AMP 2018

The 2018 Asset Management Plan for the

Town of Edson

Overall Grade D	Infrastructure Report Card The Town of Edson			
Asset Category	Asset Health (Condition)	Current Financial Capacity	Overall Grade	Comments
Road Network	B	F	D	83% of the Town's Road Network is in Very Good, Good, or Fair condition. The average annual capital allocation required to sustain Edson's Road totals approximately **$2,647,000**. Based on Edson's current annual funding of **$960,000**, there is an annual **deficit of $1,687,000**.
Bridges & Culverts	C	F	D	Currently 47% of the Town's Bridges & Culverts are in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Bridges & Culverts totals approximately **$194,000**. Based on Edson's current annual funding of **$0** there is an annual **deficit of $194,000**.
Water Network	B	F	C	87% of the Town's Water Network is in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Water Network totals approximately **$1,184,000**. Based on Edson's current annual funding of **$496,000**, there is an annual **deficit of $688,000**.
Sanitary Sewer Network	C	F	D	Only 33% of the Town's Sanitary Sewer Network is in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Sanitary Sewer Network totals approximately **$2,357,000**. Based on Edson's current annual funding of **$666,000**, there is an annual **deficit of $1,691,000**.
Storm Water Network	B	D	C	78% of the Town's Storm Water Network is in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Storm Water Network totals approximately **$869,000**. Based on Edson's current annual funding of **$496,000**, there is an annual **deficit of $373,000**.

Machinery & Equipment	C	F	F	Only 38% of the Town's Machinery & Equipment is in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Machinery & Equipment totals approximately **$753,000**. Based on Edson's current annual funding of **$57,000**, there is an annual **deficit of $696,000**.
Vehicles	C	C	C	Only 29% of the Town's Vehicles are in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Vehicles totals approximately **$311,000**. Based on Edson's current annual funding of **$235,000**, there is an annual **deficit of $76,000**.
Buildings	D	F	F	Only 2% of Town's Buildings assets are in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Buildings totals approximately **$1,500,000**. Based on Edson's current annual funding of **$60,000**, there is an annual **deficit of $1,440,000**.
Land Improvements	C	F	D	Only 34% of the Town's Land Improvements are in Very Good or Good condition. The average annual capital allocation required to sustain Edson's Land Improvements totals approximately **$811,000**. Based on Edson's current annual funding of **$235,000**, there is an annual **deficit of $576,000**.

Note: Infrastructure Report Card Rating System Description is located in Appendix A.

Executive Summary

Municipal infrastructure provides the foundation for the economic, social, and environmental health and growth of a community. We rely on infrastructure to facilitate the movement of goods and people, deliver clean drinking water, and provide a high quality of life. Municipalities across Canada are responsible for ensuring that these vital services and critical infrastructure are accessible and reliable. Municipalities own and manage nearly 60% of all public infrastructure in the country. However, due to aging infrastructure and because of declining senior government grants, municipalities are struggling to meet desired levels of service. Developing a viable solution requires a strategic, innovative and sustainable solution.

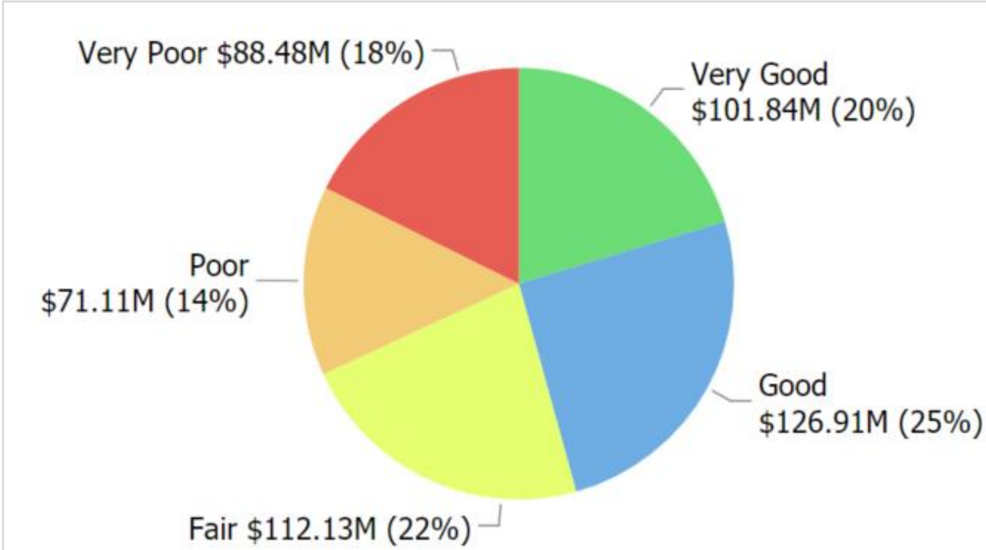
As part of Public Sector Digest's (PSD) Asset Management Roadmap the Town of Edson has committed to taking the necessary steps towards developing a systemic, sustainable and intelligently-structured asset management program. This process has involved the collaboration of PSD's industry-leading asset management team with municipal staff.

This comprehensive asset management plan (AMP) serves as the culmination of all activities undertaken as part of the Roadmap. It is an indispensable guide to asset management planning and investment into the future. Asset management is critical to extracting the highest total value from public assets at the lowest lifecycle cost. This AMP outlines both the existing state of municipal infrastructure and the Town's financial capacity to sustain existing infrastructure into the future. Furthermore, it details the outcomes of each step of the Roadmap and provides recommendations for maintaining and continuing to develop the Town's asset management program.

As analyzed in this asset management plan, the Town of Edson's infrastructure portfolio comprises the following asset categories: Road Network, Bridges & Culverts, Water Network, Sanitary Sewer Network, Storm Water Network, Machinery & Equipment, Vehicles, Buildings, and Land Improvements. The replacement cost of the Town's asset portfolio is estimated to be approximately $500 million.

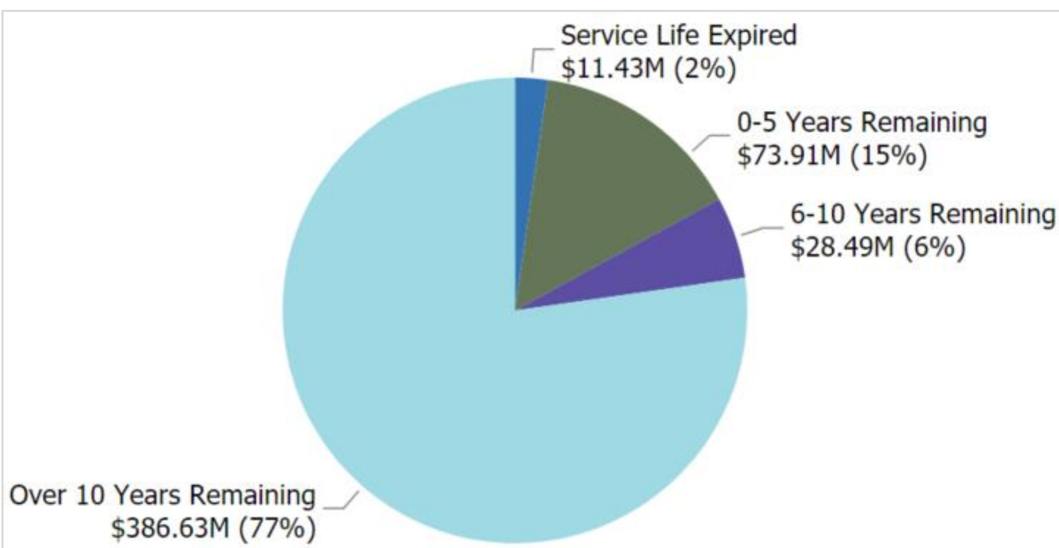
In recent years, staff have put a significant amount of effort into building and refining the Town's asset inventory to ensure that it represents a high level of accuracy and reliability. This remains an ongoing process and will lead to the continuous improvement of valuation estimates and asset management strategies.

Based on updated replacement costs, and a combination of assessed and age-based condition data, 45% of assets, with a valuation of $229 million, are in Very Good or Good condition, meaning that these assets are fit for the future or adequate to meet today's service requirements. However, 32% of municipal assets are in Poor or Very Poor condition with a valuation of $160 million, meaning that these assets are unfit for sustained service or are rapidly approaching the end of their estimated service life.



Current asset condition has been determined according to a combination of assessed condition data and age-based condition estimates. While municipal staff have made significant progress in collecting assessed condition data, there are still several asset categories that require assessment. To increase the confidence and accuracy of this information, the Town should strive to complete routine condition assessments across the entire asset portfolio on a regular cycle.

Approximately 77% of the assets analyzed in this AMP have at least 10 years of useful life remaining. However, 2% of assets, which have a total valuation of $11 million, remain in operation beyond their estimated useful life and require immediate attention to determine appropriate treatment options.



In some cases, these assets may be found to be in better condition than originally thought, and simply require the adjustment of projections about their remaining service life. In other cases, replacement or rehabilitation may be required. Municipal staff are in the process of determining appropriate asset management strategies for these high-risk assets.

In order for an AMP to be effective, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the municipality to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

The Town's infrastructure backlog represents the investment needed today to meet previously deferred replacement needs and bring municipal assets to a state of good repair. Currently, the municipality has a combined infrastructure backlog of $12 million.

In order to reduce the infrastructure backlog and meet annual requirements to sustain the Town's assets, a financial strategy was developed as part of this AMP. The following table outlines the annual infrastructure deficit identified:

Funding Source	Annual Requirement	Funding Available	Annual Deficit
Tax-Funded Assets	$7,085,000	$2,043,000	$5,042,000
Rate-Funded Assets	$3,541,000	$1,162,000	$2,379,000
Total:	**$10,626,000**	**$3,205,000**	**$7,421,000**

The following table compares the total and average annual tax/rate change required to eliminate the Town's infrastructure deficit and achieve full funding across all asset categories included in the Asset Management Plan:

Funding Source	Years Until Full Funding	Total Tax/Rate Change	Average Annual Tax/Rate Change
Tax-Funded Assets	20 Years	43.1%	2.2%
Rate-Funded (Sanitary Sewer Network)	20 Years	85.8%	4.3%
Rate-Funded (Water Network)	20 Years	41.9%	2.1%

For tax-funded assets, we recommend a 20-year plan to achieve full funding by:

a) increasing tax revenues by 2.2% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered

b) when realized, reallocating the debt cost reductions of $412,000 to the infrastructure deficit as outlined in **Section 8.0**

c) allocating the current non-tax revenue as outlined in **Section 8.0**

d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in

For rate-funded assets (Water & Sanitary Network) we recommend a 20-year plan to achieve full funding by:

a) increasing rate revenues by 4.3% for sanitary services and 2.1% for water services each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.

b) when realized, reallocating the debt cost reductions of $702,000 for the Sanitary Network and $177,000 for the Water Network to the applicable infrastructure deficit as outlined in **Section 8.0**

c) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in

Although our financial strategies allow the municipalities to meet its long-term funding requirements and reach fiscal sustainability, injection of additional revenues will be required to mitigate existing infrastructure backlogs.

With the recent asset management approach developed and endorsed by Alberta Municipal Affairs, municipalities are responsible for implementing a wide range of asset management planning strategies and initiatives. With the completion of the Roadmap and the delivery of this AMP, the Town of Edson is well-positioned to meet and even exceed the standards outlined by the Province.

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1.0 Introduction & Context

1.1 What is asset management?

Canadian municipalities are responsible for managing and maintaining a broad range of infrastructure assets for the purpose of providing value and adequate services to their citizens. This includes roads and bridges, to facilitate movement; water, sewer and storm water networks to provide clean drinking water and dispose of waste or excessive rainfall; and buildings, facilities and parks to provide community and recreational spaces. The provision of these services requires a vast and costly network of infrastructure assets. Planning for the sustainability of these assets requires a systematic and comprehensive plan for maintaining, rehabilitating, and replacing infrastructure at the lowest cost to the organization and its stakeholders.

Until recently, most public-sector organizations have taken an ad-hoc and informal approach to the management of infrastructure assets. Many organizations lacked a basic understanding of what assets they owned, where they were located, what they were worth, and what condition they were in. As a result, there has been widespread mismanagement of municipal assets, often contributing to the rapid deterioration of critical infrastructure. As a remedy to this challenge, municipal asset management is comprised of a series of processes and practices designed to manage all assets effectively and sustainably.

The goal of a municipality engaged in asset management is to minimize the lifecycle costs of owning, operating, and maintaining assets, at an acceptable level of risk, while continuously delivering established levels of service for present and future customers. This encompasses the planning, design, construction, operation, and maintenance of infrastructure used to provide municipal services. By implementing asset management processes, infrastructure needs can be prioritized over time, while ensuring timely investments to minimize repair and rehabilitation costs and maintain municipal assets now and into the future.

1.2 What are the benefits of asset management?

The Town of Edson owns and manages a diverse portfolio of assets to provide residents, businesses, employees, and visitors with safe access to important services, such as transportation, recreation, culture, economic development and much more. As such, it is critical that the municipality manage these assets optimally in order to produce the highest total value for taxpayers. This report will assist the municipality in the pursuit of comprehensive asset management of its capital assets.

Implementing the key principles and best practices of asset management can lead to a significant overhaul of organizational processes, practices, and procedures. Prior to implementing these changes, an overview of the benefits of asset management is useful to understand why this organizational change is valuable and how it will improve outcomes for all stakeholders. The following infographic outlines why an organization should engage in the development of a robust and sustainable asset management program.

Table 1 Benefits of Asset Management

Benefits of Asset Management	
	Good governance and increased accountability
	Data-driven decision-making
	Enhanced sustainability of infrastructure
	Improved level of service and quality of life
	Accurate forecasting of infrastructure replacement and enhancement needs
	Compliance with federal and provincial regulations

1.3 What is an asset management plan?

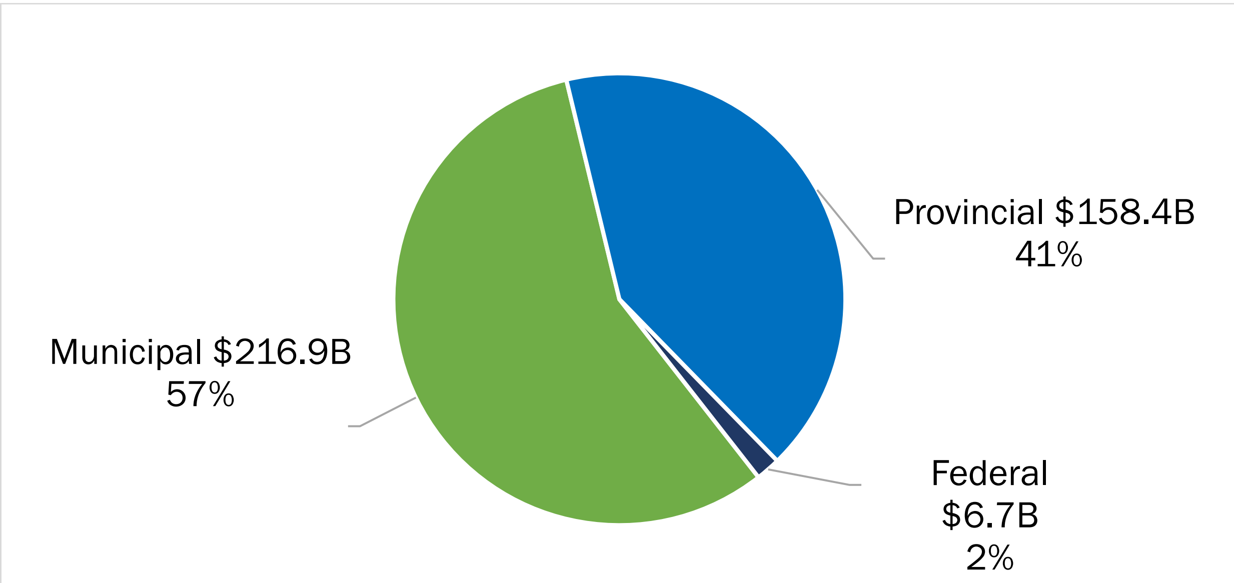
An asset management plan (AMP) is a strategic planning document that outlines key asset data and identifies the resources and funding required to meet organizational objectives. This AMP was developed to support the Town of Edson's vision for its asset management practice and programs. It provides key asset data and information about the municipality's infrastructure portfolio, asset inventory and replacement costs. This document also includes a detailed analysis of this data to determine optimized asset management strategies, the current state of infrastructure, the municipality's capital investment framework, and financial strategies to achieve fiscal sustainability while reducing and eventually eliminating funding gaps.

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

1.4 Infrastructure Ownership in Canada

Across Canada, the municipal share of public infrastructure increased from 22% in 1955 to nearly 60% in 2013. The federal government's share of critical infrastructure stock, including roads, water and wastewater, declined by nearly 80% in value since 1963.

Figure 1 Municipal Share of Public Infrastructure



The municipality relies on these assets to provide residents, businesses, employees, and visitors with safe access to important services, such as transportation, recreation, culture, economic development, and much more. As such, it is critical that municipal assets are managed effectively in order to produce the highest total value for taxpayers. This AMP will assist the municipality in the pursuit of judicious asset management of its capital assets.

1.5 Asset Management in Alberta

The Federal Government has been working with the provinces to implement asset management practices across municipalities. Each province has been given the autonomy to create their own approach to asset management. Alberta municipalities are ultimately given responsibility for managing their assets; however, Alberta Municipal Affairs has developed an asset management approach, as required under the Canada-Alberta Gas Tax Agreement. The approach was approved by Infrastructure Canada.

As of 2015, Alberta municipalities are required to prepare three-year financial and five-year capital plans and are encouraged to develop asset management practices to assist with this.

The Province of Alberta has developed a two-phased approach to the development of asset management practices at the municipal-level:

PHASE I (2015-2017)

- Complete and publish an inventory of current tools and resources
- Support the development and rollout of tools that support asset management
- Enhance existing advisory services and training opportunities

Measurement of municipal progress in asset management during Phase 1 will be based on data currently collected in Municipal Sustainability Initiative (MSI) capital project applications. MSI program guidelines require the municipality to confirm that a multi-year capital plan has been prepared.

PHASE II (2018-2023)

- Assist municipalities to implement corporate planning regulatory requirements
- Expand tools and resources where gaps are identified

To assist with the development of municipal asset management practices, the Province has developed an Asset Management Handbook and Toolkit through efforts between Alberta Municipal Affairs and the Consulting Engineers of Alberta. The available tools have been designed to help kick-start municipalities who are in the early stages of their asset management journey or to support others with continuous improvement of their asset management programs.[1]

[1] https://www.alberta.ca/municipal-asset-management.aspx

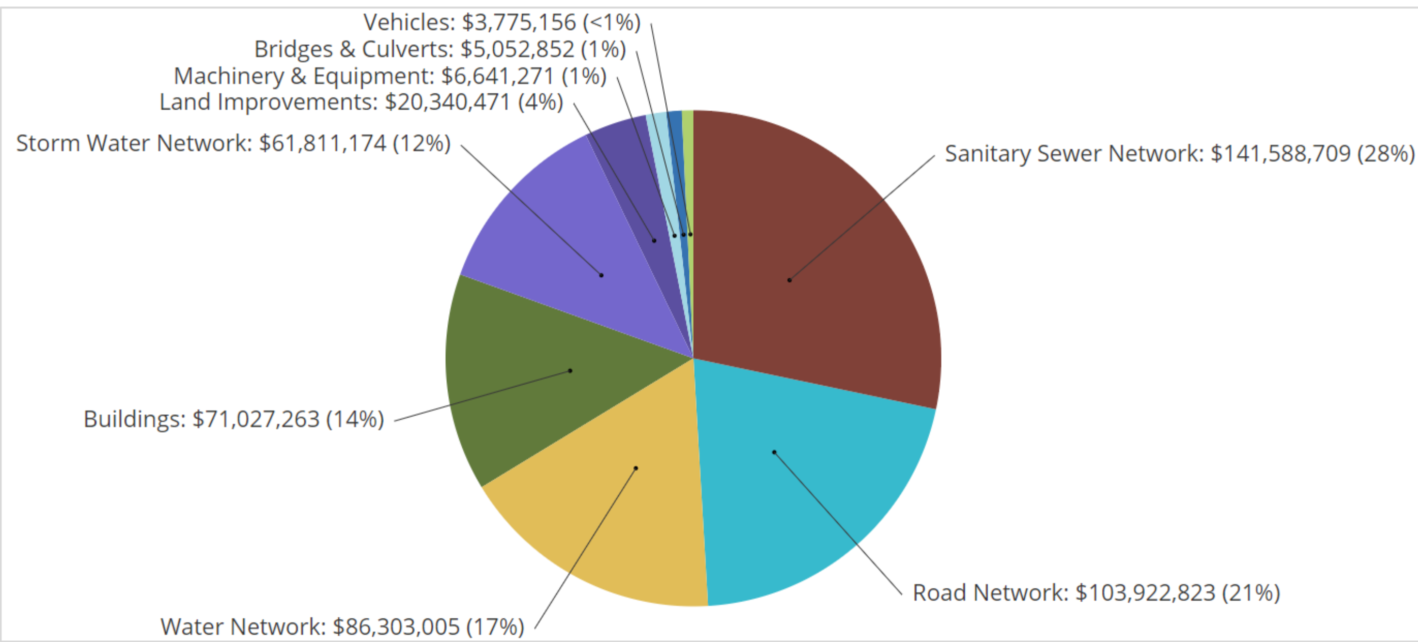
2.0 Asset Portfolio Overview

In this section, we aggregate technical and financial data across all asset categories analyzed in this AMP and summarize the state of the infrastructure using key asset-level and financial indicators. These indicators will provide a high-level picture of the assets that the municipality owns, historical trends in infrastructure investment, and the condition and estimated useful life remaining for the Town's assets. This data will be used as a starting point to conduct more detailed analyses on individual Asset Categories.

2.1 Replacement Cost – All Asset Categories

The asset categories analyzed in this AMP for the municipality have a total replacement cost of $500 million, of which the Sanitary Sewer Network comprises the largest percentage (28%), followed by the Road Network at 21%.

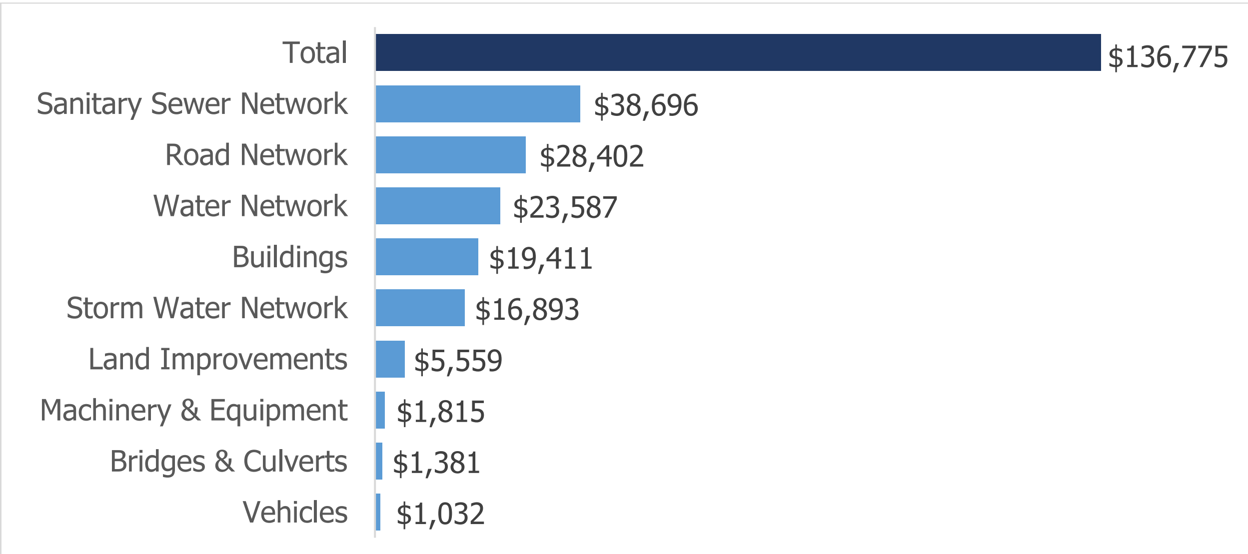
Figure 2 Asset Replacement Cost - All Asset Categories



2.2 Household Asset Ownership

Asset ownership per household totals $136,775 based on 3,659 private dwellings.

