2022

Asset Management Plan

This Asset Management Plan 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 the Town of Moosonee totals $123 million. 66% of all assets analysed are in fair or better condition and assessed condition data was available for 39% 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 (roads) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service, a sustainable financial plan was developed.

To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Municipality's average annual capital requirement totals $3.4 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $400 thousand towards capital projects or reserves per year. As a result, the Municipality is funding 12% of its 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 Municipality'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 Municipality review the feasibility of implementing a 4.1% annual increase in revenues over a 15-year phase-in period. Similarly, water and sanitary rate revenues would need to increase at 3.1% annually for 15 years and 14.3% annually for a 15-year phase in to close respective funding gaps. Funding scenarios over longer time frames are also presented which reduce the annual increases.

In addition to annual needs, there is also an infrastructure backlog of $28 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 Municipality 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 Town'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 Municipality 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 the highest affordable service levels to the Moosonee community.

About this Document

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

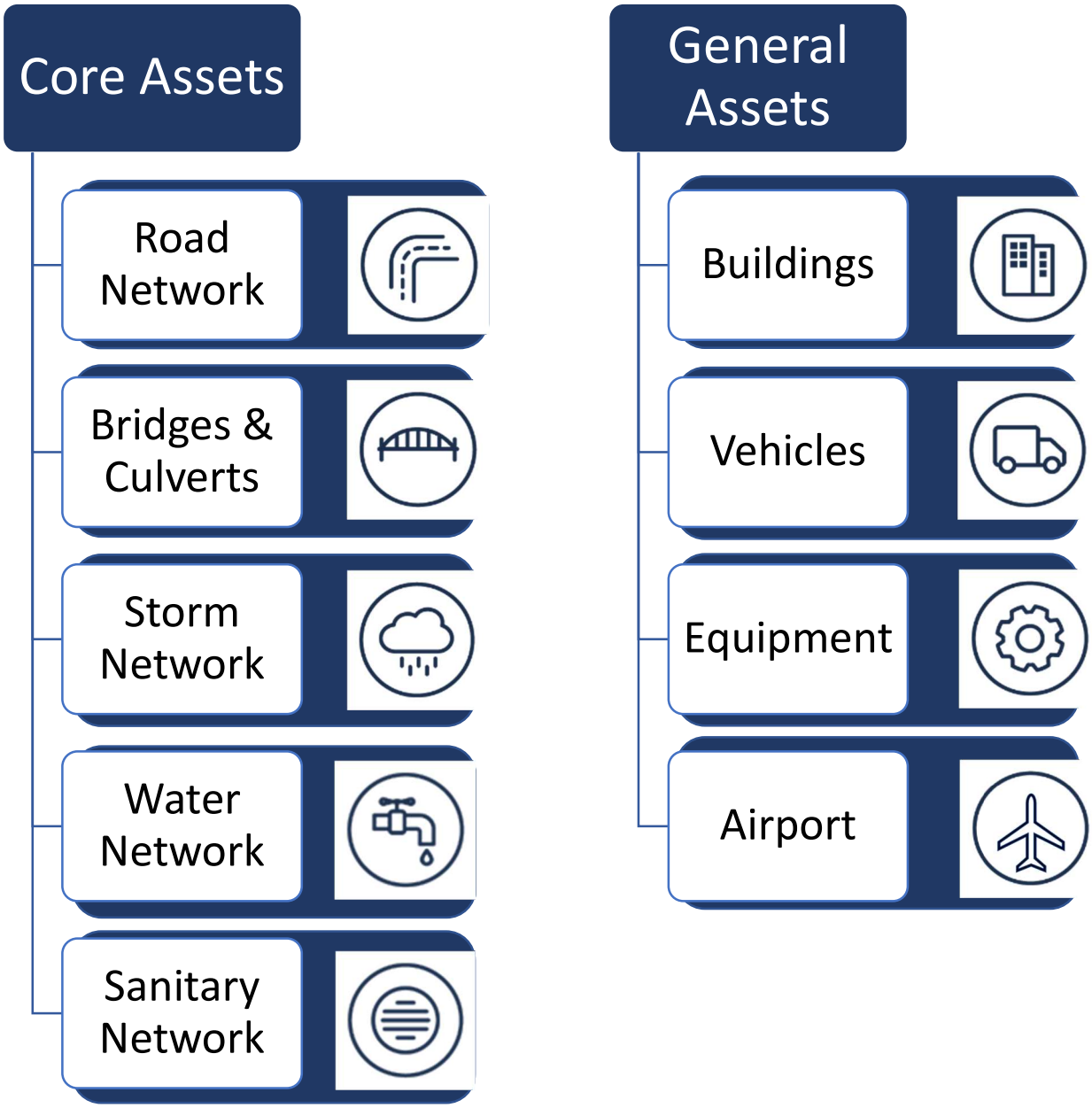
Table 1 Ontario Regulation 588/17 Requirements and Reporting Deadlines

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 Municipality 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 Municipality's primary asset management system.

These challenges are quite common among municipalities and require long-term commitment and sustained effort by staff. As the Municipality'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.

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.

Moosonee's mission is to work with community members to encourage participation in community development while respecting diverse cultures, traditions, and values. We will build and promote a safe and sustainable community that provides municipal services in a fiscally responsible manner.

Asset Management Policy

An asset management policy represents a statement of the principles guiding the Municipality's approach to asset management activities. It aligns with the organization and provides clear direction to municipal staff on their roles and responsibilities. Moosonee adopted their asset management policy on June 25th, 2019, in accordance with Ontario Regulation 588/17.

The policy identifies the Town aims to ensure that its assets are effectively managed across the complete asset lifecycle in a safe, efficient, coordinated, and environmentally sensitive way that sustainably serves the needs of its residents, and optimizes the long-term return on investment. In doing so the Town will comply with all legal, regulatory, safety and environmental requirements placed upon it, and will not compromise the safety of its employees and residents.

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 Moosonee 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 Municipality'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
Infrastructure	Road Network	Gravel Roads Sidewalks Signs Streetlights
	Bridges & Culverts	Bridges Culverts
	Storm Network	Storm Mains Catchbasin Manholes Catchbasins
	Water Network	Hydrants Water Meters General Water Equipment Water Treatment Watermains
	Sanitary Network	Lagoons General Sanitary Equipment Sanitary Mains Sanitary Forcemains Manholes Lift Stations
General Capital	Buildings	Administration Fire Recreation Public Works
	Equipment	Administration Fire Recreation Public Works
	Vehicles	Administration Fire Public Works
	Airport	Buildings Equipment Runway Vehicles

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

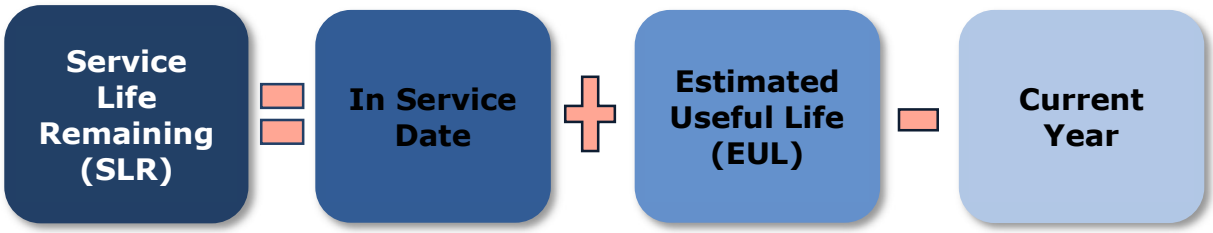
User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the Municipality 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 Municipality 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 Municipality can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the Municipality can more accurately forecast when it will require replacement. The SLR is calculated as follows:

Figure 1 Service Life Remaining Calculation



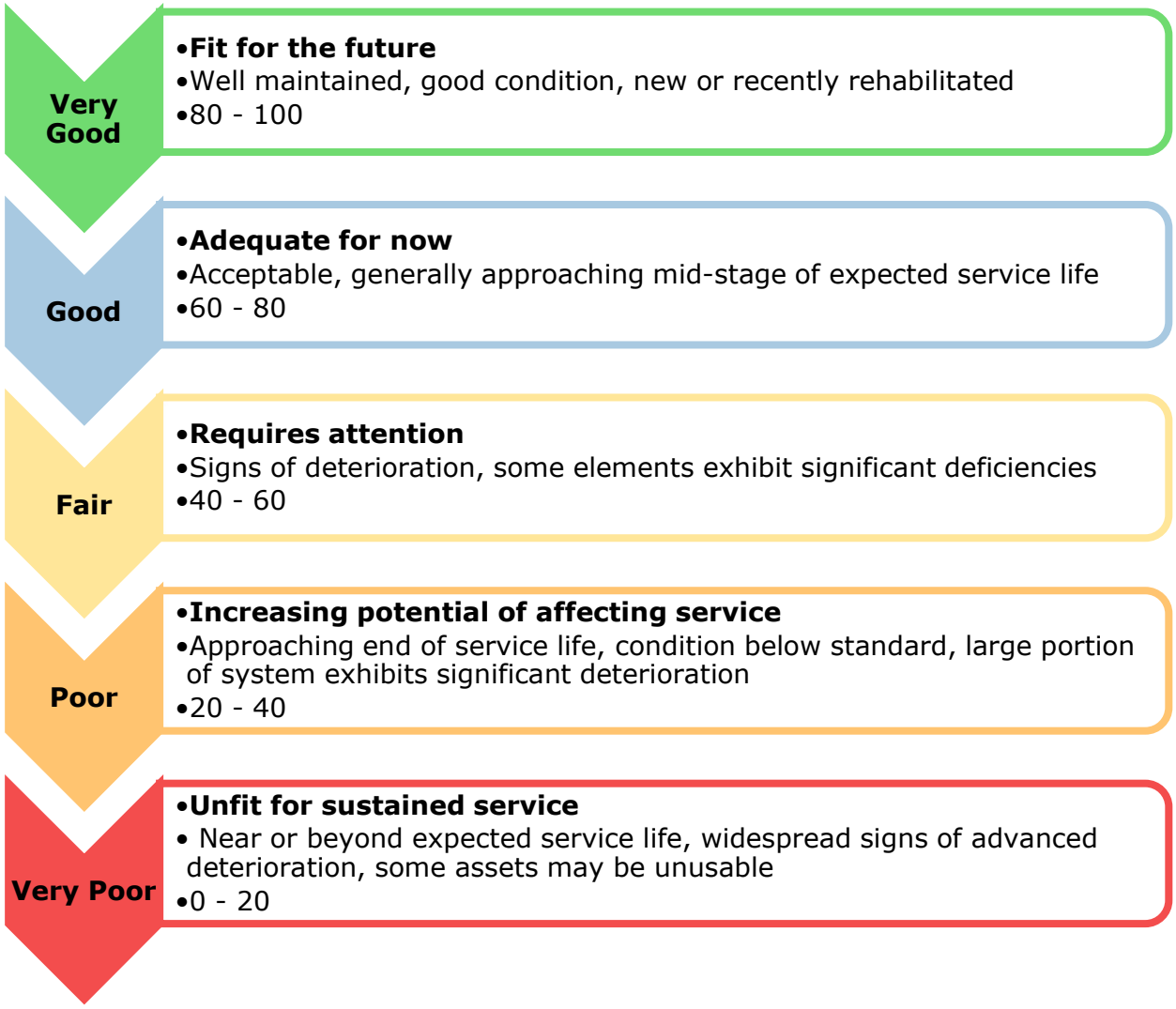
Asset Condition

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 Municipality'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



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 K: 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. **Error! Reference source not found.** provides a description of each type of activity, the general difference in cost, and typical risks associated with each.

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

Figure 3 Lifecyle Management Typical Interventions

Maintenance

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

Rehabilitation / Renewal

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

Replacement

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

Risk Management Strategies

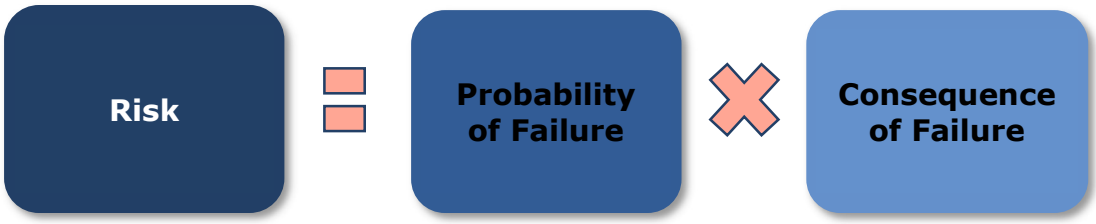
Municipalities generally take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important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

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

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

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

Figure 4 Risk Equation



Probability of Failure

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

Consequence of Failure

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

Levels of Service

A level of service (LOS) is a measure of the services that Moosonee 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 the 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.

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 Municipality 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 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 Municipality'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 Municipality must determine the technical metrics that will be used by July 1, 2024. The metrics can be found in the LOS subsection within each asset category.

Current and Proposed Levels of Service

Moosonee is focused on measuring the current LOS provided to the community. Once current LOS have been measured and trended the Municipality 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 Municipality. 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 Municipality 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 Municipality 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 Municipality'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 Moosonee'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 Municipality 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 Municipality can determine the extent of any existing funding gap.

Portfolio Overview

Community Profile

The Town of Moosonee is a single tier municipality in the Cochrane District located within Northeastern Ontario. The Town is located along Moose River on the south end of James Bay.

The region was settled in 1900 and development began in 1903 by a crew of 21 people who worked at a French company called Révillon Frères, a luxury goods distributor. In 1932, The Temiskaming and Northern Ontario Railway was extended from Cochrane to Moosonee. As Moosonee developed, the economy was centred on transportation rather than luxury goods.

The Town is recognized for its train called the Polar Bear Express which runs from Moosonee station to Cochrane. The train can transport cars, canoes, ATVs and snowmobiles. Other attractions include the Railway Car Museum which displays the cultural history of the area, and the MNR Interpretive Centre which highlights the wildlife, geological and geographical features of the region.

Moosonee has experienced recent decreases in population over the passed 15 years. The Town has a younger population above the provincial average.

Table 3 Moosonee & Ontario Census Information

Census Characteristic	Moosonee	Ontario
Population 2021	1,471	14,223,942
Population Change 2016-2021	4.7	5.8%
Total Private Dwellings	612	5,929,250
Population Density	898.8/km^2	15.9/km^2
Land Area	1.64 km^2	892,411.76 km^2

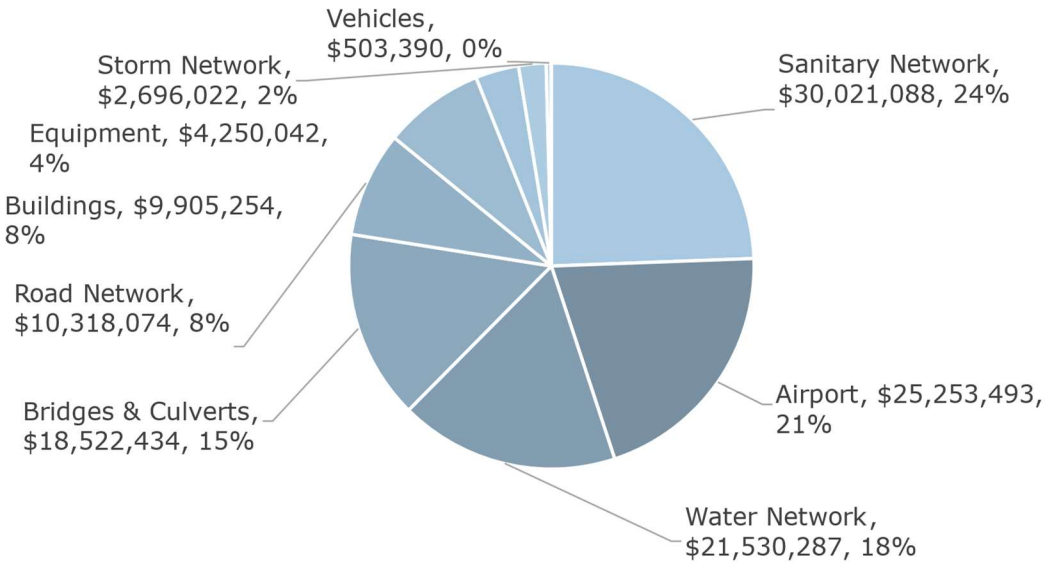
State of the Infrastructure

Asset Category	Replacement Cost	Asset Condition	Financial Capacity	
Road Network	$10,318,074	Fair (50%)	Annual Requirement:	$326,806
			Funding Available:	$204,712
			Annual Deficit:	**$122,094**
Bridges & Culverts	$18,522,434	Good (68%)	Annual Requirement:	$461,676
			Funding Available:	$0
			Annual Deficit:	**$461,676**
Storm Network	$2,696,022	Very Good (97%)	Annual Requirement:	$35,947
			Funding Available:	$0
			Annual Deficit:	**$35,947**
Water Network	$21,530,287	Good (77%)	Annual Requirement:	$432,612
			Funding Available:	$0
			Annual Deficit:	**$432,612**
Sanitary Network	$30,021,088	Poor (34%)	Annual Requirement:	$609,915
			Funding Available:	$0
			Annual Deficit:	**$609,915**
Buildings	$9,905,254	Poor (20%)	Annual Requirement:	$246,230
			Funding Available:	$0
			Annual Deficit:	**$246,230**
Vehicles	$503,390	Poor (28%)	Annual Requirement:	$75,441
			Funding Available:	$0
			Annual Deficit:	**$75,441**
Equipment	$4,250,042	Poor (39%)	Annual Requirement:	$362,493
			Funding Available:	$0
			Annual Deficit:	**$362,493**
Airport	$25,253,493	Fair (47%)	Annual Requirement:	$835,490
			Funding Available:	$200,000
			Annual Deficit:	**$635,490**
Overall	**$123,000,083**	**Fair (51%)**	Annual Requirement:	$3,386,610
			Funding Available:	$404,712
			Annual Deficit:	**$2,981,898**

Replacement Cost

The asset categories have a total replacement cost of $123 million based on available inventory data. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.

Figure 5 Portfolio Replacement Value

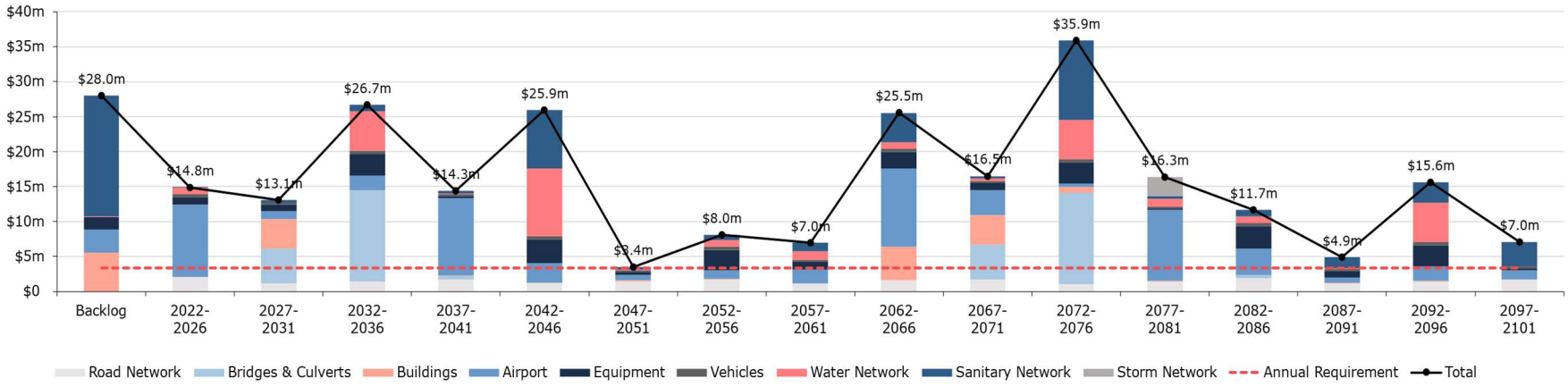


Forecasted Capital Requirements

Aging assets require maintenance, rehabilitation, and replacement. below illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for all asset categories analyzed. On average, $3.4 million is required each year to remain current with capital replacement needs for Moosonee's asset portfolio (red dotted line).

Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. This figure relies on age and available condition data. Based on the current replacement cost of the portfolio, estimated at $123 million, this represents an annual target reinvestment rate of 2.75%.

Figure 6 Forecasted Capital Requirements



The chart also illustrates a backlog of $28 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, 66% of assets in Moosonee are in fair or better condition. This estimate relies on both age-based and field condition data.

Assessed condition data is available for 39% 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 4 Assessed Condition Data Sources

Asset Category	Assets with Assessed Condition	Source of Condition Data
Road Network	98%	Internal Staff
Bridges & Culverts	100%	2020 A.Ibarra - Hatch
Buildings	16%	Internal Staff
Airport	42%	Internal Staff
Equipment	49%	Internal Staff
Vehicles	93%	Internal Staff
Sanitary Network	15%	2015 Annual Report

Service Life Remaining

Based on asset age, available assessed condition data and estimated useful life, 60% of the Municipality's assets will require rehabilitation / replacement within the next 10 years. Details of the capital requirements identified in each asset section.

Risk & Criticality

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

Funding

Major capital rehabilitation projects are entirely dependant on the availability of grant funding opportunities. When grants are not available, projects are 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 Moosonee's asset inventory is portrayed in the figure below.

Figure 7 Overall Asset Risk Breakdown

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

Moosonee Climate Profile

The Town of Moosonee is in Northeastern Ontario along the shore of Hudson Bay. The Town 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 Town of Moosonee may experience the following trends:

1. Higher Average Annual Temperature:
   - Between the years 1971 and 2000 the annual average temperature was -0.8 ºC
   - Under a high emissions scenario, the annual average temperatures are projected to increase by 2.3 ºC by the year 2050 and over 7.1 ºC by the end of the century.
2. Increase in Total Annual Precipitation:
   - Under a high emissions scenario, Moosonee is projected to experience an 17% increase in precipitation by the year 2050 and a 22% increase by the end of the century.
3. 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 impacted by James Bay.

James Bay

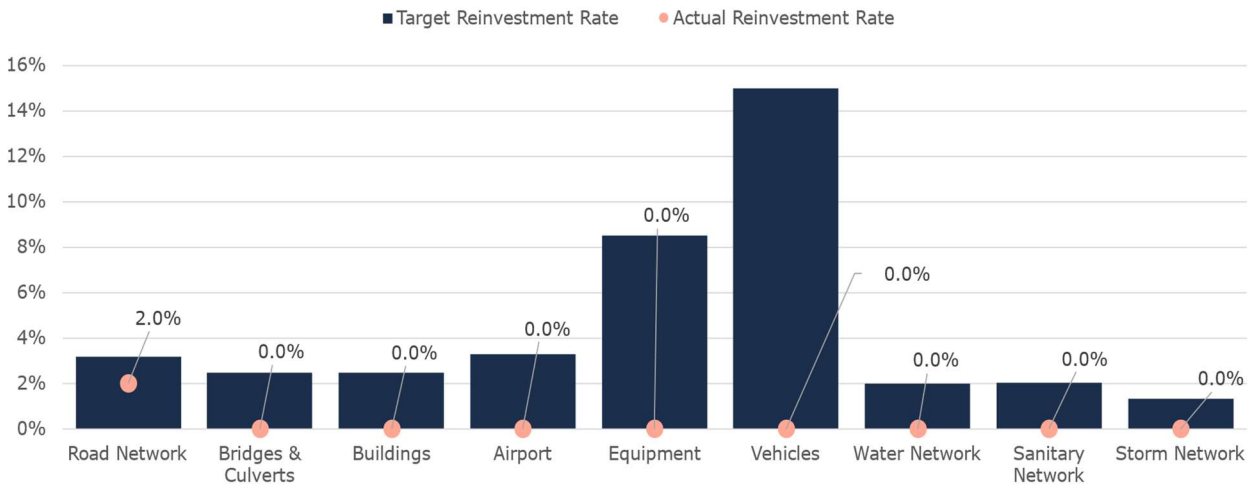
James Bay is a large body of water located at the southern end of Hudson Bay in Canada. There are about 81,000 people living in within the James Bay watershed. According to an environmental change study within Hudson and James Bay Region, the effects of climate change are visible by increasing air temperatures and melting glaciers. This may effect terrestrial and aquatic ecosystems in the region. Resources within the region are being exploited through hydropower generation, mineral extraction and forest harvesting which may have effects on ecosystems as well.

There is more frequent extreme weather, increased variability in weather patterns, warmer seasons, and changes in precipitation. These factors may have an impact on infrastructure such as the road network.

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 Municipality should be allocating approximately $3.4 million annually, for a target reinvestment rate of 2.75%. Actual annual spending on infrastructure totals approximately $200 thousand, for an actual reinvestment rate of 0.17%.

Figure 8 Target vs Actual Reinvestment Rates



Impacts of Growth

The Town of Moosonee adopted their Official Plan in 2006 which bases its projections on the Growth Plan for Northern Ontario and reflects the goals of the Planning Act.

The purpose of the Official Plan is to guide decision-making for land use and economic development over the next 20 years. It includes general land use designations, policies to be considered during development approval and municipal services, and a Community Improvement Strategy to guide improvements to infrastructure, building stock, and public facilities. The Official Plan will provide a basis for partnerships and incentives between the public and private sectors.

The settlement area will be the focus of residential and employment growth. Opportunities for intensification and redevelopment are prioritized while development and land use patterns which are adjacent to settlement areas that prevents expansion of settlement areas will be avoided. The younger age cohort and working age population is expected to increase. Changes in demographics within the Town will need to be considered when optimizing and adapting existing infrastructure.

Census data over the passed 20 years has indicated a steady decline in population. A significant portion of the population of the town is transient in nature which may influence the overall population of Moosonee. The following table was developed using census data from 2001 to 2021.

Table 5 Historical Population Data

Historical Figures	1996	2001	2006	2011	2016	2021
Population	1,939	936	2,006	1,725	1,481	1,512
Population Change	N/A	-52%	114%	-14%	-14%	2%
Private Dwellings	N/A	297	658	635	633	629

The population of Moosonee ranges from 1,939 in 1996 to 1,512 in 2021. Between the years of 1996 and 2006 there was an extreme drop and increase in population. Since 2006, there has been a steady decrease of population until 2016. In 2021, there was a slight increase in population which could indicate population stability for the Town.

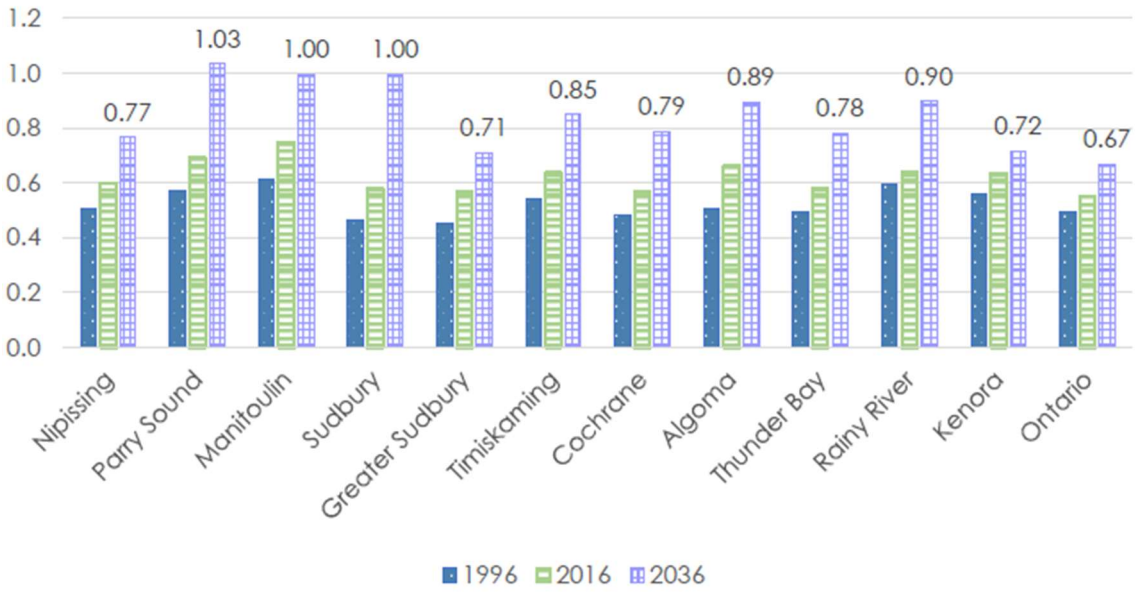
Regional Growth

In 2021 the Come North Conference Report was produced by FedNor and Government of Canada. The document describes short, medium, and long-term objectives for all communities in Northern Ontario as it relates to population growth.

According to the report all 11 Census Districts in Northern Ontario (Nipissing, Parry Sound, Manitoulin, Sudbury, Greater Sudbury, Timiskaming, Cochrane, Algoma, Thunder Bay, Rainy River, Kenora) are currently experiencing the following trends: population decline, population aging, or labour shortages. The report highlights a risk of these communities becoming economically unsustainable unless population retention and attraction numbers improve. The risk is the result of the dependency ratio increasing. The dependency ratio is the ratio of people unable to support themselves without assistance; people between the ages of 0 and 14 and 64 and older.

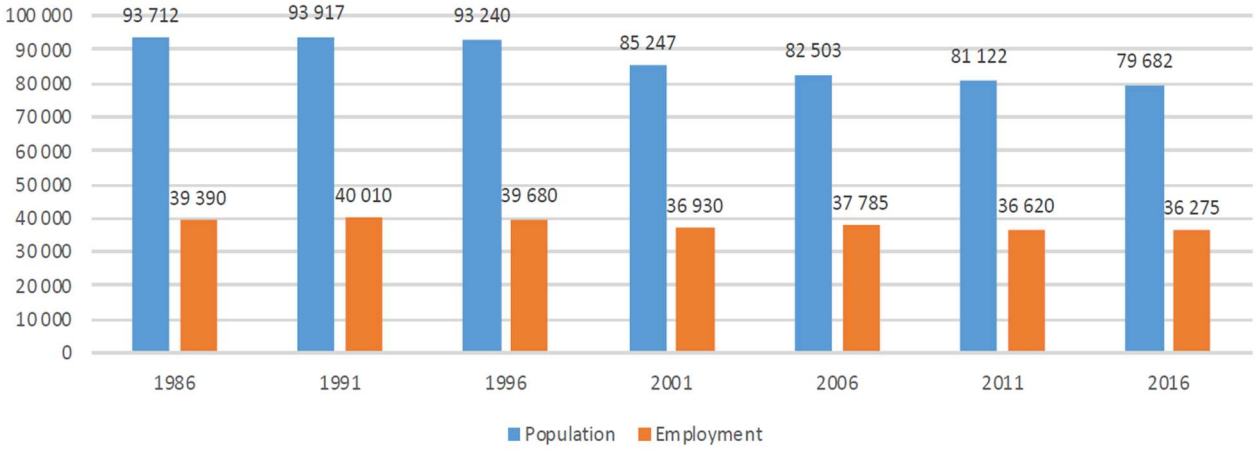
The goal is to achieve a dependency ratio of 0.5. In 1996, every Census District was at or near the goal but by 2016, none were below and more than half had a ratio in excess of 0.6. The following graph displays the dependency ratio for each Census District in 1996 and 2016 along with a projected ratio for the year 2036.

Figure 9 Dependency Ratio



The Town of Moosonee is found in the Cochrane district, which is expected to reach a dependency ratio of 0.79. The population trends overall in the Cochrane District are in decline. The following graph from the 2019 Northern Projections Cochrane District Human Capital Series report by the Northern Policy Institute, displays the population trends from 1986 to 2016.

Figure 10 Cochrane District Population Trends



The following table, found in the same report, shows population projections in the Cochrane District for the years 2021 to 2041.

Table 6 Cochrane District Population Projections

Year	Ages 0-19	Ages 20-64	Ages 65+	Total
2021	17,163	45,475	15,951	78,589
2026	16,627	41,520	18,681	76,828
2031	15,892	38,676	20,566	75,134
2036	15,260	37,319	20,962	73,541
2041	14,894	36,535	20,669	72,098

The most recent census data from 2021, shows a slight decrease in the population, reaching a total of 77,963. According to census data, the population increase is entirely restricted to the population of 65 and older; thus further increasing the dependency ratio.

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Financial Strategy

Financial Strategy Overview

Each year, the Town of Moosonee makes important investments in its infrastructure's maintenance, renewal, rehabilitation, and replacement to ensure assets remain in a state of good repair. However, spending needs typically 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 Town'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 Moosonee, the spending of 2021 and 2022 values 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
- Revenue from water and wastewater rates allocated to capital reserves
- The Canada Community Benefits Fund (CCBF), formerly the Federal Gas Tax Fund
- The Ontario Community Infrastructure Fund (OCIF)
- The Airport Infrastructure Fund (AIF)

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 Municipality 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.

However, for the road network, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented.

The following table compares two scenarios for the road network:

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

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

Table 7 Annual Requirement Comparison

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	$683,299	$326,806	$356,484

The implementation of a proactive lifecycle strategy for roads leads to a potential annual cost avoidance of approximately $350 thousand for the road network. This represents an overall reduction of the road network annual requirements by 52%.

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

Table 8 outlines the total average annual capital requirements for existing assets in each asset category. Based on a replacement cost of $123 million, annual capital requirements total more than $3.4 million for all the asset categories analysed.

The table also illustrates the system-generated, equivalent target reinvestment rate (TRR), calculated by dividing the annual capital requirements by the total replacement cost of each category. The cumulative target reinvestment for these categories is estimated at 3.74%.

Table 8 Average Annual Capital Requirements

Asset Category	Replacement Cost	Annual Capital Requirements	Target Reinvestment Rate
Road Network	$10,318,074	$326,806	3.2%
Bridges & Culverts	$18,522,434	$461,676	2.5%
Buildings	$9,905,254	$246,230	2.5%
Airport	$25,253,493	$835,490	3.3%
Equipment	$4,250,042	$362,493	8.5%
Vehicles	$503,390	$75,441	15.0%
Water Network	$21,530,287	$432,612	2.0%
Sanitary Network	$30,021,088	$609,915	2.0%
Storm Network	$2,696,022	$35,947	1.3%
Total	**$123,000,083**	**$3,386,610**	**2.75%**

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 9 summarizes how current funding levels compare with funding required for each asset category. At existing levels, the Municipality is funding 12% of its annual capital requirements for all infrastructure analyzed. This creates a total annual funding deficit of $3.14 million.

Table 9 Current Funding Position vs Required Funding

Asset Category	Annual Capital Requirements	Annual Funding Available	Annual Infrastructure Deficit	Funding Level
Road Network	$326,806	$204,712	$122,094	63%
Bridges & Culverts	$461,676	$-	$461,676	0%
Buildings	$246,230	$-	$246,230	0%
Airport	$835,490	$200,000	$835,490	24%
Equipment	$362,493	$-	$362,493	0%
Vehicles	$75,441	$-	$75,441	0%
Water Network	$432,612	$-	$432,612	0%
Sanitary Network	$609,915	$-	$609,915	0%
	$3,350,663	**$404,712**	**$2,945,951**	**12%**

Closing the Gap

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

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

Full Funding Requirements Tax Revenues

In 2022, Moosonee will have an annual tax revenue of $2,310,008. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require an 82.4% 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 10 Phasing in Annual Tax Increases

Total % Increase Needed in Annual Property Taxation Revenues	Phase-in Period			
	5 Years	10 Years	15 Years	20 Years
82.4%	13%	6.3%	4.1%	3.1%

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.

Full Funding Requirements Utility Rate Revenues

For 2022, Moosonee's forecasted water rate revenues total $755,000. Annual capital requirements for the water network total $432,612, against available funding of $0. This creates a funding deficit of $432,612. To close this annual gap, the Municipality's water revenues would need to increase by 57.3%.

Similarly, sanitary rate revenues are forecasted to be $ $335,000 in 2022. Average annual requirements for Moosonee's sanitary assets total $609,915, against available funding of $0, creating an annual deficit of $609,915. Rate revenues would need to increase by 182.1% to close this funding gap.

To achieve these increases, several scenarios have been developed using phase-in periods ranging from five to twenty years. As with tax revenues, short phase-in periods may require excessive rate increases, whereas more extended timeframes may lead to larger backlogs and more unpredictable spending on emergency repairs and replacements.

Table 11 Phasing in Rate Increases

Category	Phase-in Period			
	5 Years	10 Years	15 Years	20 Years
Water Network (57.3%)	9.5%	4.6%	3.1%	2.3%
Sanitary Network (182.1%)	49.3%	22.2%	14.3%	10.5%

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 12: 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

1. Review feasibility of adopting a full-funding scenario that achieves 100% of average annual requirements for the asset categories analyzed. This involves:
    - implementing a 4.5% annual tax increase over a 15-year phase-in period and allocating the full increase in revenue towards capital funding
    - implementing a 3.1% rate increase for water over a 15-year phase-in period, and a 14.3% increase for sanitary, over a 15-year phase-in period
    - continued allocation of OCIF and CCBF funding as previously outlined
    - using risk frameworks and staff judgement to prioritize projects, particularly to aid in elimination of existing infrastructure backlogs

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. 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 Municipality's assets. 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: Road Network

State of the Infrastructure

Moosonee's road network comprises one of the largest share of its infrastructure portfolio, with a current replacement cost of $10.3 million. The Town also owns and manages other supporting infrastructure and capital assets, including sidewalks, signs and streetlights.

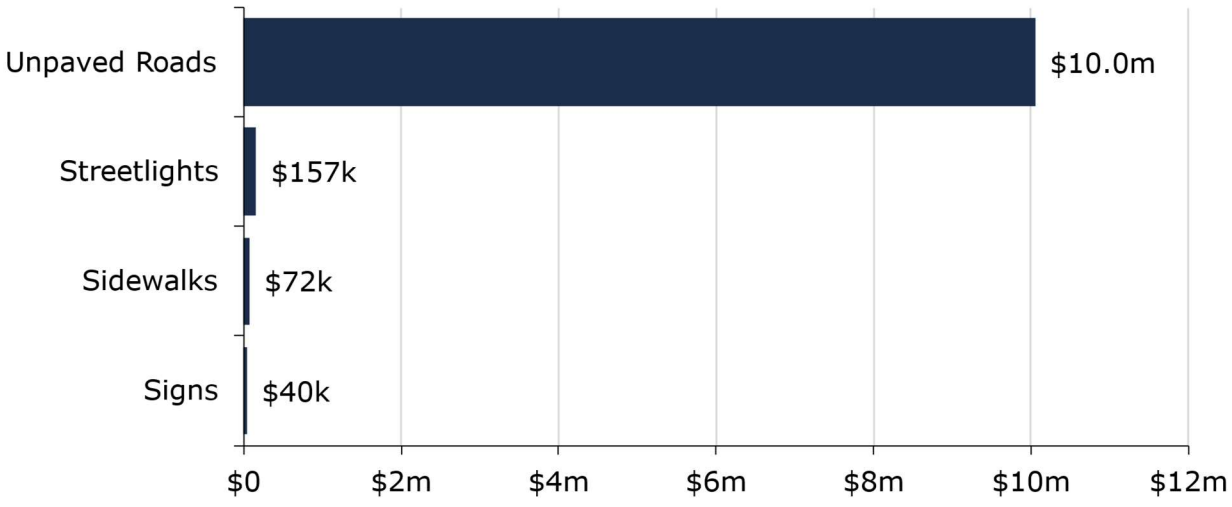
The state of the infrastructure for the road network is summarized below.

