead to a decrease in the yearly annual growth rate as the average home occupancy is inversely correlated with the size of the aging community.

Approximately 80% of the growth expected for the county will be within the Township of South Frontenac. This large bias is due to its proximity to the City of Kingston. The plan indicates that growth will not only be achieved through an increase of permanent residents and that seasonal housing will grow as well, empowered by the population and economic activity of the City of Kingston.

Table 6 Frontenac County Populations Projections

Historic & Projected Figures	2006	2016	2026	2036	2046
Population	27,520	27,290	29,600	31,800	33,200
Population Over 65	14%	21%	27%	31%	35%

Financial Strategy

Financial Strategy Overview

Each year, Frontenac County makes important investments in its infrastructure's maintenance, renewal, rehabilitation, and replacement to ensure assets remain in a state of good repair. However, increasing needs will soon exceed fiscal capacity. In fact, most municipalities continue to struggle with annual infrastructure deficits. Achieving full-funding for infrastructure programs will take many years and should be phased-in gradually to reduce burden on the community.

This financial strategy is designed for the county's existing asset portfolio and is premised on two key inputs: the average annual capital requirements and the average annual funding typically available for capital purposes. The annual requirements are based on the replacement cost of assets and their serviceable life, and where available, lifecycle modeling. This figure is calculated for each individual asset and aggregated to develop category-level values.

The annual funding typically available is determined by averaging historical capital expenditures on infrastructure, inclusive of any allocations to reserves for capital purposes. For Frontenac County, the funding allocated to capital for 2022 were used to project available funding.

Only reliable and predictable sources of capital funding are used to benchmark funds that may be available on any given year. The funding sources include:

- Revenue from taxation allocated to reserves for capital purposes
- The Canada Community Benefits Fund (CCBF), formerly the Federal Gas Tax Fund
- The Ontario Community Infrastructure Fund (OCIF)

Although provincial and federal infrastructure programs can change with evolving policy, CCBF, and OCIF are considered as permanent and predictable.

Annual Capital Requirements

The annual requirements represent the amount the county should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs, and achieve long-term sustainability. For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

As the lifecycle strategy scenario represents the lowest cost option available to the county, we have used this annual requirement in the development of the financial strategy.

Table 7 outlines the total average annual capital requirements for existing assets in each asset category. Based on a replacement cost of $135 million, annual capital requirements total more than $4.6 million for all the asset categories analysed.

The table also illustrates the system-generated, equivalent target reinvestment rate (TRR) of each category, calculated by dividing the annual capital requirements by the total replacement cost. The cumulative target reinvestment for these categories is estimated at 3.4%.

Table 7 Average Annual Capital Requirements

Asset Category	Replacement Cost	Annual Capital Requirements	Target Reinvestment Rate
Buildings	$103,710,000	$2,191,000	2.1%
Machinery & Equipment	$14,045,000	$1,539,000	11.0%
Trails	$12,646,000	$217,000	1.7%
Vehicles	$4,657,000	$640,000	13.7%
Total	**$135,058,000**	**$4,587,000**	**3.4%**

Although there is no industry standard guide on optimal annual investment in infrastructure, the TRRs above provide a useful benchmark for organizations. In 2016, the Canadian Infrastructure Report Card (CIRC) produced an assessment of the health of municipal infrastructure as reported by cities and communities across Canada. The CIRC remains a joint project produced by several organizations, including the Federation of Canadian Municipalities (FCM), the Canadian Society of Civil Engineers (CSCE), the Canadian Network of Asset Managers (CNAM), and the Canadian Public Works Association (CPWA).

The 2016 version of the report card also contained recommended reinvestment rates that can also serve as benchmarks for municipalities. The CIRC suggest that, if increased, these reinvestment rates can "stop the deterioration of municipal infrastructure." The report card contains both a range for reinvestment rates that outlines the lower and upper recommended levels, as well as current municipal averages.

Current Funding Levels

Table 8 summarizes how current funding levels compare with funding required for each asset category. At existing levels, the county is funding 36% of its annual capital requirements for all infrastructure analyzed. This creates a total annual funding deficit of $3 million.

Table 8 Current Funding Position vs Required Funding

Asset Category	Annual Capital Requirements	Annual Funding Available	Annual Infrastructure Deficit	Funding Level
Buildings and Land Improvements	$2,191,000	$284,000	$1,907,000	13%
Machinery & Equipment	$1,539,000	$612,000	$927,400	40%
Trails	$217,000	$78,000	$139,000	36%
Vehicles	$640,000	$652,000	$(12,000)	102%
Total	**$4,587,000**	**$1,626,262**	**$2,901,000**	**36%**

Closing the Gap

Eliminating annual infrastructure funding shortfalls is a difficult and long-term endeavor for municipalities. Considering the county's current funding position, it will require many years to reach full funding for current assets.

This section outlines how Frontenac County can close the annual funding deficits using own-source revenue streams, i.e., property taxation, and without the use of additional debt for existing assets.

Full Funding Requirements Tax Revenues

In 2022, Frontenac County had an annual tax revenue of $11,433,000. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require a 26% tax change over time.

To achieve this increase, several scenarios have been developed using phase-in periods ranging from five to twenty years. Shorter phase-in periods may place too high a burden on taxpayers, whereas a phase-in period beyond 20 years may see a continued deterioration of infrastructure, leading to larger backlogs.

Table 9 Phasing in Annual Tax Increases

Total % Increase Needed in Annual Property Taxation Revenues	Phase-in Period			
	5 Years	10 Years	15 Years	20 Years
26%	4.8%	2.4%	1.6%	1.2%

Funding 100% of annual capital requirements ensures that major capital events, including replacements, are completed as required. Under this scenario, projects are unlikely to be deferred to future years. This delivers the highest asset performance and customer levels of service.

Use of Debt

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

Table 10: Premiums for Debt Financing 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%

[1] Current municipal Infrastructure Ontario rates for 15-year lending is 3.2%.

Recommendations and Key Considerations

Financial Strategies

Review the feasibility of adopting a full-funding scenario that achieves 100% of the average annual requirements for the asset categories analyzed. This involves:

- implementing a 1.6% annual tax increase over a 15-year phase-in period and allocating the full increase in revenue towards capital funding
- using risk frameworks and staff judgement to prioritize projects, particularly to aid in elimination of existing infrastructure backlogs
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

NOTE: Although difficult to capture inflation costs, supply chain issues, and fluctuations in commodity prices will also influence capital expenditures.

Asset Data

1. Continuously review, refine, and calibrate lifecycle and risk profiles to better reflect actual practices and improve capital projections. In particular:
   - the timing of various lifecycle events, the triggers for treatment, anticipated impacts of each treatment, and costs.
   - the various attributes used to estimate the likelihood and consequence of asset failures, and their respective weightings.
2. Asset management planning is highly sensitive to replacement costs. Periodically update replacement costs based on recent projects, invoices, or estimates, as well as condition assessments, 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 for this estimate. Staff judgement and historical data can help attenuate extreme and temporary fluctuations in cost estimates and keep them realistic.
3. Like replacement costs, an asset's established serviceable life can have dramatic impacts on all projections and analyses, including long-range forecasting and financial recommendations. Periodically reviewing and updating these values to better reflect in-field performance and staff judgement is recommended.

Risk and Levels of Service

1. Risk models and matrices can play an important role in identifying high-value assets, and developing an action plan which may include repair, rehabilitation, replacement, or further evaluation through updated condition assessments. As a result, project selection and the development of multi-year capital plans can become more strategic and objective. Initial models have been built into Citywide for all asset groups. As the data evolves and new attribute information is obtained, these models should also be refined and updated.
2. Although Ontario Regulation 588/17 requires reporting on specific, prescribed KPIs for the county's core assets, municipalities have discretion on the KPIs they select to track the performance of their non-core assets, such as buildings and vehicles. This information is required for the 2024 iteration of the AMP. KPIs should be established for all non-core asset groups to support regulatory compliance. Further, as available, data on current performance should be centralized and tracked to support any calibration of service levels ahead of O. Reg's 2025 requirements on proposed levels of service.
3. Staff should monitor evolving local, regional, and environmental trends to identify factors that may shape the demand and delivery of infrastructure programs. These can include population growth, and the nature of population growth; climate change and extreme weather events; and economic conditions and the local tax base. This data can also be used to revise service level targets.

Appendix A: Buildings

State of the Infrastructure

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

- Long-term care, Fairmount Home (FMT)
- Paramedic services, Ambulance Bases (FP)
- County administration (Admin)

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

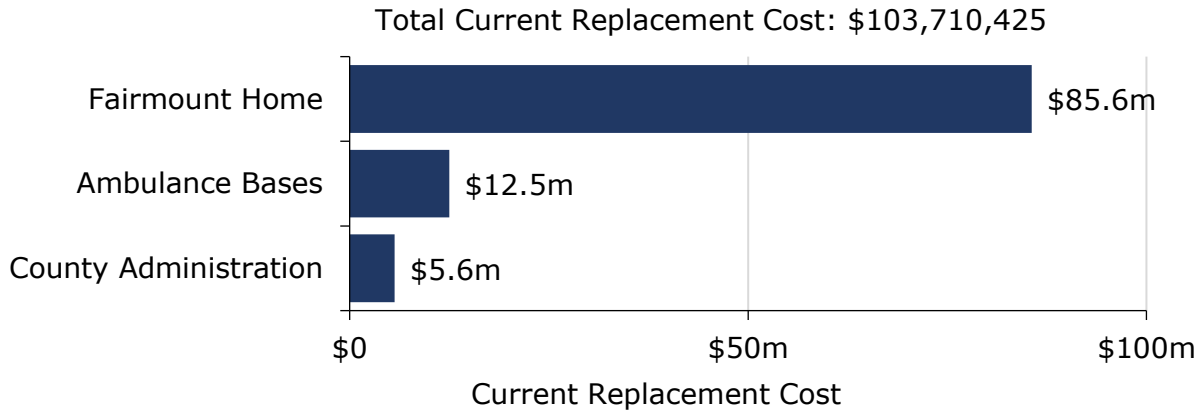
Table 11 Buildings State of Infrastructure Summary

Replacement Cost	Condition	Financial Capacity	
$103.7 million	Fair (56%)	Annual Requirement:	$2,191,000
		Capital Funding Available:	$284,000
		Annual Deficit:	$1,907,000

Inventory & Valuation

The graph below displays the total replacement cost of each asset segment in Frontenac County's buildings inventory. As the county has had a complete componentization of their buildings inventory Frontenac County is able to track the replacement/lifecycle needs more accurately.