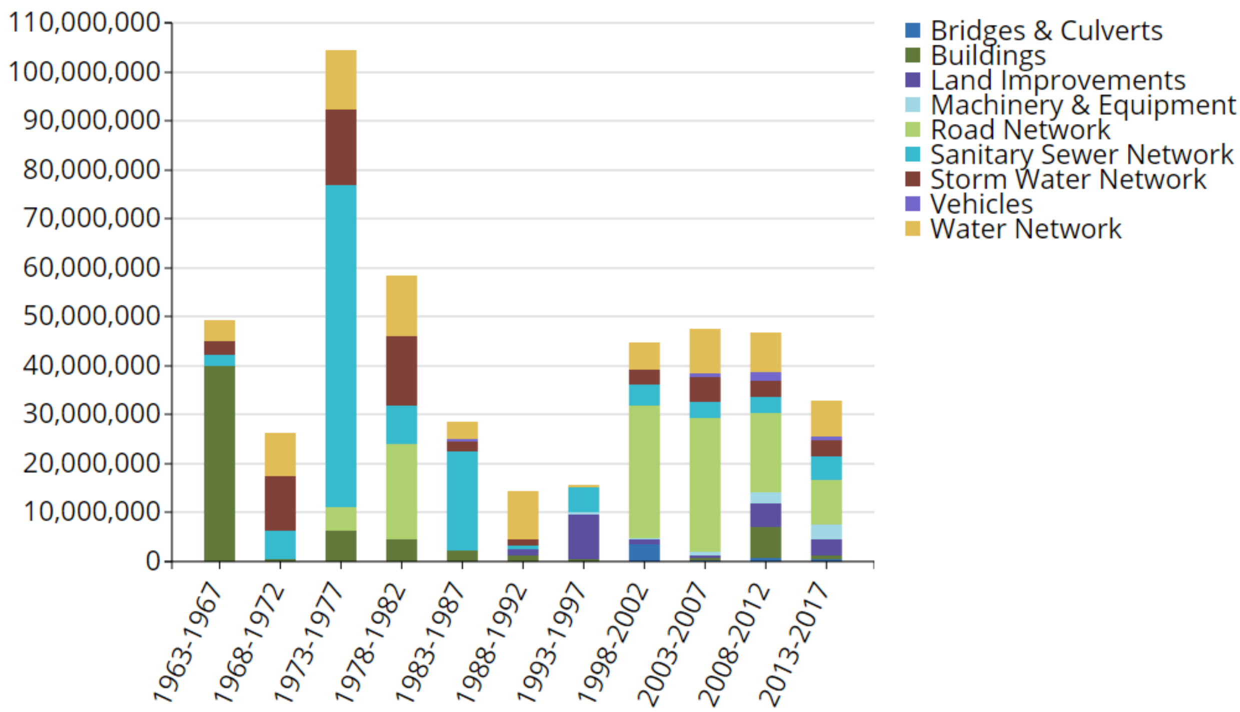
Figure 3 Household Asset Ownership – All Asset Categories



2.3 Historical Investment in Infrastructure

Figure 4 illustrates the historical investments made in the asset categories analyzed in this AMP since 1964.

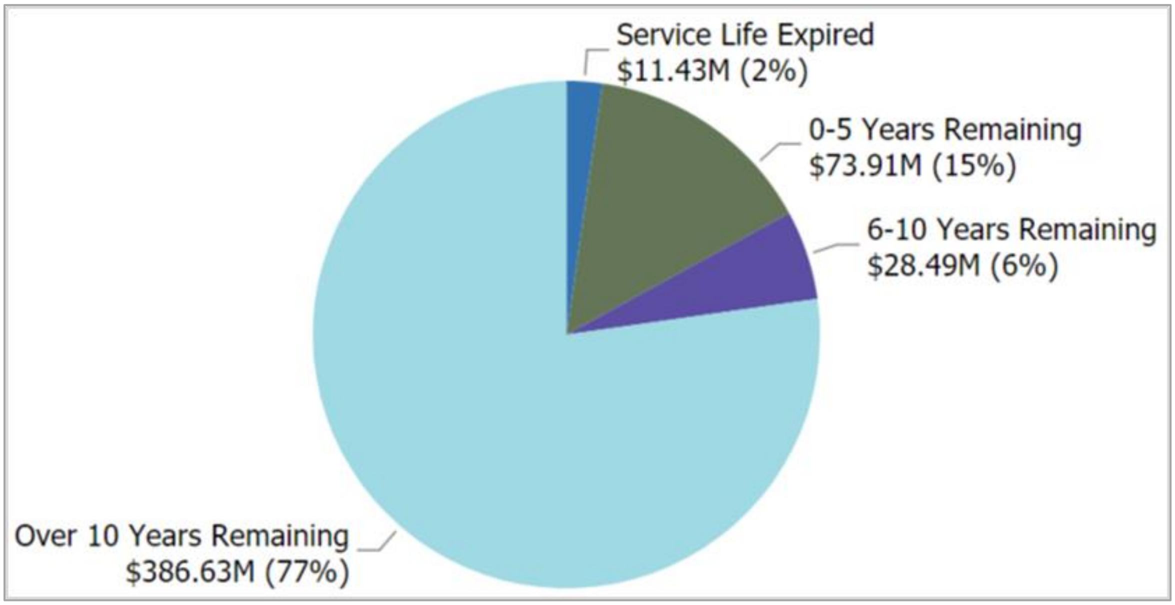
Figure 4 Historical Investment in Infrastructure - All Asset Categories



2.4 Remaining Service Life

While age is not a precise indicator of an asset's health, in the absence of assessed condition assessment data, it can serve as a high-level, meaningful approximation and help guide replacement needs and facilitate strategic budgeting. **Figure 5** illustrates the percentage of municipal infrastructure assets that have surpassed their estimated service life, as well as the percentage that are within 10 years of their estimated end-of-life.

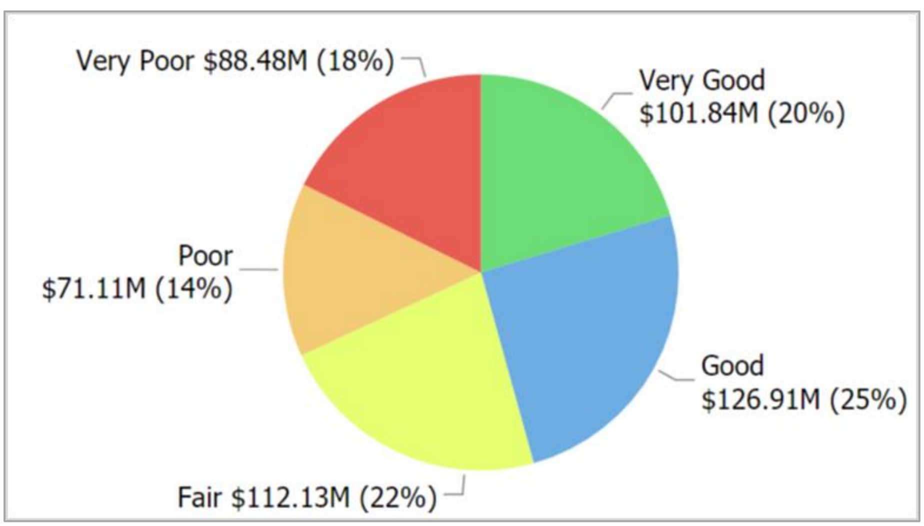
Figure 5 Remaining Service Life - All Asset Categories



2.5 Overall Asset Condition

Based on a combination of assessed and age-based condition data, **Figure 6** illustrates the current condition of the Town's municipal infrastructure assets by replacement cost.

Figure 6 Asset Condition – All Asset Categories

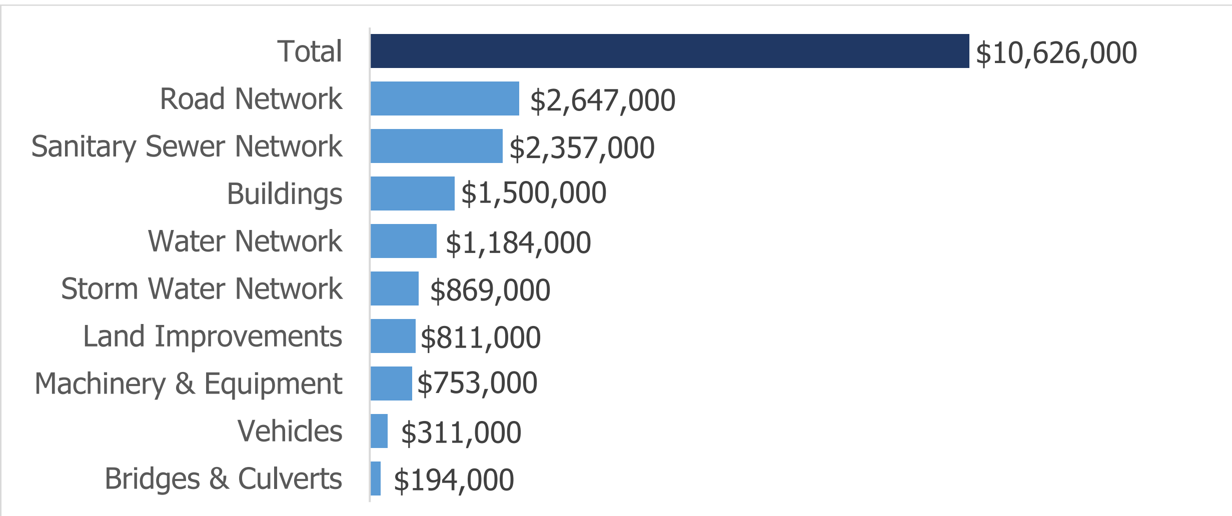


3.0 Financial Overview

3.1 Annual 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. In total, the municipality must allocate approximately $10.6 million annually to address capital requirements for the assets included in this AMP.

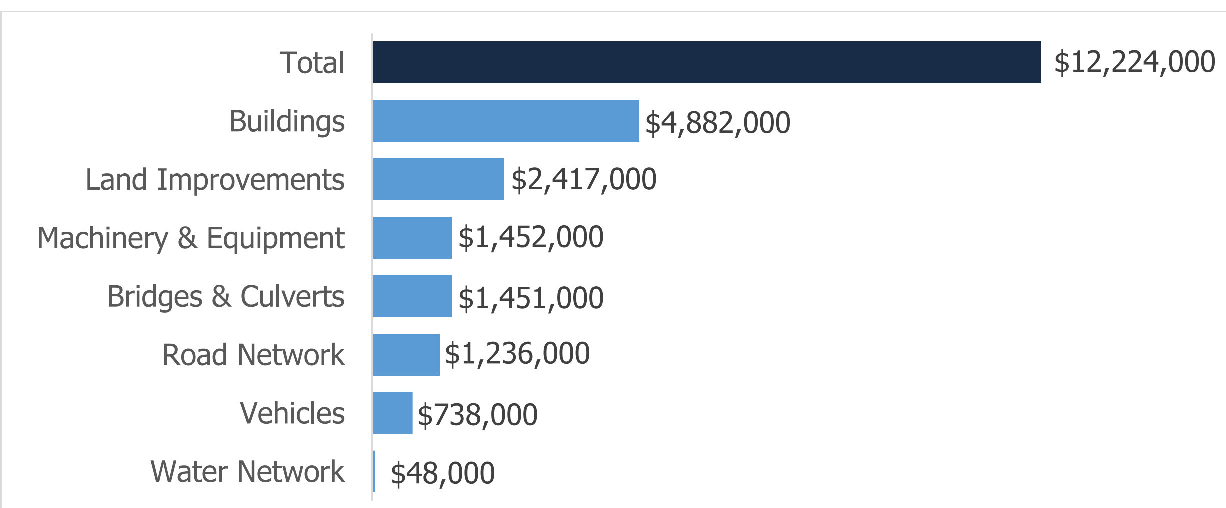
Figure 7 Annual Requirements by Asset Category



3.2 Infrastructure Backlog

The municipality has a combined infrastructure backlog of $12.2 million. The backlog represents the investment needed today to meet previously deferred replacement needs.

Figure 8 Infrastructure Backlog - All Asset Categories



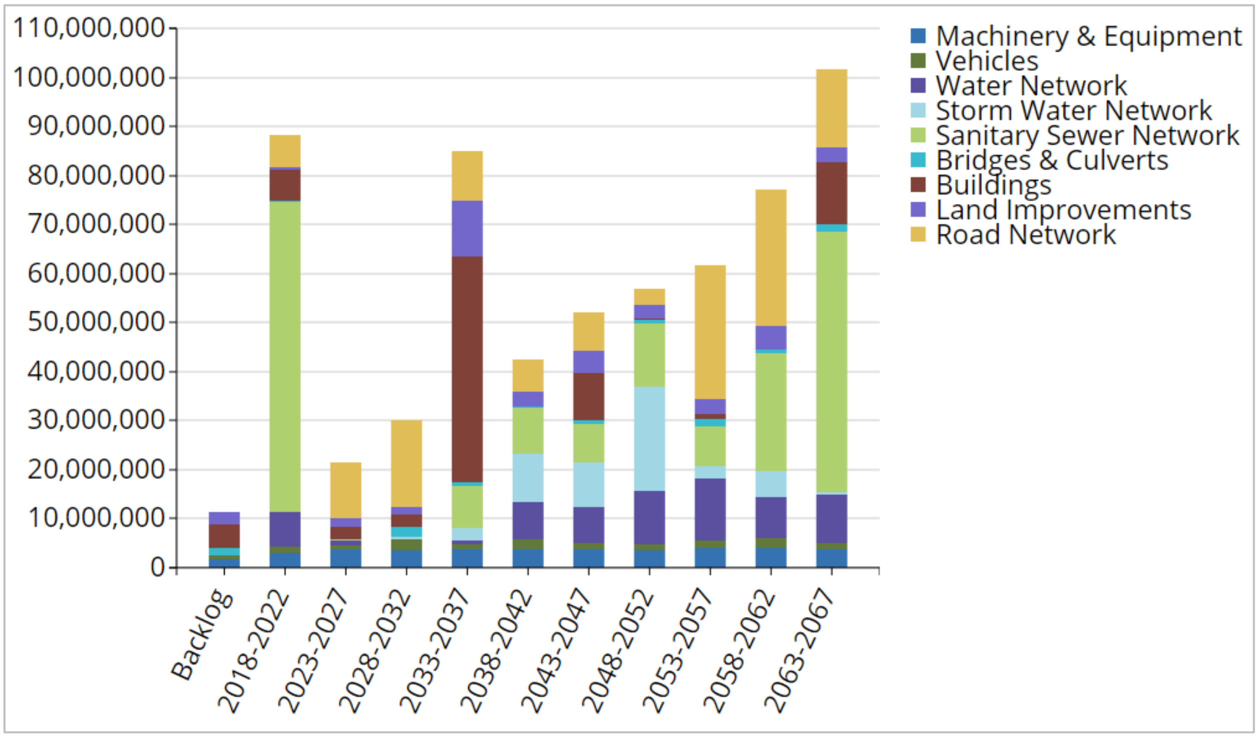
3.3 Asset Replacement Requirements

In this section, we illustrate the aggregate short-, medium-, and long-term infrastructure spending requirements for each asset category in the AMP. The backlog is the total investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their estimated useful life.

The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Figure 9 Replacement Profile - All Asset Categories – End-of-Life Replacement & Lifecycle Activities

Average Annual Capital Requirement: $10,626,000



The above graph includes both lifecycle capital activates (rehabilitation) as well as the cost of end-of-life replacement. This version of the Town's AMP only includes lifecycle events for paved roads. Additional details can be found in **Section 6.1.5.**

4.0 Data and Methodology

The Town's dataset for the asset categories analyzed in this AMP are maintained in a centralized asset inventory. This inventory includes key asset attributes and financial data, such as historical costs, in-service dates, field inspection data, asset health, and replacement costs.

4.1 Condition Data

Assets deteriorate in condition over time. Municipalities generally implement a straight-line amortization approach to model the deterioration of their capital assets and use age-based data to estimate an asset's remaining useful life. However, this approach is often a poor representation of an asset's actual condition and rate of deterioration. In the absence of condition data and customized deterioration curves, age-based estimates can be a useful approximation of when future field intervention activities and investment is required.

As available, actual field condition data was used to make recommendations more meaningful and representative of the municipality's state of infrastructure. The value of condition data cannot be overstated as it provides a more accurate representation of the state of infrastructure than does age alone.

As part of PSD's Roadmap, the Town was encouraged to collect condition data for as many assets as possible. Town staff were provided with condition assessment guidelines to ensure the consistent and uniform collection of data, in addition to data gathering templates to store all assessed data for upload to the main asset inventory.

4.1.1 Source of Condition Data by Asset Category

Table 2 provides an overview of the source of condition data used in the development of this AMP.

Table 2 Source of Condition Data – All Asset Categories

Asset Category	Segment	Type of Condition Data	Source of Condition Data
Road Network	Paved Roads	98% Assessed 2% Age-based	Shelby Engineering/GHD (2018)
Bridges & Culverts	All	Age-based	n/a
Water Network	Water Mains	19% Assessed 81% Age-based	Internal Assessment (2018)
	All Others	Age-based	n/a
Sanitary Sewer Network	Sanitary Mains	31% Assessed 69% Age-based	Internal Assessment (2018)
	All Others	Age-based	n/a
Storm Water Network	Storm Mains	10% Assessed 90% Age-based	Internal Assessment (2018)
	All Others	Age-based	n/a
Machinery & Equipment	All	Age-based	n/a
Vehicles	All	Age-based	n/a
Buildings	All	71% Assessed 29% Assessed	Internal Assessment (2017)
Land Improvements	All	Age-based	n/a

Capturing assessed condition is typically more critical for core asset categories (roads, bridges, water, sewer, storm etc.) than for non-core asset categories (Vehicles, Machinery & Equipment, IT etc.). For the purposes of the Roadmap, the municipality focused on collecting condition data for only core Asset Categories. In the future, the municipality may wish to perform more detailed condition assessments on minor asset categories.

4.2 Asset Attribute Data

While asset condition data is perhaps the most important type of data to collect, additional asset data is required to support asset management strategy development and decision-making. Asset attribute data provides greater context and clarity to the state of an asset and allows for the development of robust risk and lifecycle management strategies to prioritize projects and ultimately extend the life of assets.

Table 3 lists the asset attributes that PSD recommends collecting for core asset categories and the percentage of data already available in the CityWide database for each attribute. This table only includes core asset categories.

Table 3 Asset Attribute Data – Major Asset Categories

Asset Category	Asset Attribute	% Completion in Asset Inventory
Road Network (Paved Roads)	Surface Width (m)	**100%**
	Length (m)	**100%**
	Road Design Class	**100%**
	Surface Material	**100%**
	Service Class	**100%**
Water Network (Water Mains)	Length (m)	**100%**
	Pipe Diameter (mm)	**100%**
	Material	**100%**
Sanitary Sewer Network (Sanitary Mains)	Length (m)	**100%**
	Material	**100%**
	Pipe Diameter (mm)	**100%**
Storm Water Network (Storm Mains)	Length (m)	**100%**
	Pipe Diameter (mm)	**100%**
	Material	**100%**

4.3 Financial Data

In this AMP, the average annual requirement is the amount, based on current replacement costs, that the Town should set aside annually so that assets can be replaced upon reaching the end of their lifecycle.

To determine current funding capacity, all existing sources of funding are identified and combined to enumerate the total available funding. These figures are then assessed against the average annual requirements and are used to calculate the annual funding shortfall and additional financial strategies.

In addition to the annual shortfall, most municipalities face significant infrastructure backlogs. The infrastructure backlog is the accrued financial investment needed in the short-term to bring the assets to a state of good repair. This amount is identified for each asset category.

4.3.1 Replacement Costs

Developing an asset investment strategy requires an estimation of the cost to replace assets that have reached the end of their service life. The replacement cost considers the replacement of an asset with a similar, but not necessarily identical, asset available in the current marketplace.

There are a range of methods to determine asset replacement costs – some more accurate and reliable than others.

- **Cost/Unit** – Cost is based on replacement cost per unit provided by the municipality
- **User-Defined Cost** – Cost is based on replacement costs provided by the municipality
- **CPI/NRBCPI** – Historical cost is inflated based on Consumer Price Index tables
- **Flat Rate Inflation** – Historical cost is inflated by the same percentage each year up to the current year

4.3.2 Source of Replacement Cost by Asset Category

Table 4 provides an overview of the source of replacement costs for major components within each asset category.

Table 4 Source of Replacement Cost - All Asset Categories

Asset Category	Asset Segment	Replacement Cost Source
Road Network	Paved Roads	100% Cost/Unit
Bridges & Culverts	All	95% CPI Tables 5% User Defined Cost
Water Network	All	91% Cost/Unit 9% CPI Tables
Sanitary Sewer Network	All	99% Cost/Unit 1% CPI Tables
Storm Water Network	Storm Sewer Mains	98% Cost/Unit 2% User-Defined Cost
Machinery & Equipment	All	87% CPI Tables
Vehicles	All	95% CPI 5% User-Defined Cost
Buildings	All	100% User-Defined Cost
Land Improvements	All	100% CPI

4.4 Limitations and Assumptions

Several limitations continue to persist as municipalities advance their asset management practices:

- As available, we use field condition assessment data to illustrate the state of infrastructure and develop the requisite financial strategies. However, in the absence of observed data, we rely on the age of assets and their estimated useful life to estimate their physical condition.

- A second limitation is the use of inflation measures, for example using CPI/NRBCPI to inflate historical costs in the absence of actual replacement costs. While a reasonable approximation, the use of such multipliers may not be reflective of market prices and may over- or understate the value of a municipality's infrastructure portfolio and the resulting capital requirements.

- Our calculations and recommendations will reflect the best available data at the time this AMP was developed.

- The focus of this plan is restricted to capital expenditures and does not capture O&M (operating and maintenance) expenditures on infrastructure.

5.0 State of Local Infrastructure

5.1.1 Approach and Methodology

The State of Local Infrastructure provides a summary of Edson's asset portfolio with current inventory as of the end of 2017. Each asset category below will be organized by the following headings:

Asset Inventory & Replacement Cost

The asset inventory contains a comprehensive list of all capital assets, which are organized by **Category** and **Segment**.