Replacement Cost	Condition	Financial Capacity	
		Annual Requirement:	$326,806
$10,318,074	Fair (50%)	Funding Available:	$204,712
		Annual Deficit:	$122,094

Inventory & Valuation

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

Figure 11 Road Network Replacement Value

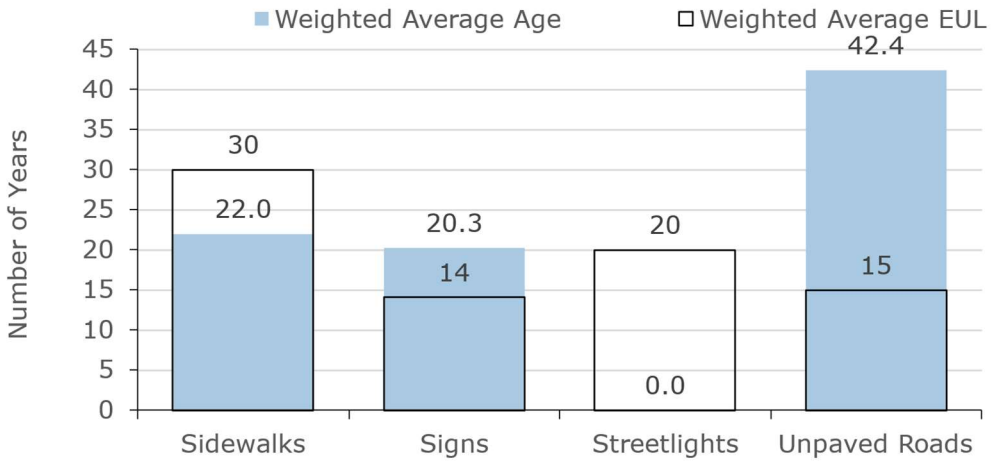


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent realistic capital requirements.

Asset Condition & Age

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

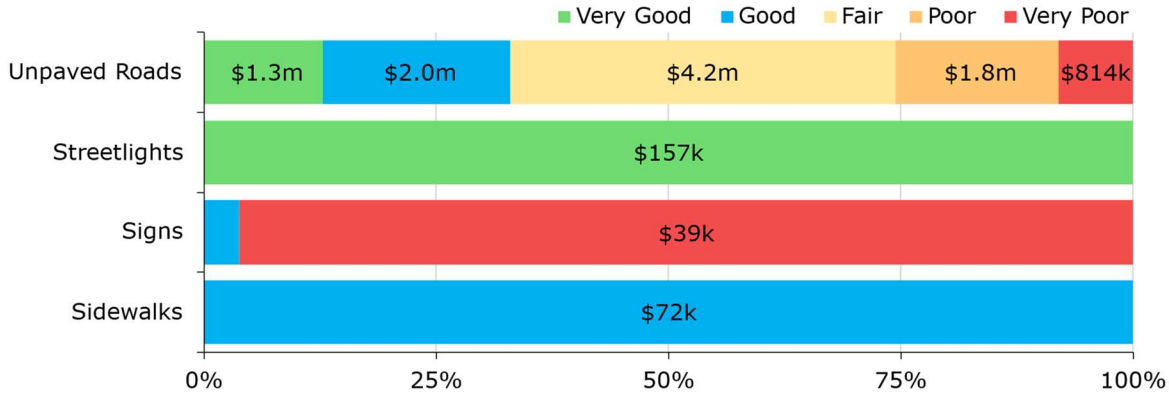
Figure 12 Road Network Average Age vs Average EUL



The analysis shows that, based on in-service dates, gravel roads continue to remain in operation beyond their expected useful life, with an average age of 42.4 against an average expected serviceable life of 15 years. This is due to the life cycle management strategies currently being utilized which will be outlined in a later section.

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

Figure 13 Road Network Condition Breakdown



To ensure that Moosonee's road network continues to provide an acceptable level of service, the Municipality 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 roads.

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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The Municipality's current approach is described below.

All roads inspected/patrolled in accordance with O. Reg. 239/02 Minimum Maintenance Standards

Internal staff roads condition assessment was completed in 2022

The condition scale for roads utilized is from 0 to 100 from Very Poor to Very Good.

Lifecycle Management Strategy

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

The following lifecycle strategies shown in Figure 14 have been developed as a proactive approach to managing the lifecycle of municipally owned roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Figure 14 Road Network Current Lifecycle Strategy

Maintenance

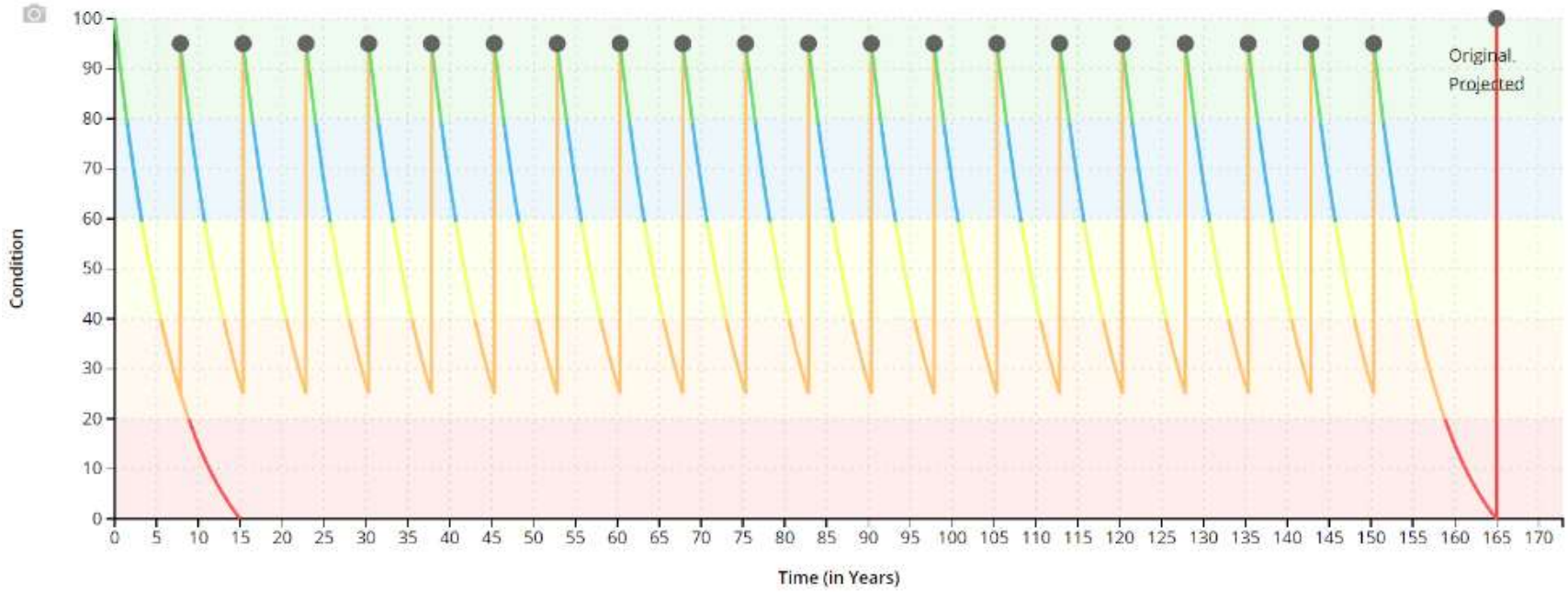
- deficiency repairs as required from patrols for minimum maintenance standards such as grading, pothole filling, and dust control, etc.
- winter control

Rehabilitation / Renewal / Replacement

- prioritization is based on road usage - no defined programs for rehabilitation are scheduled
- activities are more reactive

The lifecycle model used to estimate the savings to annual capital requirement are shown in Figure 15. Using a condition of 25 as the activity trigger to apply 50mm of gravel to a roadway allows the Town to maintain their road network. In the figure below the series stops with the last gravel addition at 150 years however it is the intension to continue past that time frame.

Figure 15 Gravel Road Lifecycle Model



Forecasted Capital Requirements

Error! Reference source not found. illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Municipality's road network. This analysis was run until 2051 to capture at least one iteration of replacement for the longest-lived asset in the asset register.

Moosonee's average annual requirements (red dotted line) total $327 thousand for all assets in the road network. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. The chart illustrates capital needs through the forecast period in 5-year intervals.

It also shows a backlog $39 thousand, comprising assets that have reached the end of their useful life. The projections are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades. They are based on asset replacement costs, age analysis, and condition data when available, as well as lifecycle modeling (roads only identified above).

Figure 16 Road Network Forecasted Capital Replacement Requirements

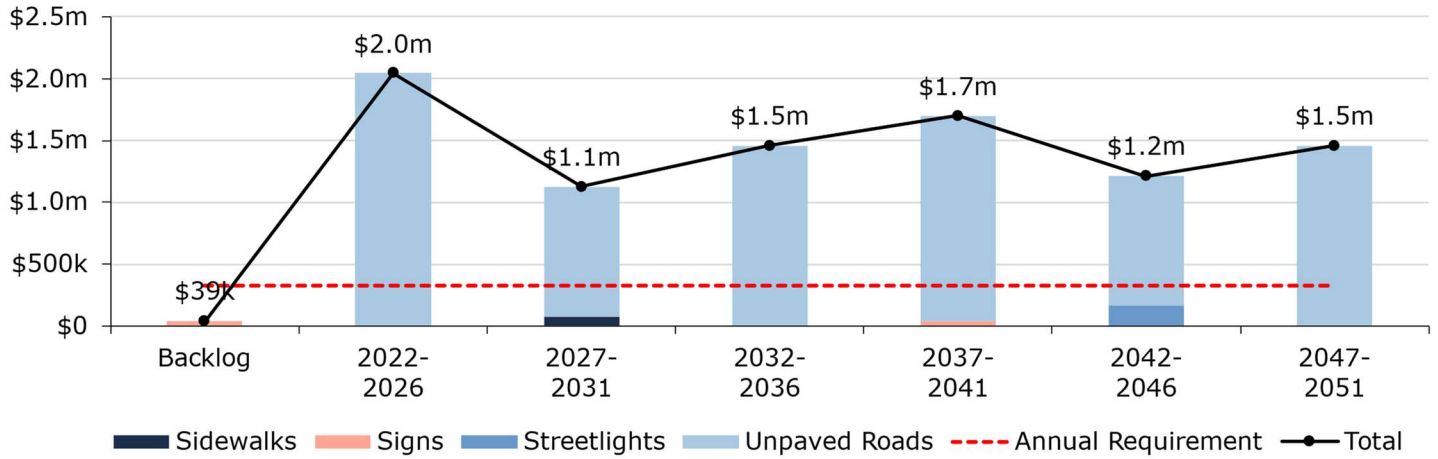


Table 13 below summarizes the projected cost of lifecycle activities (rehabilitation and replacement) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

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

Table 13 Road Network System-generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Sidewalks	$72k	$0	$0	$0	$0	$0	$0	$0	$0	$72k	$0
Signs	$5k	$0	$0	$0	$948	$0	$3k	$594	$0	$0	$0
Streetlights	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Unpaved Roads	$3.1m	$0	$365k	$0	$0	$1.7m	$0	$421k	$266k	$0	$365k

Risk & Criticality

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

Figure 17 Road Network Risk Matrix

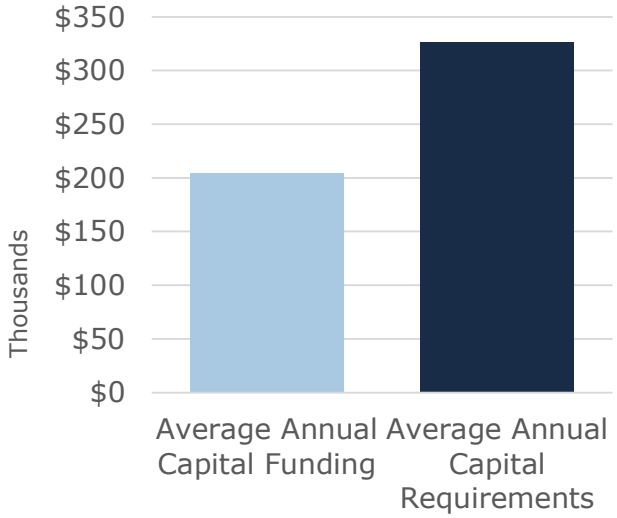
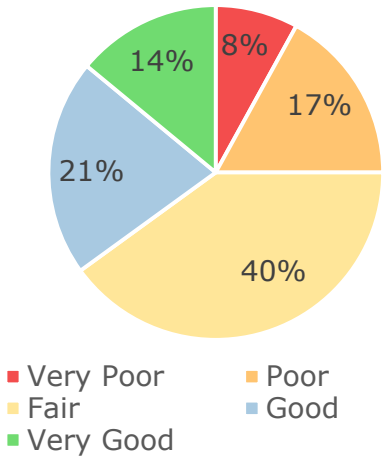
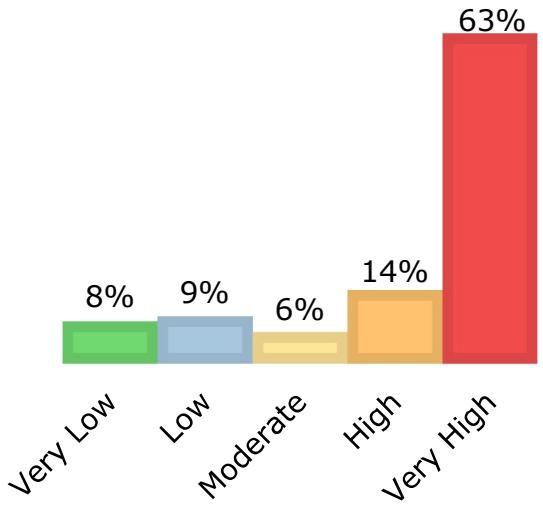
This is a high-level model developed by municipal staff and it should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets allows the Municipality 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.

Levels of Service

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

Table 14: Road Network Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

The tables that follow summarize Moosonee's current levels of service with respect to prescribed KPIs under Ontario Regulation 588/17.

Community Levels of Service

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

Table 15 Ontario Regulation 588/17 Road Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Sustainable	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Figure 18
Affordable	Description of the lifecycle activities (maintenance, rehabilitation, and replacement) - section reference in the AMP	See Lifecycle Management Strategy on page 3A
Reliable	Description or images that illustrate the different levels of road class pavement	There are no paved roads in Moosonee

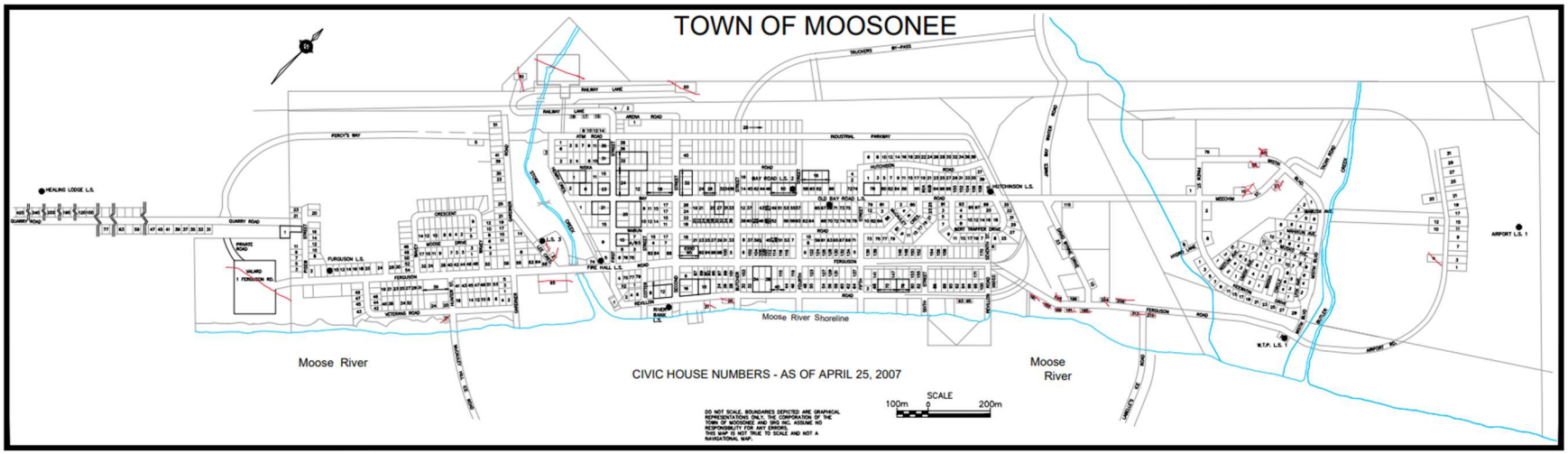
Technical Levels of Service

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

Table 16 Ontario Regulation 588/17 Road Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Sustainable	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	0.039 km/km^2
Affordable	Annual Capital Reinvestment Rate	2.0%
Reliable	Average pavement condition index for paved roads	N/A
	Average surface condition for unpaved roads (e.g. excellent, good, fair, poor)	Fair (48.6)

Figure 18 Road Network Map



Appendix B: Bridges & Culverts

State of the Infrastructure

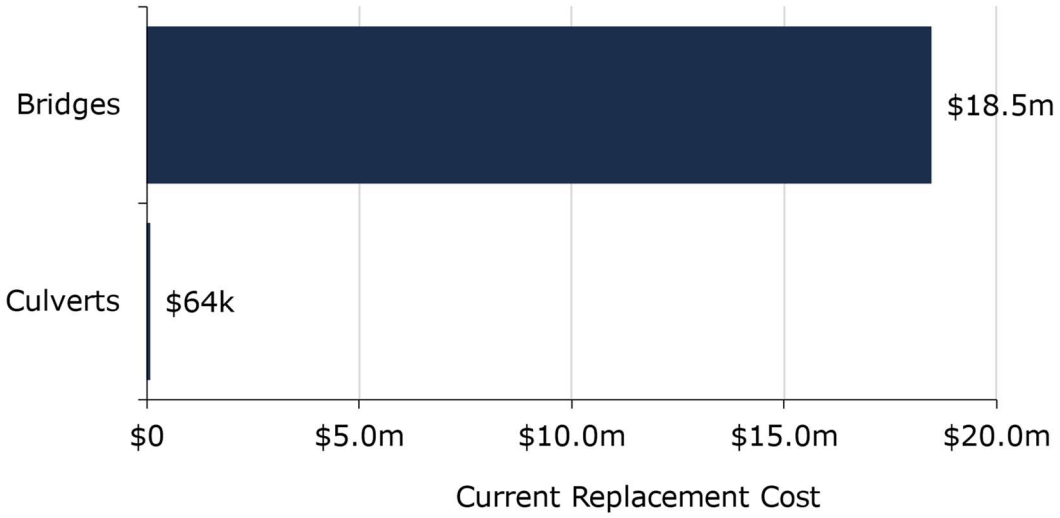
Bridges and culverts (B&C) represent a critical portion of the transportation services provided to the community. The state of the infrastructure for bridges and culverts is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$18,522,434	Good (68%)	Annual Requirement:	$461,676
		Funding Available:	$0
		Annual Deficit:	$461,676

Inventory & Valuation

Figure 19 below displays the replacement cost of each asset segment in the Municipality's bridges and culverts inventory.

Figure 19 Bridges & Culverts Replacement Cost

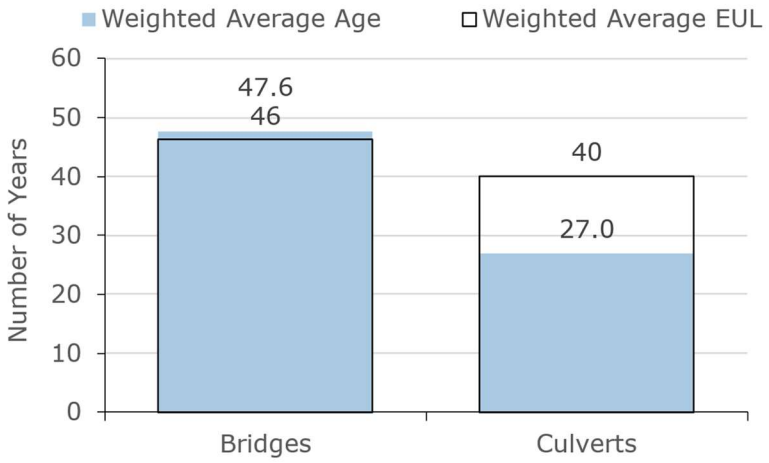


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed. This can be included in the Ontario Structures Inspection Manual (OSIM) inspections as the replacement cost is part of the calculation for the bridge condition index (BCI).

Asset Condition & Age

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

Figure 20 B&C Average Age vs Average EUL



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

Figure 21 B&C Condition Breakdown

To ensure that the Municipality's bridges and culverts continue to provide an acceptable level of service, the staff should monitor the average condition of all assets.