Figure 9 Buildings Replacement Cost

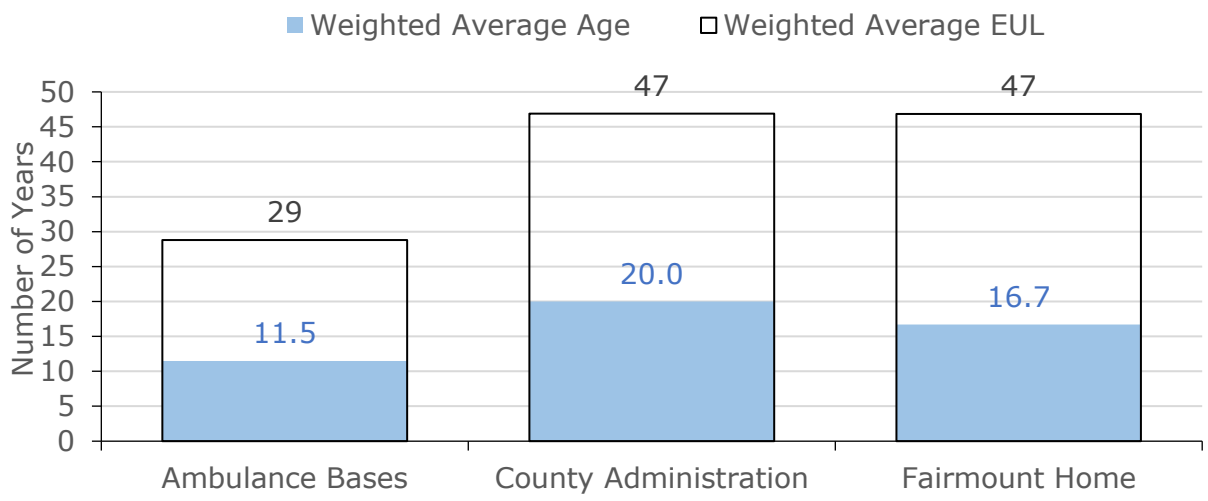


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

Asset Condition & Age

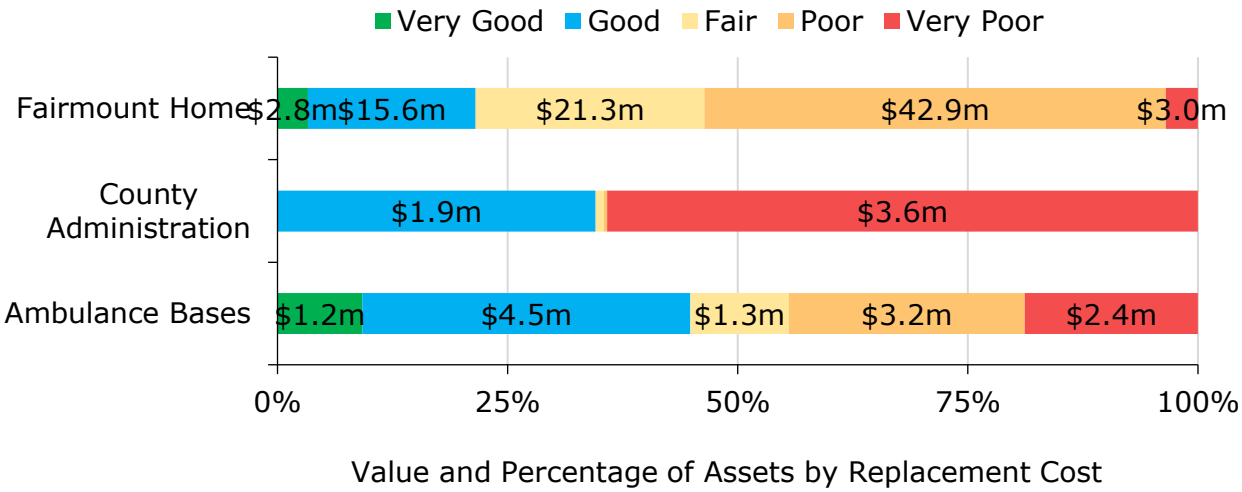
The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 10 Buildings Average Age vs Average EUL



These assets are componentized which helps to add accuracy to the projections. The graph below visually illustrates the average condition for each asset segment on a very good to very poor.

Figure 11 Buildings Condition Breakdown



To ensure that the municipal buildings continue to provide an acceptable level of service, the county 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 allow staff to determine the remaining service life of assets and identify the most cost-effective approach to managing them. Currently, the county performs assessments on a five-year cycle. The last assessment was completed in 2019, and the next began in 2023. The 2019 assessment used a 1-5 rating scale, from unacceptable to good, and following the Uniformat II industry standard. Buildings are repaired as needed based on deficiencies identified by outside experts, staff, or residents.

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 county's current lifecycle management strategy.

Figure 12 Buildings Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Maintenance of buildings is outlined as activities from the BCI assessment and assigned to each asset in the inventory
- Other maintenance actions are triggered by inspections identifying safety, or structural issues
- Typical rehabilitation strategies of buildings include roof, HVAC, window and door replacements.
- Full replacements is considered generally when the asset has deteriorated significantly, and maintenance and rehabilitation is no longer cost-effective.
- Full replacement is also considered when the service level required exceeds what is possible from the physical asset.

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Frontenac County should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 85 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 $2.18 million or $10.9 million over a 5-year period.

Figure 13 Buildings Forecasted Capital Replacement Requirements

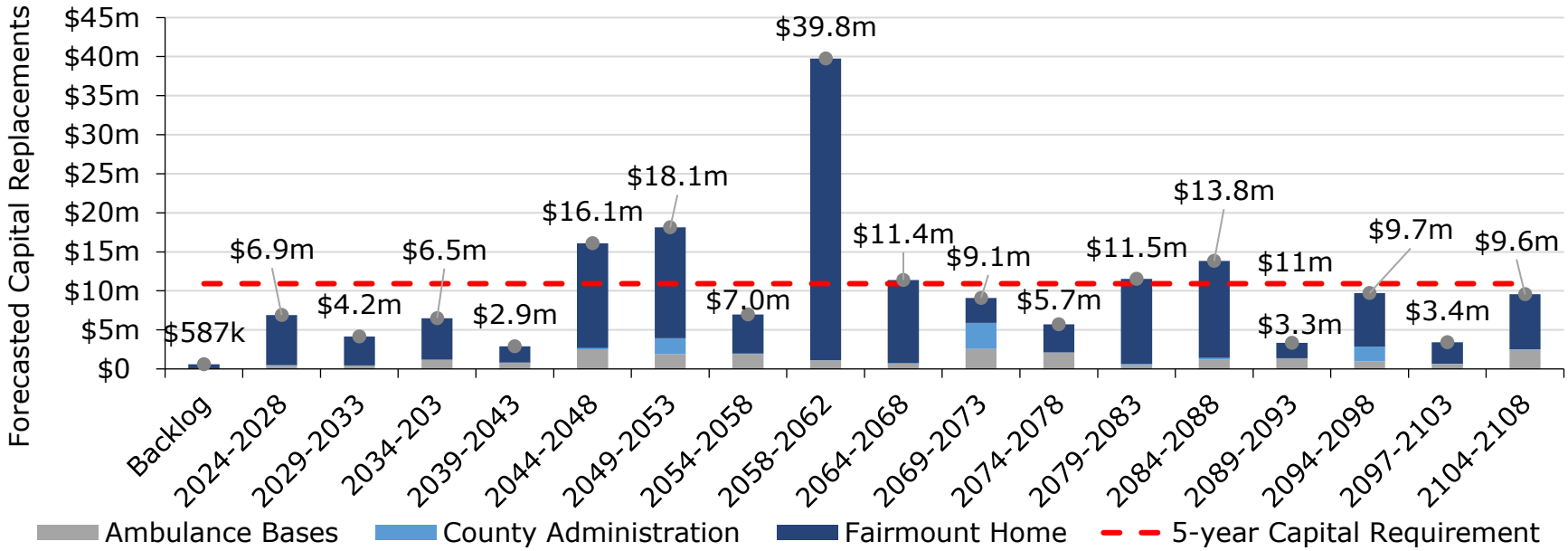


Table 12 below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service.

Table 12 Buildings System-Generated 10-Year Capital Costs

Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Ambulance Bases	**$862k**	$0	$197k	$178k	$36k	$3k	$93k	$43k	$165k	$145k	$1k
County Administration	**$59k**	$15k	$14k	$0	$0	$31k	$0	$0	$0	$0	$0
Fairmount Home	**$10.1m**	$563k	$1.9m	$2.8m	$389k	$833k	$1.0m	$164k	$911k	$69k	$1.5m

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.

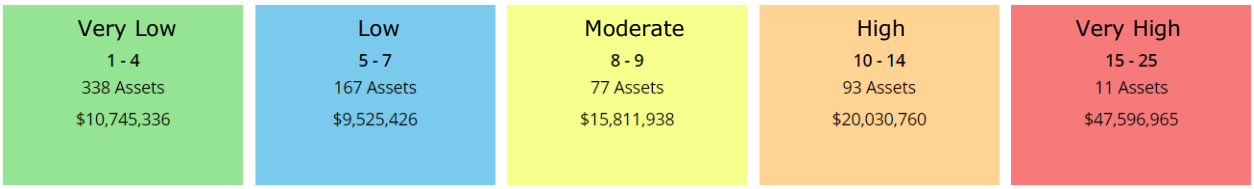
Risk & Criticality

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 E: Risk Rating Criteria for the criteria used to determine the risk rating for all asset categories.