Categories include groups of assets that provide similar services to the community (E.g. Road Network, Water Network, Machinery & Equipment)

Segments are divided into groups of assets that perform similar functions within each Category (e.g. Hydrants, Standpipes, Water Connections, Water Mains).

Developing an asset investment strategy requires an estimation of the cost to replace assets that have reached the end of their service life. The replacement cost considers replacement of the modern equivalent asset with similar (but not necessarily identical) assets which are available for procurement.

The asset inventory listing in each Category includes the following details for each Segment:

1. **Quantity –** unit of measure (kilometres, metres, units etc.)

2. **Replacement Cost Method** – describes how the replacement cost was determined using one of the following methods:
    a. Cost/Unit – Cost is based on replacement cost/unit provided by the municipality
    b. User-Defined Cost – Cost is based on replacement costs provided by the municipality
    c. CPI Tables – Historical cost of assets is inflated based on the Consumer Price Index or the Non-residential Building Construction Price Index

3. **Replacement Cost** – the total estimated cost to replace the asset

Current Asset Condition

As available, actual field condition data has been used to make recommendations more meaningful and representative of the Town's current state of infrastructure. The value of this condition data cannot be overstated as it provides a more accurate representation of the state of infrastructure than does age alone.

This section identifies whether each segment's condition data is based on assessed condition or age-based estimates of condition. It also identifies each segment's average condition rating and the percentage of service life remaining

This AMP uses the following rating scale to determine asset condition, developed as part of the Canadian Infrastructure Report Card.[2]

Table 5 Canadian Infrastructure Report Card - Rating Scale for Asset Condition

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

Estimated Useful Life & Average Age

Once an asset begins its service life it is generally expected that it will deteriorate over time and eventually require replacement. To plan for future asset replacement a municipality must identify, to the best of their ability, when replacement will be required. To estimate asset replacement requirements each asset is assigned an Estimated Useful Life. This value quantifies the period over which the municipality expects the asset to be available for use and remain in-service before requiring replacement or disposal. The determination of the useful life of an asset requires an element of judgment and needs appropriately qualified personnel to make the assessment.

Each asset is assigned an Estimated Useful Life according to the length of time that an asset is expected to remain in-service before requiring full replacement. This section identifies the Estimated Useful Life for each Segment in addition to the average age of assets that are currently in-service.

This section also includes the average age of assets by Segment. This data is based on the In-Service Dates provided for each asset in the Town's asset inventory.

[2] http://canadianinfrastructure.ca/downloads/Canadian_Infrastructure_Report_2016.pdf

The collection of assessed condition data can further augment the expected Service Life Remaining. Once condition is assessed it is often found that an asset may last longer, or perhaps shorter than originally estimated. This assessed condition data can either extend or decrease the Service Life Remaining for a given asset.

Risk & Criticality

With a limited amount of capital funding available to municipalities, staff must regularly make decisions about which lifecycle activities are required and which can be deferred at the lowest risk to the organization.

Ensuring that capital spending is allocated to the assets and projects with the highest risk of failure requires the development of a risk model that provides a quantitative risk rating for each asset.

For the purposes of this analysis:

$$Risk = Probability\ of\ Failure(PoF) \times Consequence\ of\ Failure(CoF)$$

This section identifies the data that has been used to determine the risk rating that has been assessed for each asset.

The risk matrix included in this section provides a visual representation of the level of risk in each asset category. Individual assets are grouped based on both their Consequence of Failure (1-5) and Probability of Failure (1-5). The assets located closer to the bottom-left of the matrix (green boxes) are less likely to fail and have lesser consequences for the municipality if they do fail. The assets located closer to the top-right of the matrix (red boxes) are at the greatest risk of failure and will have far greater consequences for the municipality if they do.

Lifecycle Management

In this section, the lifecycle management strategy for each asset category has been identified. This details the municipality's approach to the maintenance, rehabilitation and replacement of existing infrastructure.

This can include both asset specific strategies where detailed lifecycle strategies are defined for an entire asset type, or more general strategies for the management of the entire category of assets.

Forecasted Capital Requirements

In this section, we illustrate the short, medium, and long-term infrastructure spending requirements for the Town's infrastructure.

For the asset categories which do not yet have lifecycle strategies developed, this graph will only include the cost of end-of-life replacement events. It is presumed that these assets will simply be replaced once they reach the end of their estimated useful life.

The asset categories that include assets with lifecycle management strategies will include the cost of capital rehabilitation events in addition to the cost of end-of-life replacement events.

The year-range of each graph is adjusted to include at least one full lifecycle of all assets within the asset category.

5.1 Road Network

5.1.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Road Network inventory. Gravel roads have been included because they comprise a significant portion of the Town's road network. However, the lifecycle management strategies for these assets consist of perpetual maintenance activities and do not require capital costs for rehabilitation activities or end-of-life replacement. These operational costs will not be considered in the financial strategy for this AMP.

Table 6 Asset Inventory - Road Network

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Alley	76,999 m²	Cost/Unit	$6,467,874
Curb & Gutter	92,407 m	Cost/Unit	$12,243,875
Sidewalks	52,521 m	Cost/Unit	$8,474,280
Signs	35 units	CPI Inflation	$173,723
Surface (Gravel)	81,210 m²	Not Planned for Replacement	n/a
Surface (Paved)	694,075 m²	Cost/Unit	$76,563,071
		Total:	**$103,922,823**

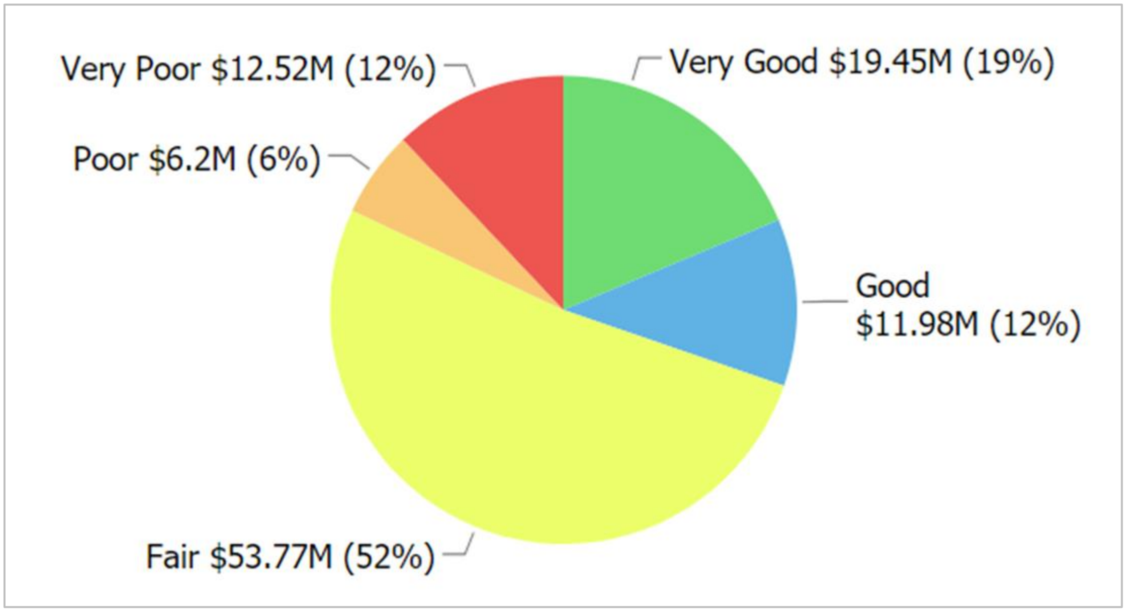
5.1.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 7 Current Asset Condition - Road Network

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Alley	Age-based	Poor	21%
Curb & Gutter	Age-based	Fair	53%
Sidewalks	Age-based	Good	60%
Signs	Age-based	Very Good	83%
Surface (Paved)	Internal Assessment	Good	61%
	Overall:	**Fair**	**57%**

Figure 10 Current Asset Condition - Road Network



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

5.1.3 Estimated Useful Life & Average Age

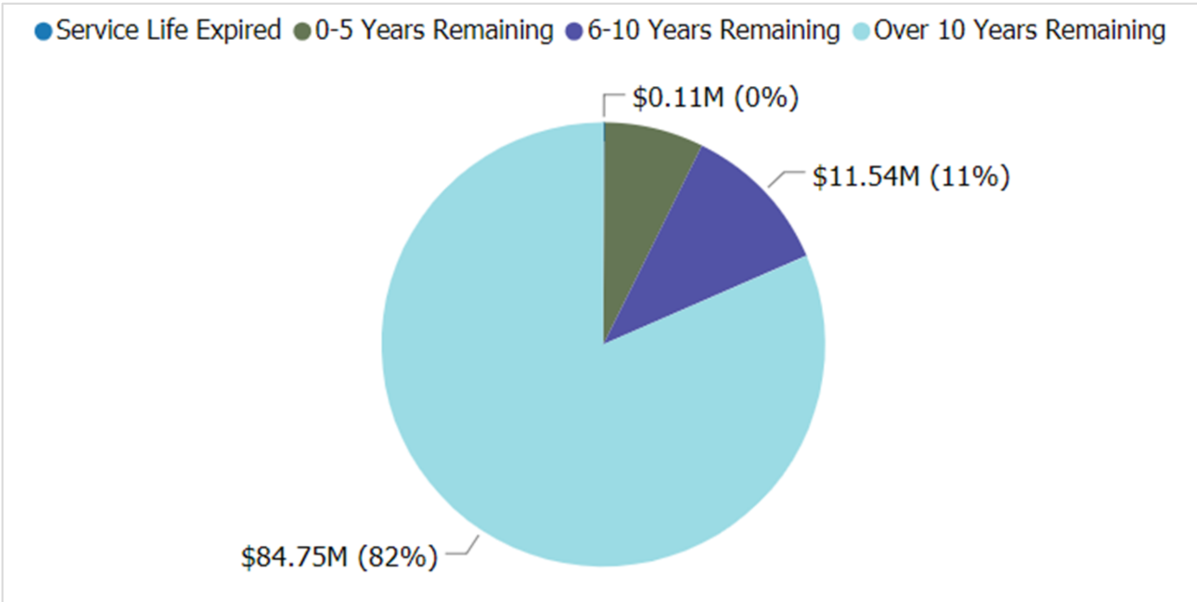
The estimated useful life for Road Network assets has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 8 Service Life Remaining - Road Network

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Alley	40-50 Years	8 Years 4 Months
Curb & Gutter	40 Years	20 Years 2 Months
Sidewalks	30 Years	17 Years 6 Months
Signs	27-30 Years	24 Years 10 Months
Surface (Paved)	40 Years	12 Years 4 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 11 Service Life Remaining - Road Network



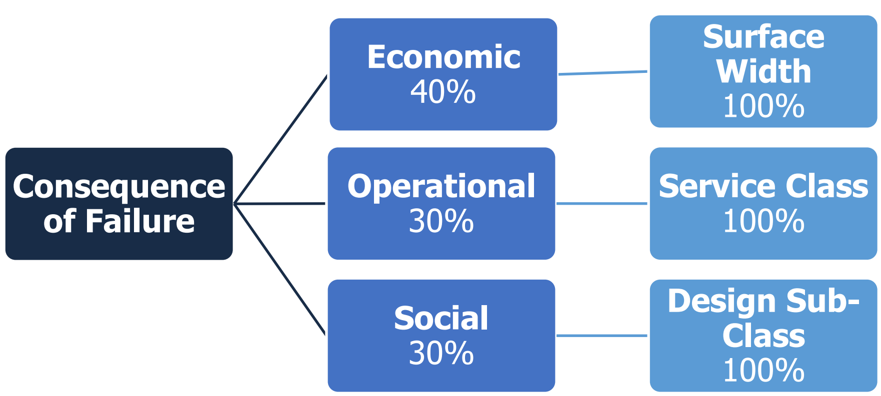
5.1.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for the Road Network.

Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for the Road Network.



Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.

Consequence	1	2	3	4	5
5	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	0 Assets $0	4 Assets $855,624	17 Assets $3,964,044	0 Assets $0	1 Asset $448,868
3	7 Assets $1,605,240	21 Assets $4,552,081	227 Assets $48,022,609	25 Assets $6,486,519	14 Assets $2,876,424
2	15 Assets $786,638	23 Assets $1,721,917	81 Assets $9,657,211	7 Assets $940,884	63 Assets $3,909,877
1	153 Assets $3,180,764	242 Assets $5,707,624	168 Assets $3,759,770	1 Asset $157,696	220 Assets $5,289,033

Probability

5.1.5 Lifecycle Management

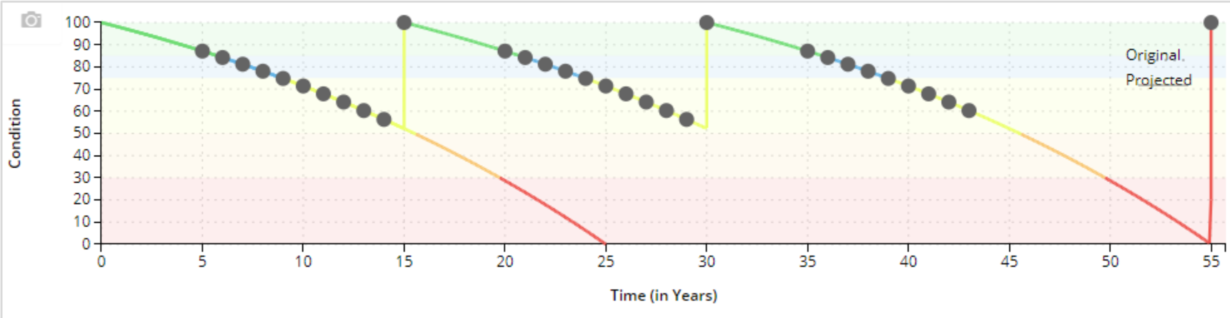
Paved Roads

Because paved roads represent a significant portion of the Town's overall asset portfolio it's important to develop a lifecycle management strategy with the goal of lifecycle cost optimization in mind. By intervening at the right time in a paved roads life and completing maintenance and rehabilitation activities, staff believe that they can extend the life of these assets and achieve the lowest total cost of ownership. The following strategy has been developed and applied to paved road surfaces by municipal staff.

Table 9 Paved (Surface) – Lifecycle Strategy

Event Name	Event Type	Age at Event
Crack Sealing	Maintenance	As needed
Surface Re-Profiling	Rehabilitation	15 Years
Two-Lift Overlay	Rehabilitation	30 Years
End-of-Life Replacement	Replacement	55 Years

Figure 12 Paved (Surface) – Lifecycle Strategy



As the Town's understanding of the current cost, risk and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

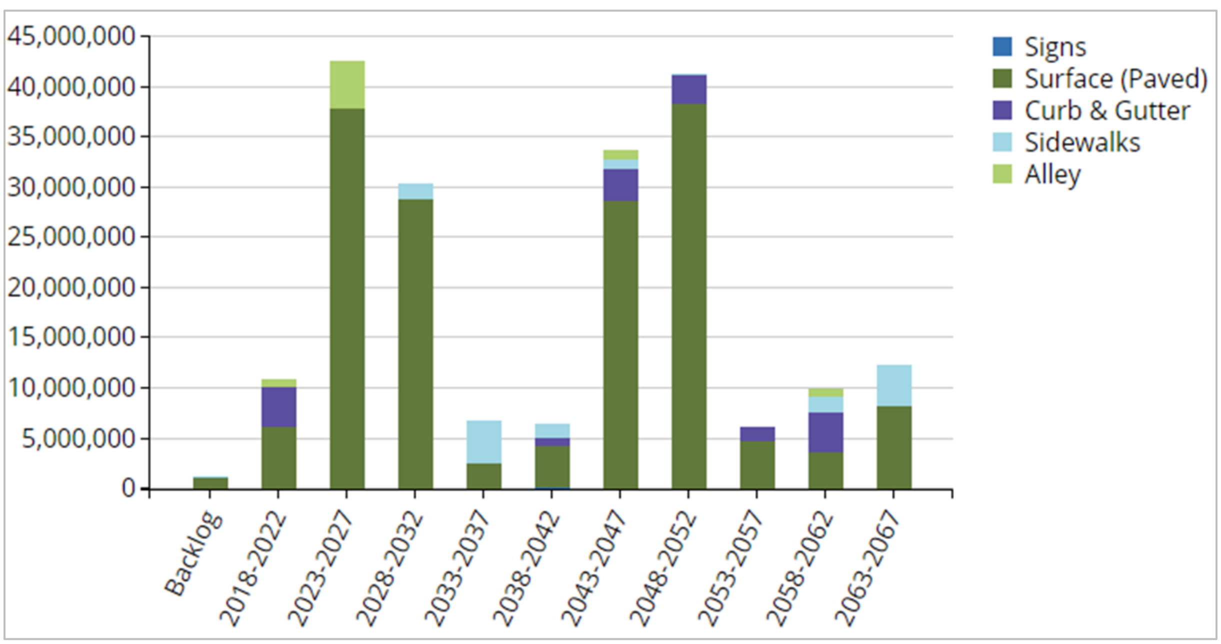
5.1.6 Forecasted Capital Requirements

The development of a lifecycle strategy allows the Town to compare capital requirements between a simple end-of-life replacement strategy and one that factors in the lifecycle strategy that has been developed for paved road surfaces.

The following bar chart forecasts the capital requirements for the Road Network over the next 50 years, considering only the cost of end-of-life replacement of all assets. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Figure 13 Forecasted Capital Requirements (End-of-Life Replacement) - Road Network

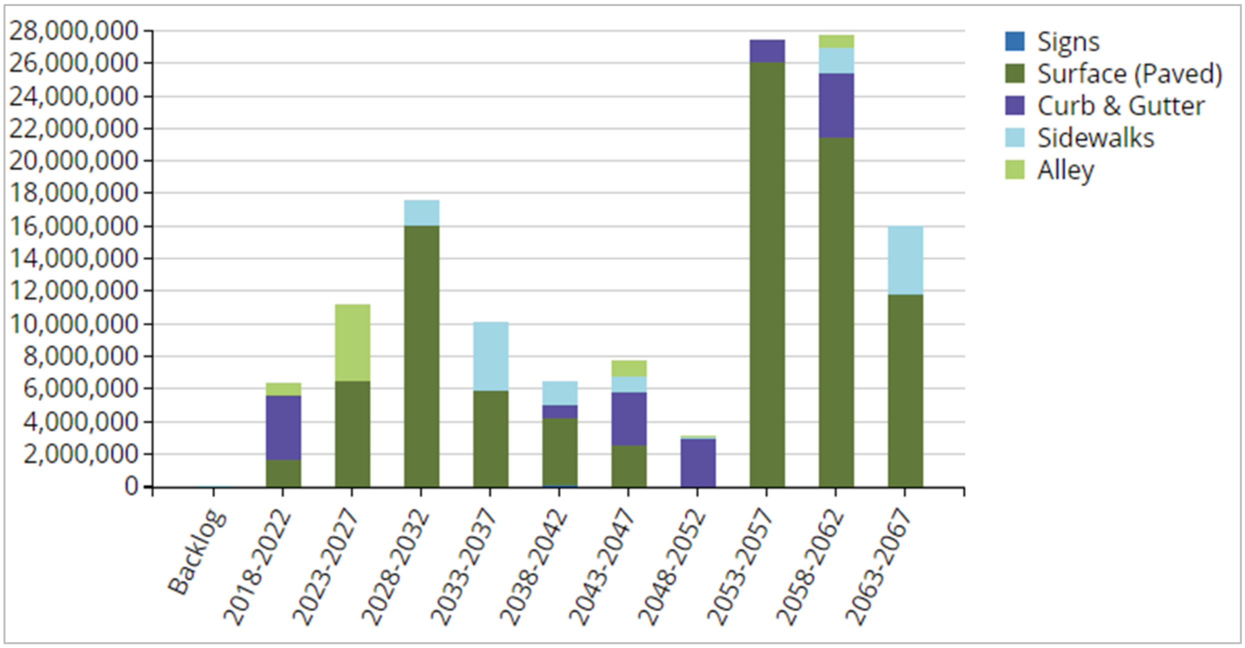
Average Annual Capital Requirement: $3,795,000



Based on the lifecycle strategy developed for paved roads, and including the cost of all rehabilitation and replacement events, the replacement requirements for the Road Network over the next 50 years are as follows:

Figure 14 Forecasted Capital Requirements (Lifecycle Strategy) - Road Network

Average Annual Capital Requirement: $2,647,000



5.1.7 Recommendations

1. Continue internal condition assessment program for road surfaces according to a routine assessment schedule.

2. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for the Road Network should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

3. Current levels of service should be measured according to the annual changes in condition, risk and cost of the program as well as the technical and community levels of service metrics established by the Town in Section **7.1.7** and **7.1.8.**

4. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.2 Bridges & Culverts

5.2.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Bridges & Culverts inventory.