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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Moosonee's current approach is to assess the 4 bridges and culverts every 2 years in accordance with the Ontario Structure Inspection Manual (OSIM). The most recent assessment was completed in 2020 by Hatch.

The condition scale for roads utilized is from 0 to 100 from Very Poor to Very Good. See the following images as a summary of the bridges condition in the Town.

Figure 22 Butler Creek Bridge (BCI=61.8 Good)

Figure 23 Ferguson Creek Bridge (BCI=79.8 Good)

Figure 24 Quarry Road Bridge (BCI=79 Good)

Figure 25 ATIM Road Bridge (BCI=78.2 Good)

Lifecycle Management Strategy

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

Table 17 B&C Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement
•All lifecycle activities are driven by the results of inspections competed according to the Ontario Structure Inspection Manual (OSIM)

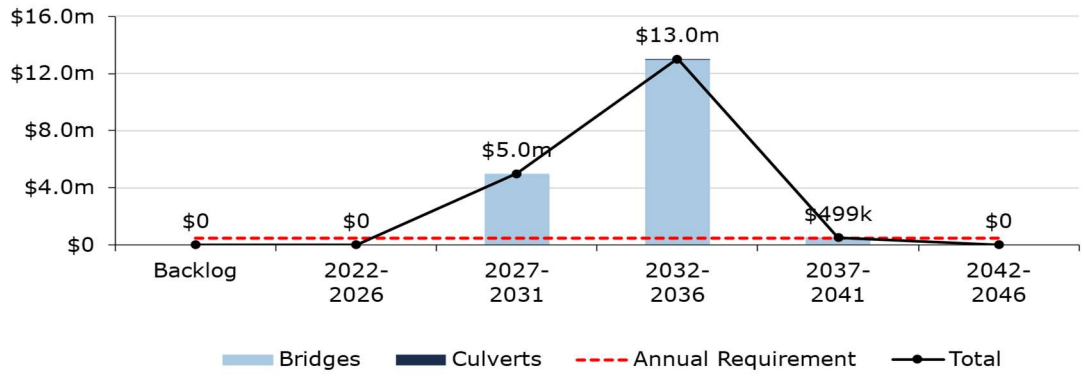
Forecasted Capital Requirements

Figure 26 illustrates the cyclical short-, medium- and long-term infrastructure rehabilitation and replacement requirements for the Municipality's bridges and culverts. These projections are based on asset replacement costs, age analysis, and condition data. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

The analysis was run until 2046 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Moosonee's average annual requirements (red dotted line) for bridges and culverts total $462 thousand. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

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

Figure 26 B&C Forecasted Capital Replacement Requirements



These are represented at the major asset level, i.e., full cost of bridge or culvert, rather than partial repair, rehabilitation, or replacement.

Table 18 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 are represented at the major asset level, i.e., full cost of bridge or culvert, rather than partial repair, rehabilitation, or replacement.

Table 18 B&C System-generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Bridges	$5.0m	$0	$0	$0	$0	$0	$0	$0	$5.0m	$0	$0
Culverts	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

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

These projections may be different from actual capital forecasts as outlined in OSIM inspections and recommended workplans. Consistent data updates, especially condition, will improve the alignment between the system-generated expenditure requirements, and the Municipality's capital expenditure forecasts, including long-term capital plans.

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 J: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

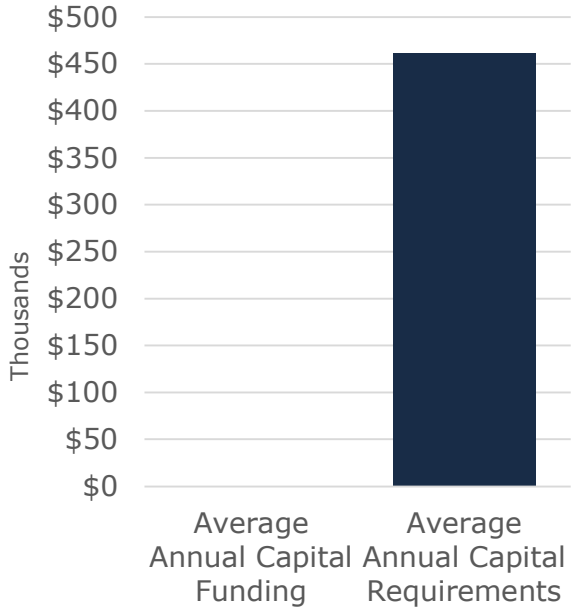
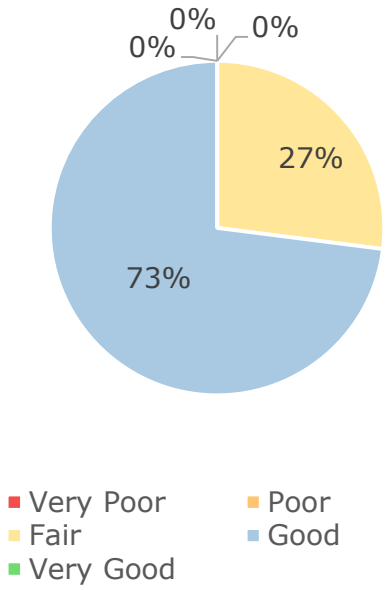
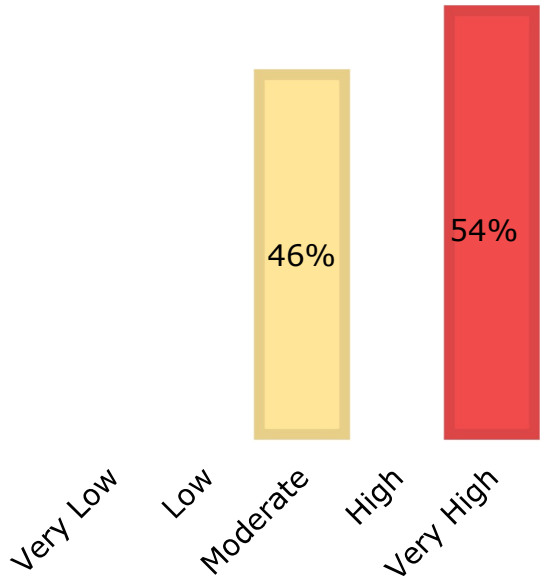
This is a high-level model developed by municipal staff and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

Figure 27 B&C Risk Matrix

Levels of Service

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

Table 19: B&C Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

The metrics included below are the technical and community level of service metrics that are required as part of O. Reg. 588/17.

Community Levels of Service

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

Table 20 Ontario Regulation 588/17 B&C Community Levels of Service

Core Values	Qualitative Description	Current LOS
Reliable	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and culverts are a key component of the municipal transportation network for all types of traffic.
Affordable	Description of the lifecycle activities (maintenance, rehabilitation and replacement) - section reference in the AMP	See section Lifecycle Management Strategy on page 4B
Sustainable	Description or images of the condition of bridges and culverts and how this would affect use of the bridges and culverts	See Figure 22 Butler Creek Bridge (BCI=61.8 Good), Figure 23 Ferguson Creek Bridge (BCI=79.8 Good), Figure 24 Quarry Road Bridge (BCI=79 Good)

Technical Levels of Service

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

Table 21 Ontario Regulation 588/17 B&C Technical Levels of Service

Core Values	Technical Metric	Current LOS
Reliable	% of bridges in the municipality with loading or dimensional restrictions	0%
Affordable	Annual Capital Reinvestment Rate	0%
Sustainable	Average bridge condition index value for bridges	69
	Average bridge condition index value for structural culverts	71.6

Appendix C: Storm Network

State of the Infrastructure

Moosonee's storm network infrastructure includes storm mains, manholes, and catchbasins. The total current replacement of the Municipality's storm infrastructure is estimated at approximately $2.7 million.

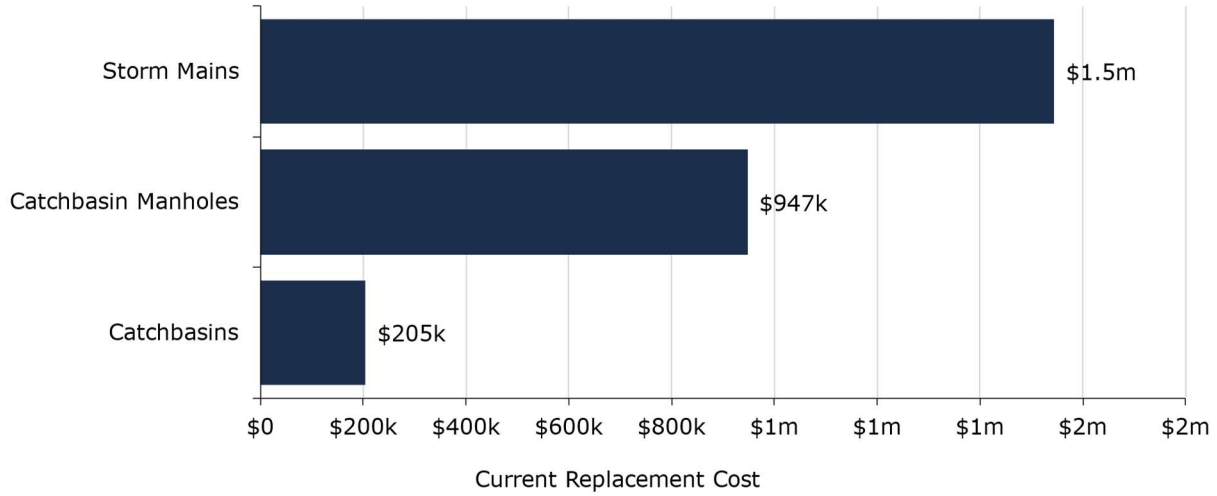
The state of the infrastructure for the storm network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
		Annual Requirement:	$35,947
$2,696,022	Very Good (97%)	Funding Available:	$0
		Annual Deficit:	$35,947

Asset Inventory & Valuation

The graph below displays the replacement cost of each asset segment in the Town's storm network inventory.

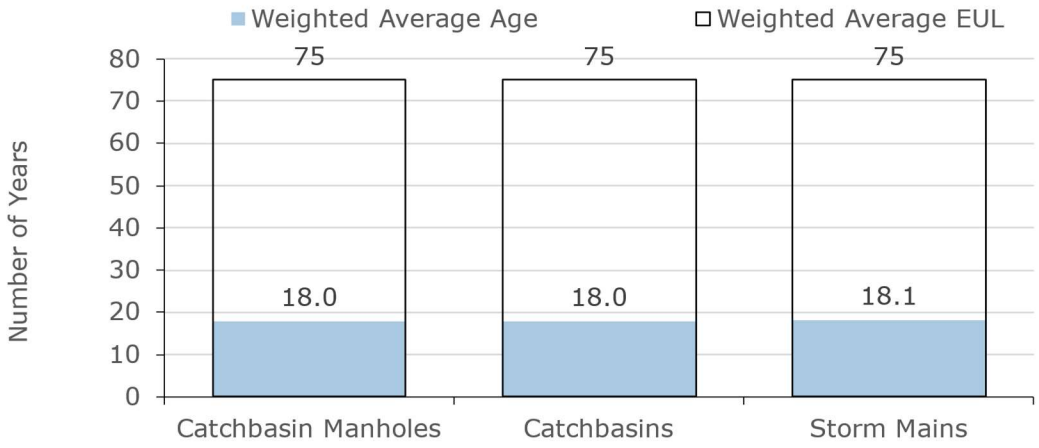
Figure 28 Storm Network Replacement Cost



Asset Condition & Age

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

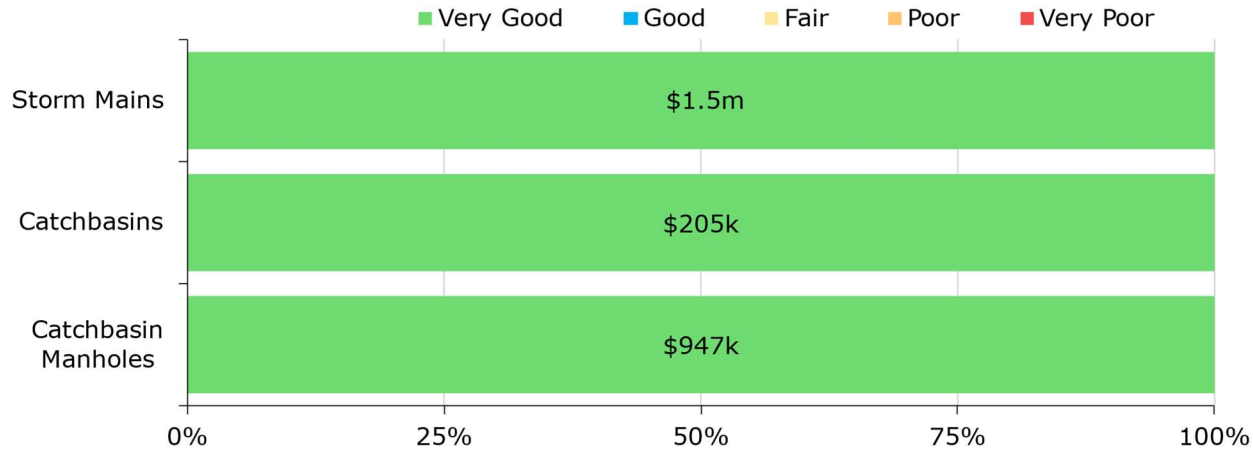
Figure 29 Storm Network Average Age vs Average EUL



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 30 Storm Network Condition Breakdown



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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The Town's current approach is reactive based on flooding issues or washouts.

Lifecycle Management Strategy

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

Figure 31 Storm Network Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

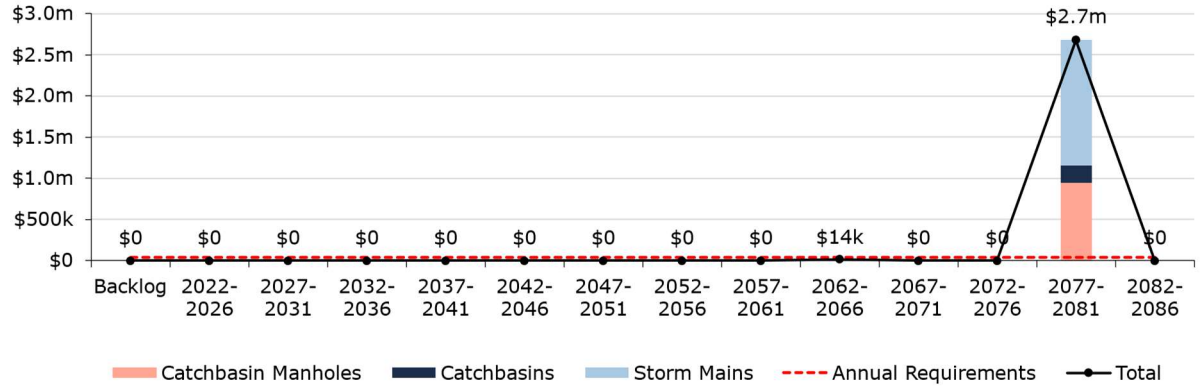
- All lifecycle activities are driven by the issues within the system and complaints. If other infrastructure work is scheduled any required repairs are coordinated.

Forecasted Capital Requirements

Figure 32 Storm Network Forecasted Capital Replacement RequirementsFigure 32 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's storm infrastructure. This analysis was run until 2086 to capture at least one iteration of replacement for the longest-lived asset in the asset register.

Moosonee's average annual requirements (red dotted line) total $36 thousand for all storm network assets. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 32 Storm Network Forecasted Capital Replacement Requirements



The projected replacement of storm mains is a large spike in 2032 to 2036, it is unlikely that all mains will need to be replaced as forecasted. Coordinated projects, along with CCTV inspection data, will assist in scheduling replacements and rehabilitations.

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

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

Table 22 Storm Network System-Generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Catchbasin Manholes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Catchbasins	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

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

Risk & Criticality

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

Figure 33 Storm Network Risk Matrix

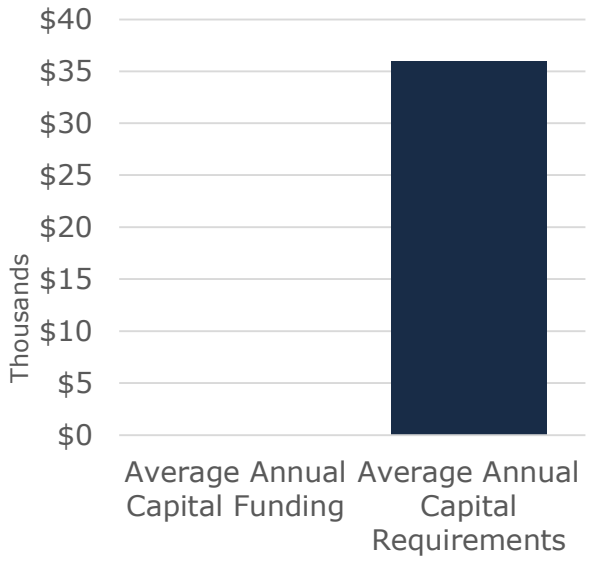
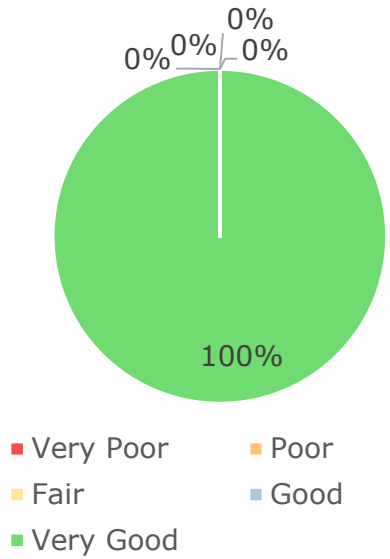
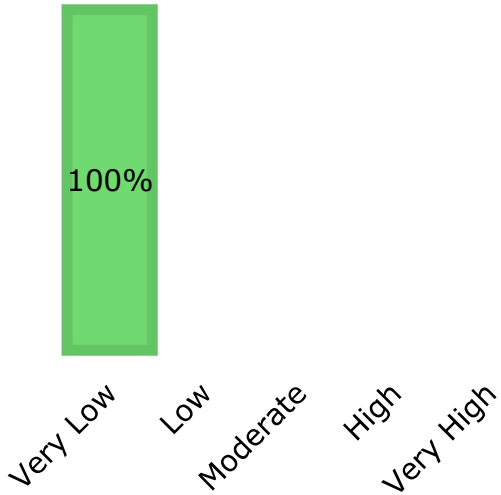

Consequence
5
4
3
2
1
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
6 Assets $363,337.35
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
23 Assets $704,697.08
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
110 Assets $1,513,793.48
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
40 Assets $114,193.60
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
0 Assets $0.00
1
2
3
4
5
Probability

This is a high-level model developed by municipal staff and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The identification of critical assets allows the Municipality to determine appropriate risk mitigation strategies and treatment options.