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 identification of critical assets allows the county to determine 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.

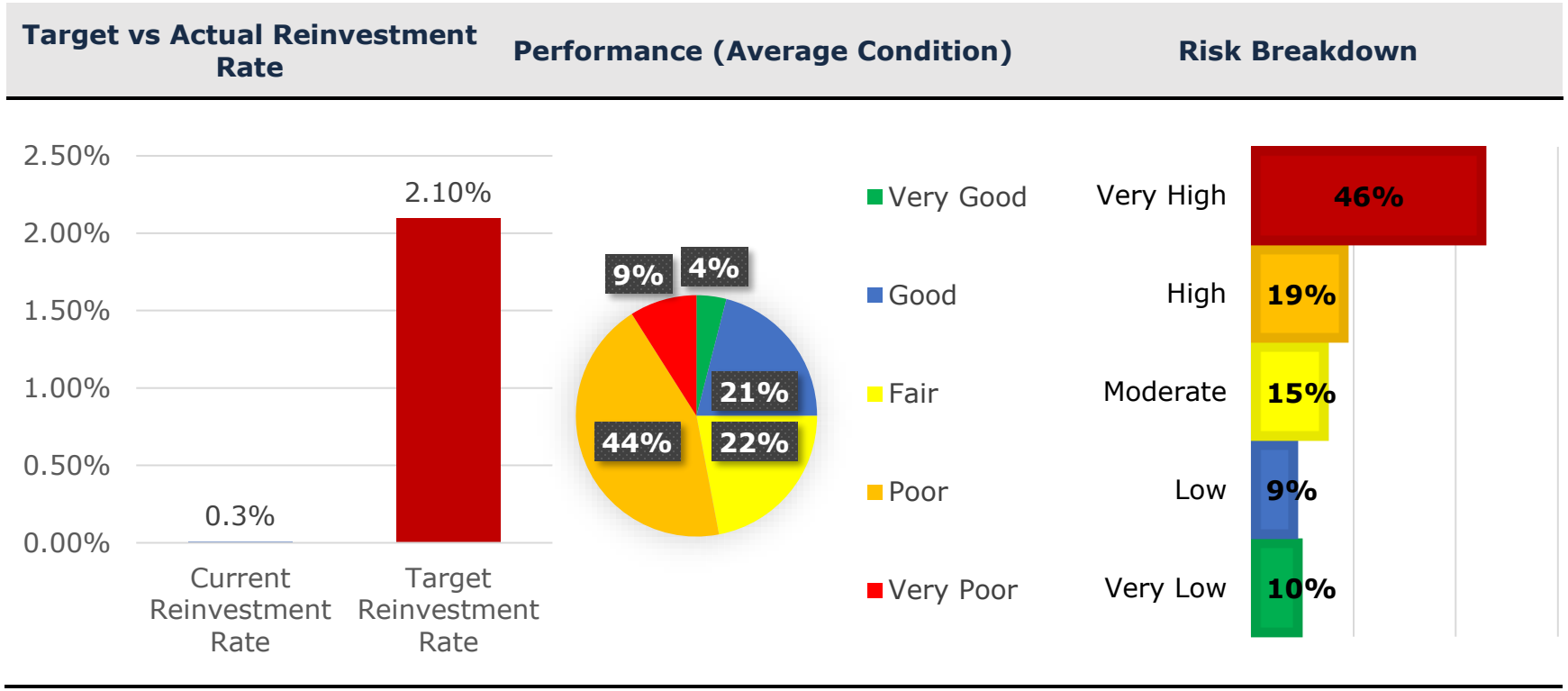
Figure 14 Buildings Risk Matrix



Levels of Service

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

Figure 15: Buildings Strategic Levels of Service



Community Levels of Service

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

Table 13 Ontario Regulation 588/17 Buildings Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Accessible & Reliable	Description of monthly and annual facilities inspection process	FMT: Annual inspection of Sprinkler System, Extinguishers, Bed Entrapment, Ceiling Lift Track Load Bearing, Septic System, FIT Testing Machines; semi-annual testing of the Fire Suppression system; bi-annual load testing of generators.
Safe & Regulatory	Description of the current condition of municipal facilities and the plans that are in place to maintain or improve the provided level of service	A Building Condition Assessment (BCA) was received in 2024. This report outlines repairs, maintenance and capital works forecast yearly to 2048 based on the current condition of the County-owned buildings assessed. Generally, the buildings are in fair to very good condition, with only the Parham Paramedic base being assessed as poor condition. The BCA estimated $5.5M building work would be required from 2024 to 2026. Fairmount Home, assessed as fair condition, accounts for $5.1M of these costs; this is 10% of the building replacement cost.

Technical Levels of Service

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

Table 14 Ontario Regulation 588/17 buildings Technical Levels of Service

Service Attribute	Technical Metric	Current LOS	
Accessible & Reliable	# of annual work orders issued through Ameresco Asset Work Order System		683
Affordable	O&M Annual Maintenance Costs	Admin	$15,286
		FMT	$276,776
		FP	$202,271
	Annual capital reinvestment rate		0.3%
Safe & Regulatory	% of facilities that are in fair or better condition		47
	% of facilities that are in poor or very poor condition		53

Appendix B: Vehicles

State of the Infrastructure

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

- Paramedic services
- County administration
- Non-ambulance paramedic services

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

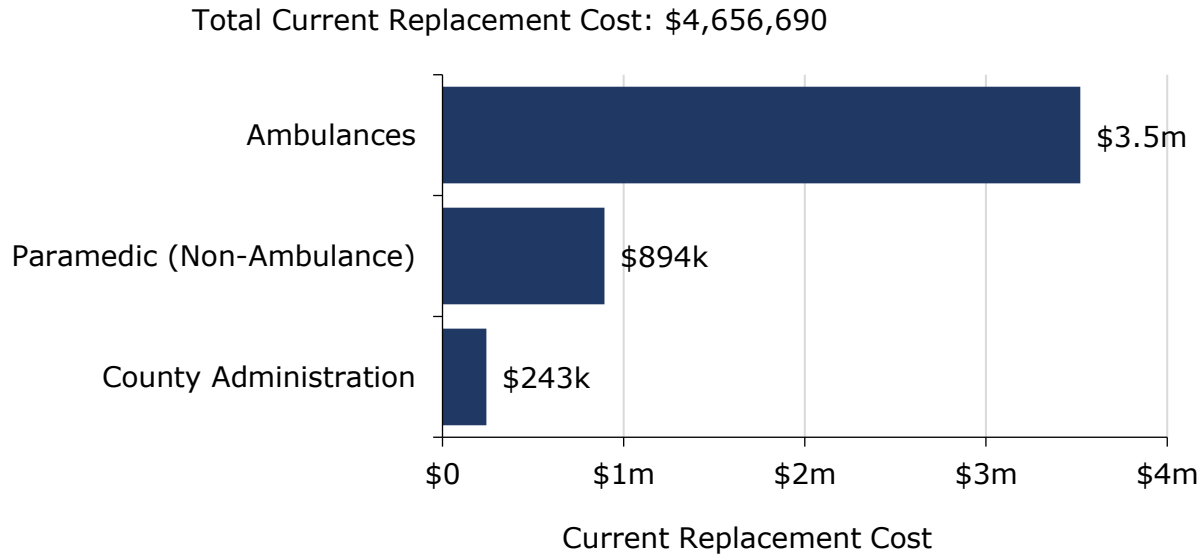
Table 15 Vehicles State of Infrastructure Summary

Replacement Cost	Condition	Financial Capacity	
$4.66 million	Poor (26%)	Annual Requirement:	$640,000
		Capital Funding Available:	$652,000
		Annual Surplus:	$12,000

Inventory & Valuation

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

Figure 16 Vehicle Replacement Costs

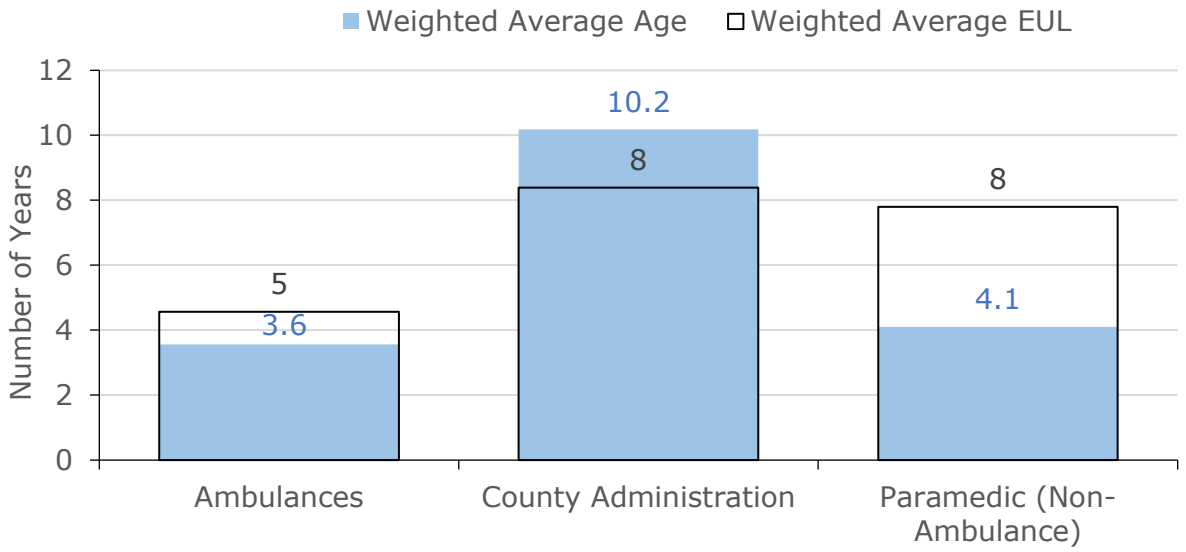


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

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.