Table 10 Asset Inventory – Bridges & Culverts

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	4 units	CPI Inflation	$896,253
Culverts	10 units	CPI Inflation	$4,156,599
		Total:	**$5,052,852**

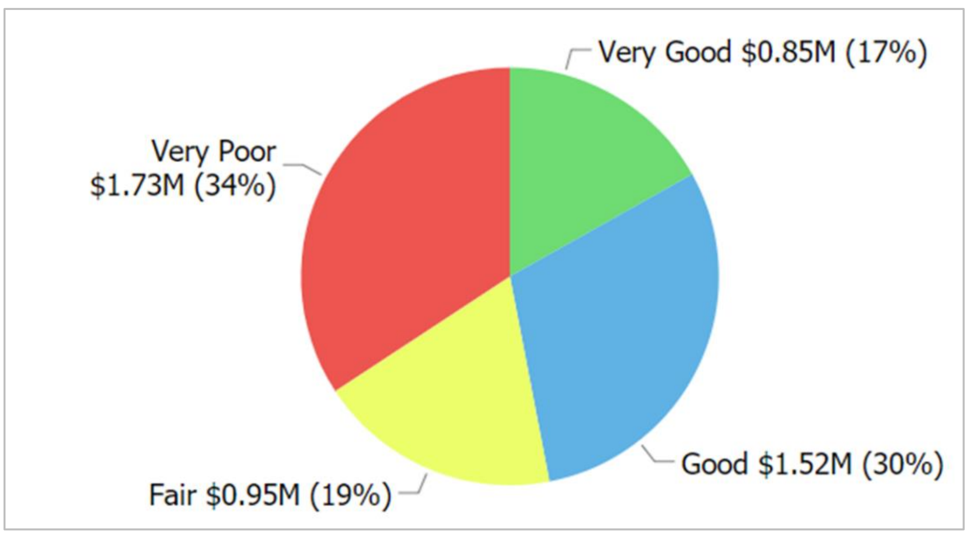
5.2.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 11 Current Asset Condition – Bridges & Culverts

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Bridges	Age-based	Poor	33%
Culverts	Age-based	Fair	46%
	Overall:	**Fair**	**44%**

Figure 15 Current Asset Condition – Bridges & Culverts



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

5.2.3 Estimated Useful Life & Average Asset Age

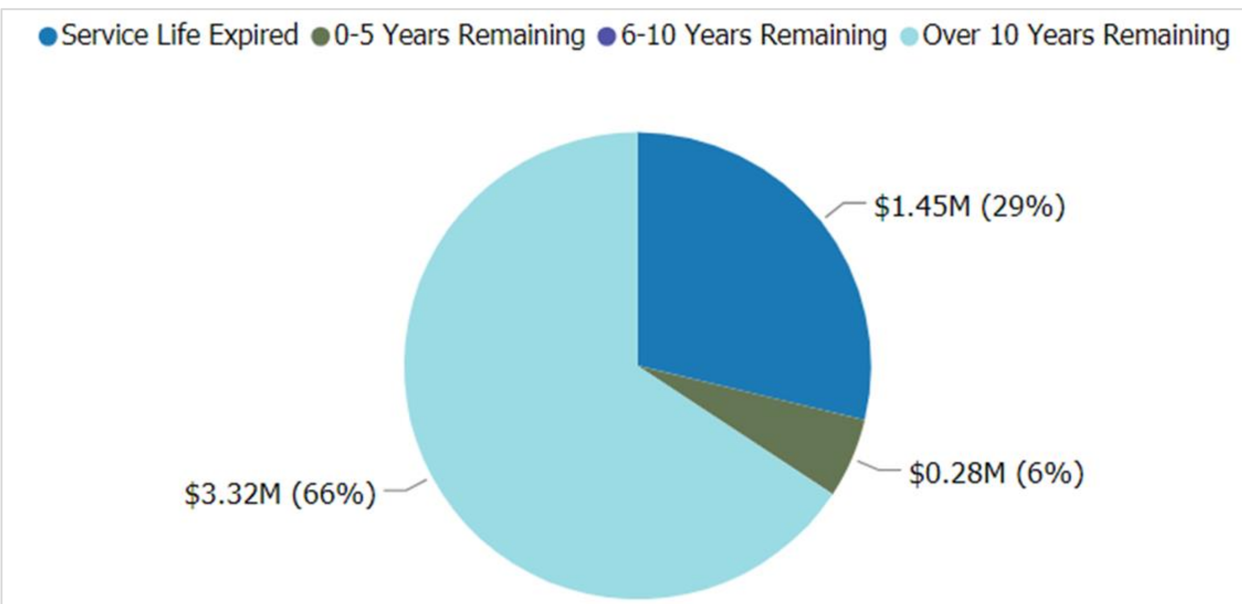
The estimated useful life for Bridges & Culverts has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 12 Service Life Remaining – Bridges & Culverts

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Bridges	17-22 Years	6 Years 2 Months
Culverts	14-70 Years	26 Years 9 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 16 Service Life Remaining – Bridges & Culverts



5.2.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for Bridges & Culverts.

Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for Bridges & Culverts.

Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.

Consequence \ Probability	1	2	3	4	5
5	0 Assets $0	1 Asset $826,294	1 Asset $948,469	0 Assets $0	0 Assets $0
4	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0	2 Assets $1,255,288
3	1 Asset $360,126	1 Asset $274,563	0 Assets $0	0 Assets $0	1 Asset $279,893
2	2 Assets $414,768	2 Assets $420,395	0 Assets $0	0 Assets $0	1 Asset $195,965
1	1 Asset $77,091	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0

5.2.5 Lifecycle Management

Alberta Transportation's Bridge Inspection and Maintenance System outlines a province-wide approach to the proper management of bridge structures. This includes a process for bridge inspection and assessment as well as a guide to rehabilitation and replacement strategies.

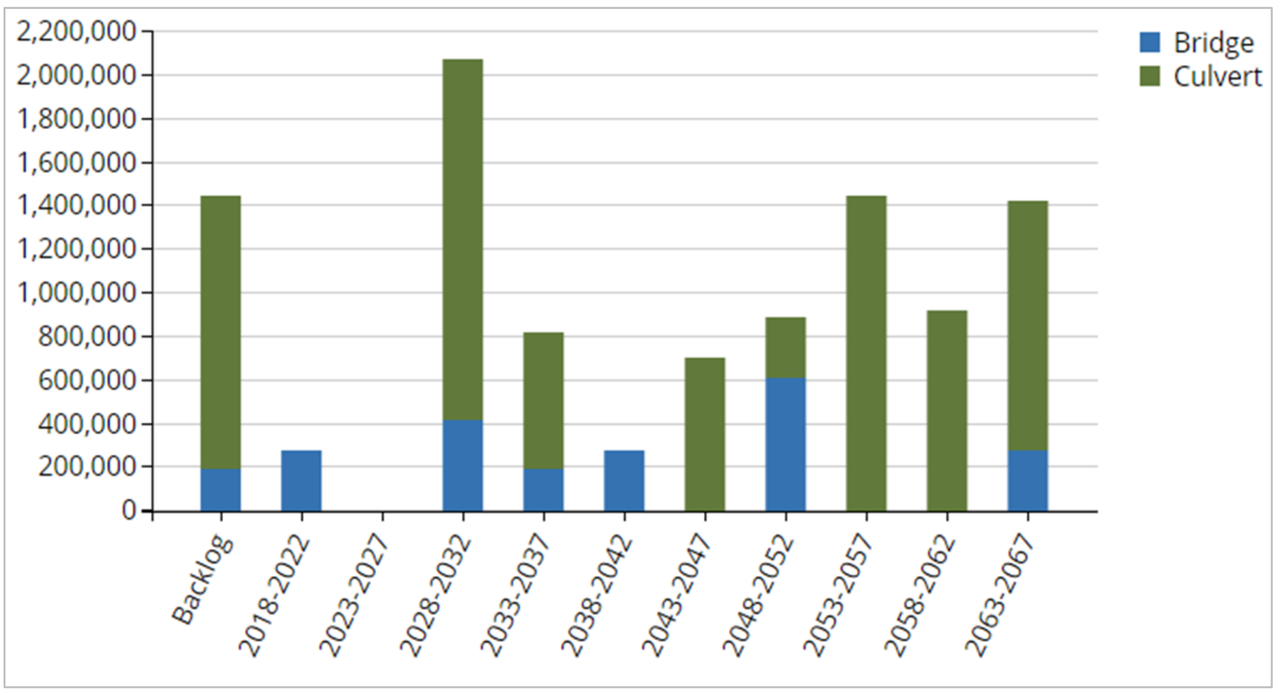
Town staff rely on the findings of trained and competent inspectors when determining the lifecycle requirements for all bridges and culverts and endeavour to employ an optimal lifecycle strategy.

5.2.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements over the next 50 years for the Town's Bridges & Culverts. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Average Annual Capital Requirement: $194,000

Figure 17 Forecasted Capital Requirements - Bridges & Culverts



5.2.7 Recommendations

1. As condition assessments are completed, this data should be uploaded into the asset inventory and be incorporated into asset management planning and decision-making

2. The lifecycle management strategy for Bridges & Culverts should continue to be driven by the recommendations by the engineers that complete routine inspections and assessments

3. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for Bridges & Culverts should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

4. Current levels of service should be measured according to the annual changes in condition, risk and cost of the program as well as the technical and community levels of service metrics established by the Town in Section **7.1.7** and **7.1.8.**

5. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.3 Water Network

5.3.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Water Network.

The replacement cost/units for water mains have been determined based on average costs incurred as cited in recently commissioned engineering contracts. Each water main asset has a per metre replacement cost based on the pipe material and diameter that it is expected to be replaced with.

Table 13 Asset Inventory - Water Network

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Boiler/Valve House	2 units	CPI Inflation	$209,399
Degasification Plant Building	1 unit	CPI Inflation	$450,057
Distribution Pumphouse	1 unit	CPI Inflation	$639,588
Glenwood Reservoir Building	2 units	CPI Inflation	$483,028
Hydrants	322 units	CPI Inflation	$2,986,605
Water Mains	78,796 m	Cost/Unit	$79,022,906
Water Well	31 units	CPI Inflation	$2,355,405
Water Well Pump	7 units	CPI Inflation	$156,017
		Total:	**$86,303,005**

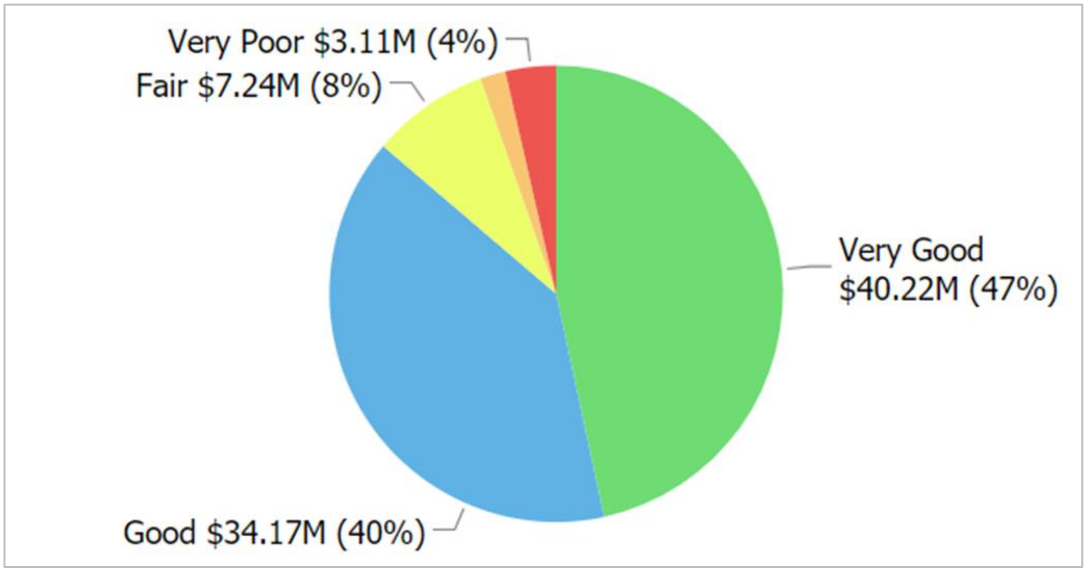
5.3.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 14 Current Asset Condition - Water Network

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Boiler/Valve House	Age-based	Very Poor	14%
Degasification Plant Building	Age-based	Fair	48%
Distribution Pumphouse	Age-based	Poor	34%
Glenwood Reservoir Building	Age-based	Very Poor	19%
Hydrants	Age-based	Fair	59%
Water Mains	19% Assessed	Very Good	86%
Water Well	Age-based	Good	65%
Water Well Pump	Age-based	Very Good	91%
	Overall:	**Very Good**	**84%**

Figure 18 Current Asset Condition - Water Network



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

5.3.3 Estimated Useful Life & Average Asset Age

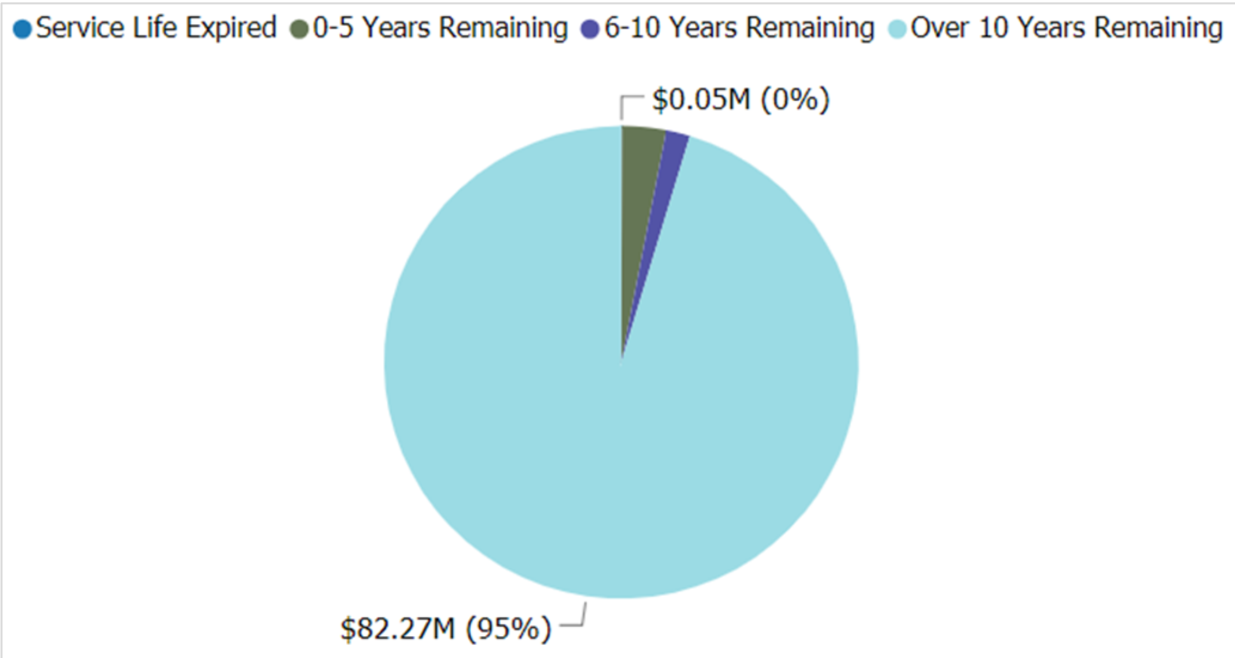
The estimated useful life for Water Network has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 15 Service Life Remaining - Water Network

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Boiler/Valve House	50 Years	1 Year 6 Months
Degasification Plant Building	50 Years	24 Years
Distribution Pumphouse	50 Years	17 Years
Glenwood Reservoir Building	20-50 Years	10 Years 1 Month
Hydrants	73-75 Years	66 Years 1 Month
Water Mains	75 Years	42 Years 2 Months
Water Well	45-75 Years	28 Years 6 Months
Water Well Pump	45 Years	40 Years 10 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 19 Service Life Remaining - Water Network



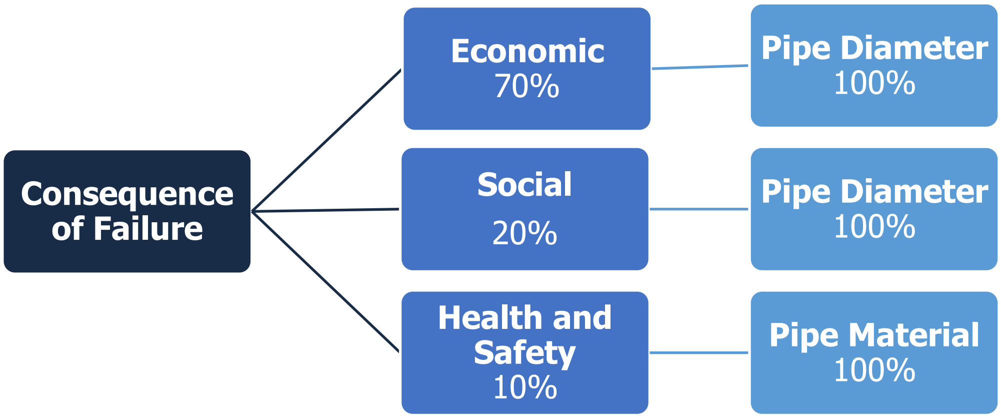
5.3.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for water mains.

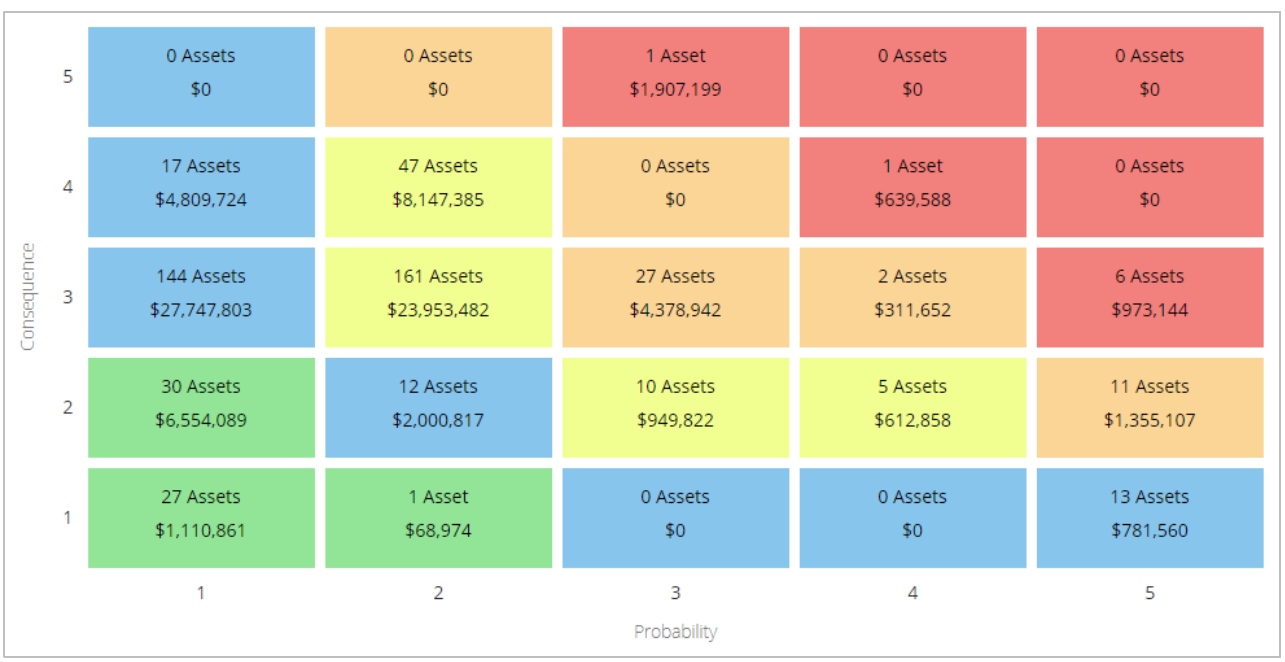
Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for water mains.



Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.



5.3.5 Lifecycle Management

The lifecycle management strategy for the Town's water mains involves maintenance activities that ensure that the water distribution system continues to operate at a high standard of quality. Flushing and swabbing events are completed on an annual basis.

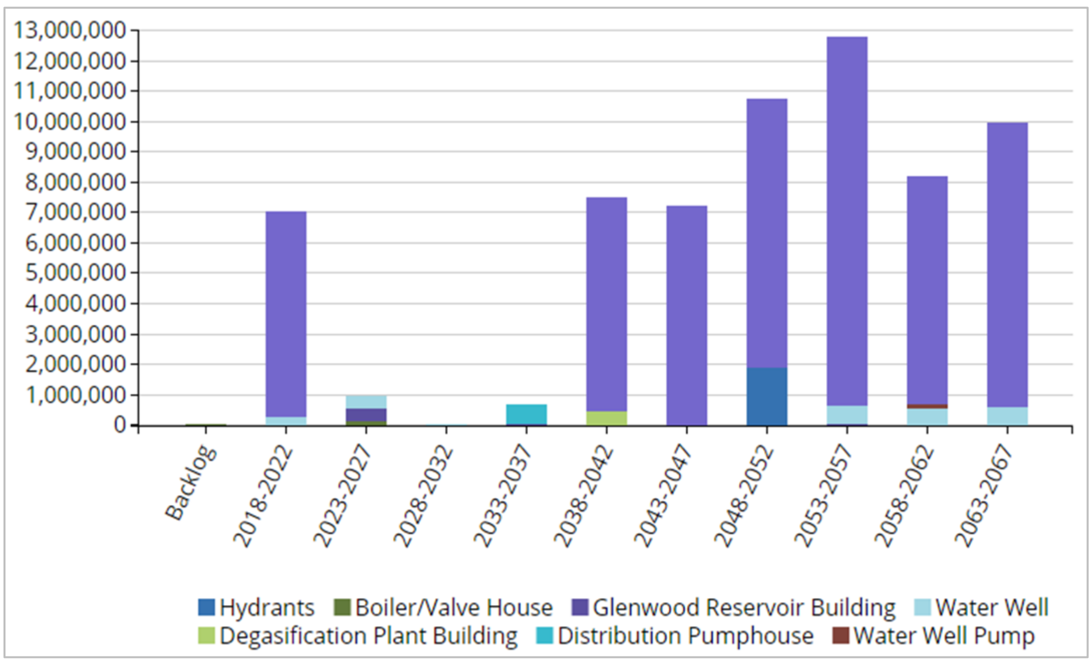
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.3.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Water Network. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Average Annual Capital Requirement: $1,184,000

Figure 20 Forecasted Capital Requirements - Water Network



5.3.7 Recommendations

1. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for the Water Network should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

2. Current levels of service should be measured according to the annual changes in condition, risk and cost of the program as well as the technical and community levels of service metrics established by the Town in Section **7.1.7** and **7.1.8.**

3. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.4 Sanitary Sewer Network

5.4.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Sanitary Sewer Network.

The replacement cost/unit for sewer mains has been determined based on average costs incurred as part of recent engineering contracts. Sewer mains have been assigned a per metre replacement cost based on the pipe material and diameter that it is expected to be replaced with.