Levels of Service

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

Table 23: Storm Network Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

Community Levels of Service

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

Table 24 Ontario Regulation 588/17 Storm Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Sustainable	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater management system	See Figure 34
Reliable	A map of the storm system	There is no map of the system only a flood map
Affordable	Description of the lifecycle activities (maintenance, rehabilitation and replacement)	See Lifecycle Management Strategy on page 3C

Technical Levels of Service

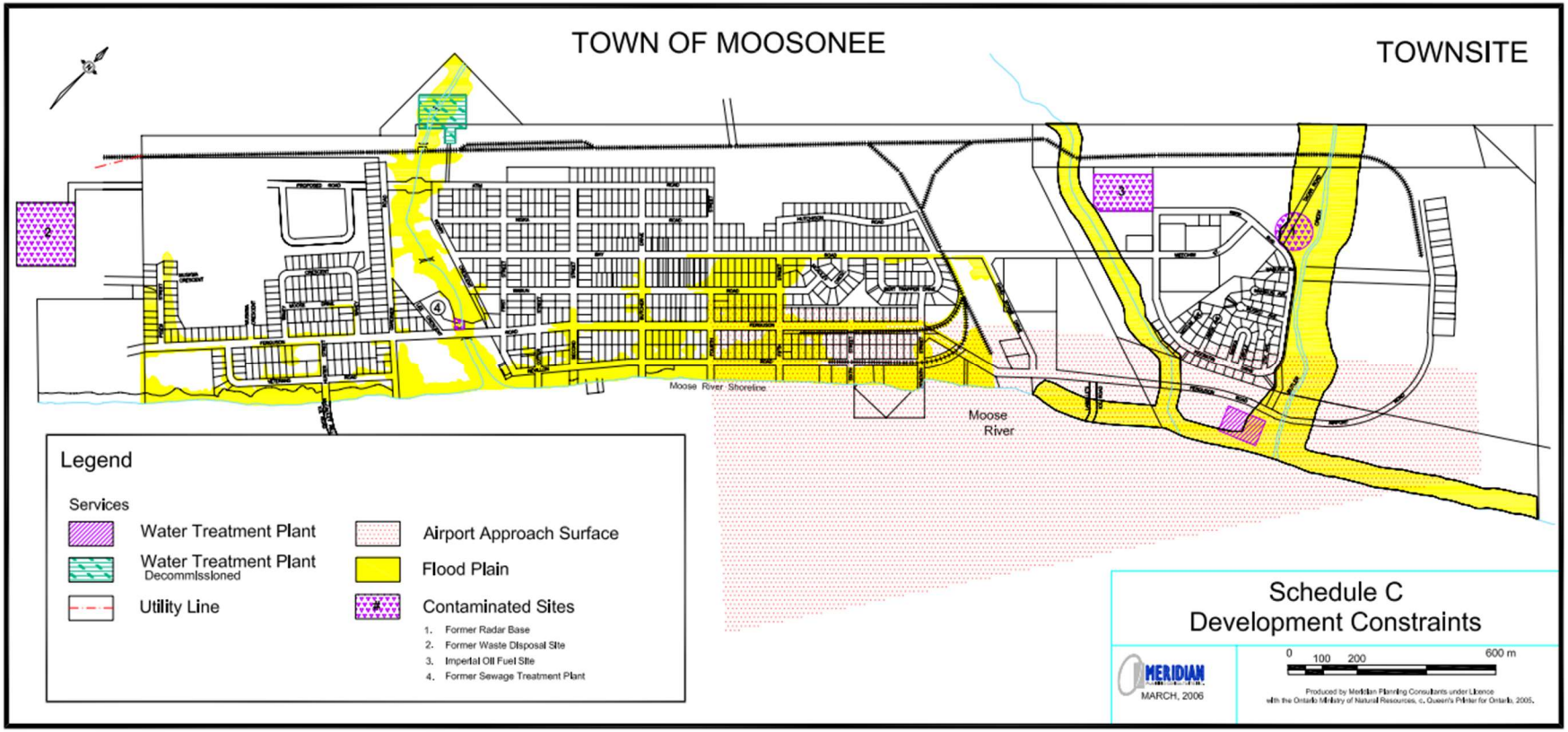
The following table outlines the quantitative metrics that determine the technical level of service provided by the water network.

Table 25 Ontario Regulation 588/17 Storm Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Sustainable	% of properties in municipality resilient to a 100-year storm	0%
	% of the municipal stormwater management system resilient to a 5-year storm	0%
Reliable	% of the Stormwater Network that is in greater than or equal to a FAIR condition	100%

Affordable	Annual capital reinvestment rate	0%

Figure 34 Flood Map



Appendix D: Water Network

State of the Infrastructure

Moosonee's water network includes mains, hydrants, meters, a treatment facility, and general water equipment with a total current replacement cost of more than $21.5 million. The Town has a contract with a company to act as their operating authority.

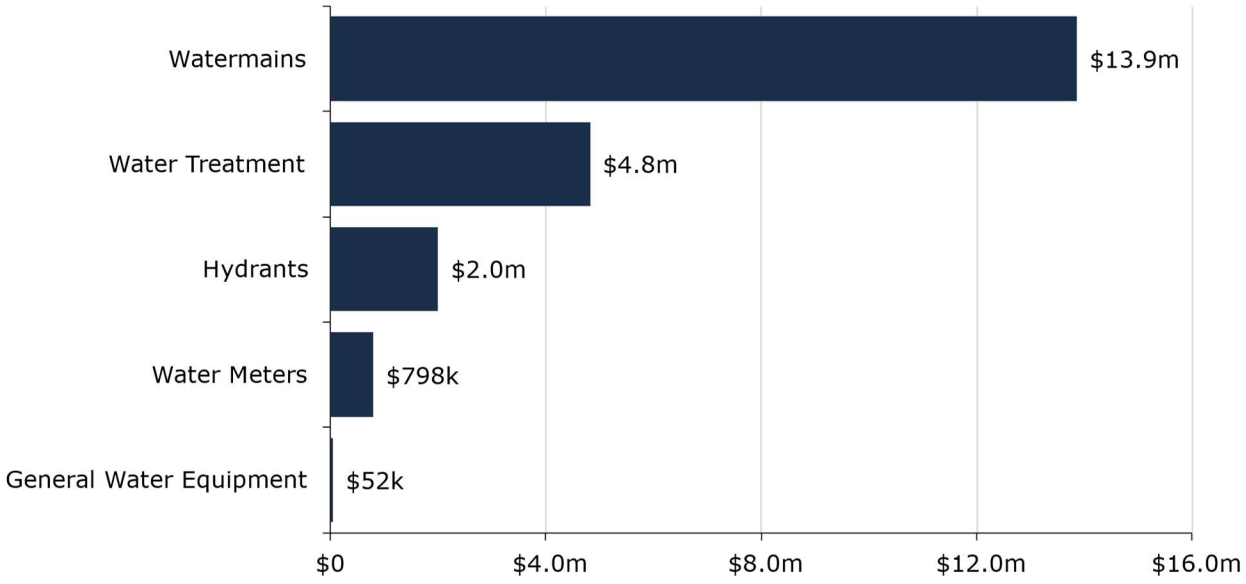
The state of the infrastructure for the water network is summarized in the following table:

Replacement Cost	Condition	Financial Capacity	
$21,530,287	Good (77%)	Annual Requirement:	$432,612
		Funding Available:	$0
		Annual Deficit:	$432,612

Inventory & Valuation

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

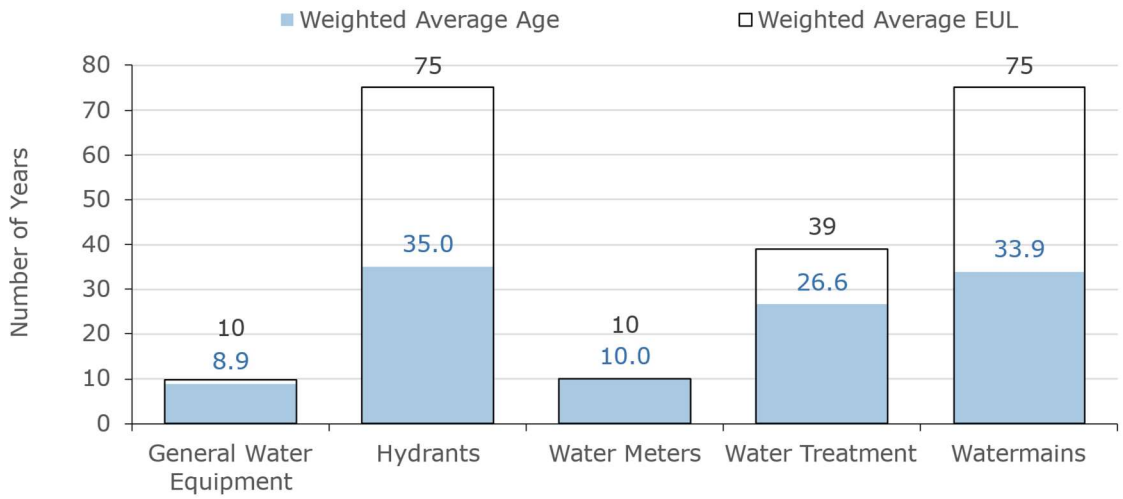
Figure 35 Water Network Replacement Cost



Asset Condition & Age

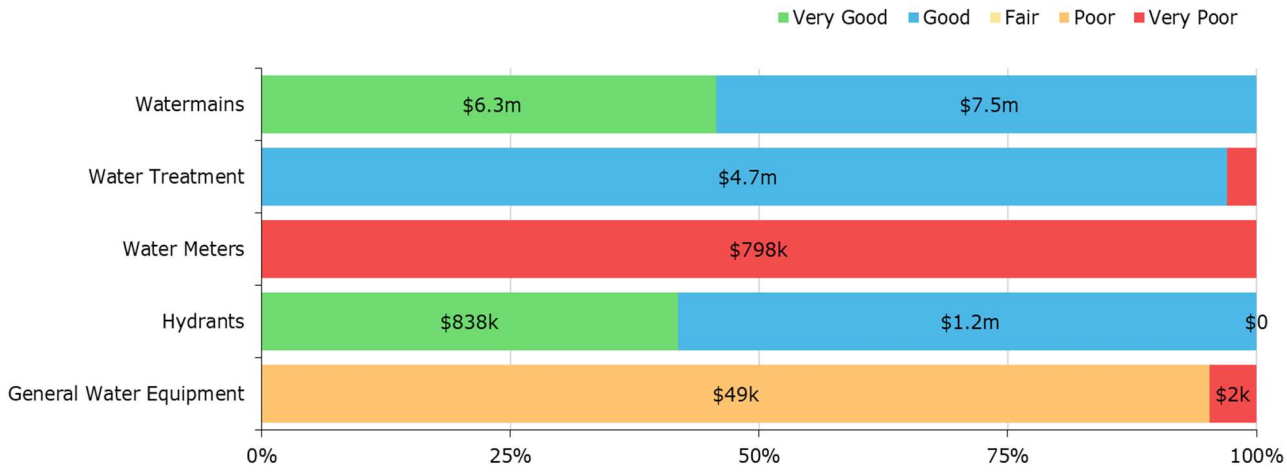
The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 36 Water Network Average Age vs Average EUL



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

Figure 37 Water Network Condition Breakdown



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

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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The Town's current approach is working with their operating authority to coordinate their recommendations and record keeping.

Lifecycle Management Strategy

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

Table 26 Water Network Current Lifecycle Strategy

Maintenance

- operating authority recommendations
- Engineers assessments

Rehabilitation / Renewal

- operating authority recommendations
- Failure frequencies, service life estimates

Replacement

- determined using service life estimates, feedback from operating authority, rebuild vs. replace cost comparison

Forecasted Capital Requirements

Figure 38 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Municipality's water system portfolio. This analysis was run until 2101 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Moosonee's average annual requirements (red dotted line) total $433 thousand for all water network assets. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

At this point, replacement needs peak at more than $5.7 million between 2032 and 2036 as well as between 2042 and 2046 at $9.7 million. The chart also illustrates a backlog of $108 thousand, dominated by water treatment assets. These projections and estimates are based on current asset records, their replacement costs, and age analysis only. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 38 Water Network Forecasted Capital Replacement Requirements

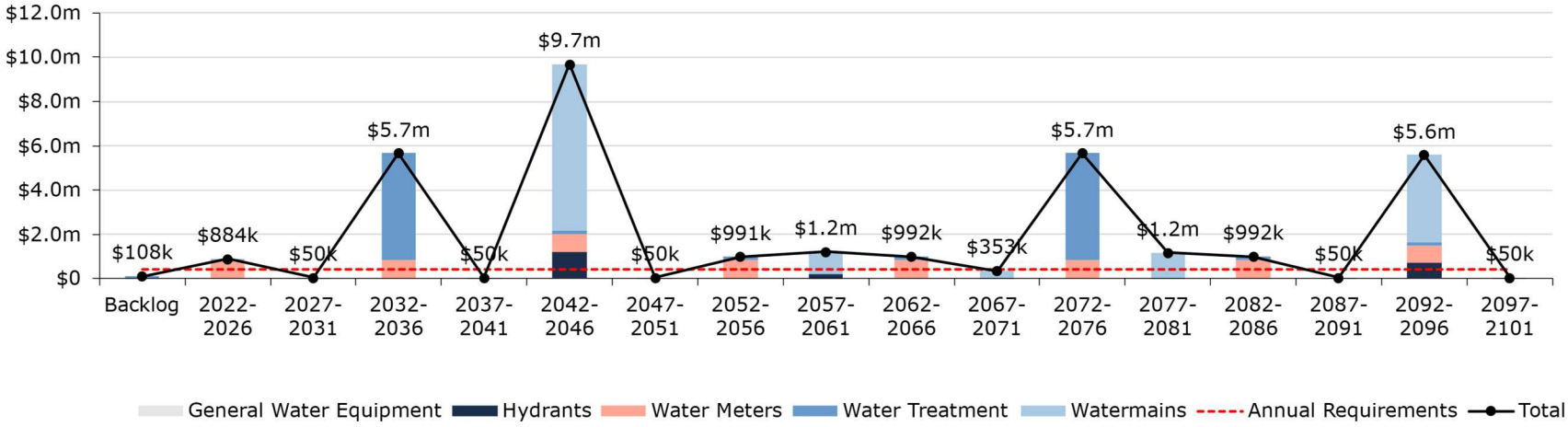


Table 27 below summarizes the projected cost of lifecycle activities (capital replacement only) that will need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register, which was limited to staff assessment from 2018 asset management plan, asset age, replacement cost, and useful life.

Table 27 Water Network System-Generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
General Water Equipment	$52k	$0	$49k	$0	$0	$497	$2k	$0	$0	$497	$0
Hydrants	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Meters	$798k	$798k	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Treatment	$84k	$36k	$0	$0	$0	$0	$48k	$0	$0	$0	$0
Watermains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

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

Risk & Criticality

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

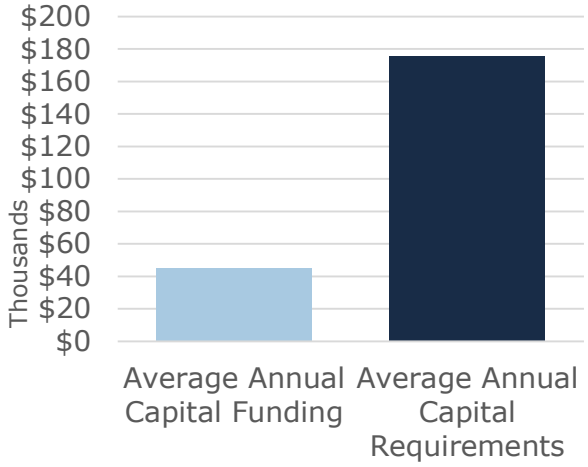
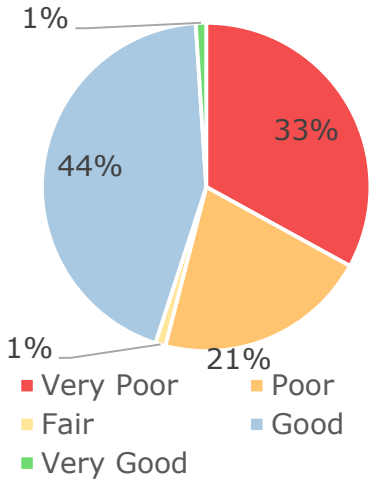
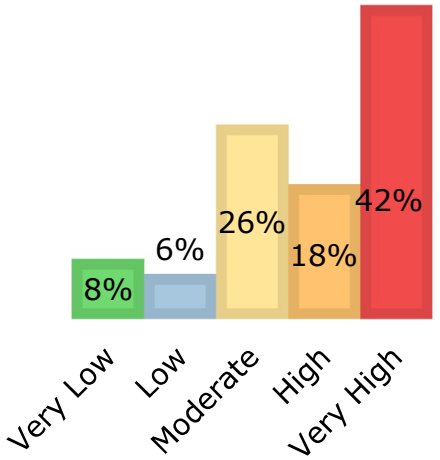
Figure 39 Water Network Risk Matrix

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

Levels of Service

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

Table 28: Water Network Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

Community Levels of Service

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

Table 29 Ontario Regulation 588/17 Water Network Community Levels of Service

Core Value	Qualitative Description	Current LOS
Affordable	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Figure 40
	Description of the lifecycle activities (maintenance, rehabilitation and replacement)	See Lifecycle Management Strategy on page 3D
Sustainable	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	Fire flow is provided throughout the entire water system
Reliable	Description of boil water advisories and service interruptions	Boil water advisories and service interruptions are managed in partnership with the company under contract to manage water operations

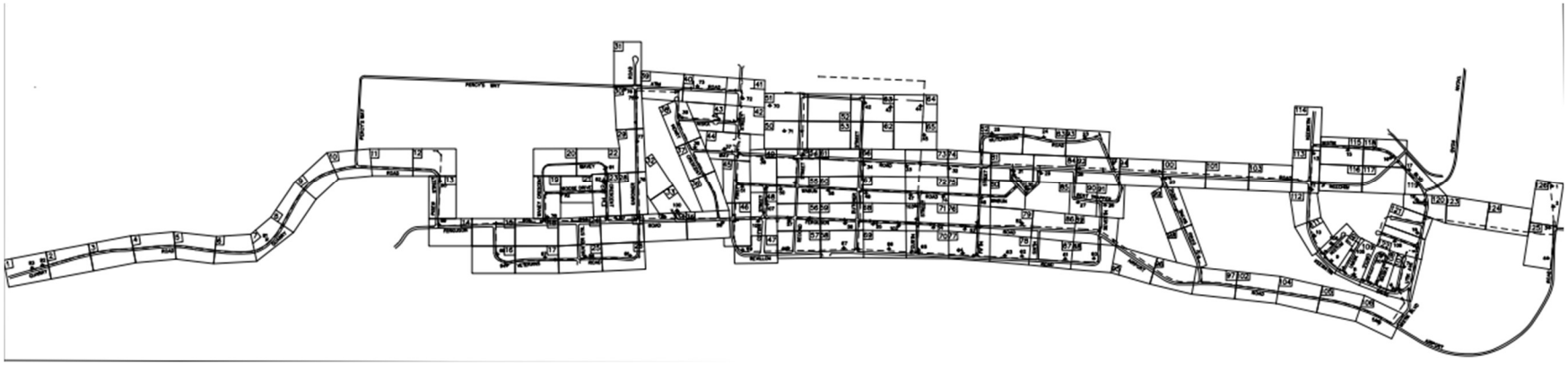
Technical Levels of Service

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

Table 30 Ontario Regulation 588/17 Water Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Affordable	% of properties connected to the municipal water system	100%
	Annual capital reinvestment rate	0%
Sustainable	% of properties where fire flow is available	100%
	% of the water system that is in greater than or equal to a FAIR condition	95%
Reliable	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	1.39
	# of connection-days per year where water is not available to water main breaks compared to the total number of properties connected to the municipal water system	2.17

Figure 40 Water Network Map



Appendix E: Sanitary Network

State of the Infrastructure

Moosonee's sanitary network infrastructure includes sanitary mains and forcemains, lagoons, life stations, manholes and general sanitary equipment. The total current replacement of the Town's sanitary collection and treatment infrastructure is estimated at approximately $30 million.

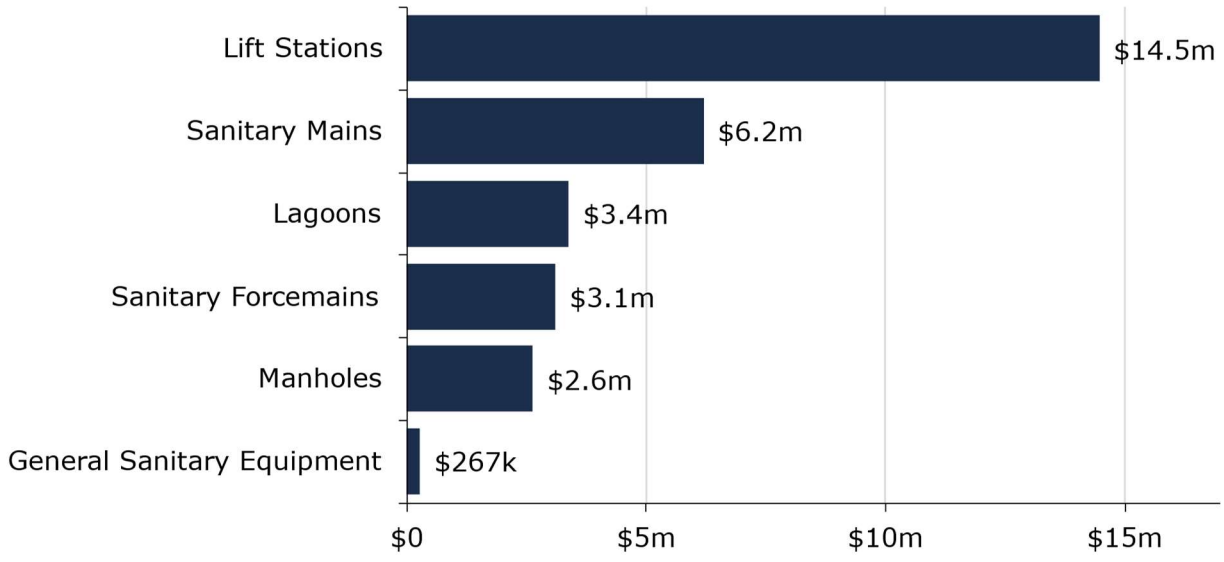
The state of the infrastructure for the sanitary network is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$30,021,088	Poor (34%)	Annual Requirement:	$609,915
		Funding Available:	$0
		Annual Deficit:	$609,915

Asset Inventory & Valuation

The graph below displays the replacement cost of each asset segment in the Moosonee's sanitary network inventory.