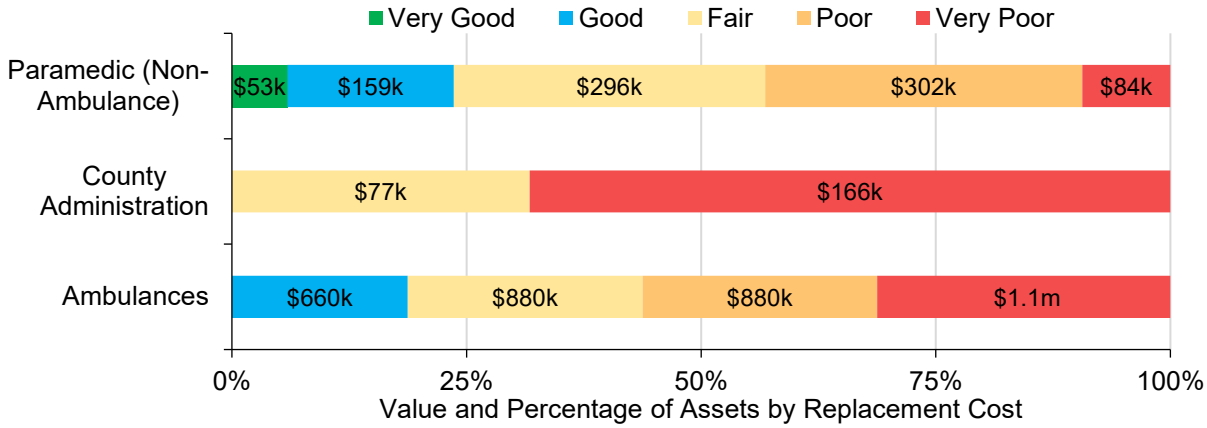
Figure 17 Vehicles Average Age vs Average EUL



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 18 Vehicles Condition Breakdown



To ensure that the county's vehicles continue to provide an acceptable level of service, the county 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. An example of the county's current approach is staff complete regular visual inspections of vehicles to ensure they are in state of adequate repair prior to operation.

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 19 Vehicles Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Oil change, tire replacement/rotation, transmission fluid, brakes, minor as-needed repairs
- Maintenance plan is every 10,000 km and is based on the manufacturer maintenance plan and report to Ministry of Health.
- Replacement considered when no longer cost-effective to maintain, or when asset can no longer be relied upon to be available when required.

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that the county should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 45 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 $640 thousand or $3.2 million over a 5-year period.

Figure 20 Vehicle Forecasted Capital Replacement Requirements

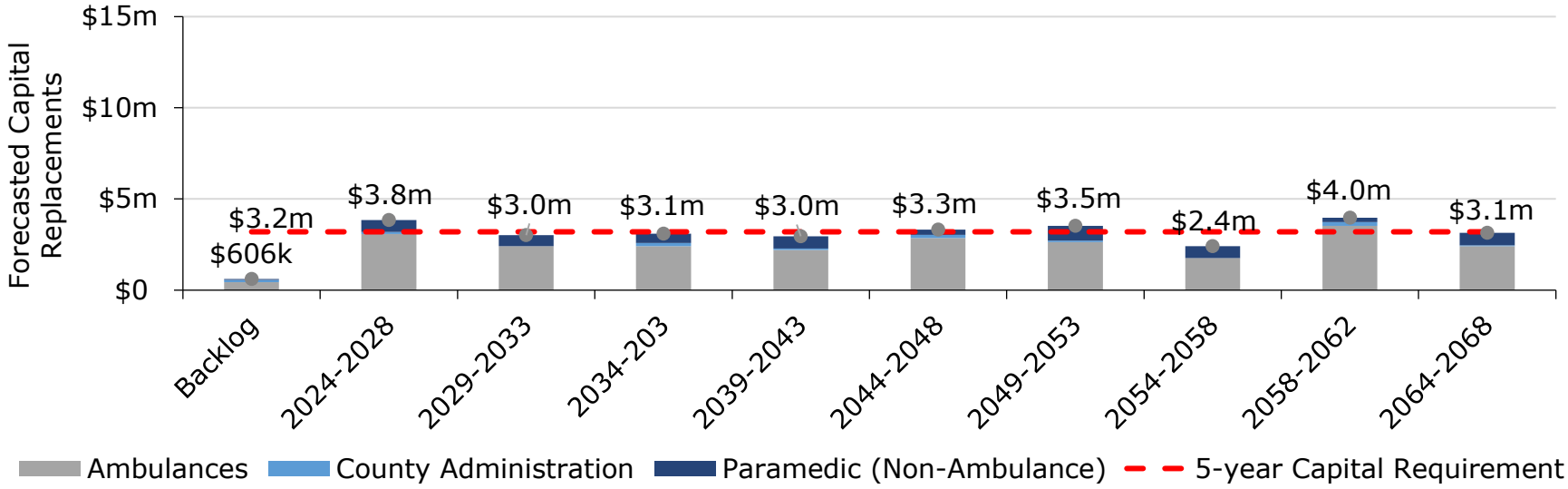


Table 16 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 16 Vehicles System-Generated 10-Year Capital Costs

Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Ambulances	**$5.5m**	$660k	$660k	$660k	$440k	$660k	$0	$0	$1.1m	$880k	$440k
County Administration	**$119k**	$42k	$0	$0	$42k	$35k	$0	$0	$0	$0	$0
Paramedic (non-ambulance)	**$1.2m**	$42k	$302k	$263k	$33k	$0	$211k	$0	$0	$84k	$302k

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 county's capital expenditure forecasts

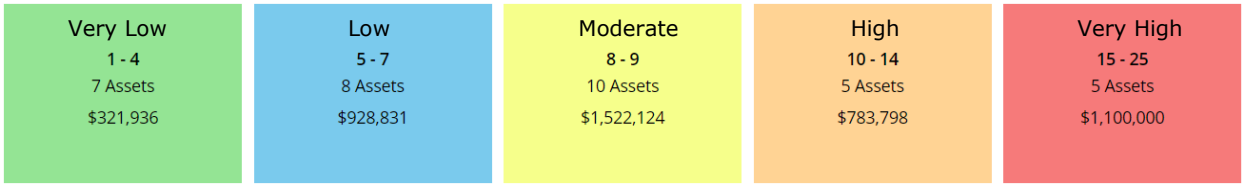
Risk & Criticality

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 E: Risk Rating Criteria for the criteria used to determine the risk rating for all asset categories.

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 identification of critical assets allows the county 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.

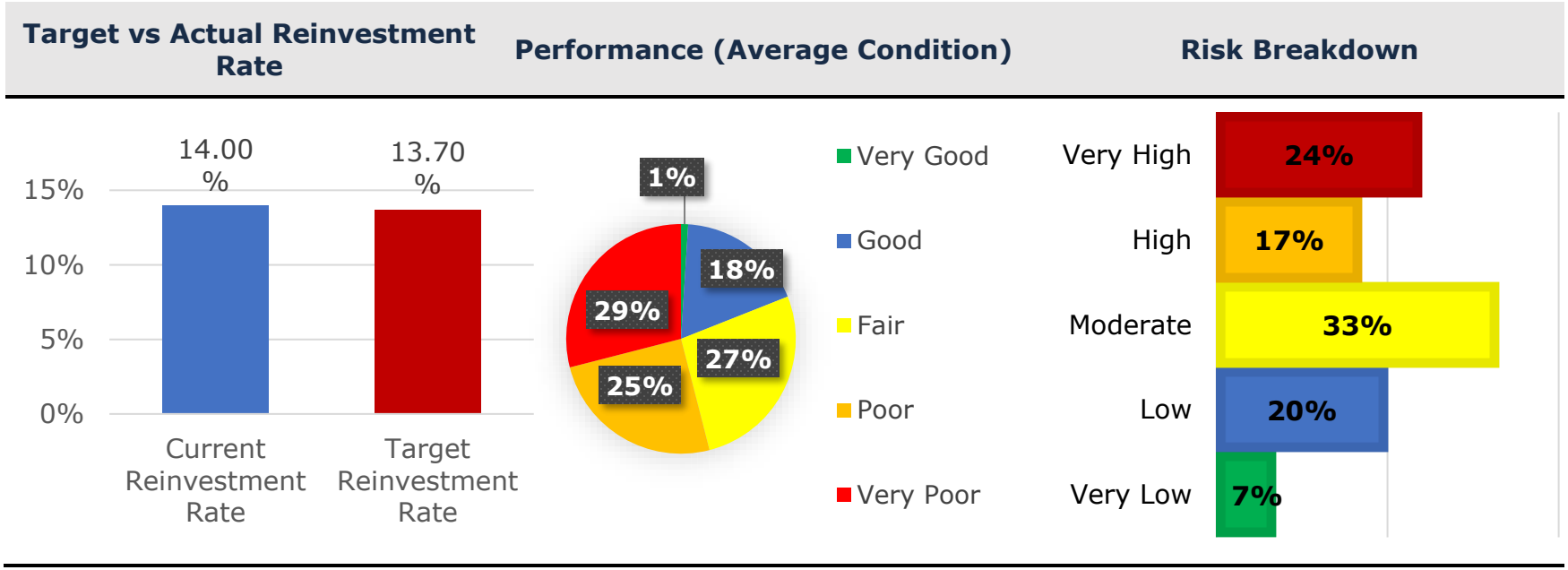
Figure 21 Vehicles Risk Matrix



Levels of Service

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

Figure 22: Vehicles Strategic Levels of Service



Community Levels of Service

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

Table 17 Ontario Regulation 588/17 Vehicles Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Accessible & Reliable	Description of the Fleet Management and Safety Program	There is a Frontenac Paramedics policy as well as MOH requirements (a policy must be in place for maintenance)
Safe & Regulatory	Description of the current condition of municipal vehicles and the plans that are in place to maintain or improve the provided level of service	Currently ambulances are remounted after 5 years, with the remounts being in service for another 5 years; other paramedic vehicles 5-10 years depending on its purpose, county admin vehicles are replaced every 10 years as required. Future plans will be assisted by the AMP analysis. E.g. minimize downtimes by monitoring idle time & the impact on vehicle replacement schedules.