Table 16 Asset Inventory - Sanitary Sewer Network

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Lagoon	1 unit	CPI Inflation	$52,307,404
Lagoon Blower House	1 unit	CPI Inflation	$569,967
Lagoon Flow Meter/Influent Shack	1 unit	CPI Inflation	$24,437
Manholes	767 units	CPI Inflation	$9,204,000
Sanitary Mains	69,738 m	Cost/Unit	$79,387,746
Wastewater Fill Station	2 units	CPI Inflation	$65,965
Wastewater Fill Station Lines	500 m	CPI Inflation	$29,191
		Total:	**$141,588,710**

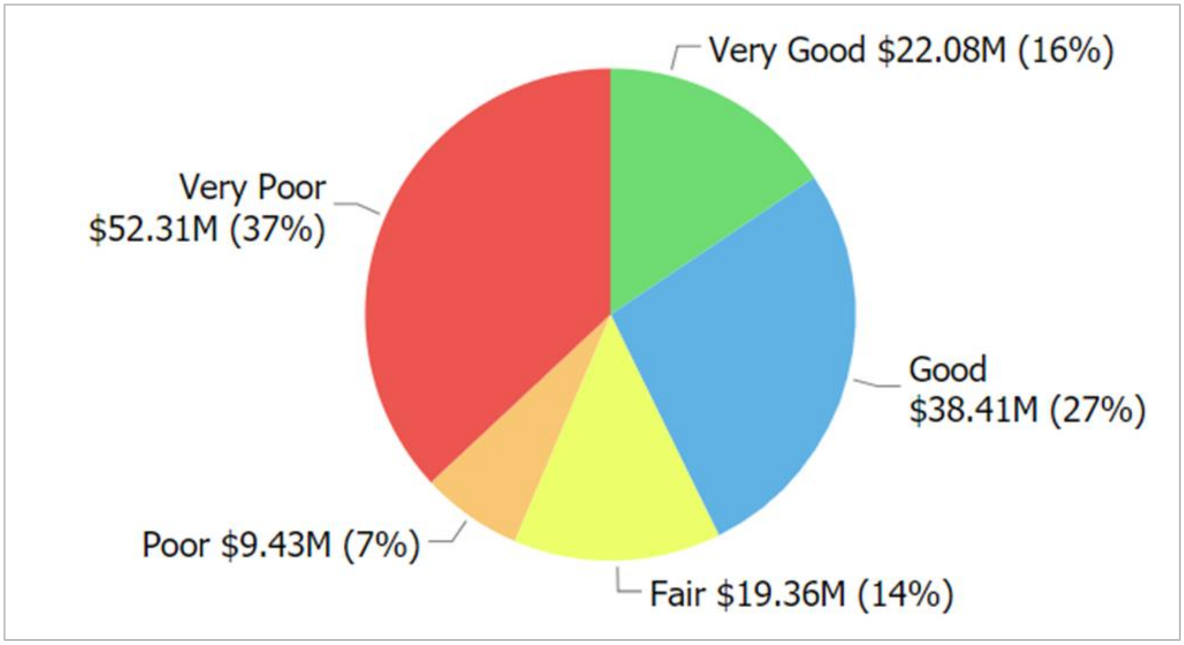
5.4.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 17 Current Asset Condition - Sanitary Sewer Network

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Lagoon	Age-based	Very Poor	2%
Lagoon Blower House	Age-based	Poor	34%
Lagoon Flow Meter/Influent Shack	Age-based	Poor	34%
Manholes	Age-based	Fair	46%
Sanitary Mains	31% Assessed	Very Good	81%
Wastewater Fill Station	Age-based	Very Good	93%
Wastewater Fill Station Lines	Age-based	Very Good	95%
	Overall:	**Fair**	**50%**

Figure 21 Current Asset Condition - Sanitary Sewer Network



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

5.4.3 Estimated Useful Life & Average Asset Age

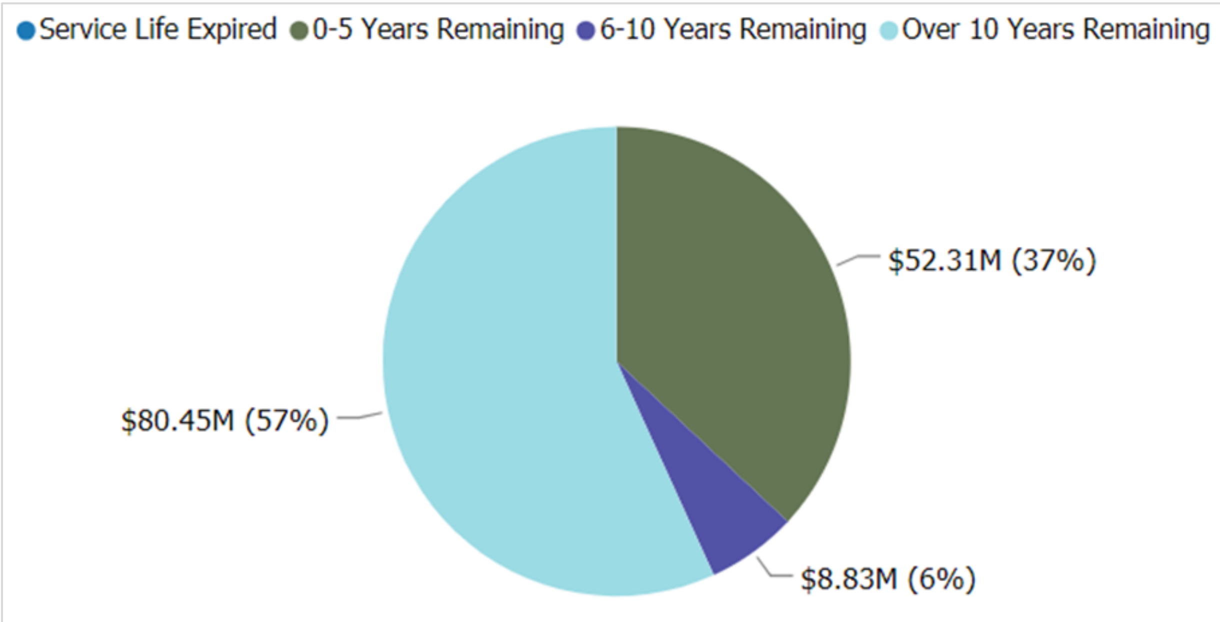
The estimated useful life for Sanitary Sewer Network has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 18 Service Life Remaining - Sanitary Sewer Network

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Lagoon	45 Years	1 Year
Lagoon Blower House	50 Years	17 Years
Lagoon Flow Meter/Influent Shack	50 Years	17 Years
Manholes	74-75 Years	67 Years 6 Months
Sanitary Mains	75 Years	35 Years 10 Months
Wastewater Fill Station	50 Years	46 Years 5 Months
Wastewater Fill Station Lines	75 Years	70 Years 11 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 22 Service Life Remaining - Sanitary Sewer Network



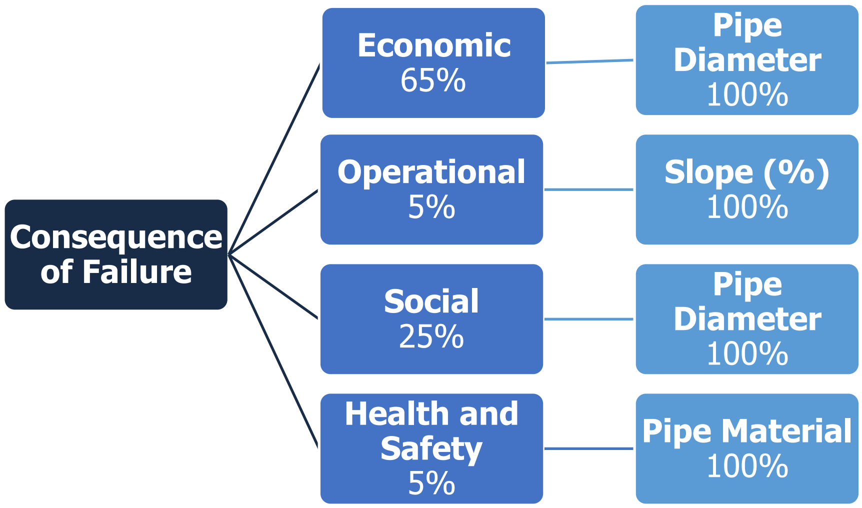
5.4.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for all Sanitary Sewer Network assets.

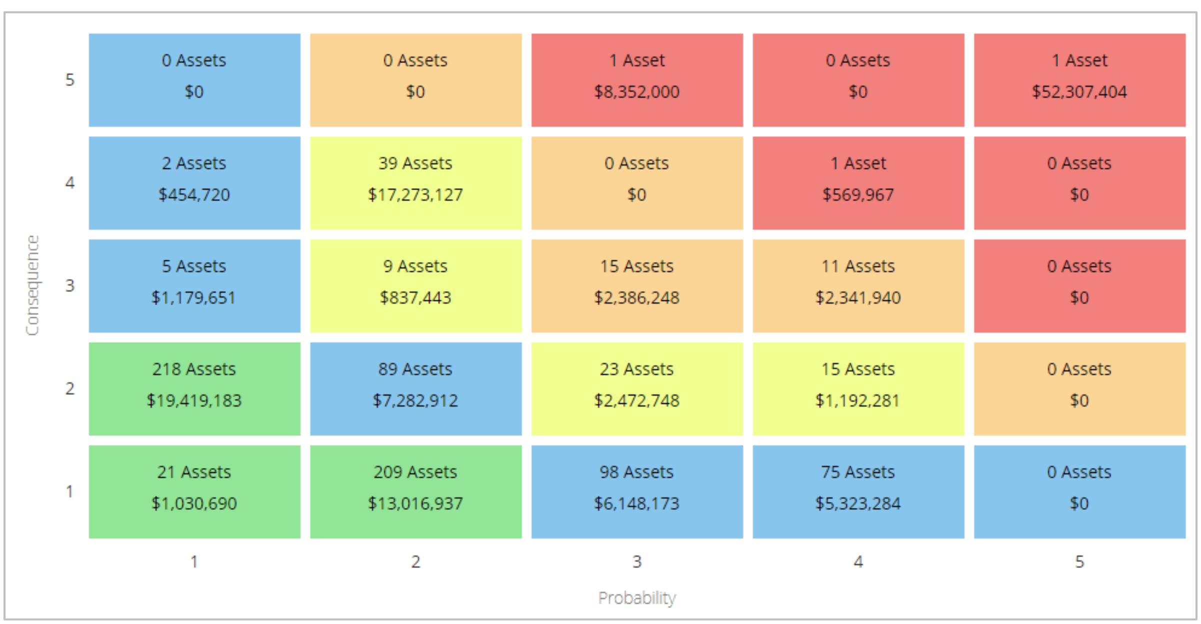
Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for Sanitary Sewer Mains.



Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.



5.4.5 Lifecycle Management

The Town's lifecycle management strategy for the sanitary mains includes preventative maintenance events such as sewer flushing. Flushing is completed on a regular basis to maintain flow and reduce the risk of blockage in main sewer lines.

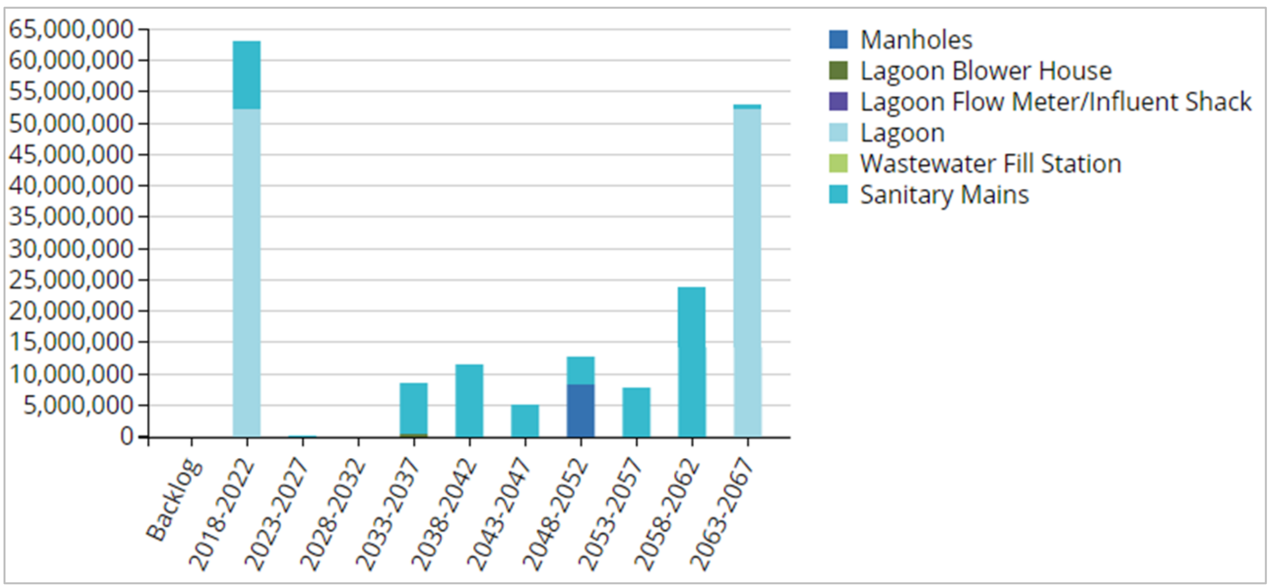
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.4.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Sanitary Sewer Network. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Average Annual Capital Requirement: $2,357,000

Figure 23 Forecasted Capital Requirements - Sanitary Sewer Network



5.4.7 Recommendations

1. The Town should develop a CCTV inspection strategy to determine an assessed condition value for each inspected pipe segment. This assessed condition value should be uploaded into the centralized asset registry to increase the accuracy and reliability of long-term needs forecasting.

2. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for the Sanitary Sewer Network should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

3. Current levels of service should be measured according to the annual changes in condition, risk and cost of the program as well as the technical and community levels of service metrics established by the Town in Section **7.1.7** and **7.1.8.**

4. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.5 Storm Water Network

5.5.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Storm Water Network.

The replacement cost/unit for all Storm Water Network components except for ponds has been determined based on average costs incurred as part of recent engineering contracts. Storm mains have been assigned a per metre replacement cost based on the pipe material and diameter that it is expected to be replaced with.

Table 19 Asset Inventory - Storm Water Network

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Catch Basins	949 units	Cost/Unit	$6,643,000
Manholes	370 units	Cost/Unit	$4,440,000
Pond	2 units	CPI Inflation	$1,031,705
Storm Mains	26,086 m	Cost/Unit	$49,696,470
		Total:	**$61,811,175**

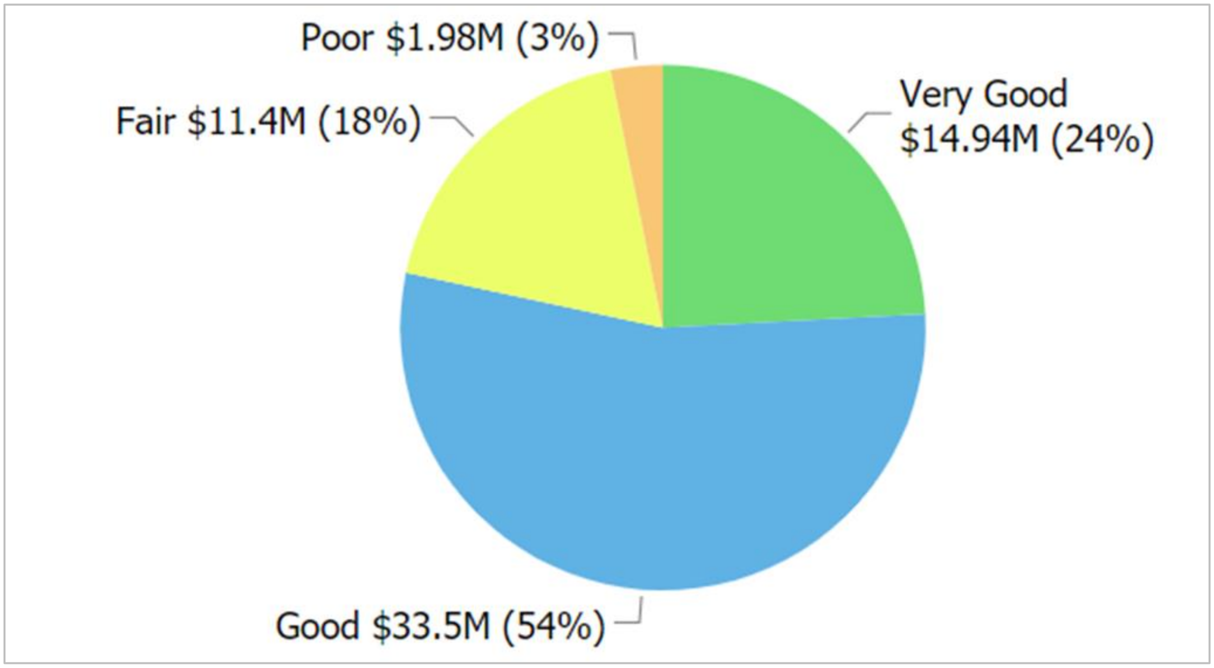
5.5.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 20 Current Asset Condition - Storm Water Network

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Catch Basins	Age-based	Fair	49%
Manholes	Age-based	Fair	47%
Pond	Age-based	Very Good	84%
Storm Mains	10% Assessed	Very Good	82%
	Overall:	**Good**	**76%**

Figure 24 Current Asset Condition - Storm Water Network



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

5.5.3 Estimated Useful Life & Average Asset Age

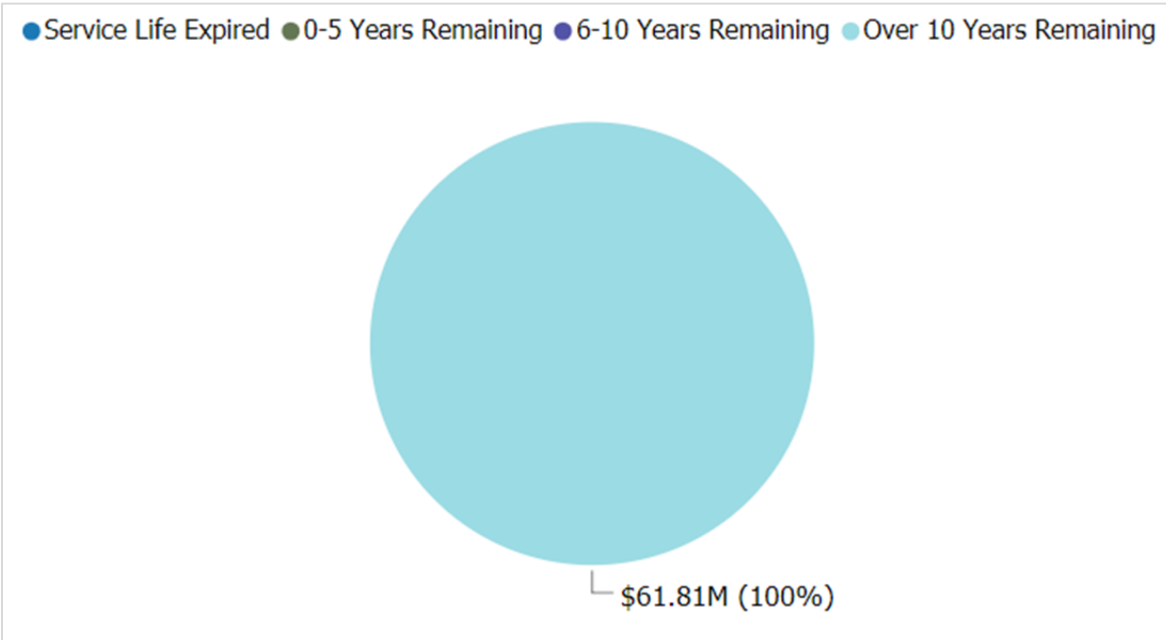
The estimated useful life for Storm Water Network has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 21 Service Life Remaining - Storm Water Network

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Catch Basins	75 Years	39 Years 3 Months
Manholes	73-75 Years	65 Years 6 Months
Pond	75 Years	62 Years 10 Months
Storm Mains	70-75 Years	34 Years 3 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 25 Service Life Remaining - Storm Water Network



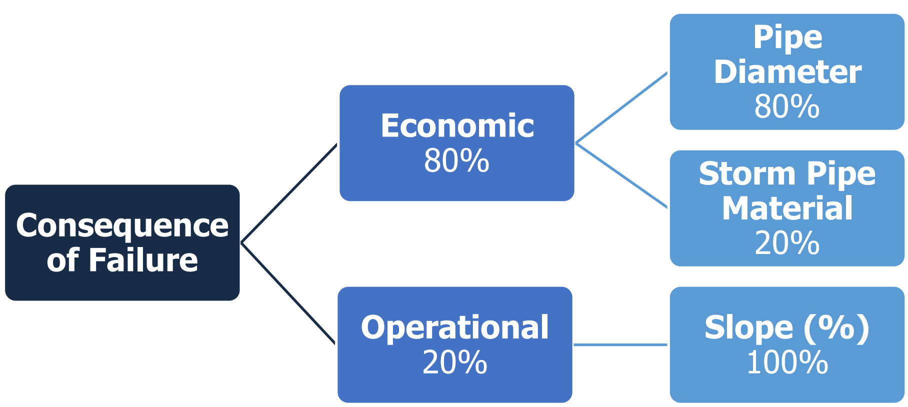
5.5.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for all storm sewer mains.

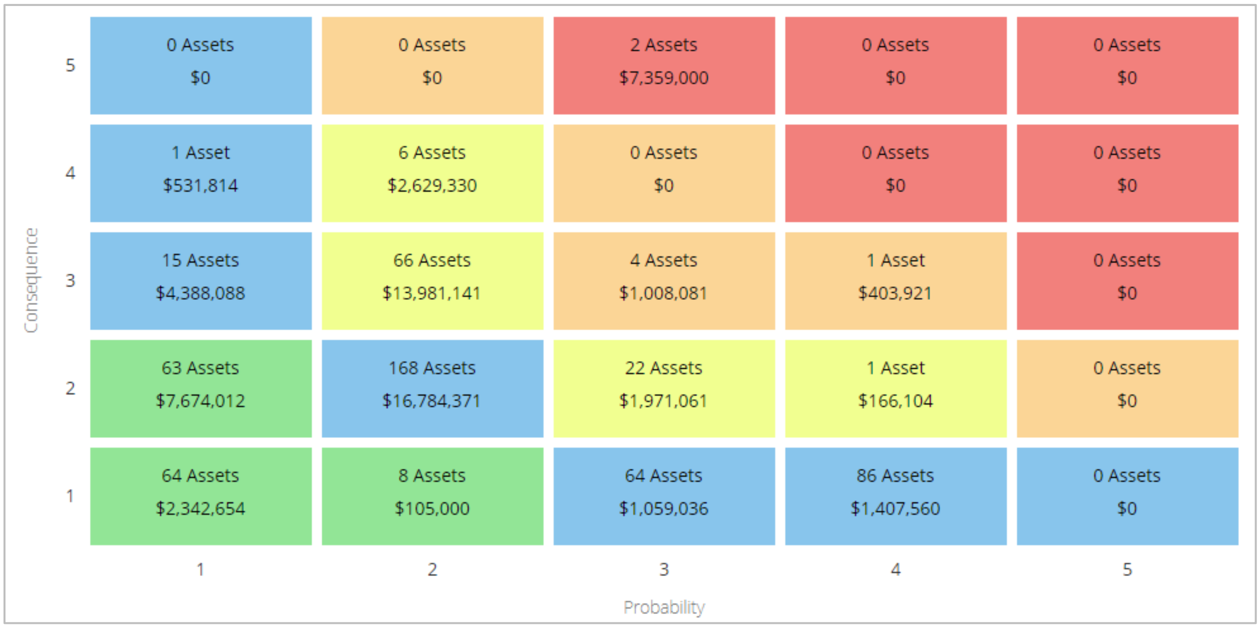
Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for storm sewer mains.



Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.



5.5.5 Lifecycle Management

The Town's lifecycle management strategy for the Storm Water Network includes a series of preventative maintenance activities including flushing, rodding, and boring. These activities ensure that storm main blockages are limited, and that stormwater flows as designed throughout the network.

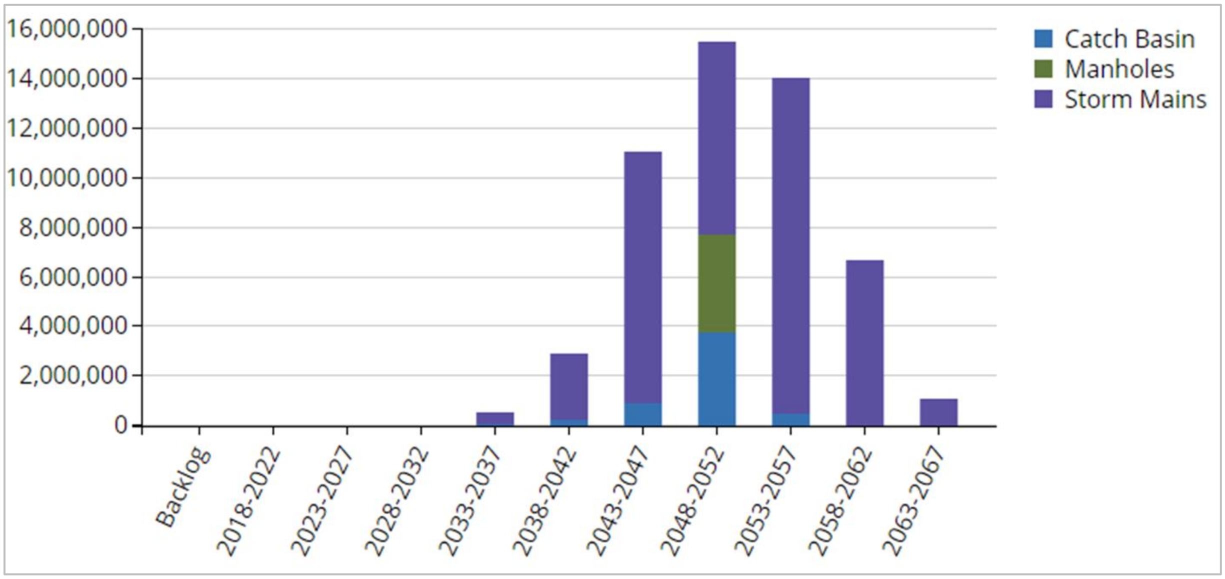
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.5.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for end-of-life replacement of the Storm Water Network. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Figure 26 Forecasted Capital Requirements - Storm Water Network

Average Annual Capital Requirement: $869,000



5.5.7 Recommendations

1. The Town should develop and implement a routine condition assessment schedule for the Storm Water Network. Storm Mains are considered to be in a good state of repair, meaning assessments may only be beneficial on components that are beginning to approach their end of life or have been identified as problem areas.