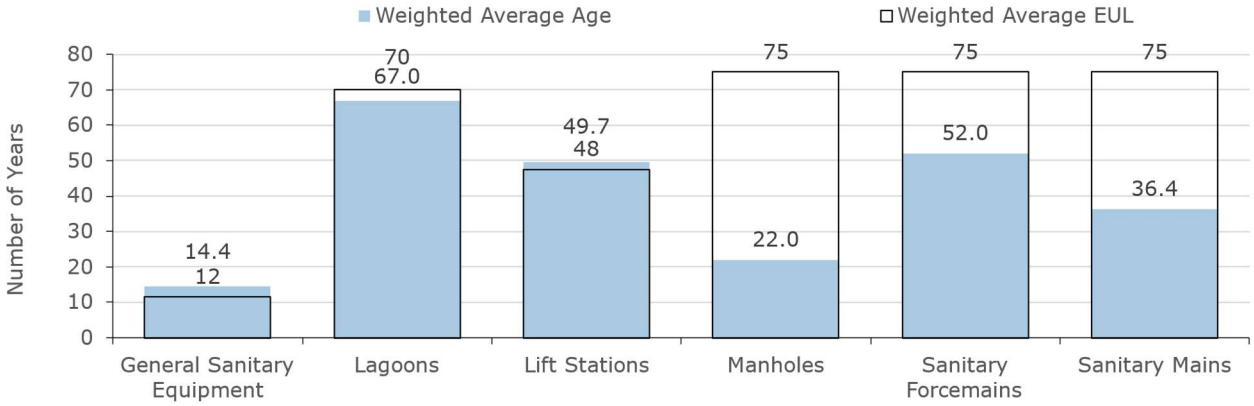
Figure 41 Sanitary Network Replacement Cost



Asset Condition & Age

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

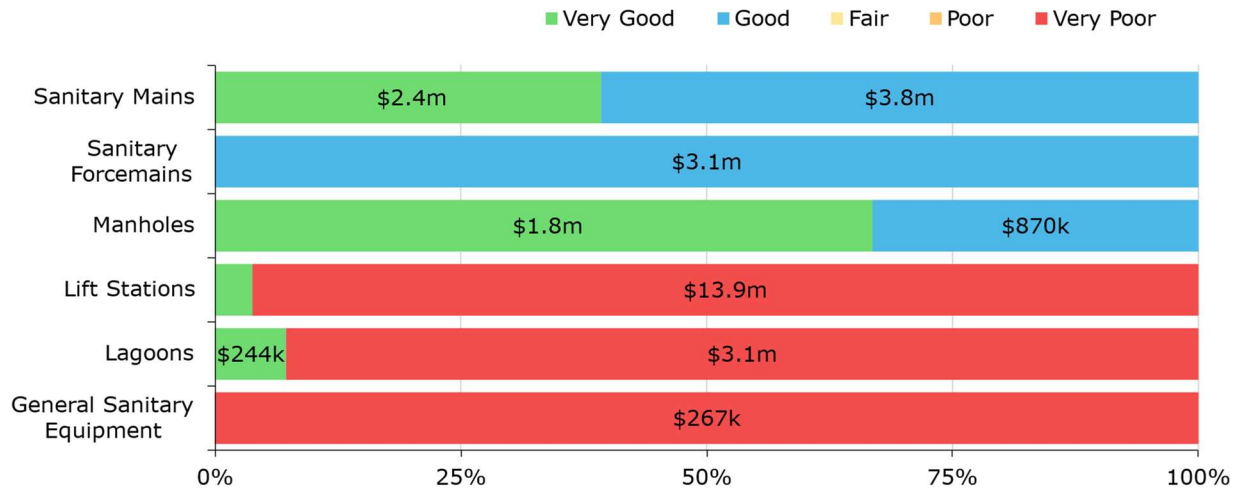
Figure 42 Sanitary Network Average Age vs Average EUL



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 43 Sanitary Network Condition Breakdown



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

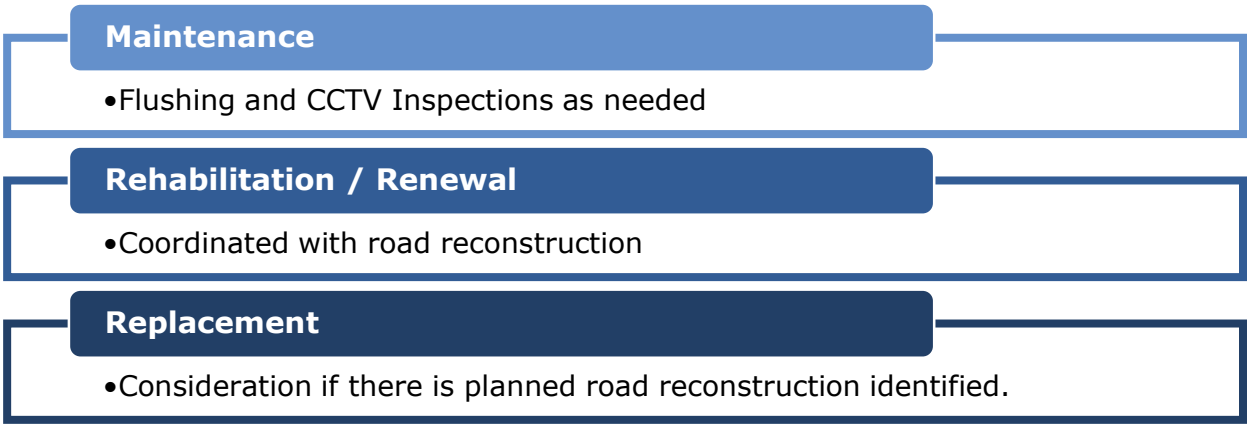
Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The Town's current approach is staff inspections and operating authority records.

Lifecycle Management Strategy

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

Figure 44 Sanitary Network Current Lifecycle Strategy

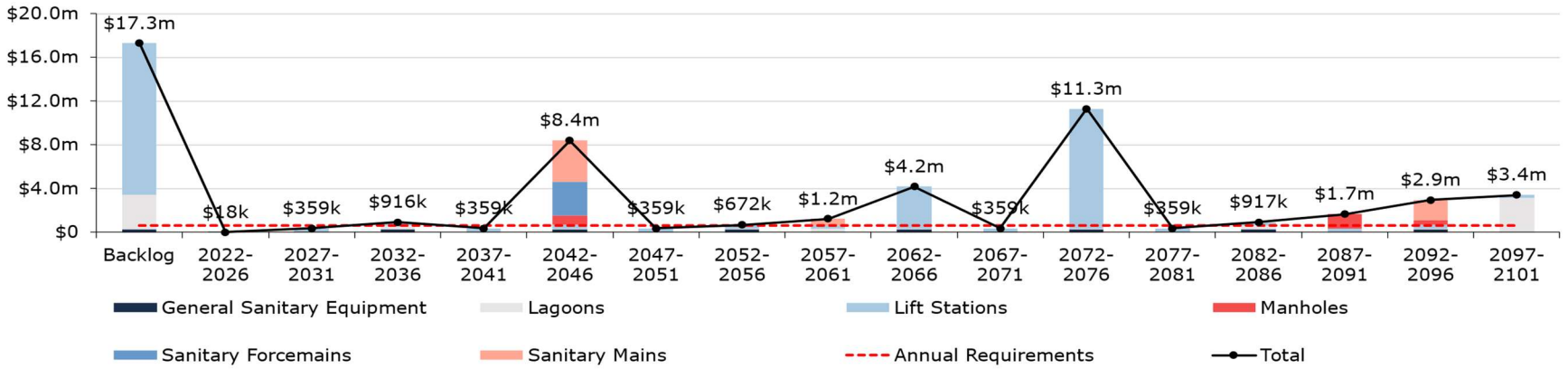


Forecasted Capital Requirements

Figure 45 illustrates the cyclical short-, medium- and long-term infrastructure replacement requirements for the Town's sanitary infrastructure. This analysis was run until 2101 to capture at least one iteration of replacement for the longest-lived asset in the asset register. Moosonee's average annual requirements (red dotted line) total $610 thousand for all sanitary network assets. Although actual spending may fluctuate substantially from year to year, this figure is a useful benchmark value for annual capital expenditure targets (or allocations to reserves) to ensure projects are not deferred and replacement needs are met as they arise.

Replacement needs are forecasted to fluctuate over the long-term time horizon and peaking at $17.3 million backlog that is mostly lift stations. These projections and estimates are based on asset replacement costs and age analysis. They are designed to provide a long-term, portfolio-level overview of capital needs and should be used to support improved financial planning over several decades.

Figure 45 Sanitary Network Forecasted Capital Replacement Requirements



Lift Stations and other assets are not componentized, limiting the accuracy of these projections. In addition, like water assets, particularly mains, it is unlikely that all mains will need to be replaced as forecasted. Coordinated projects, along with CCTV inspection data, would help to prioritize replacements and rehabilitations.

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

Table 31 Sanitary Network System-Generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
General Sanitary Equipment	$15k	$0	$0	$0	$0	$1k	$12k	$0	$0	$1k	$0
Lagoons	$47k	$0	$0	$0	$0	$0	$47k	$0	$0	$0	$0
Lift Stations	$314k	$16k	$0	$0	$0	$0	$298k	$0	$0	$0	$0
Manholes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Forcemains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

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

Risk & Criticality

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

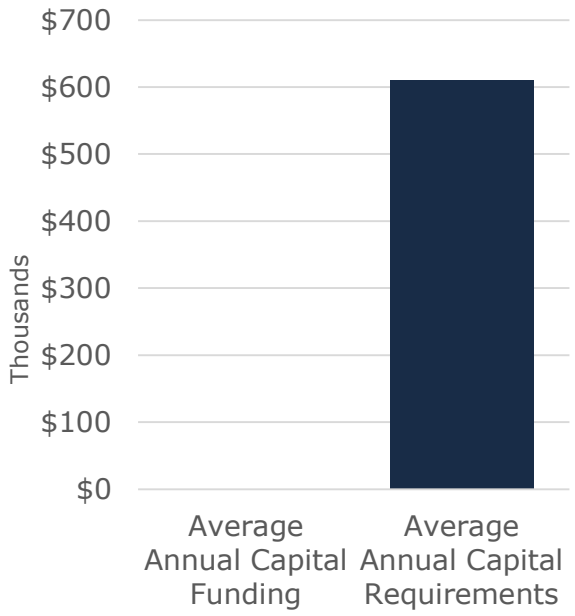
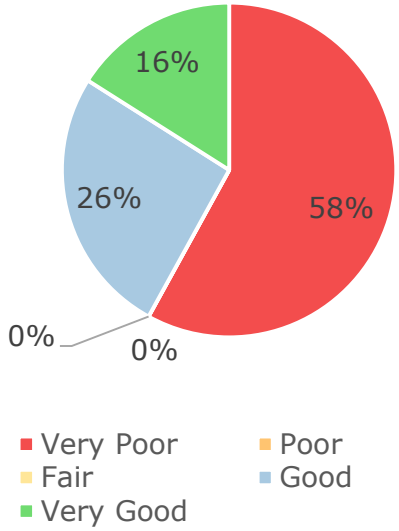
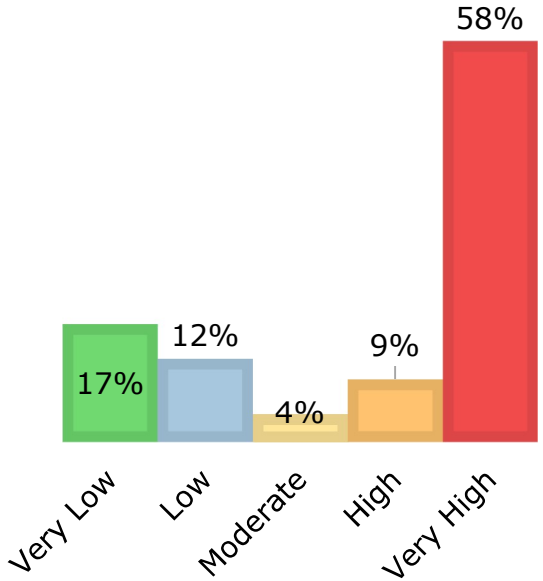
Figure 46 Sanitary Network Risk Matrix

This is a high-level model developed by municipal staff and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure. The identification of critical assets allows the Municipality to determine appropriate risk mitigation strategies and treatment options.

Levels of Service

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

Table 32: Sanitary Network Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

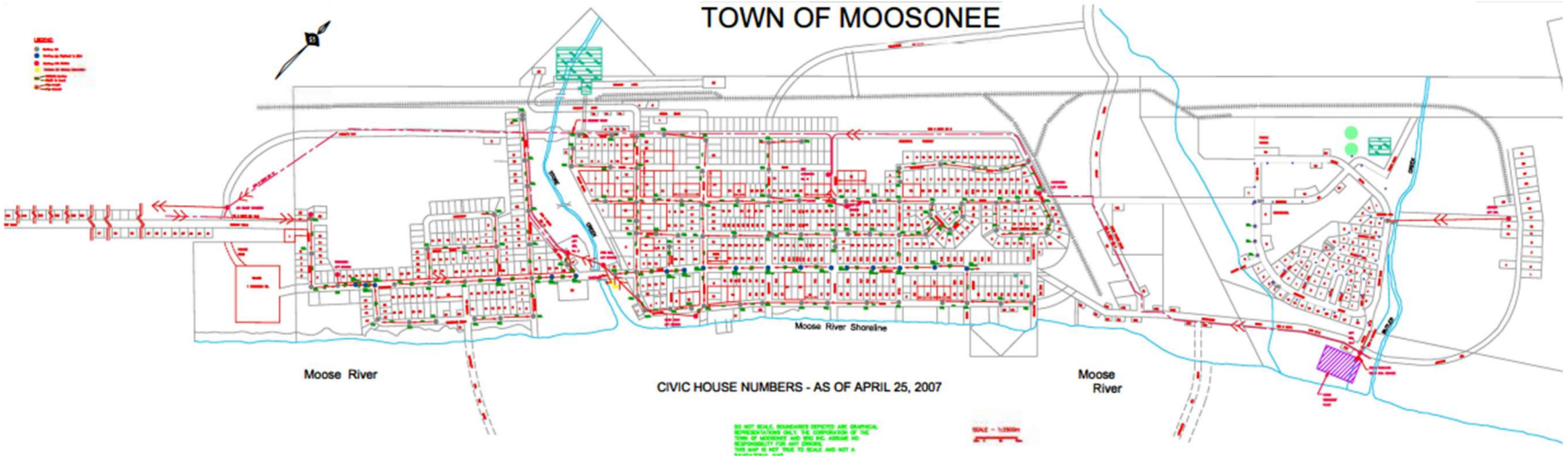
Community Levels of Service

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

Table 33 Ontario Regulation 588/17 Sanitary Network Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Affordable	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater systems	See Figure 47
	Description of the lifecycle activities (maintenance, rehabilitation and replacement)	See Lifecycle Management Strategy on page 3E
Sustainable	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	No overflow structure exists, other then large wet well and overflow alarm indicator at sewage plant
Reliable	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	Two bypasses in 2022. One from LS1 and one from LS. Total volume of 1667 cubic metres
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter the sanitary network through the weeping tiles under resident's homes, but sewage does not generally back up into homes
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	Not resilient, we have some stormwater runoff through ditches and basins
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Discharged into natural water body. Dosed with alum, main treatment is settling in the lagoons.

Figure 47 Sanitary Network Map



Technical Levels of Service

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

Table 34 Ontario Regulation 588/17 Sanitary Network Technical Levels of Service

Service Attribute	Technical Metric	Current LOS
Affordable	% of properties connected to the municipal wastewater system	100%
	Annual Capital Reinvestment Rate	0%
Sustainable	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	9.3
	% of the sanitary system that is in greater than or equal to a FAIR condition	42%
Reliable	# of connection-days per year due to sanitary main backups compared to the total number of properties connected to the municipal wastewater system	2.0
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	4.19
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0

Appendix F: Buildings

State of the Infrastructure

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

- administrative offices
- fire stations
- public works garages and storage sheds
- community centre

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

Replacement Cost	Condition	Financial Capacity	
$9,905,254	Poor (20%)	Annual Requirement:	$246,230
		Funding Available:	$0
		Annual Deficit:	$246,230

Inventory & Valuation

The graph below displays the total replacement cost of each asset segment in Moosonee's buildings inventory. As the Municipality has not had a complete componentization of their buildings their inventory is high level at an entire building replacement only.

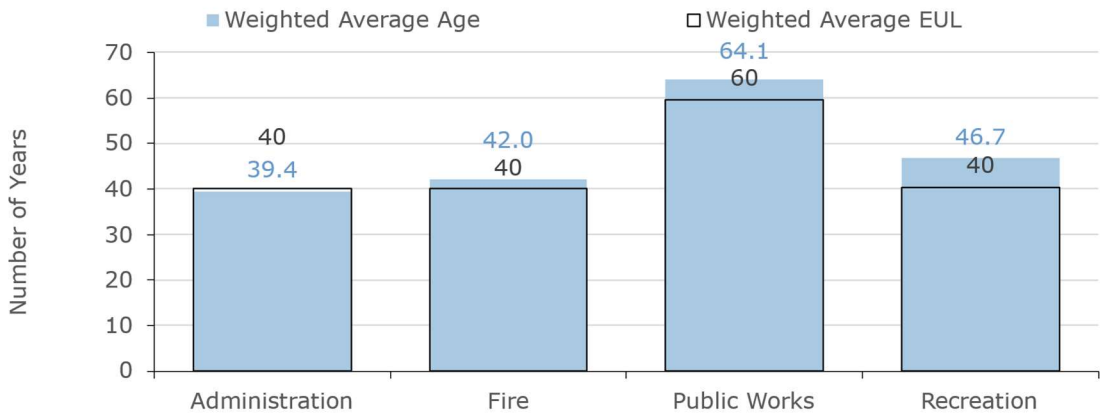
Figure 48 Buildings Replacement Cost

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

Asset Condition & Age

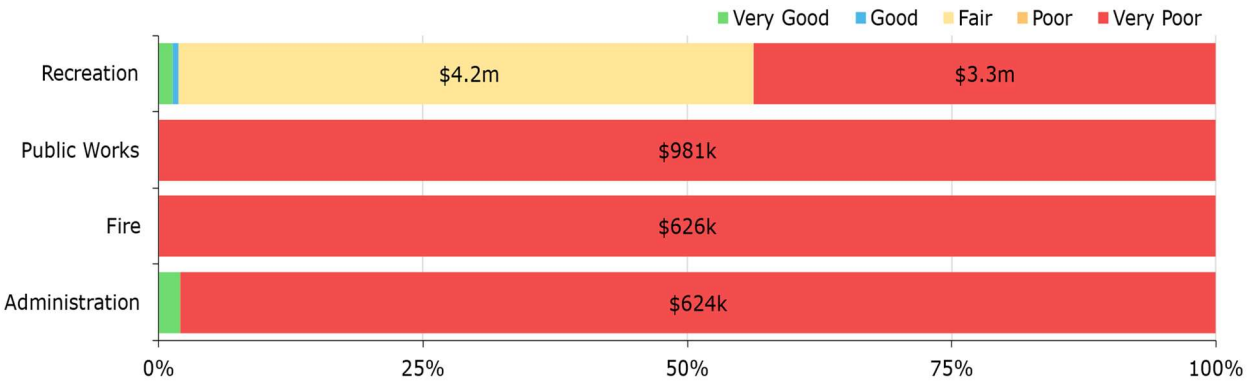
The graph below identifies the average age, and the estimated useful life for each asset segment. The values are weighted based on replacement cost.