Technical Levels of Service

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

Table 18 Ontario Regulation 588/17 Vehicles Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Accessible & Reliable	% of vehicles that meet maintenance and inspection requirements	100%
	Average Annual KM Driven by Paramedic Ambulances	38,604
	# of motor vehicle at-fault accidents involving municipal vehicles	3
Affordable	Annual capital reinvestment rate	14%
Safe & Regulatory	% of vehicles that are in fair or better condition	29
	% of vehicles that are in poor or very poor condition	71

Appendix C: Machinery & Equipment

State of the Infrastructure

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

- Computer hardware, software, and phone systems to support all county services
- Specialized equipment to support the delivery of paramedic services
- Equipment to support long-term care at Fairmount home.

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

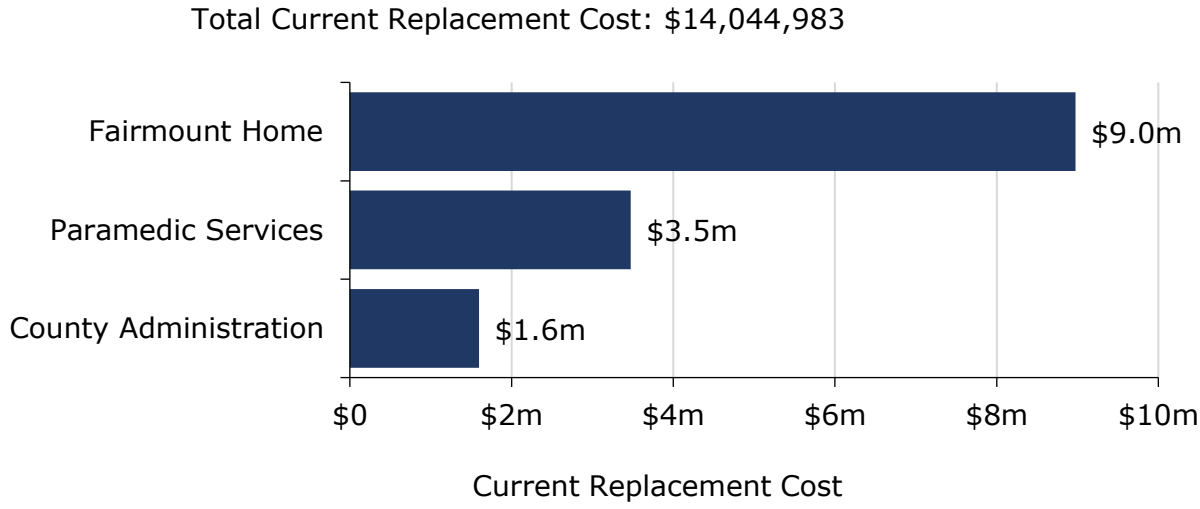
Table 19 Machinery & Equipment State of Infrastructure Summary

Replacement Cost	Condition	Financial Capacity	
$14.05 million	Poor (30%)	Annual Requirement:	$1,539,000
		Funding Available:	$612,000
		Annual Deficit:	$927,000

Inventory & Valuation

The graph below displays the total replacement cost of each asset segment in the Frontenac County's equipment inventory.

Figure 23 Machinery & Equipment Replacement Costs

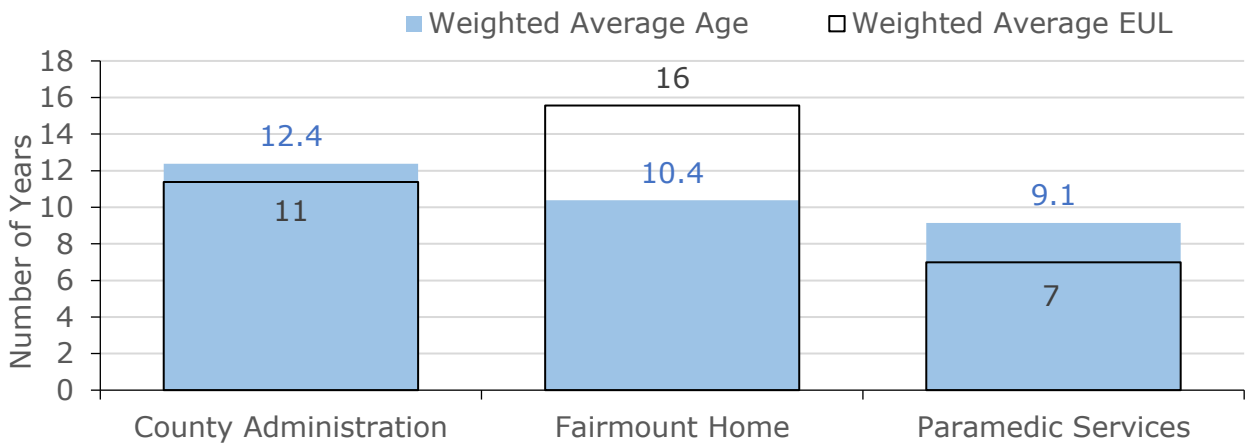


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent capital requirements.

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.

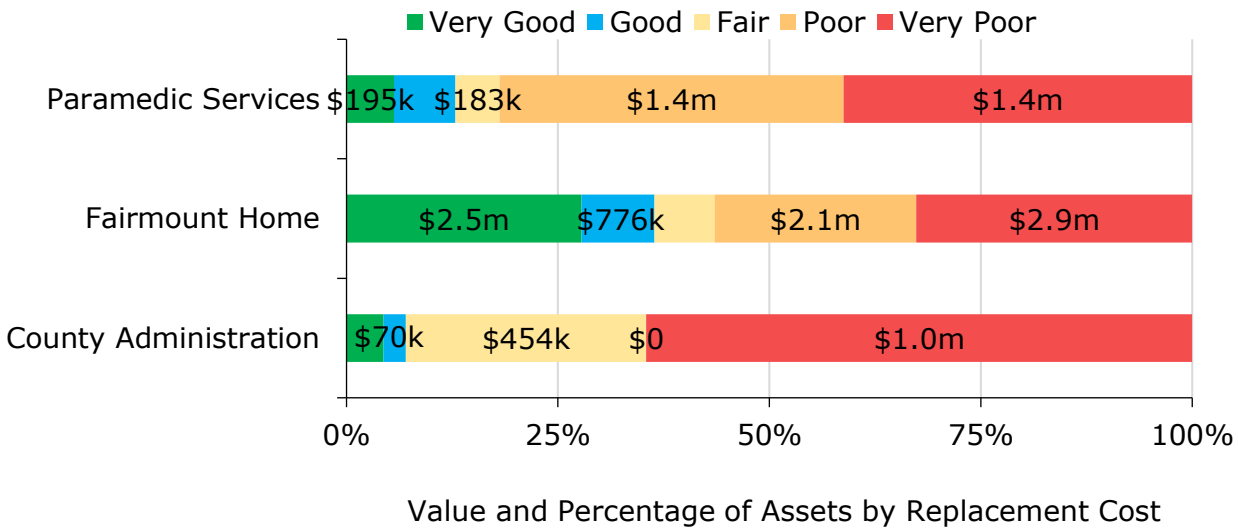
Figure 24 Machinery & Equipment Average Age vs Average EUL



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 25 Machinery & Equipment Condition Breakdown



To ensure that the county's equipment continues to provide an acceptable level of service, Frontenac County 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. Machinery and equipment are evaluated in the last year of their useful life for replacement to determine if the life can be extended. These assessments are primarily administered internally. There are some types with very established assessments (i.e. Paramedic Services), but also many don't have any formal annual assessment procedures.

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 26 Machinery & Equipment Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Similar to condition and age data, it is categorized by equipment type and department dependant
- Rehabilitation activities are typically not exercised but will be considered if a replacement part can extend the life of an asset
- Replacement is considered when an asset's condition or performance has deteriorated significantly

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 $1.5 million or or $7.7 million over a 5-year period.

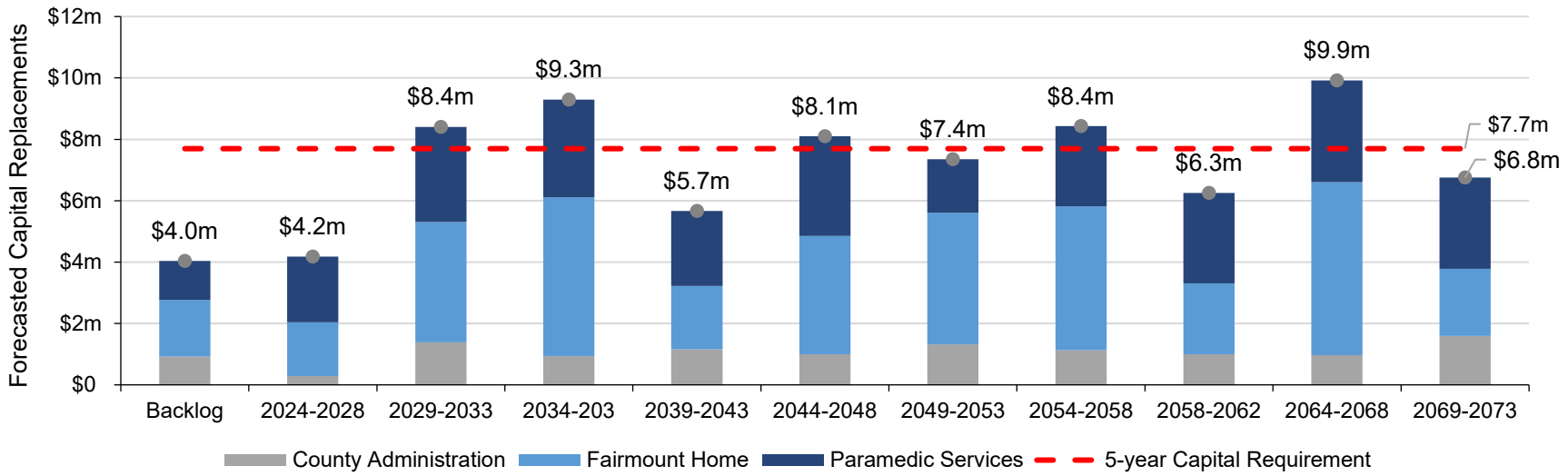


Figure 27 Machinery & Equipment Forecasted Capital Replacement Requirements

Table 20 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 20 Machinery & Equipment System-Generated 10-Year Capital Costs

Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
County Administration	**$1.7m**	$108k	$16k	$12k	$70k	$81k	$764k	$75k	$316k	$70k	$157k
Fairmount Home	**$5.7m**	$698k	$430k	$328k	$224k	$78k	$2.8m	$365k	$194k	$543k	$46k
Paramedic Services	**$5.2m**	$1.2m	$253k	$236k	$271k	$148k	$287k	$1.5m	$864k	$164k	$273k

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 county's capital expenditure forecasts.