2. As the Town's understanding of the probability and consequence of asset failure changes, the risk assessment framework for the Storm Water Network should be adjusted accordingly. This may include the addition of new data or the re-weighting of existing parameters.

3. Current levels of service should be measured according to the annual changes in condition, risk and cost of the program as well as the technical and community levels of service metrics established by the Town in Section **7.1.7** and **7.1.8.**

4. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.6 Machinery & Equipment

5.6.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Machinery & Equipment inventory.

All replacement costs have been determined through the inflation of each assets historical cost to today's value.

Table 22 Asset Inventory - Machinery & Equipment

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Administration	9 units	CPI Inflation	$360,778
Airport	10 units	CPI Inflation	$1,325,393
Community Services	1 unit	CPI Inflation	$9,653
Fire Protection	4 units	CPI Inflation	$48,955
Mower	1 unit	CPI Inflation	$8,244
Parks	3 units	CPI Inflation	$52,946
Public Health	1 unit	CPI Inflation	$28,876
Public Works Heavy Machinery	26 units	CPI Inflation	$2,028,909
Public Works Shop Equipment	55 units	CPI Inflation	$601,842
Public Works Trucks	10 units	CPI Inflation	$1,041,715
Repsol Place	16 units	CPI Inflation	$377,523
Roads	1 unit	CPI Inflation	$84,934
Waste Management	4 units	CPI Inflation	$671,503
		Total:	**$6,641,271**

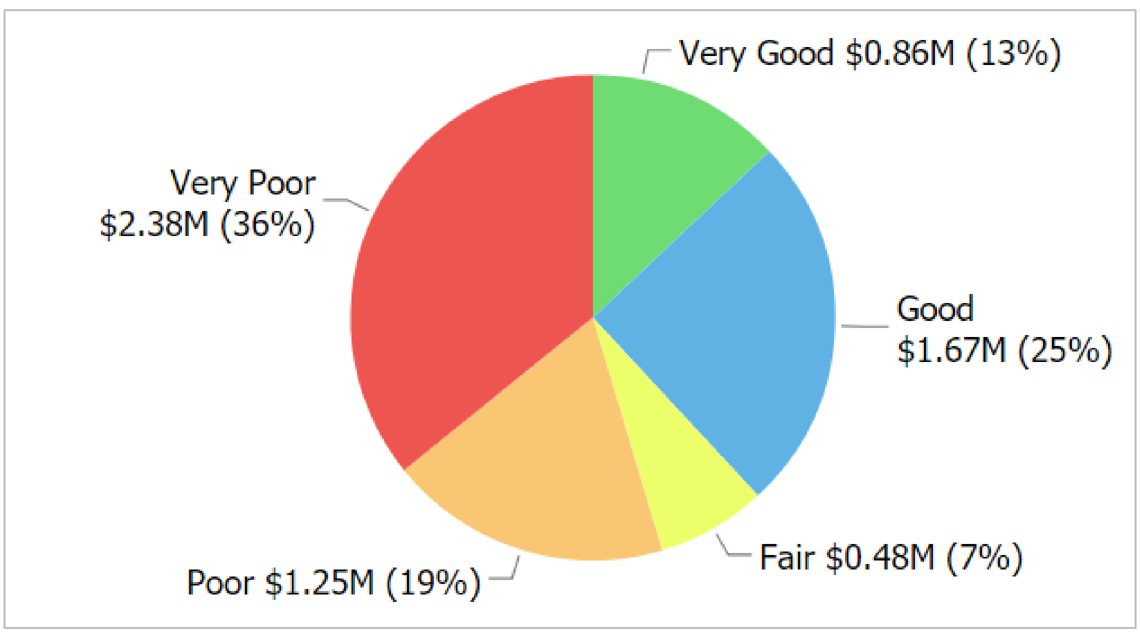
5.6.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 23 Current Asset Condition - Machinery & Equipment

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Administration	Age-based	Poor	33%
Airport	Age-based	Fair	58%
Community Services	Age-based	Very Good	89%
Fire Protection	Age-based	Poor	36%
Mower	Age-based	Very Good	99%
Parks	Age-based	Good	76%
Public Health	Age-based	Fair	48%
Public Works Heavy Machinery	Age-based	Poor	33%
Public Works Shop Equipment	Age-based	Poor	26%
Public Works Trucks	Age-based	Poor	24%
Repsol Place	Age-based	Good	79%
Roads	Age-based	Fair	49%
Waste Management	Age-based	Poor	36%
	Total:	**Fair**	**40%**

Figure 27 Current Asset Condition - Machinery & Equipment



To ensure that the Town's Machinery & Equipment continues to provide an acceptable level of service, the Town 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 Machinery & Equipment.

5.6.3 Estimated Useful Life & Average Asset Age

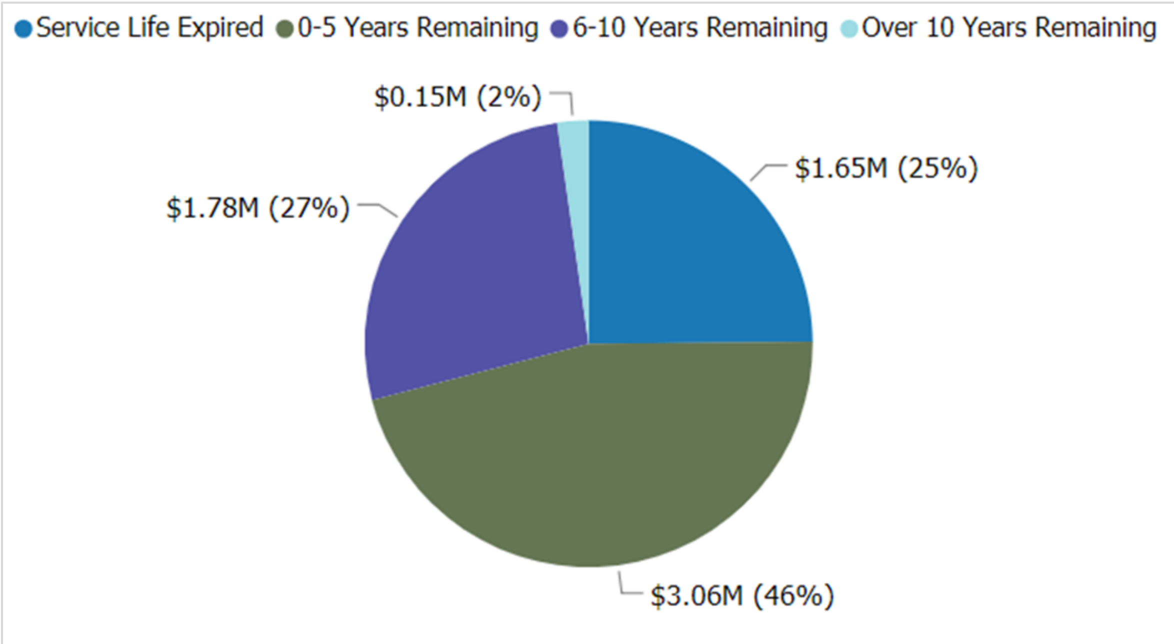
The estimated useful life for Machinery & Equipment has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 24 Service Life Remaining - Machinery & Equipment

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Administration	5-20 Years	3 Years 8 Months
Airport	10-15 Years	4 Years 7 Months
Community Services	10 Years	8 Years 11 Months
Fire Protection	5-12 Years	4 Years
Mower	10 Years	9 Years 11 Months
Parks	5-15 Years	7 Years 2 Months
Public Health	10 Years	4 Years 10 Months
Public Works Heavy Machinery	7-38 Years	11 Months
Public Works Shop Equipment	5-38 Years	1 Year 11 Months
Public Works Trucks	5-15 Years	(4 Months)
Repsol Place	5-38 Years	7 Years 11 Months
Roads	10 Years	4 Years 11 Months
Waste Management	10-15 Years	1 Year 10 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 28 Service Life Remaining - Machinery & Equipment



5.6.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for Buildings.

Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for Buildings.

Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.

Consequence \ Probability	1	2	3	4	5
5	1 Asset $528,383	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4	0 Assets $0	2 Assets $555,101	0 Assets $0	3 Assets $732,900	1 Asset $250,124
3	0 Assets $0	1 Asset $202,530	1 Asset $166,166	0 Assets $0	3 Assets $551,915
2	3 Assets $390,517	2 Assets $250,567	1 Asset $84,934	2 Assets $279,340	8 Assets $831,133
1	6 Assets $100,113	25 Assets $502,183	18 Assets $232,912	15 Assets $237,703	36 Assets $744,750

5.6.5 Lifecycle Management

Machinery & Equipment assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation and replacement activities. Although regular maintenance is required to ensure the proper operation of all Vehicles assets, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

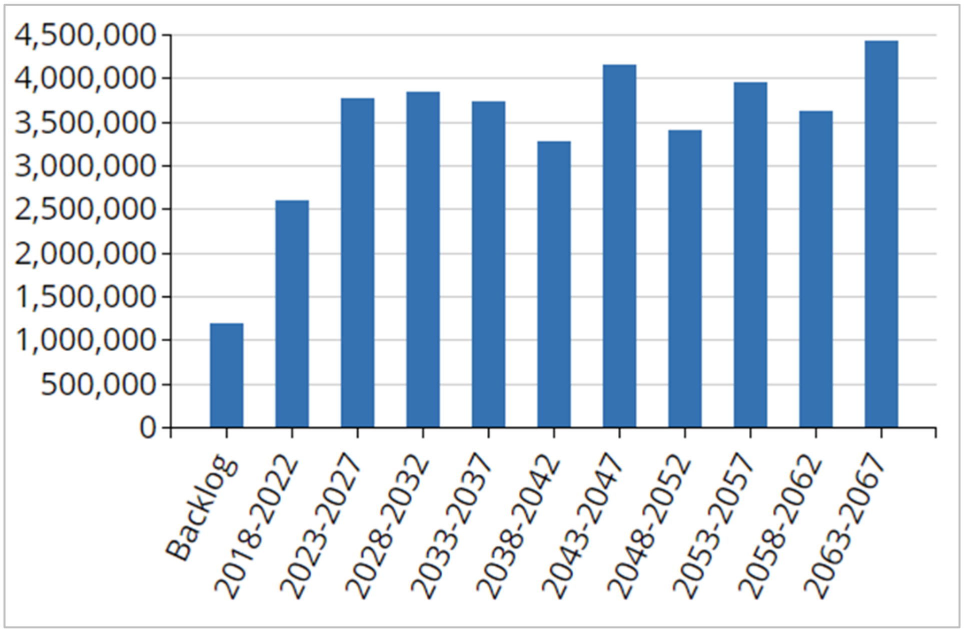
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.6.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of Machinery & Equipment assets. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Figure 29 Forecasted Capital Requirements - Machinery & Equipment

Average Annual Capital Requirement: $753,000



5.6.7 Recommendations

1. The Town should develop and implement a routine condition assessment schedule for Machinery & Equipment.

2. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for Machinery & Equipment.

3. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.7 Vehicles

5.7.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Vehicles inventory.

All replacement costs have been determined through the inflation of each assets historical cost to today's value.

Table 25 Asset Inventory - Vehicles

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Emergency Response Vehicles	7 units	Cost Inflation	$2,017,283
Fire - General Vehicles	1 unit	Cost Inflation	$51,335
Fire - Light Duty Trucks	5 units	Cost Inflation	$99,775
Fire - Water Tanker	1 unit	Cost Inflation	$339,601
Public Works - Heavy Duty	9 units	Cost Inflation	$241,572
Public Works - Light Duty	68 units	Cost Inflation	$1,025,590
		Total:	**$3,775,156**

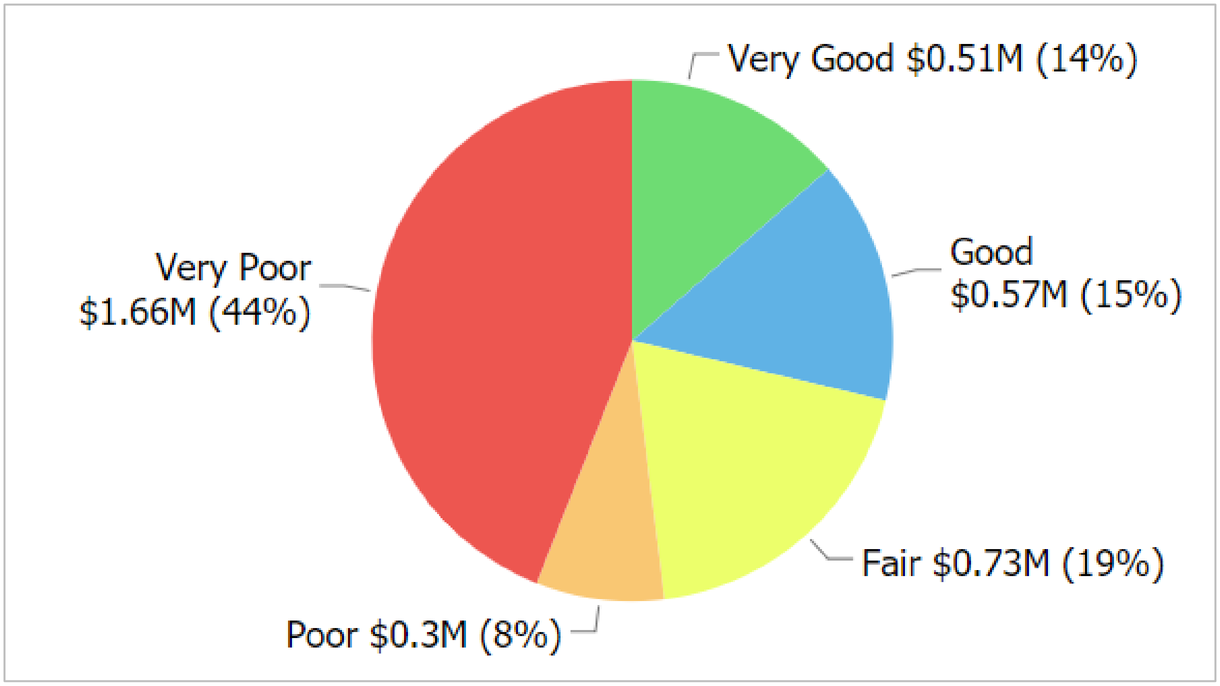
5.7.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 26 Current Asset Condition - Vehicles

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Emergency Response Vehicles	Age-based	Poor	36%
Fire - General Vehicles	Age-based	Very Poor	16%
Fire - Light Duty Trucks	Age-based	Poor	30%
Fire - Water Tanker	Age-based	Very Good	93%
Public Works - Heavy Duty	Age-based	Very Poor	14%
Public Works - Light Duty	Age-based	Poor	34%
	Overall:	**Poor**	**39%**

Figure 30 Current Asset Condition - Vehicles



To ensure that the Town's Vehicles continues to provide an acceptable level of service, the Town 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.

5.7.3 Estimated Useful Life & Average Asset Age

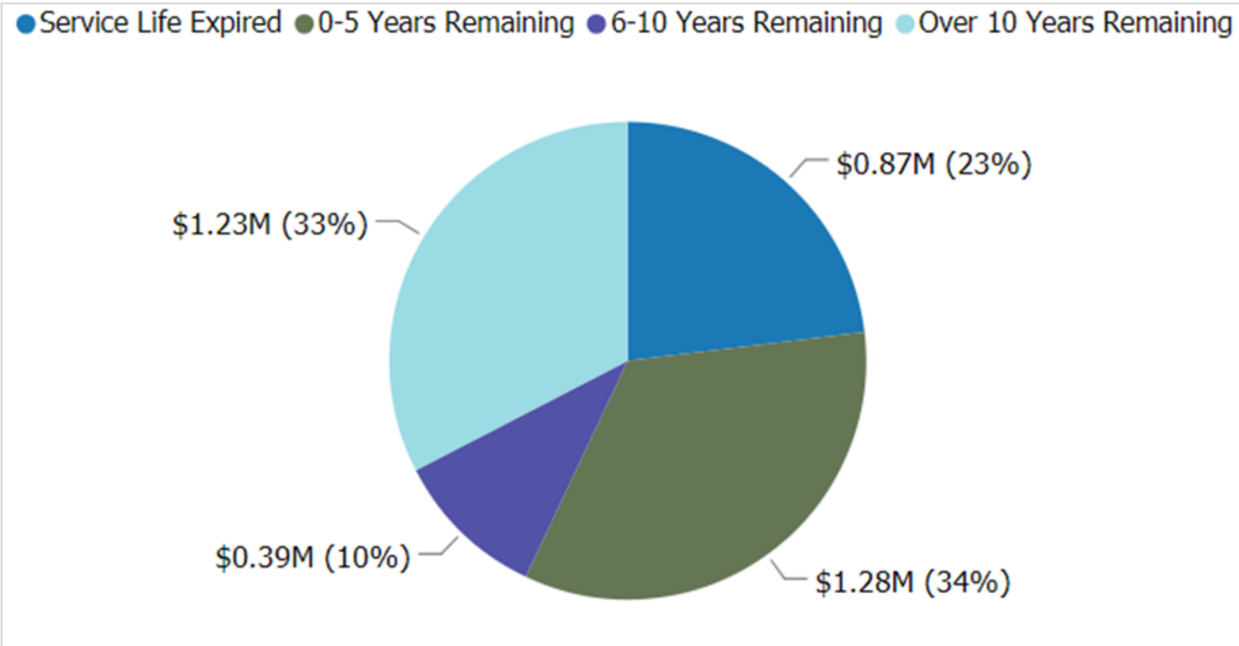
The estimated useful life for Vehicles has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

Table 27 Service Life Remaining - Vehicles

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Emergency Response Vehicles	10-25 Years	(3 Years 4 Months)
Fire - General Vehicles	10 Years	1 Year 7 Months
Fire - Light Duty Trucks	10 Years	4 Years 6 Months
Fire - Water Tanker	25 Years	23 Years 4 Months
Public Works - Heavy Duty	10-16 Years	(2 Years 4 Months)
Public Works - Light Duty	1-10 Years	2 Years 8 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 31 Service Life Remaining – Vehicles



5.7.4 Risk & Criticality

Probability of Failure

The following hierarchy identifies the risk parameters used to calculate the probability of failure for Buildings.

Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for Buildings.

Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.

5.7.5 Lifecycle Management

Vehicles assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation and replacement activities. Although regular maintenance is required to ensure the proper operation of all Vehicles assets, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

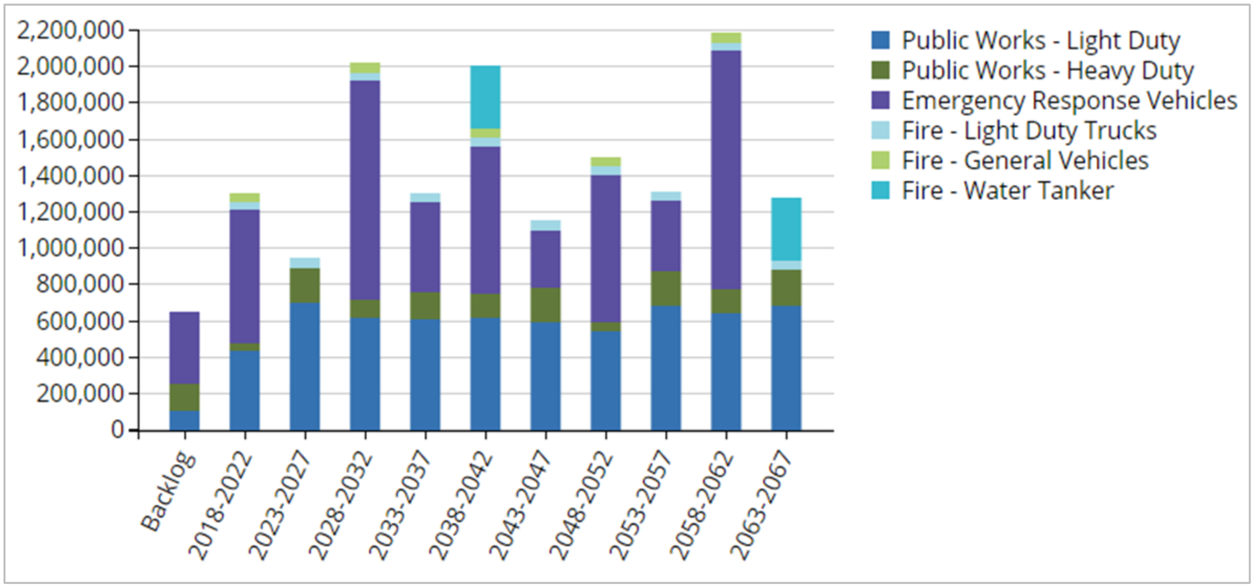
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.7.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for the replacement of the Town's Vehicles. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Figure 32 Forecasted Capital Requirements - Vehicles

Average Annual Capital Requirement: $311,000



5.7.7 Recommendations

1. Considering that the relatively poor condition of the Town's Vehicles is based on age-based estimated of condition, staff should consider implementing a condition assessment program to provide an updated condition rating that can be used for long-term capital planning.

2. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for Vehicles.

3. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.8 Buildings

5.8.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Buildings inventory.

Most replacement costs have been updated by staff in 2018, with the rest using cost inflation.