Figure 49 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 50 Buildings Condition Breakdown



To ensure that the municipal buildings continue to provide an acceptable level of service, the Municipality should monitor the average condition of all assets. Each asset's estimated useful life should also be reviewed to determine whether adjustments need to be made to better align with the observed service life.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. Buildings are repaired as required 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 Town's current lifecycle management strategy is as required, repairs are made.

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that Moosonee should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 35 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average capital requirements at $246 thousand.

Figure 51 Buildings Forecasted Capital Replacement Requirements

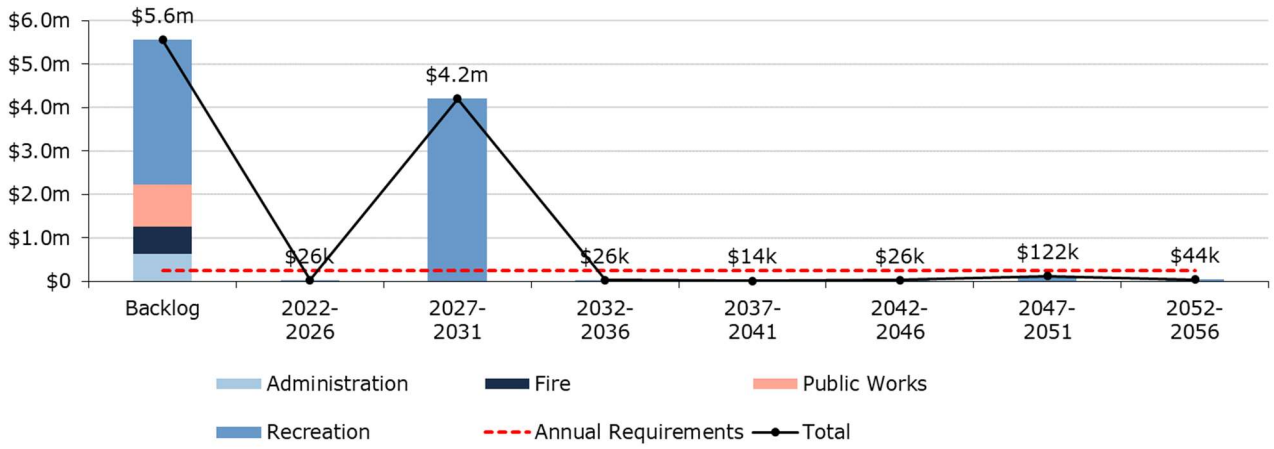


Table 35 below summarizes the projected cost of lifecycle activities (capital activities only) that may need to be undertaken over the next 10 years to support current levels of service. There is also a $5.6 million backlog identified.

Table 35 Buildings System-Generated 10-Year Capital Costs

Segment	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Administration	$624k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Fire	$626k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Public Works	$981k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recreation	$3.3m	$26k	$0	$0	$0	$0	$4.2m	$0	$0	$31k	$0
Total	**$5.6m**	**$26k**	**$0**	**$0**	**$0**	**$0**	**$4.2m**	**$0**	**$0**	**$31k**	**$0**

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

Risk & Criticality

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

Figure 52 Buildings Risk Matrix

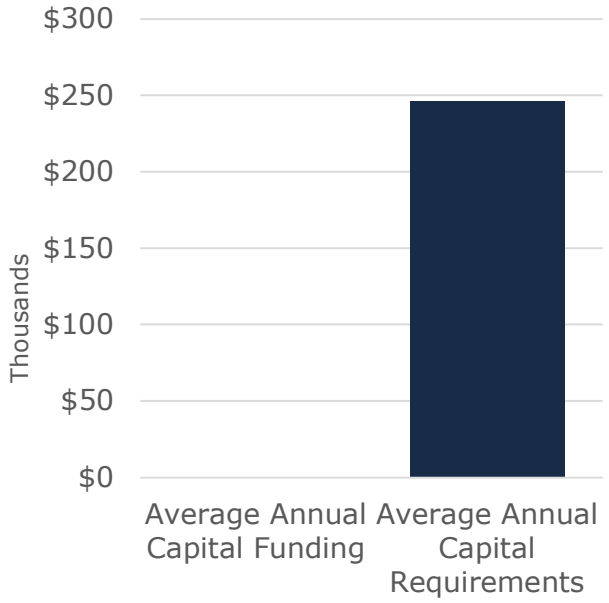
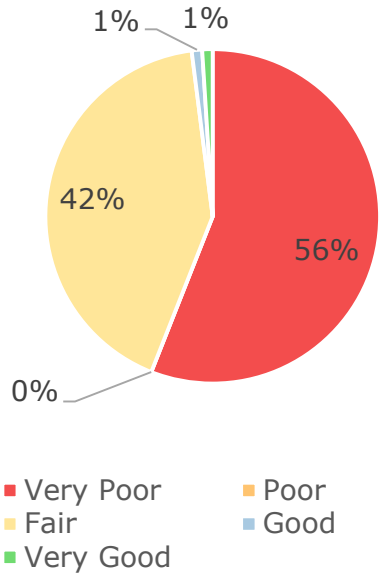
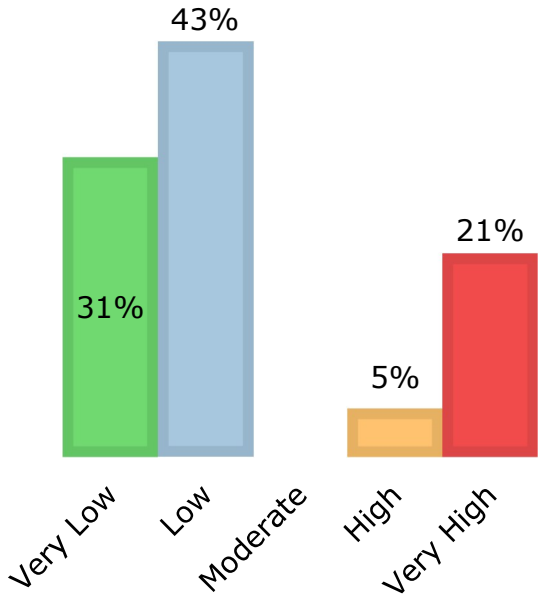
This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets allows the Town 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

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

Table 36: Buildings Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

Community Levels of Service

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

Table 37 Buildings Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Sustainable & Reliable	A description of the facilities provided within municipal buildings	Administrative offices, fire stations, public works garages and storage sheds and a community centre
Affordable	Description of the lifecycle activities (maintenance, rehabilitation and replacement)	See Lifecycle Management Strategy on page 3F

Technical Levels of Service

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

Table 38 Buildings Technical Levels of Service

Service Attribute	Technical Metrics	Current LOS
Sustainable & Reliable	% of the Building Assets that are in greater than or equal to a FAIR condition	44%
Affordable	Annual capital reinvestment rate	0%

Appendix G: Vehicles

State of the Infrastructure

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

- administration
- public works
- fire

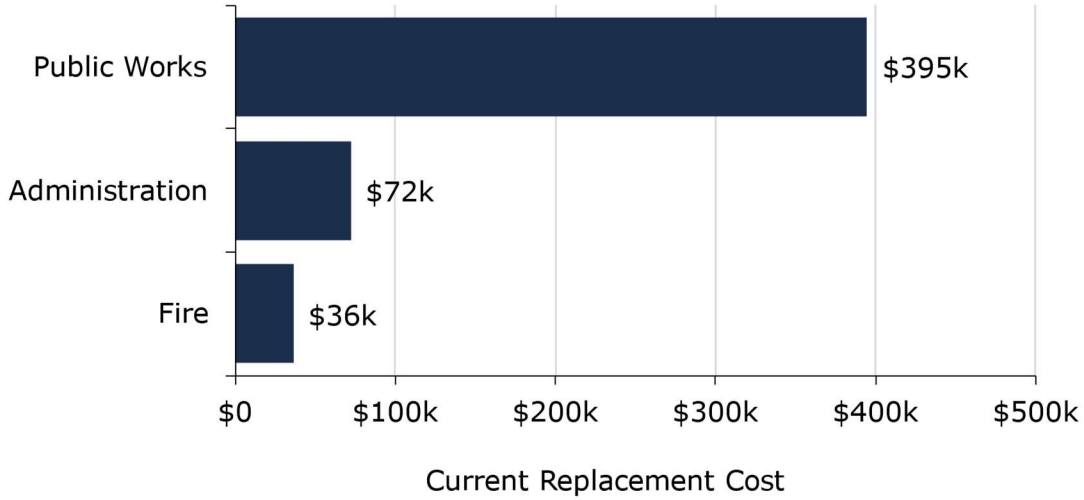
The state of the infrastructure for the vehicles is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$503,390	Poor (28%)	Annual Requirement:	$75,441
		Funding Available:	$0
		Annual Deficit:	$75,441

Inventory & Valuation

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

Figure 53 Vehicle Replacement Costs

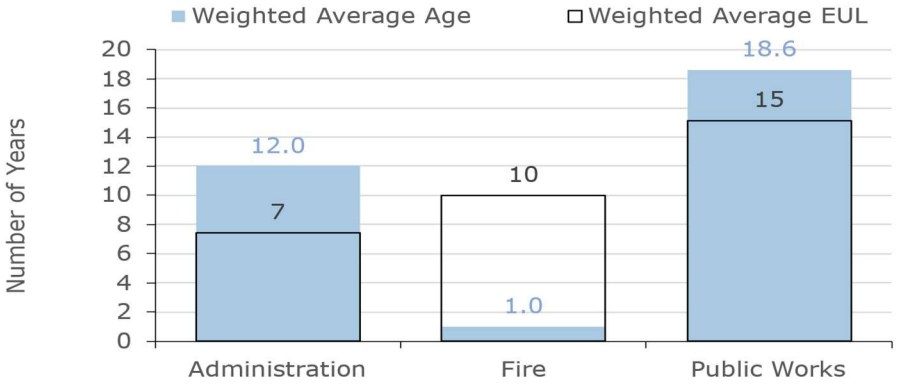


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to represent capital requirements more accurately.

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 54 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 55 Vehicles Condition Breakdown

To ensure that the Town's vehicles continue to provide an acceptable level of service, the Municipality 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 Municipality'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 56 Vehicles Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- operations and maintenance done by internal PW staff including, oil changes, repairs, annual safeties
- warranty and diagnostics are done by external mechanics
- mechanic recommendations for replacements

Forecasted Capital Requirements

The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs. The following graph identifies capital requirements over the next 15 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 $75 thousand.

Figure 57 Vehicle Forecasted Capital Replacement Requirements

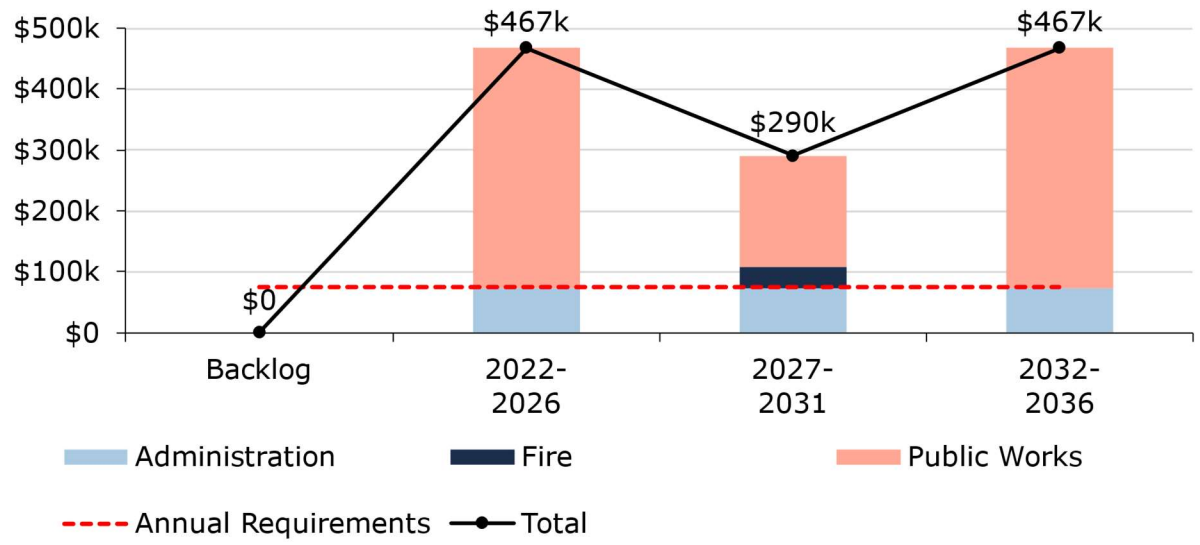


Table 39 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 39 Vehicles System-Generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Administration	$144k	$36k	$36k	$0	$0	$0	$36k	$36k	$0	$0	$0
Fire	$36k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$36k
Public Works	$577k	$139k	$117k	$139k	$0	$0	$139k	$42k	$0	$0	$0

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 Municipality'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 J: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

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.

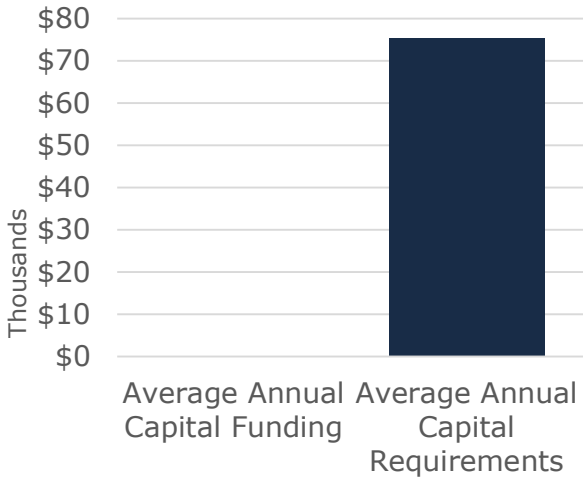
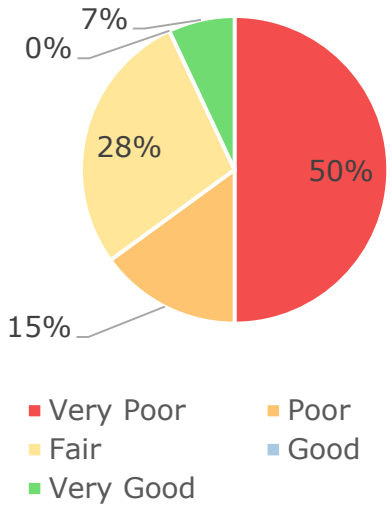
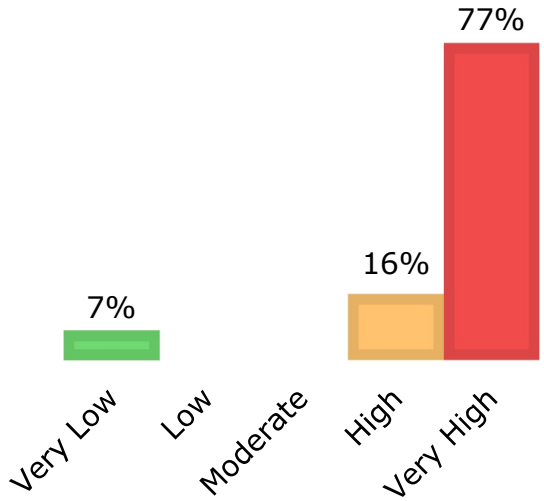
The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Figure 58 Vehicles Risk Matrix

Levels of Service

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

Table 40: Vehicles Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

Community Levels of Service

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

Table 41 Vehicles Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Sustainable & Reliable	A description of the services provided by municipal vehicles	Administration, fire services as well as public works operations
Affordable	Description of the lifecycle activities (maintenance, rehabilitation and replacement)	See Lifecycle Management Strategy on page 3G

Technical Levels of Service

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

Table 42 Vehicles Technical Levels of Service

Service Attribute	Technical Metrics	Current LOS
Sustainable & Reliable	% of the Vehicles that are in greater than or equal to a FAIR condition	35%
Affordable	Annual capital reinvestment rate	0%

Appendix H: Equipment

State of the Infrastructure

To maintain the quality stewardship of Moosonee'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 municipal services
- Safety equipment to support the delivery of protection services
- Mowers to support parks maintenance
- Public Works equipment to support roadway maintenance

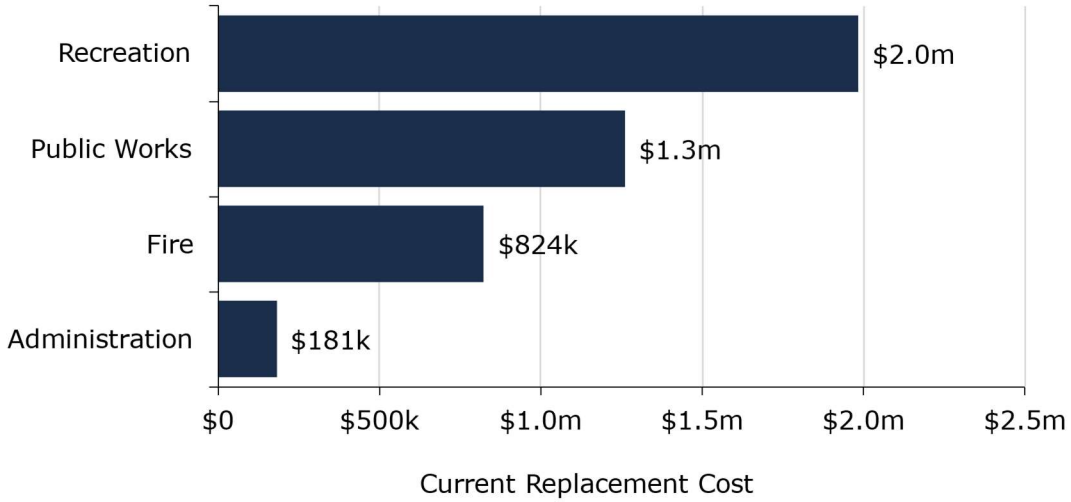
The state of the infrastructure for equipment is summarized in the following table.

Replacement Cost	Condition	Financial Capacity	
$4,250,042	Poor (39%)	Annual Requirement:	$362,493
		Funding Available:	$0
		Annual Deficit:	$362,493

Inventory & Valuation

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

Figure 59 Equipment Replacement Costs

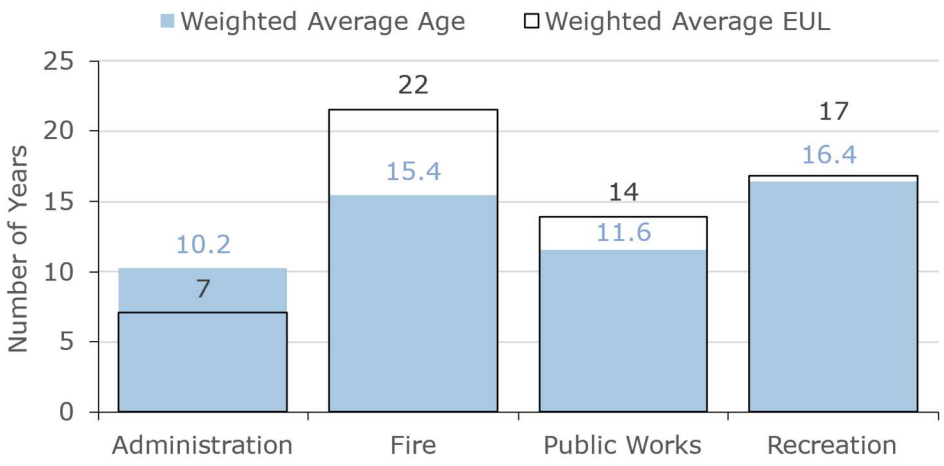


Each asset's replacement cost should be reviewed periodically to determine whether adjustments are needed to more accurate represent capital requirements.