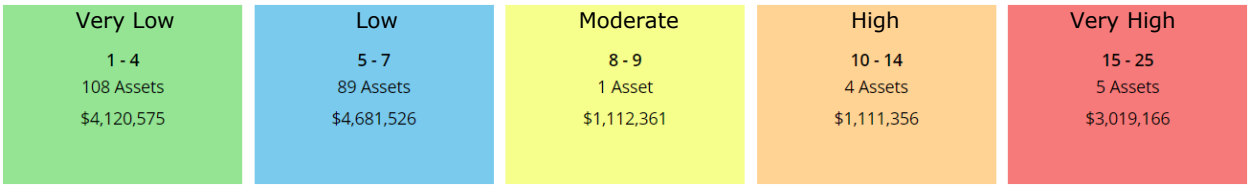
Risk & Criticality

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 E: Risk Rating Criteria for the criteria used to determine the risk rating for all asset categories.

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 identification of critical assets allows the county 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.

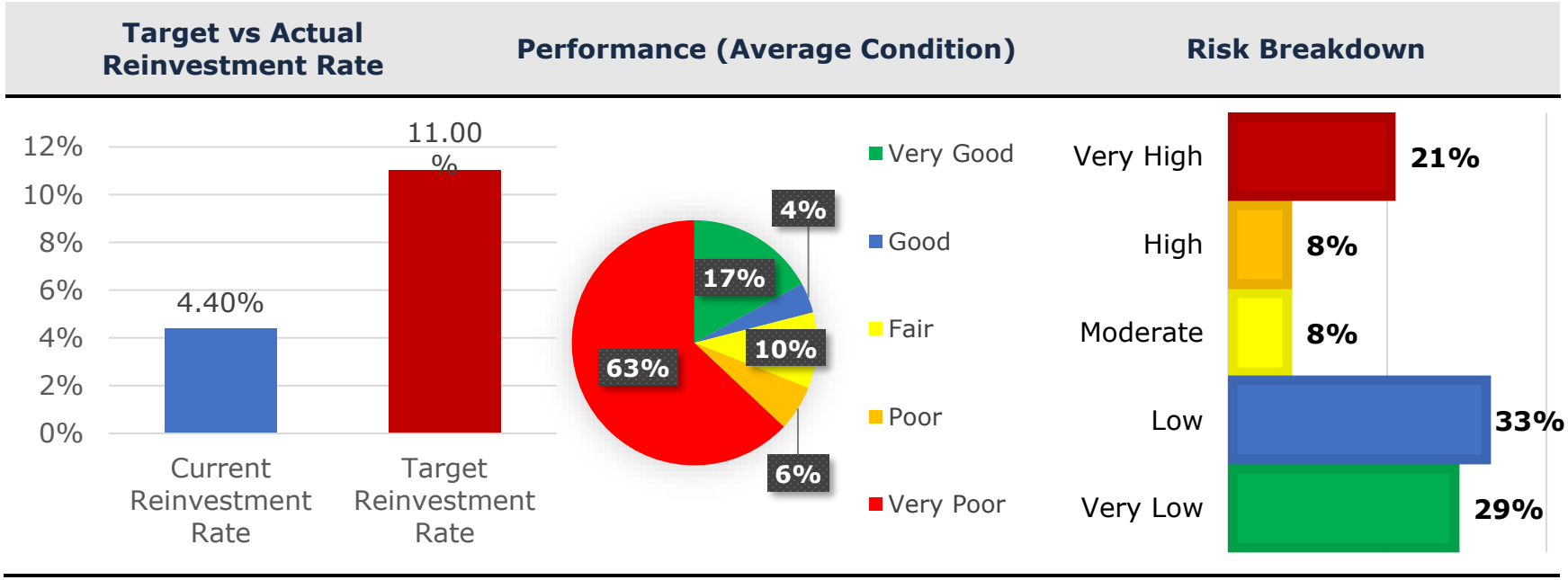
Figure 28 Machinery & Equipment Risk Matrix



Levels of Service

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

Figure 29: Machinery & Equipment Strategic Levels of Service



Community Levels of Service

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

Table 21 Ontario Regulation 588/17 Machinery & Equipment Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Accessible & Reliable	Description of the machinery & equipment inspection process and any licensing requirements for operators	Frontenac Paramedics: Patient care equipment is operated by Licensed paramedics. Logistics staff is certified for maint of equip, certified for working at heights. Currently only the defibrillators require licensing and must be operated by a licensed paramedic. Fairmount: Policies and procedures are in place for regular inspection of equipment that is mandated by legislation or internal policy.
Safe & Regulatory	Description of the current condition of machinery & equipment and the plans that are in place to maintain or improve the provided level of service	Frontenac Paramedics & Fairmount: current plans follow manufacturers best practices. No mechanical equipment manufacturer guidelines have been documented but this practice is planned with the construction of the new paramedic base.

Technical Levels of Service

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

Table 22 Ontario Regulation 588/17 Machinery & Equipment Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Accessible & Reliable	FP: % Equipment under a regulatory requirement that meets compliance standards	100%
	FP: % of regulatory inspections completed monthly, quarterly, or annually as required	100%
	FMT % of regulatory inspections completed on schedule	100%
Affordable	Annual capital reinvestment rate	2.1%
Safe & Regulatory	% of machinery & equipment that are in fair or better condition	29
	% of machinery & equipment that are in poor or very poor condition	69

Appendix D: K&P Trail

State of the Infrastructure

Frontenac County owns several asset types that compliment the K&P Trail network. These include:

- The trail itself
- Bridges and culverts
- Equipment and signage
- Parking areas

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

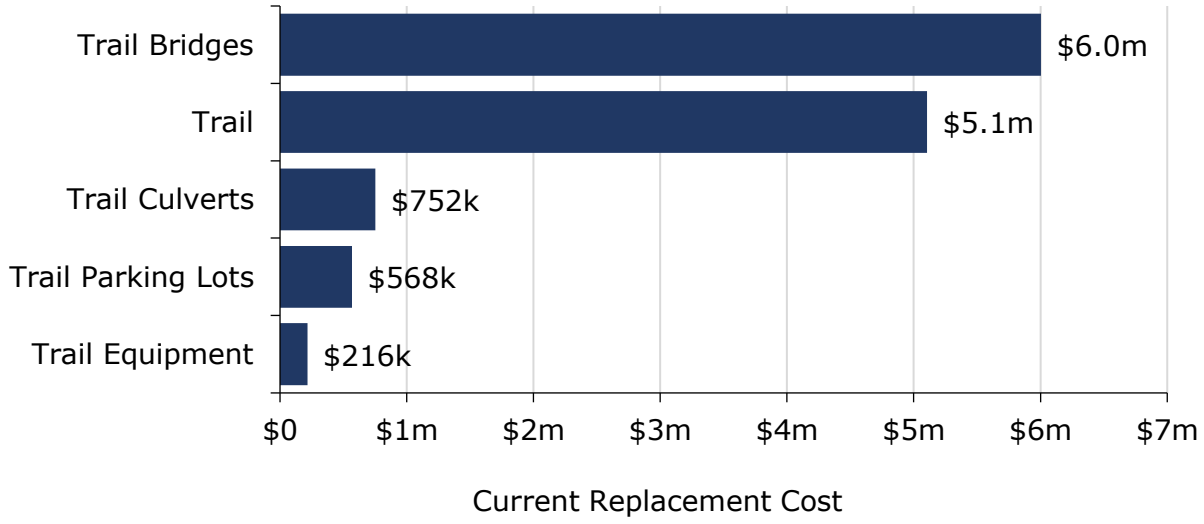
Table 23 Buildings State of Infrastructure Summary

Replacement Cost	Condition	Financial Capacity	
$12.65 million	Fair (56%)	Annual Requirement:	$217,000
		Funding Available:	$78,000
		Annual Deficit:	$139,000

Inventory & Valuation

K&P Trail asset category has a replacement value of $12.6 million.