Table 28 Asset Inventory - Buildings

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Airport Maintenance Garage	1 unit	User-Defined	$350,541
Airport Shed	1 unit	Cost Inflation	$50,273
Airport Terminal	1 unit	User-Defined	$522,881
Cemetery Shop Garage	1 unit	User-Defined	$64,896
Civic Centre	1 unit	User-Defined	$2,889,929
Doctor's House	2 units	User-Defined	$484,000
Dog Pound and Addition	1 unit	User-Defined	$200,332
Fire Hall	1 unit	User-Defined	$2,324,226
Glenwood Park Changing Rooms	2 units	User-Defined	$152,810
Grande Prairie Trail Reservoir	2 units	User-Defined	$11,099,175
Griffith's Park Centre	1 unit	User-Defined	$1,496,553
Lean to Pole Shed	1 unit	User-Defined	$23,226
Library	1 unit	User-Defined	$2,383,680
Medical Centre	1 unit	User-Defined	$1,610,386
Museum	1 unit	User-Defined	$3,705,094
Old RCMP Building	1 unit	User-Defined	$914,231
Parks Garage in Kinsmen Park	1 unit	User-Defined	$406,101
Pavilion	1 unit	User-Defined	$421,565
Picnic Shelter	1 unit	Cost Inflation	$28,480
Public Works Shop	2 units	User-Defined	$1,169,576
Rental House by Firehall	1 unit	User-Defined	$141,960
Repsol Place	2 units	User-Defined	$40,000,000
Salt and Sand Shed	1 unit	User-Defined	$63,178
Scale House at Landfill	1 unit	User-Defined	$100,430
Transfer Station Garage	1 unit	User-Defined	$388,869
Willmore Park Garage	1 unit	User-Defined	$34,871
		Total:	**$71,027,263**

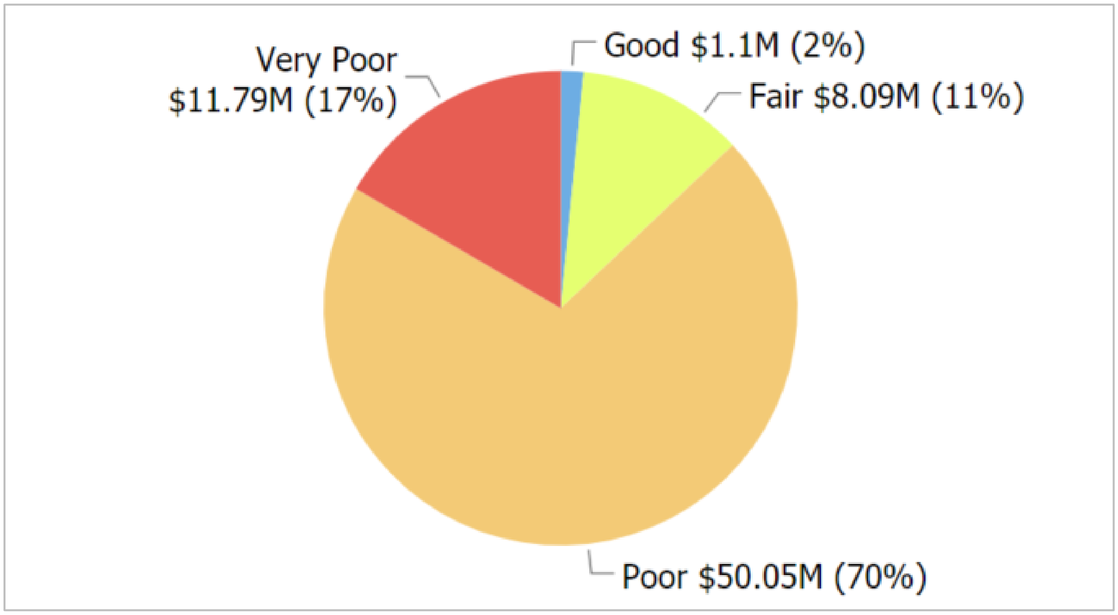
5.8.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 29 Current Asset Condition - Buildings

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Airport Maintenance Garage	Age-based	Poor	39%
Airport Shed	Age-based	Good	72%
Airport Terminal	Age-based	Very Poor	19%
Cemetery Shop Garage	Age-based	Fair	59%
Civic Centre	Age-based	Poor	39%
Doctor's House	Age-based	Good	78%
Dog Pound and Addition	Age-based	Fair	59%
Fire Hall	Age-based	Fair	59%
Glenwood Park Changing Rooms	Age-based	Good	78%
Grande Prairie Trail Reservoir	Age-based	Very Poor	5%
Griffith's Park Centre	Age-based	Poor	39%
Lean to Pole Shed	Age-based	Fair	59%
Library	Age-based	Poor	26%
Medical Centre	Age-based	Poor	38%
Museum	Age-based	Fair	59%
Old RCMP Building	Age-based	Poor	39%
Parks Garage in Kinsmen Park	Age-based	Poor	39%
Pavilion	Age-based	Good	79%
Picnic Shelter	Age-based	Very Poor	0%
Public Works Shop	Age-based	Fair	59%
Rental House by Firehall	Age-based	Very Poor	19%
Repsol Place	Age-based	Poor	39%
Salt and Sand Shed	Age-based	Fair	59%
Scale House at Landfill	Age-based	Fair	58%
Transfer Station Garage	Age-based	Fair	59%
Willmore Park Garage	Age-based	Fair	59%
	Overall:	**Poor**	**34%**

Figure 33 Current Asset Condition - Buildings



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

5.8.3 Estimated Useful Life & Average Asset Age

The estimated useful life for Buildings has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

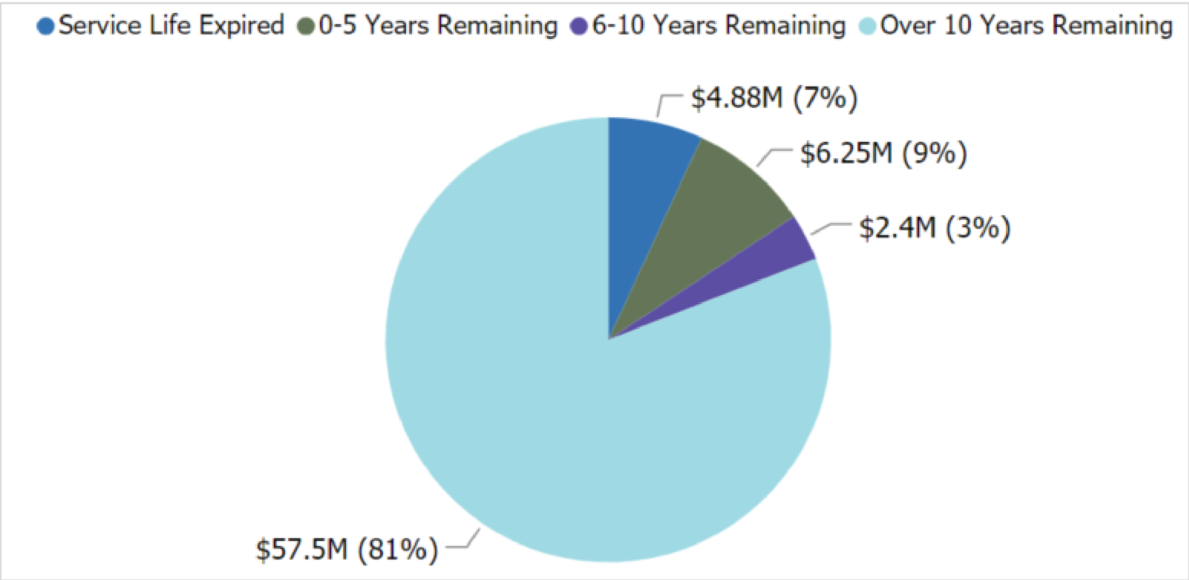
Table 30 Service Life Remaining - Buildings

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Airport Maintenance Garage	50 Years	19 Years 6 Months
Airport Shed	50 Years	35 Years 11 Months
Airport Terminal	50 Years	9 Years 5 Months
Cemetery Shop Garage	50 Years	29 Years 5 Months
Civic Centre	50 Years	7 Years 5 Months
Doctor's House	10-45 Years	20 Years 6 Months
Dog Pound and Addition	50 Years	29 Years 5 Months
Fire Hall	50 Years	29 Years 5 Months
Glenwood Park Changing Rooms	10-50 Years	22 Years 6 Months

Grande Prairie Trail Reservoir	45 Years	(3 Years 6 Months)
Griffith's Park Centre	50 Years	19 Years 6 Months
Lean to Pole Shed	50 Years	29 Years 5 Months
Library	50 Years	12 Years 11 Months
Medical Centre	20 Years	7 Years 6 Months
Museum	50 Years	29 Years 5 Months
Old RCMP Building	50 Years	19 Years 6 Months
Parks Garage in Kinsmen Park	50 Years	19 Years 6 Months
Pavilion	50 Years	39 Years 6 Months
Picnic Shelter	50 Years	(8 Years)
Public Works Shop	50 Years	29 Years 5 Months
Rental House by Firehall	50 Years	9 Years 5 Months
Repsol Place	25-50 Years	14 Years 6 Months
Salt and Sand Shed	50 Years	29 Years 5 Months
Scale House at Landfill	25 Years	14 Years 5 Months
Transfer Station Garage	50 Years	29 Years 5 Months
Willmore Park Garage	50 Years	29 Years 5 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 34 Service Life Remaining - Buildings



5.8.4 Risk & Criticality

Probability of Failure

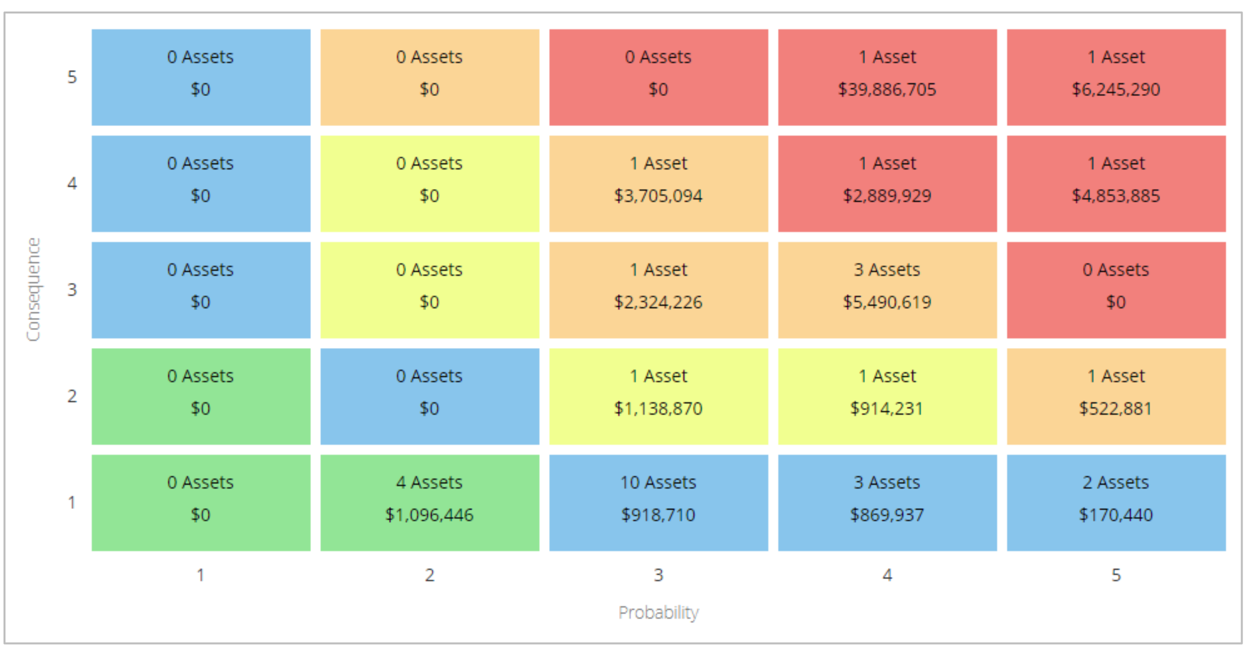
The following hierarchy identifies the risk parameters used to calculate the probability of failure for Buildings.

Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for Buildings.

Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.



5.8.5 Lifecycle Management

Buildings assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation and replacement activities. Although regular maintenance is required to ensure the proper operation of these facilities, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

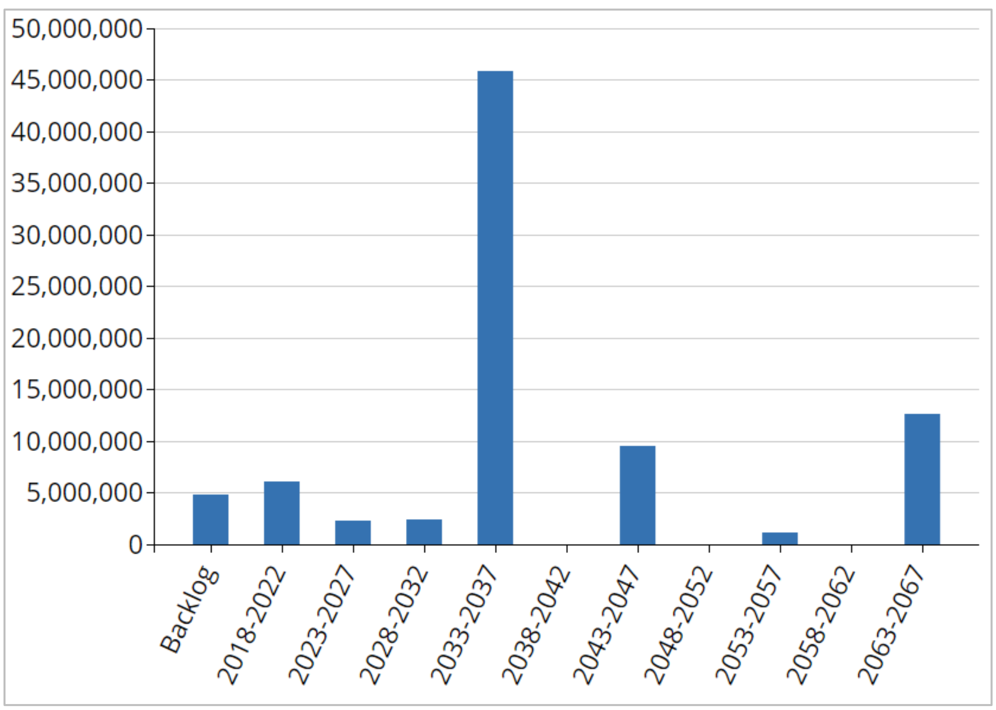
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.8.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Town's Buildings. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Average Annual Capital Requirement: $1,500,000

Figure 35 Forecasted Capital Requirements - Buildings



5.8.7 Recommendations

1. Staff should focus on the development of a component-based inventory for all Buildings units which includes assessed condition data.

2. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for Buildings.

3. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

5.9 Land Improvements

5.9.1 Asset Inventory & Replacement Cost

The following table provides the quantity and total replacement cost of the Town's Land Improvements inventory.

All replacement costs have been determined through the inflation of each assets historical cost to today's value.

Table 31 Asset Inventory - Land Improvements

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Airport (Light/Fences)	207 units	Cost Inflation	$995,886
Airport Runway	92774 m²	Cost Inflation	$8,444,721
Columbarium	35 units	Cost Inflation	$78,128
Fencing	9 units	Cost Inflation	$92,339
Hand Rails	1 unit	Cost Inflation	$11,124
Landfill	3 units	Cost Inflation	$280,212
Landscaping & Natural Capital	30 units	Cost Inflation	$1,557,351
Lighting	92 units	Cost Inflation	$174,877
Park Fencing	17 units	Cost Inflation	$299,919
Park Furnishings	2 units	Cost Inflation	$133,160
Park Light Standards and Fixtures	15 units	Cost Inflation	$115,705
Park Shelters & Structures	3 units	Cost Inflation	$370,718
Parklands, Paths, Trails & Parking Lots	48 units	Cost Inflation	$4,502,556
Playground Structures	30 units	Cost Inflation	$261,720
Sidewinder Track	1 unit	Cost Inflation	$128,352
Sport Fields & Courts	4 units	Cost Inflation	$453,968
Transfer Station	3 units	Cost Inflation	$1,441,957
Water Play & Features	4 units	Cost Inflation	$997,778
		Total:	**$20,340,471**

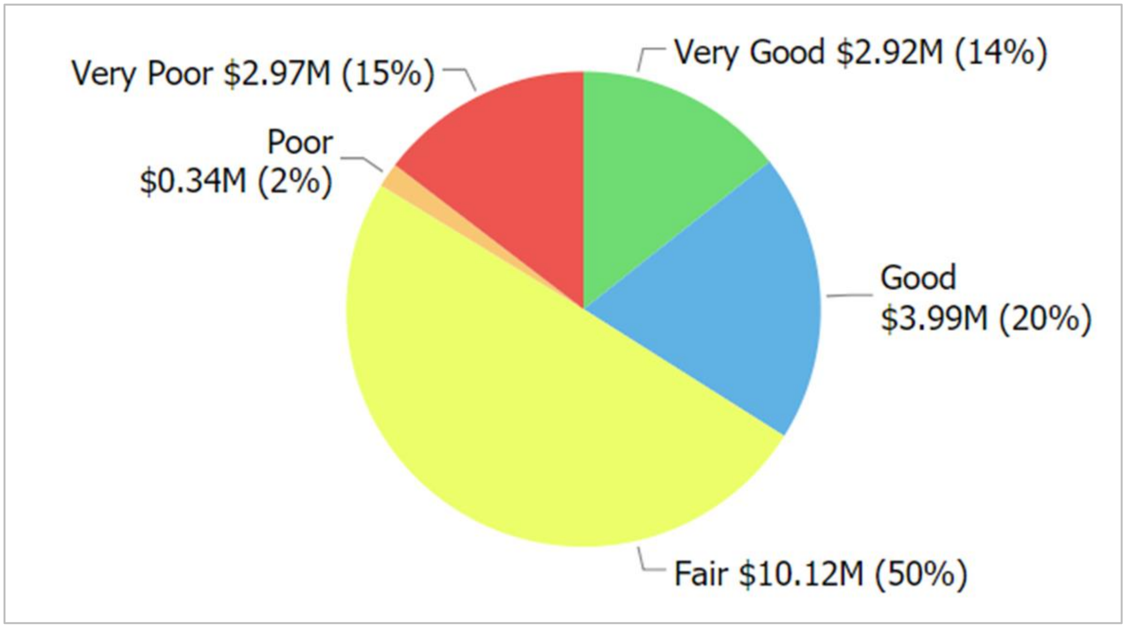
5.9.2 Current Asset Condition

The following table details the source of condition data as well as the average condition rating and the average percentage of service life remaining for each asset type.

Table 32 Current Asset Condition - Land Improvements

Asset Segment	Condition Source	Average Condition	% of Service Life Remaining
Airport (Light/Fences)	Age-based	Poor	36%
Airport Runway	Age-based	Fair	46%
Columbarium	Age-based	Fair	57%
Fencing	Age-based	Good	72%
Hand Rails	Age-based	Fair	59%
Landfill	Age-based	Fair	57%
Landscaping & Natural Capital	Age-based	Good	71%
Lighting	Age-based	Good	78%
Park Fencing	Age-based	Fair	58%
Park Furnishings	Age-based	Very Good	80%
Park Light Standards and Fixtures	Age-based	Good	73%
Park Shelters & Structures	Age-based	Very Good	83%
Parklands, Paths, Trails & Parking Lots	Age-based	Fair	50%
Playground Structures	Age-based	Very Poor	11%
Sidewinder Track	Age-based	Very Good	88%
Sport Fields & Courts	Age-based	Very Poor	17%
Transfer Station	Age-based	Very Good	76%
Water Play & Features	Age-based	Fair	55%
	Overall:	**Fair**	**52%**

Figure 36 Current Asset Condition - Land Improvements



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

5.9.3 Estimated Useful Life & Average Asset Age

The estimated useful life for Land Improvements has been assigned according to a combination of established industry standards and staff knowledge. The following table identifies these values as well as the average service life remaining as of the end of 2017.

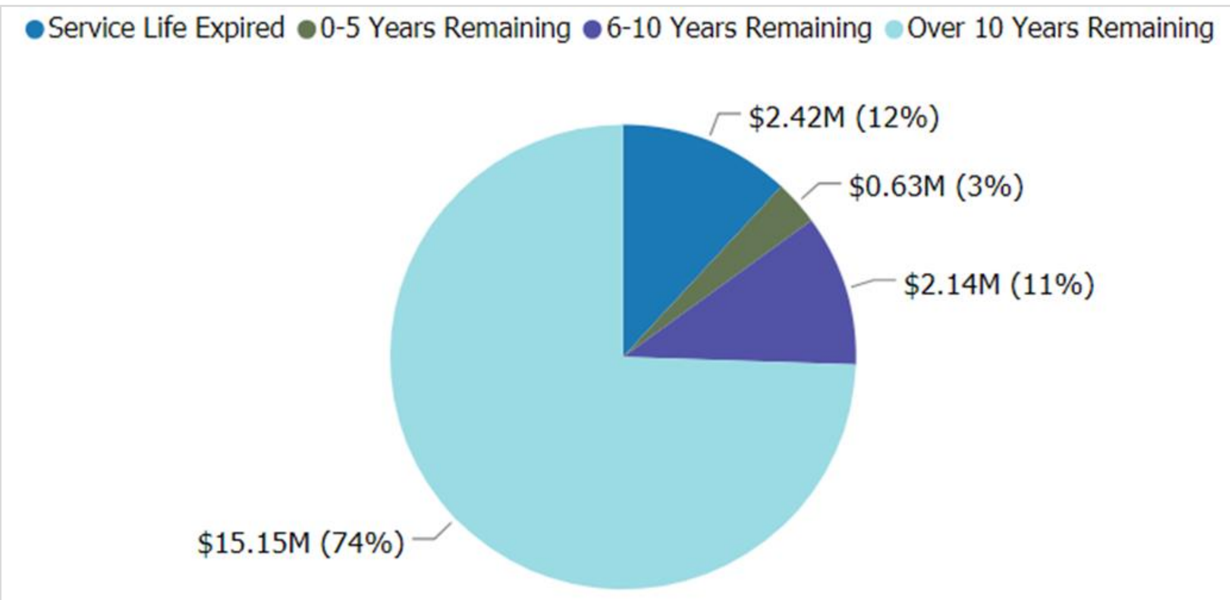
Table 33 Service Life Remaining - Land Improvements

Asset Segment	Estimated Useful Life	Average Service Life Remaining
Airport (Light/Fences)	15-20 Years	11 Years 5 Months
Airport Runway	40-50 Years	22 Years
Columbarium	14-20 Years	9 Years 7 Months
Fencing	15-20 Years	11 Years 10 Months
Hand Rails	10 Years	5 Years 11 Months
Landfill	25-30 Years	17 Years 7 Months
Landscaping & Natural Capital	15-30 Years	18 Years 10 Months
Lighting	10 Years	7 Years 8 Months
Park Fencing	15-20 Years	9 Years 5 Months

Park Furnishings	30 Years	24 Years 2 Months
Park Light Standards and Fixtures	10-20 Years	12 Years 5 Months
Park Shelters & Structures	20-30 Years	15 Years
Parklands, Paths, Trails & Parking Lots	14-50 Years	15 Years 5 Months
Playground Structures	15 Years	4 Years 2 Months
Sidewinder Track	20 Years	17 Years 6 Months
Sport Fields & Courts	20 Years	11 Months
Transfer Station	25 Years	19 Years
Water Play & Features	15-20 Years	1 Year 9 Months

The following pie chart identifies the percentage of assets, by replacement value, that have surpassed their estimated service life and how close all other assets are to approaching their projected replacement date.