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.

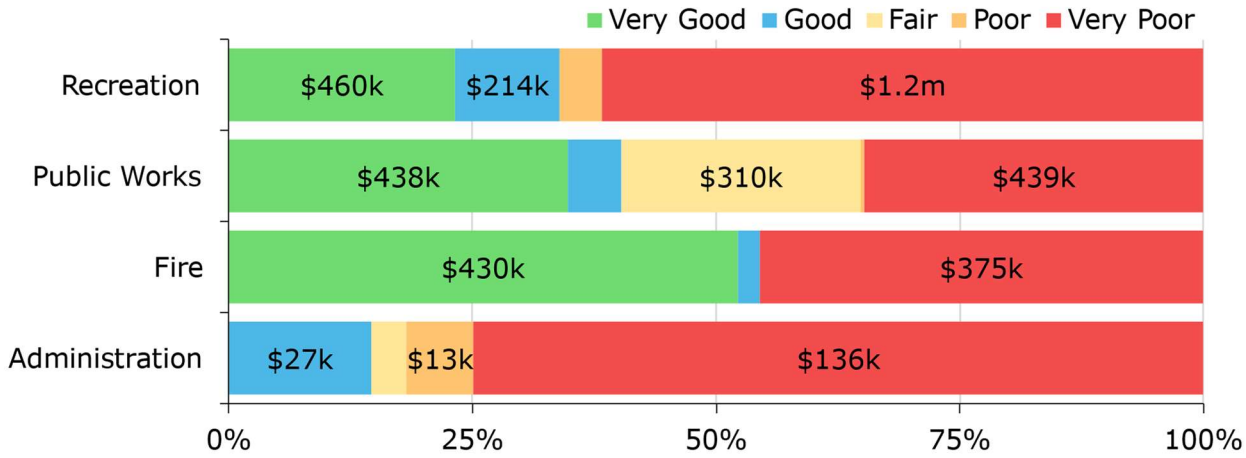
Figure 60 Equipment Average Age vs Average EUL



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 61 Equipment Condition Breakdown



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

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The current approach is varied because of the broad range of types of equipment included in this category. There are some types with very established assessments (i.e. Fire Equipment), but also many don't have any 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 62 Equipment Current Lifecycle Strategy

Maintenance / Rehabilitation / Replacement

- Similar to condition it is equipment type and department dependant

Forecasted Capital Requirements

The following graph identifies capital requirements over the next 35 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average annual capital requirements at $362 thousand.

Figure 63 Equipment Forecasted Capital Replacement Requirements

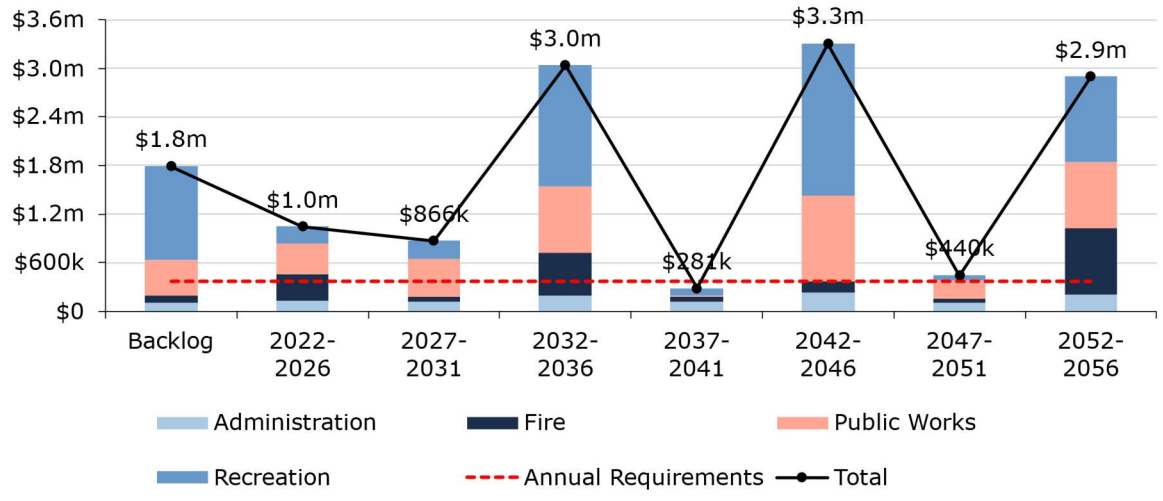


Table 43 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 43 Equipment System-Generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Administration	$246k	$36k	$13k	$8k	$18k	$53k	$53k	$20k	$0	$27k	$18k
Fire	$387k	$279k	$0	$0	$26k	$21k	$20k	$11k	$0	$19k	$11k
Public Works	$846k	$0	$4k	$320k	$53k	$6k	$9k	$0	$10k	$0	$442k
Recreation	$430k	$66k	$85k	$0	$49k	$4k	$20k	$161k	$0	$0	$44k

Internal staff condition assessment data was available for the equipment. 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 Municipality'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 J: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

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.

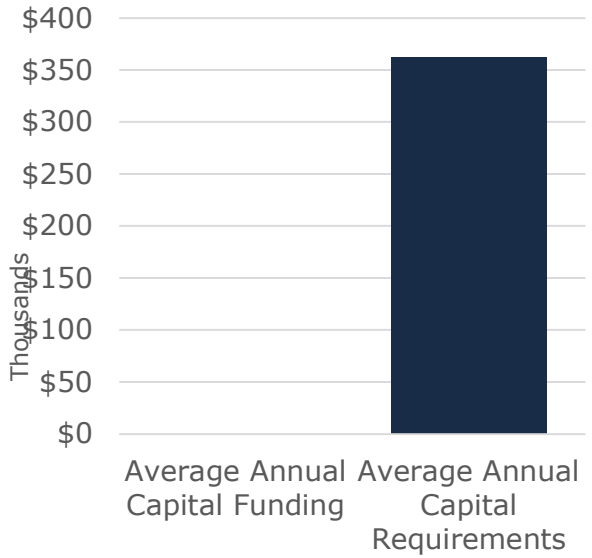
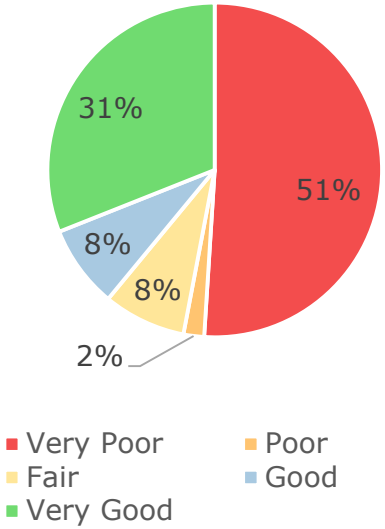
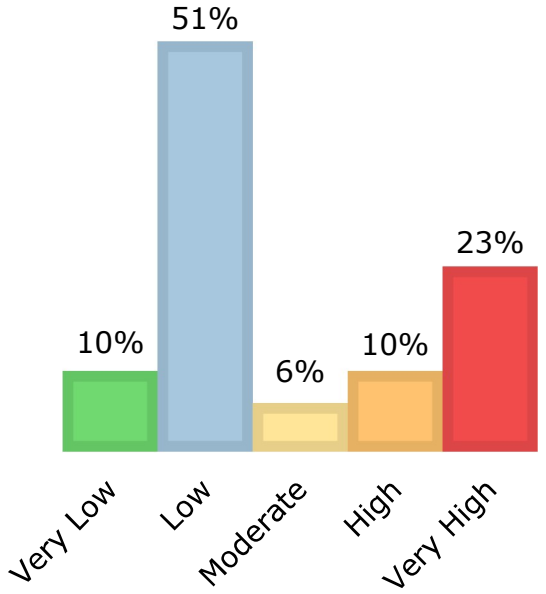
The identification of critical assets allows the Municipality to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

Figure 64 Equipment Risk Matrix

Levels of Service

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

Table 44: Equipment Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

Community Levels of Service

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

Table 45 Equipment Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Sustainable & Reliable	A description of the services provided with municipal equipment	Computer hardware and phone systems to support all municipal services. Safety equipment to support the delivery of protection services. Mowers to support parks maintenance. Public Works equipment to support roadway maintenance.
Affordable	Description of the lifecycle activities (maintenance, rehabilitation, and replacement)	See Lifecycle Management Strategy on page 3H

Technical Levels of Service

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

Table 46 Buildings Technical Levels of Service

Service Attribute	Technical Metrics	Current LOS
Sustainable & Reliable	% of the Equipment Assets that are in greater than or equal to a FAIR condition	46%
Affordable	Annual capital reinvestment rate	0%

Appendix I: Airport

State of the Infrastructure

Moosonee owns several assets that are considered part of the airport. This category includes buildings, equipment, vehicles and runways.

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

Replacement Cost	Condition	Financial Capacity	
$25,253,493	Fair (47%)	Annual Requirement:	$835,490
		Funding Available:	$200,000
		Annual Deficit:	$635,490

Inventory & Valuation

The airport asset category has a replacement value of $25 million.

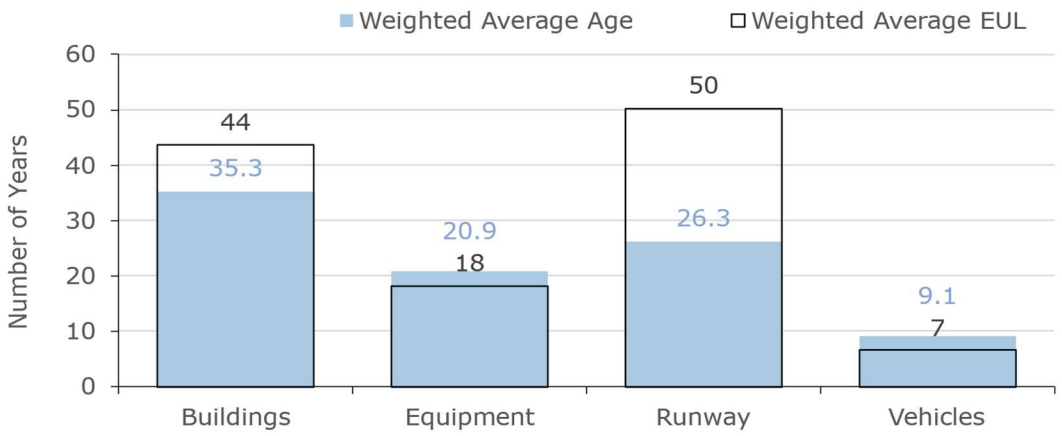
Figure 65 Airport Assets Replacement Costs

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.

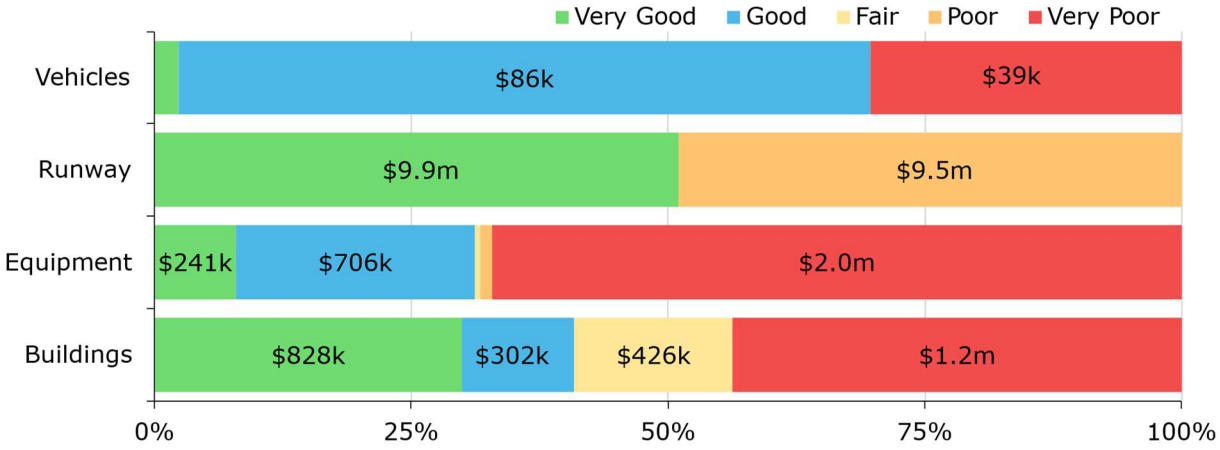
Figure 66 Airport Average Age vs Average EUL



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 67 Airport Condition Breakdown



To ensure that the Town's airport continue to provide an acceptable level of service, Moosonee should monitor the average condition of all airport assets. There are limited condition assessments available on these assets, staff should evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required.

Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The current approach varies significantly due to the varied assets included in this category.

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. There are many types of assets within this category and each type needs to have a strategy developed for future planning.

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 35 years. This projection is used as it ensures that every asset has gone through one full iteration of replacement. The forecasted requirements are aggregated into 5-year bins and the trend line represents the average annual capital requirements which are $835 thousand.

Figure 68 Airports Forecasted Capital Replacement Requirements

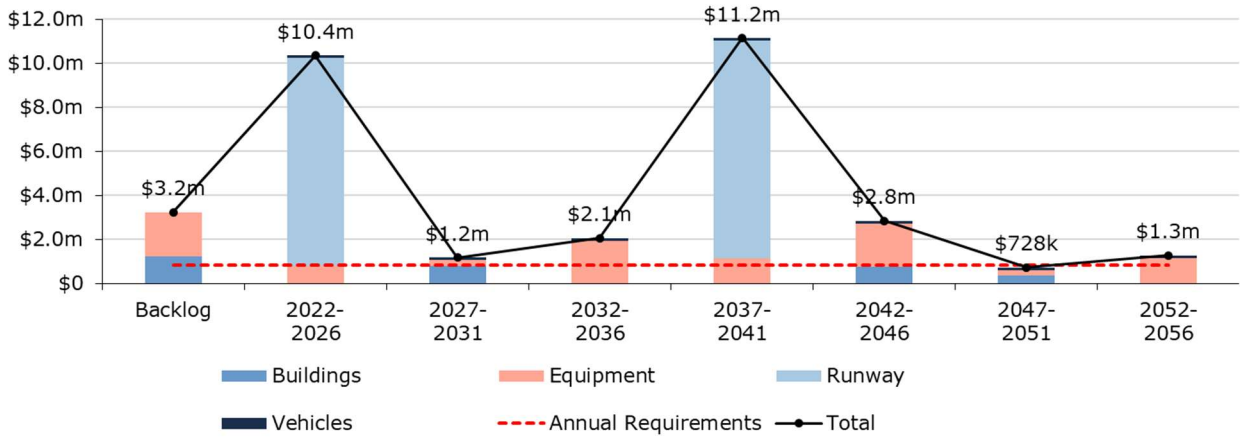


Table 47 below summarizes the projected cost of lifecycle activities (capital replacement only) that may need to be undertaken over the next 10 years to support current levels of service. These projections are generated in Citywide and rely on the data available in the asset register.

Table 47 Airports System-Generated 10-Year Capital Costs

Segment	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Buildings	$786k	$0	$0	$0	$0	$0	$426k	$0	$302k	$0	$58k
Equipment	$1.0m	$17k	$36k	$16k	$2k	$706k	$201k	$28k	$17k	$3k	$17k
Runway	$9.5m	$0	$0	$9.5m	$0	$0	$0	$0	$0	$0	$0
Vehicles	$256k	$39k	$0	$86k	$3k	$0	$39k	$0	$86k	$3k	$0

This category, a staff assessment from 2018 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 Municipality'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 J: Risk Rating Criteria for the criteria used to determine the risk rating of each asset.

Figure 69 Airport Risk Matrix

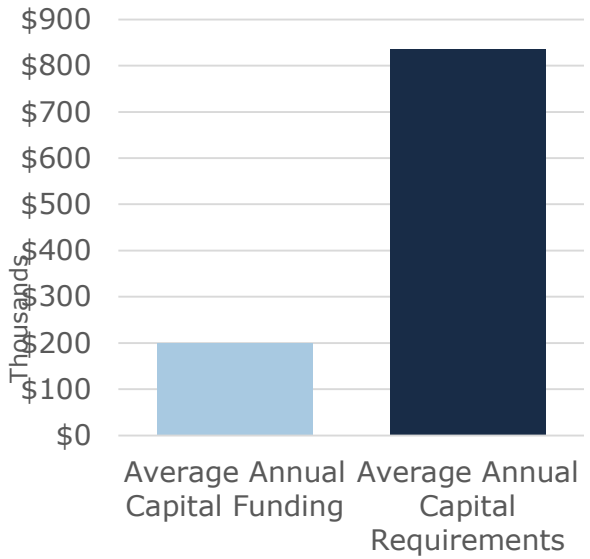
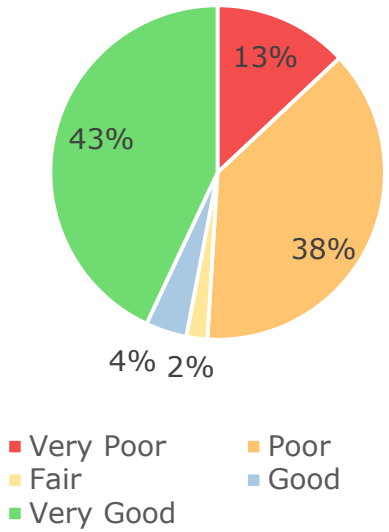
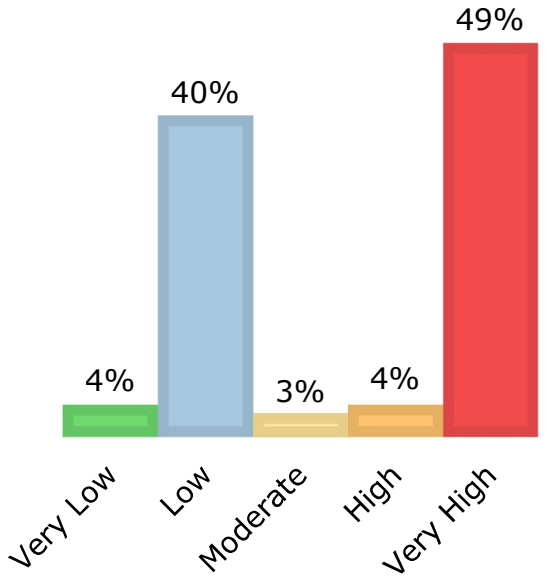
This is a high-level model that has been developed based on information currently available and should be reviewed and adjusted to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets allows the Town 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

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

Table 48: Airport Strategic Levels of Service

Target vs Actual Reinvestment Rate	Performance (Average Condition)	Risk Breakdown
		

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Town's airport.

Table 49 Airport Community Levels of Service

Service Attribute	Qualitative Description	Current LOS
Sustainable & Reliable	A description of the facilities provided within the municipal airport	Passenger and freight flights in and out of Moosonee
Affordable	Description of the lifecycle activities (maintenance, rehabilitation, and replacement)	See Lifecycle Management Strategy on page 3I

Technical Levels of Service

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

Table 50 Airport Technical Levels of Service

Service Attribute	Technical Metrics	Current LOS
Sustainable & Reliable	% of the Airport Assets that are in greater than or equal to a FAIR condition	66%
Affordable	Annual capital reinvestment rate	0.8%

Appendix J: 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

Asset Category	Asset Segment	Risk Criteria	Criteria	Weighting (%)	Sub-Criteria	Weighting (%)	Value/Range	Score
General / Corporate		COF	Economic	100%	Replacement Cost	100%	0 - 10,000 10,000 - 25,000 25,000 - 50,000 50,000 – 100,000 >100,000	1 - Insignificant 2 - Minor 3 - Moderate 4 - Major 5 - Severe
		POF	Structural	60%	Age Based Condition	100%	80 - 100 60 - 79 40 - 59 20 - 39 0 - 19	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain
			Functional	40%	Service Life Remaining	100%	> 40 30 - 40 20 - 30 10 - 20 < 10	1 - Rare 2 - Unlikely 3 - Possible 4 - Likely 5 - Almost Certain

Appendix K: 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 Municipality'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 Municipality'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 Municipality 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 Municipality 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 Municipality 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 Municipality 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