Figure 30 K&P Trail Replacement Costs

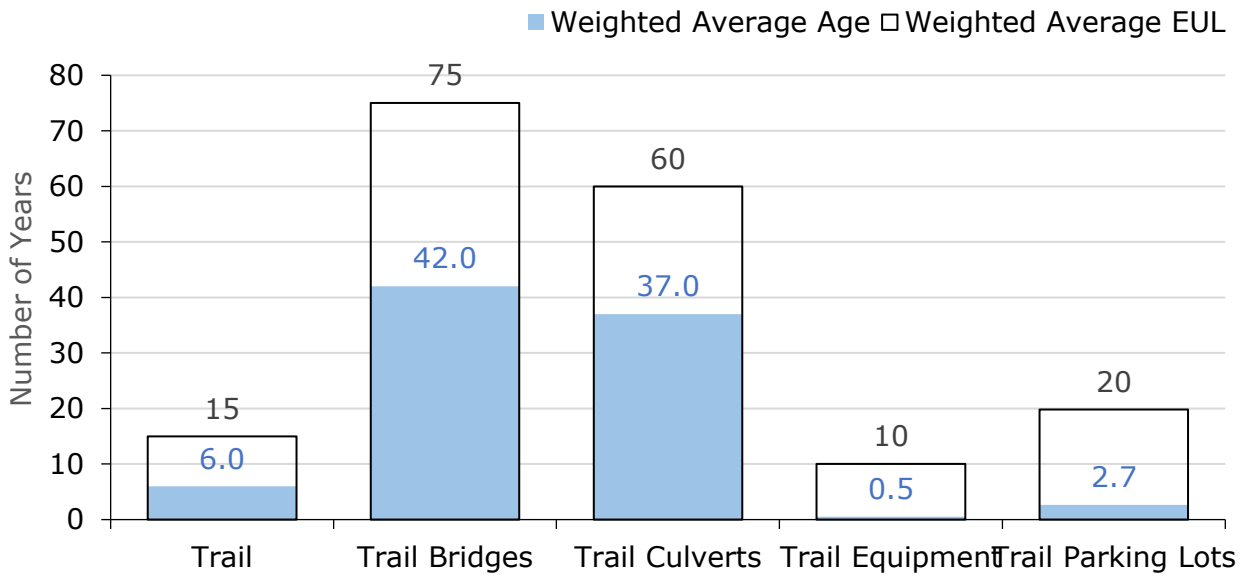


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

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.

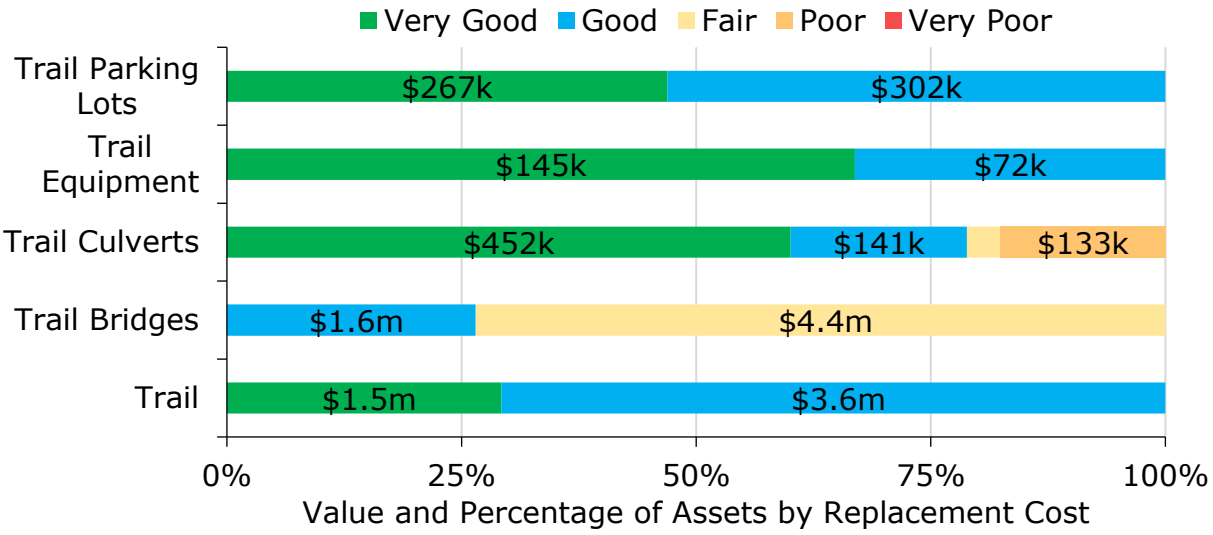
Figure 31 K&P Trail Average Age vs Average EUL



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 32 K&P Trail Condition Breakdown



To ensure that the county's K&P trail continues to provide an acceptable level of service, Frontenac County should monitor the average condition of all assets. Staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to maintain or increase asset service longevity.

Current Approach to Condition Assessment

Accurate and reliable condition data enable staff to determine the remaining service life of assets and identify the most cost-effective management strategies. The current approach is like that used for buildings, where many trail assets are assessed on a five-year cycle. However, structural bridges and culverts are inspected every two years in accordance with OSIM (Ontario Structure Inspection Manual) requirements. Each asset is assigned a condition rating on a scale from 1 to 5, ranging from unacceptable to good. Most assessments are conducted by external contractors.

Lifecycle Management Strategy

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

Figure 33 K&P Trail Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Routine maintenance of trail assets includes grading, shaping, and packing the surface, controlling dust through Calcium or Magnesium Chloride application, brushing and mowing, granular replacement, and trail inspection, including ditches and culverts, spot repairs.
- Maintenance actions are typically triggered by inspections and scheduled
- Patching repairs on laneways/parking lots
- Replacement is considered when an asset's condition has deteriorated significantly. In the case of trail assets, when rehabilitation is no longer cost-effective and the asset is near failure.

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that should be 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 annual capital requirements at $217 thousand or $1.1 million over a 5-year period.

Figure 34 K&P Trail Network Forecasted Capital Replacement Requirements

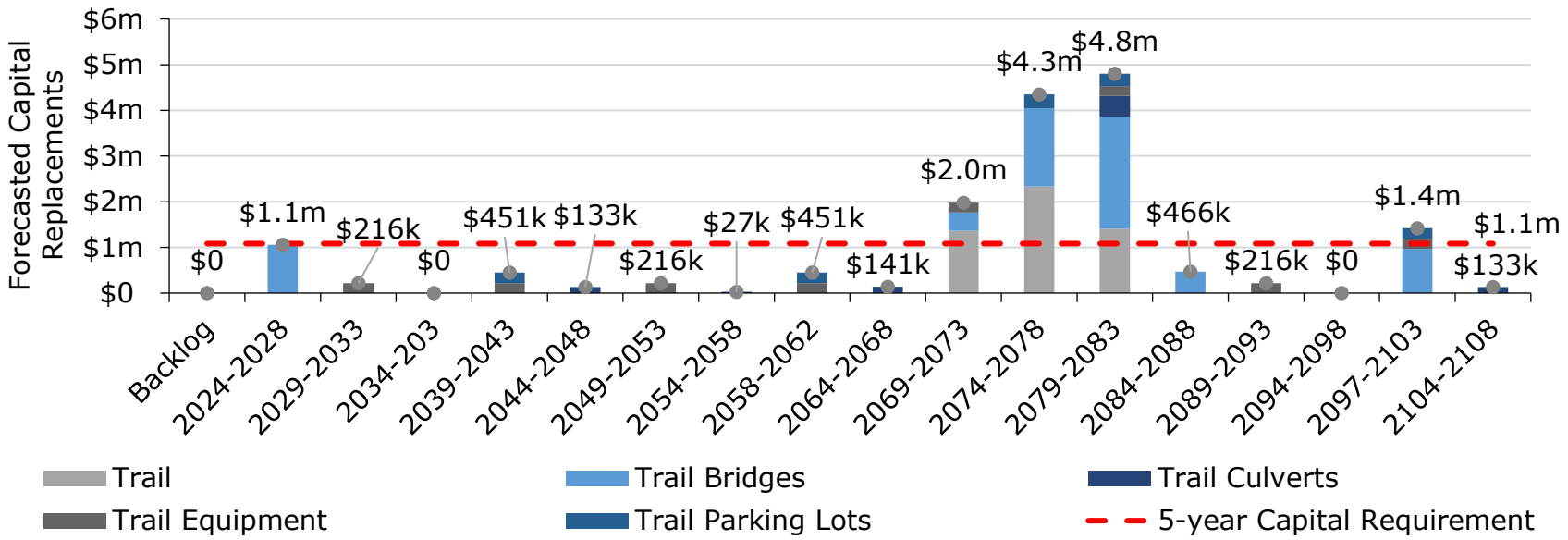


Table 24 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 24 K&P Trail Network System-Generated 10-Year Capital Costs

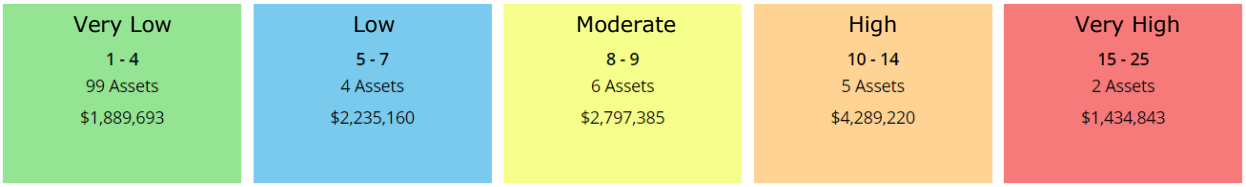
Segment	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Trail	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Trail Bridges	**$1.1m**	$0	$0	$0	$1.1m	$0	$0	$0	$0	$0	$0
Trail Culverts	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Trail Equipment	**$216k**	$0	$0	$0	$0	$0	$0	$42k	$29k	$145k	$0
Trail Parking Lots	**$0**	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

A staff assessment from 2020 for culverts and 2022 for bridges on the trail were 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 county'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 E: Risk Rating Criteria for the criteria used to determine the risk rating for all asset categories.

Figure 35 K&P Trail Network Risk Matrix



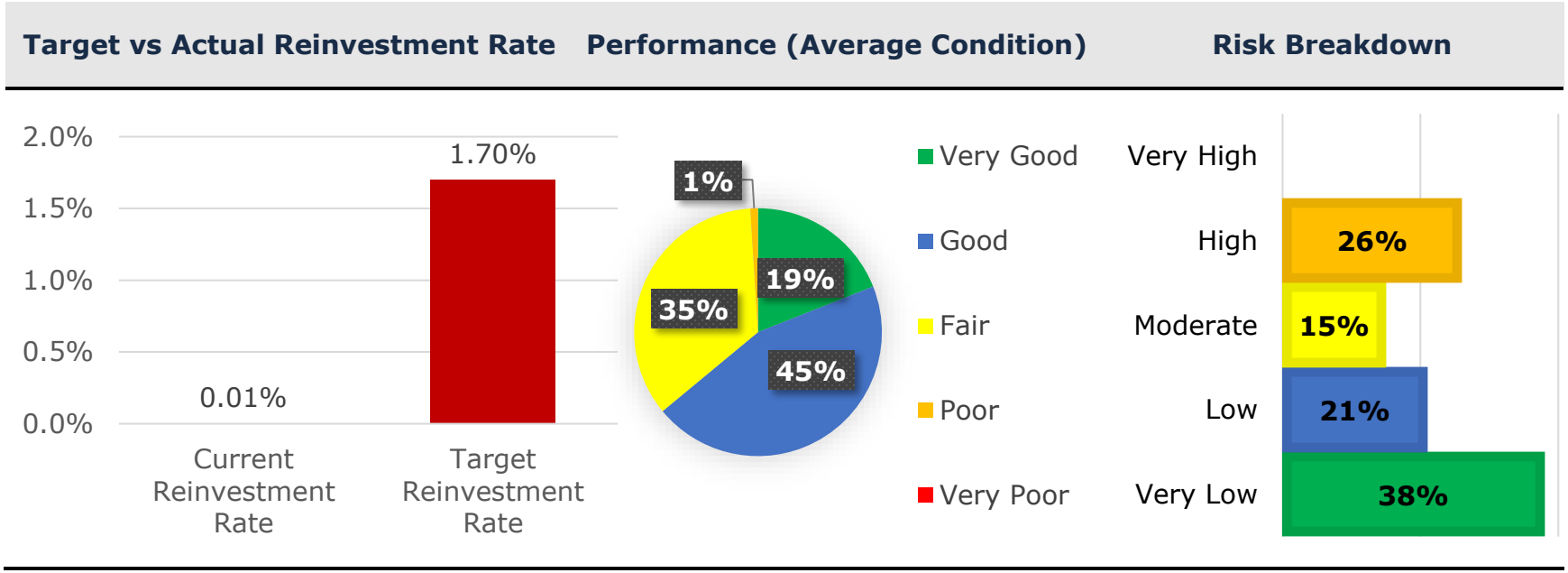
This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets allows the county to determine 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.

Levels of Service

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

Figure 36: K&P Trail Network Strategic Levels of Service



Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the K&P Trail network.

Table 25 Ontario Regulation 588/17 K&P Trail Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Accessible & Reliable	Description, which may include maps, of trails and the proximity to the surrounding community	As illustrated in Figure 37 below, the trail runs from the County's south boundary with the City of Kingston, through South, Central, and North Frontenac Townships. While still under development, it will eventually reach 90 kilometres in length to meet the boundary with the County of Lanark to the north.
Safe & Regulatory	Description of the trails inspection process and timelines for inspections	Monthly inspections of the trail network, including legislated OSIM bridge inspections every two years; proactive planned annual maintenance for the entire length of the trail.

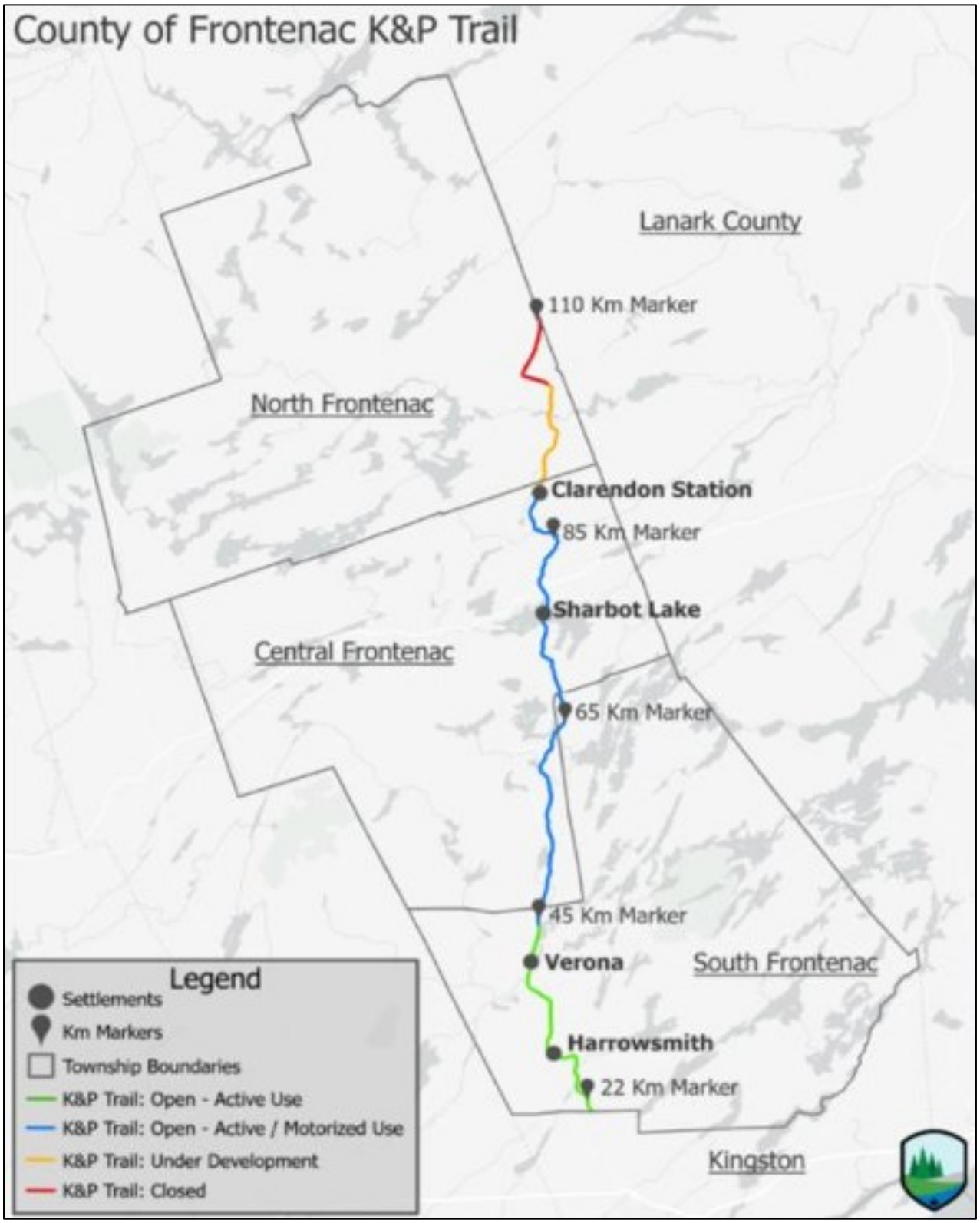
Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the K&P Trail network.

Table 26 Ontario Regulation 588/17 K&P Trail Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Sustainable	Annual use tracked through trail counters	144,384
	Km of trail network	73
Accessible & Reliable	Trail Network Inspection Target (1x per month)	12
	Number of Hazards Reported during inspections	32
Affordable	O&M cost for the trail network per km	$2,046
	Annual capital reinvestment rate	0.6%
Safe & Regulatory	% of trail assets that are in good or very good condition	84%
	% of trail assets that are in poor or very poor condition	16%

Figure 37: K&P Trail Map



Appendix E: 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 - Economic	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 - Strategic	The consequence of asset failure on strategic planning
COF - Range	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe

Risk Frameworks

Buildings

Table 27 Buildings Risk Frameworks

Asset Category	Asset Segment	Risk Criteria	Criteria	Weighting (%)	Sub-Criteria	Weighting (%)	Value/Range	Score
Buildings		COF	Economic	100%	Replacement Cost	100%	$0 - $50k $50k - $100k $100k - $500k $500k – $1.5m >$1.5m	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
		POF	Performance	100%	Assessed Condition	99%	>4.1 3.1 – 4.1 2.1 - 3.1 1.1 – 2.1 0 – 1.1	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain
			Performance		Service Life Remaining (years)	1%	>20 15 – 20 10 – 15 5 – 10 0 - 5	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain

Bridges

Table 28 Bridges Risk Frameworks

Asset Category	Asset Segment	Risk Criteria	Criteria	Weighting (%)	Sub-Criteria	Weighting (%)	Value/Range	Score
Bridges		COF	Economic	100%	Replacement Cost	100%	$0 - $50k $50k - $100k $100k - $500k $500k – $1.5m >$1.5m	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
		POF	Condition	100%	Assessed Condition	100%	>90 75 - 90 55 - 75 40 - 55 0 – 40	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain

Culverts

Table 29 Culverts Risk Frameworks

Asset Category	Asset Segment	Risk Criteria	Criteria	Weighting (%)	Sub-Criteria	Weighting (%)	Value/Range	Score
Culverts		COF	Economic	100%	Replacement Cost	100%	$0 - $50k $50k - $100k $100k - $500k $500k – $1.5m >$1.5m	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
		POF	Condition	100%	Assessed Condition	100%	>4 3 - 4 2 - 3 1 – 2 0 – 1	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain

Vehicles, Machinery & Equipment

Table 30 Machinery & Equipment, Trails, and Vehicles Risk Frameworks

Asset Category	Asset Segment	Risk Criteria	Criteria	Weighting (%)	Sub-Criteria	Weighting (%)	Value/Range	Score
Machinery & Equipment, Vehicles, Trails		COF	Economic	100%	Replacement Cost	100%	$0 - $50k $50k - $100k $100k - $250k $250k – $500k >$500k	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
		POF	Condition	100%	Assessed & Age Based Condition	100%	>80 60 - 80 40 - 60 20 - 40 0 – 20	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain

Appendix F: 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 county'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 county'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 county 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 county 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 county 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 county 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