Figure 37 Service Life Remaining - Land Improvements



5.9.4 Risk & Criticality

Probability of Failure

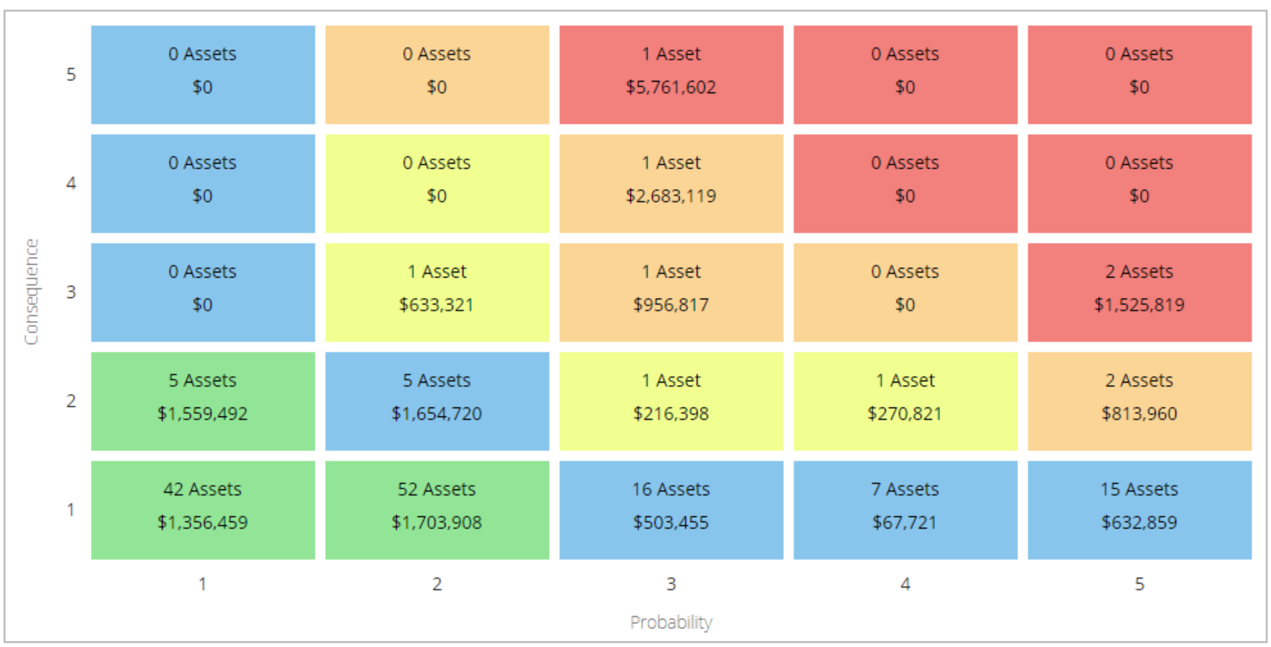
The following hierarchy identifies the risk parameters used to calculate the probability of failure for Land Improvements.

Consequence of Failure

The following hierarchy identifies the risk parameters used to calculate the consequence of failure for Land Improvements.

Risk Matrix

Using the above risk parameters, the following matrix visualizes the risk rating for each asset by multiplying the consequence and the probability of failure. Using the above risk parameters, the following matrix visualizes the risk rating for the road network by multiplying the consequence and the probability of failure. Higher risk assets are considered to have a higher criticality to service delivery, meaning that asset failure would have a proportionally higher impact on the municipality and its stakeholders. The prioritization of capital projects should consider asset risk and attempt to minimize the Town's overall risk exposure.



5.9.5 Lifecycle Management

Land Improvements assets do not typically need a detailed lifecycle strategy including maintenance, rehabilitation, and replacement activities. Although regular maintenance is required to ensure the proper operation of these assets, these costs do not factor into the capital costs included in the overall financial strategy. For the purposes of this AMP the lifecycle strategy for these assets will simply include end-of-life replacement.

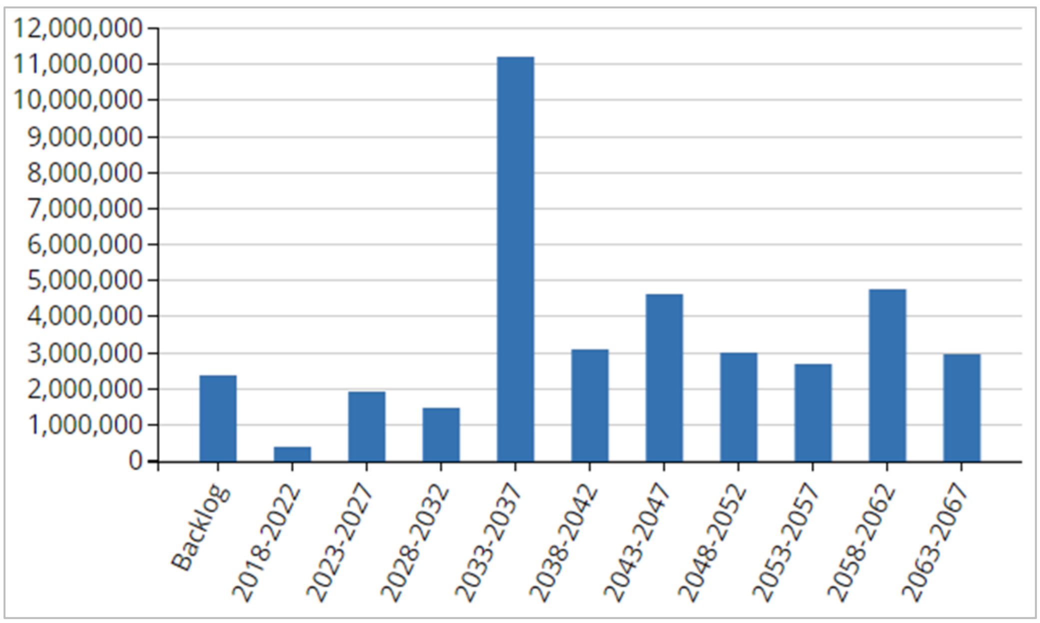
As the Town's understanding of the current cost, risk, and performance of their assets evolve, these strategies should be reviewed to determine whether they are achieving the lowest total cost of ownership while still achieving the expected level of service.

5.9.6 Forecasted Capital Requirements

The following bar chart forecasts the capital requirements for rehabilitation and replacement of the Town's Land Improvements. The average annual capital requirement represents the average annual amount of funding necessary to fund the replacement of existing infrastructure.

Figure 38 Forecasted Capital Requirements - Land Improvements

Average Annual Capital Requirement: $811,000



5.9.7 Recommendations

1. Staff should focus on the development of a component-based inventory for all Land Improvements units which includes assessed condition data.

2. The Town should work to identify the performance metrics and qualitative descriptions that will be used to measure current levels of service for Land Improvements.

3. The municipality is underfunding its long-term requirements on an annual basis. See **Section 8.0** for a detailed financial strategy designed to achieve long-term funding requirements.

6.0 Asset Management Strategies

After outlining the State of Local Infrastructure, the next step of an AMP is to identify the procedures and practices that will support the Town's organizational objectives and derive maximum value from its assets. Good asset management requires a focus on continuous program improvement based on industry best practice. This involves strategies for data collection and condition assessment, strategies for the analysis of collected data (lifecycle and risk), and strategies for performance measurement (levels of service).

This section contains information and best practices that will inform the Town's asset management strategies, outline Roadmap activities and their deliverables, and provide strategic recommendations for the continuous improvement of program activities and outputs.

6.1 Non-Infrastructure Solutions & Requirements

The municipality should consider, as requested through the provincial requirements, non-infrastructure solutions as part of its infrastructure services budgets. Non-infrastructure solutions are such items as studies, policies, condition assessments, consultation exercises, etc., that could potentially extend the life of assets or lower total asset program costs in the future without a direct investment into the infrastructure.

Typical solutions for a municipality include linking the asset management plan to the strategic plan, growth and demand management studies, infrastructure master plans, better integrated infrastructure and land use planning, public consultation on levels of service, and condition assessment programs. As part of future asset management plans, a review of these requirements should take place, and resources should be dedicated to these items.

It is recommended, under this category of solutions, that the municipality develop and implement holistic condition assessment programs for all Asset Categories. This will advance the understanding of infrastructure needs, improve budget prioritization methodologies, and provide a clearer path of what is required to achieve sustainable infrastructure programs.

6.2 State of Maturity Report

6.2.1 Introduction

Improving your asset management practices requires a structured and coordinated approach to the individual components of an asset management program. As a first step, it is important to gauge the current state of practice related to asset management at the municipality. A thorough gap analysis helps to determine where to focus efforts in order to build a strong asset management program.

The first phase of PSD's Roadmap involved a comprehensive, organization-wide assessment of asset management programs and practices within the Town. The development of the State of Maturity Report involved two key components: the Asset Management Self-Assessment Test (AMSAT) and a series of stakeholder interviews. The final State of Maturity Report outlined the organization's overall state of maturity, proficiency ratings along the six key components of asset management, and recommendations to improve the Town's asset management program.

6.2.2 Asset Management Self-Assessment Test

The Asset Management Self-Assessment Test, implemented in a survey format, relies on a series of questions across specific categories that have been created based on international standards and best practice identified as the requirements of a successful asset management program. The results of the AMSAT are then aggregated to provide a performance rating (Basic, Intermediate, Advanced) across six key components. The following table summarizes the Town's results and compares them to the national average of communities surveyed:

Table 34 AMSAT Results

Asset Management Component	Proficiency Level	National Average
Organizational Cognizance	Intermediate	Intermediate
Organizational Capacity	Basic	Intermediate
Infrastructure Data/Information	Basic	Intermediate
Asset Management Strategies	Basic	Basic
Financial Strategies	Basic	Basic
Level of Service	Basic	Basic

6.2.3 Stakeholder Interviews

As a supplement to the AMSAT, additional information was gathered through a series of in-depth interviews with departmental staff who are either directly involved in or support the delivery of an asset category. The results were used for clarification of the features of the organization's asset management program along with who is responsible for managing and delivering the activities involved in the asset management process.

6.2.4 Highlights from the State of Maturity Report

Workshop Date: May 26th, 2016

Organizational Cognizance

Through the AMSATs and staff interviews, it was determined that there is a basic to intermediate level of understanding in regards to asset management at both the senior management and council levels. In recent years, however, there has been an upward movement in the prioritization of asset management….asset management planning and the sustainment of community infrastructure is clearly outlined within the Town's strategic plan (2015 – 2017).

Organizational Capacity

Staff knowledge of individual asset classes is fairly expansive and general AM knowledge has increased in some areas of the organization due to the mandated implementation of certain AM initiatives. However, there are no dedicated resources within the departments for AM.

Asset Management Strategies

In general, across all asset categories, lifecycle activity analysis is performed at the project planning stage and not at the network need analysis stage within the Town. In other words, there is no consistent framework that dictates long term projections for repairs, rehabilitations, and replacements for the various asset categories.

Financial Strategies

Currently, the financial strategies within Edson are feasible based on the availability of current information. While there has been reasonable analysis of short- and long-term capital and operating/maintenance requirements for capital assets, it is premised on an incomplete understanding of overall asset performance given the absence of field condition records.

Levels of Service

Similar to most municipalities across the country, there are currently no holistic levels of service models in place at the Town for the various capital asset categories.

6.2.5 Advancing the Town's State of Maturity

Municipal asset management is an ever-evolving discipline that requires organizations to adapt to emerging regulations and continue to advance internal capabilities. The five key competencies above are areas that the Town should continue to evaluate on a regular basis to determine what areas are seeing advances and which need additional attention.

6.3 Asset Inventory Data

6.3.1 Introduction

An asset management program is only as strong as the data and information available in an organization's asset inventory. Without detailed and accurate asset data, the ability to analyze and evaluate the Town's state of the infrastructure is limited. Data gathering is a resource-intensive process, requiring sufficient human resources capacity and a significant amount of time to develop and maintain. However, committing resources to data collection will result in exponential benefits to the Town's asset management program. Better data results in greater data confidence and ultimately more reliable asset management and financial strategies.

6.3.2 Assessing Data Maturity

As a starting point, it is critical to understand the current state the Town's data collection practices. From there it is possible to develop techniques and strategies that ensure that your asset management program is being supported by detailed, consistent and complete data. A detailed data maturity assessment will evaluate and analyze the state of the Town's data collecting practices. This will help to identify what asset component data has been collected and what needs to be collected in order to increase the quality of your data and allow for more accurate and advanced analysis.

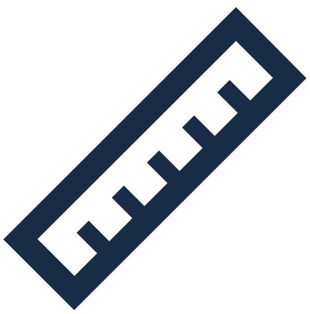
6.3.3 Ongoing Data Collection

Without plans in place for the ongoing collection of asset data and information the ability of an organization to undertake advanced forecasting and analysis will be limited. It is critical that the Town continue to provide resources for the continuing collection of data and the regular updating and maintenance of the Town's asset registry.

6.3.4 Recommendations

- Implement programs and protocols for the continuous collection and maintenance of asset data.
- Centralize and consolidate all infrastructure related data (inventory, condition, needs, prioritized requirements, financial data and GIS data) into the CityWide software database, the main asset registry database.
- Implement a data governance policy that outlines a consistent corporate approach to database maintenance and management including data handling procedures, roles and responsibilities.

6.4 Condition Assessment Programs & Guidelines



6.4.1 Introduction

The foundation of good asset management practice is comprehensive and reliable information on the current condition of your infrastructure. Municipalities need to have a clear understanding of the performance and condition of their assets, and all management decisions regarding future expenditures and field activities should be based on this knowledge.

Asset condition is a measure of the physical state of an asset or the ability of an asset to meet its required utility or level of service. An incomplete or limited understanding about the condition of a given asset can lead to substandard asset management decision-making. While there will be a point where asset rehabilitation or replacement is beneficial, it is important that field intervention activities are conducted at the optimal time to maximize the value of existing assets, and to reduce the threat of service disruption. Accurate and reliable condition data will help to prevent premature and costly rehabilitative or replacement activities and ensure that lifecycle activities occur at the right time to maximize asset value and useful life.

6.4.2 Establishing Condition Assessment Programs & Guidelines

In practice, integrating condition assessments into the Town's asset management program requires a systematic and coordinated approach to asset data collection. Standardized condition assessment guidelines and data gathering templates will ensure that all collected asset data is comprehensive and comparable. Ultimately, this will lead to increased confidence in the quality of asset data and provide a stronger basis for decision-making. Condition assessment guidelines serve as a reference for field employees responsible for collecting condition data. This document includes all component and asset level data required, element listing and code guidelines, as well as specific instructions for determining asset condition.

Condition assessment can involve different forms of analysis including subjective opinion, mathematical models, or variations thereof, and can be completed through a very detailed or very cursory approach. When establishing the condition of an entire asset category, the cursory approach (metrics such as very good, good, fair, poor, very poor) is used. This will be a less expensive and time-consuming approach when applied to thousands of assets yet will still provide actionable data. Condition ratings derived from this model use the grading system described in the following table:

Table 35 Canadian Infrastructure Report Card 2016 - Condition Grading System

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

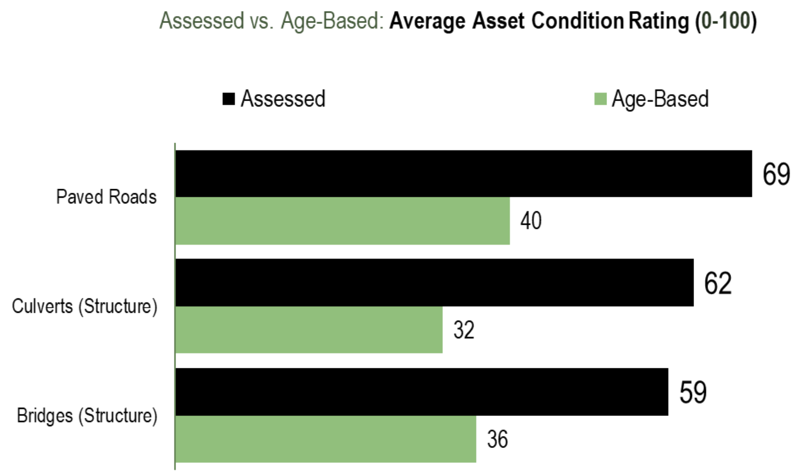
6.4.3 Assessed Condition Data vs. Age-based Data

Measuring asset condition can be a time consuming, labour-intensive, and costly practice. However, there is strong evidence that the benefits of implementing condition assessment programs will outweigh any additional costs. In 2015, PSD published a study in partnership with the Association of Municipalities of Ontario (AMO). The report, *The State of Ontario's Roads and Bridges: An Analysis of 93 Municipalities*, enumerated the infrastructure deficits, annual investment gaps, and the physical state of roads, bridges and culverts with a 2013 replacement value of $28 billion.

A critical finding of the report was the dramatic difference in the condition profile of the assets when comparing age-based estimates and actual field inspection observations. For each asset category, field data based condition ratings were significantly higher than age-based condition ratings, with paved roads, culverts, and bridges showing an increase in score (0-100) of +29, +30, and +23 points respectively (**Figure 39**). In other words, age-based measurements may be underestimating the condition of assets by as much as

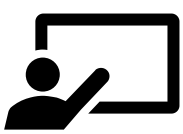
30%. The implication of this finding is that municipalities are making asset management decisions based on inaccurate data, and as a result, are likely making ineffective lifecycle maintenance and replacement decisions.

Figure 39 Assessed vs Age-based Condition Rating



This report represents a strong statistical justification for the use of condition assessments over age-based estimates. Not only will condition-based data provide a more accurate representation of asset condition, it will also provide a stronger basis for making asset management decisions and achieving the lowest total cost of ownership.

6.4.4 PSD's Condition Assessment Programs and Protocols



Workshop Date: April 6th, 2017

On April 6th, 2017 PSD staff held a workshop to guide Town staff in gathering condition data and asset attribute data for all major Asset Categories. The delivery of this workshop included hands-on training displaying how to effectively capture and store condition data as well as guidance for determining asset condition.

The Condition Assessment Documentation Package included internal condition assessment guidelines for the following Asset Categories:

1. **Facilities**
2. **Parks & Natural Areas**
3. **Road Network**
4. **Right-of-Way Appurtenances**
5. **Sidewalks**
6. **Watermains**

7. **Curb & Gutter**

The Town was also provided with Request for Proposal (RFP) specifications if condition assessments were preferred to be conducted by external consultant. These specifications were included for the following Asset Categories:

1. **Facilities**
2. **Parks & Natural Areas**
3. **CCTV Sanitary Sewers**
4. **Road Network**
5. **Right-of-way Appurtenances**
6. **Zoom Storm Sewers**

After this workshop, the Town was given the task of collecting as much relevant and useful asset data as possible within the Roadmap project scope. The collection of additional data allows for more advanced evaluation and analysis of lifecycle and financial requirements. Throughout the Roadmap, PSD worked alongside the Town to ensure that data was collected as per their recommendations and uploaded into the asset inventory in the proper format.

6.4.5 Recommendations

- Work towards gathering assessed condition on the Town's entire network of infrastructure assets and implementing routine condition assessment program for all Asset Categories that were not completed during the Roadmap.
- All future asset condition assessments should be synchronised with CityWide records in order for captured overall condition ratings to be stored within the CityWide database.
- The use of a zoom camera should be explored as an alternative inspection process for the wastewater and storm sewer mains.

6.5 Risk Management and Project Prioritization

6.5.1 Introduction

For an organization that manages a vast and diverse inventory of capital assets deciding which capital projects to fund can be an intimidating task. There is rarely enough money available to complete all required infrastructure projects. Generally, infrastructure needs exceed municipal financial resources and capacity. This resource scarcity means projects and investments must be prioritized according to their relative importance and risk of failure in order to ensure vital services and critical infrastructure continue to be provided to the community.

Traditionally, municipalities have prioritized capital projects according to a "worst-first" approach, in which the assets in the worst condition are the highest priority for rehabilitation or replacement. However, this approach fails to account for the fact that some assets are more important to the delivery of vital services and the provision of critical infrastructure than others. As a result, many assets that should be prioritized to prevent service disruption, are left to deteriorate.

6.5.2 Risk Management

A municipality's assets are often the leading edge of its exposure to external risk. As such, it is important that policies, processes and procedures are put in place in order to manage and mitigate organizational risk exposure. Minimizing risk exposure and using a risk-based analysis to drive asset management decision-making and capital project prioritization helps to prevent consequential asset failure and major service disruption. A robust risk management framework allows the Town to determine the probability and consequence of failure at both the asset category and individual asset level and use that data to optimize capital funding decisions.

6.5.3 Economic, Social and Environmental Risks

The creation of a robust risk management framework requires the development of risk profiles that take into account three different types of risk: economic, social and environmental. This is often referred to as the "triple bottom line" of assets. These three types of risk can be defined as follows:

Table 36 Triple Bottom Line of Asset Risk

	Economic	The monetary consequences of asset failure for the organization and its customers
	Social	The consequences of asset failure on the social dimensions of the community
	Environmental	The consequence of asset failure on an asset's surrounding environment

6.5.4 Calculating Asset 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. From an asset management perspective, risk is a function of the probability of failure and the consequence of failure.

$$Risk = Probability\ of\ Failure(PoF) \times Consequence\ of\ Failure(CoF)$$

The following table defines both the probability of failure and consequence of failure and the data that could be used to calculate both.

Table 37 Risk Equation Explanation

	Probability of Failure	Consequence of Failure
Definition	The probability of failure directly correlates to the condition of the asset.	The consequence of failure relates to the economic, social and environmental impact of failure.
Data/Parameters	• Asset condition • % of asset life consumed • Known operational issues • Other parameters contributing to asset deterioration (e.g. traffic counts, soil types)	• **Economic**: Cost of rehabilitation or replacement • **Social**: Number of people or critical service affected • **Environmental**: Impact of failure on surrounding environment

The strength of a risk management framework depends on the reliability and availability of asset attribute data. The integration of meaningful asset attribute data that represents the economic, social, and environmental risks will provide increased confidence in capital project decision-making and support evidence-based budget deliberations. While more data does not necessarily mean better outcomes, the careful selection of risk parameters that take into account the triple bottom line of assets can optimize asset management decision-making.

6.5.5 Risk Report Summary

Workshop Date: October 12th, 2017

On October 12th, 2017 PSD delivered a workshop on developing a risk management framework in the Town of Edson. PSD worked alongside staff at the Town to develop risk parameters that allow for the calculation of both the consequence and probability of asset failure. The following table summarizes which asset types had customized risk profiles developed and uploaded into the CityWide database.

Table 38 Overview of Risk Models Developed by Asset Category

Asset Category	Asset Type	Risk Parameters
Road Network	Road Surface	Condition Surface With Service Class Road Design Sub-Class
Sanitary Sewer Network	Sanitary Mains	Condition Pipe Diameter Slope % Pipe Material
Storm Water Network	Storm Sewer Mains	Condition Pipe Diameter Pipe Material Slope %
Water Network	Water Mains	Condition Pipe Material Pipe Diameter

6.5.6 Project Prioritization

One of the benefits of implementing a risk management framework is that it allows the Town to prioritize capital projects based on the greatest risk of failure. The implementation of the developed risk management framework enables the municipality to create reports that rank assets according to the highest risk and consequence of failure.

6.5.7 Asset Category Risk Matrices

Once both the probability of failure and the consequence of failure have been calculated for each asset, the results can be aggregated to obtain a high-level view of asset risk at an organizational level and for each major asset category. Risk matrices provide a valuable overview of asset risk and serve as an important medium to communicate where, and to what extent, risk is present within your asset portfolio.

6.5.8 Recommendations

- Complete risk model development and assessment for minor Asset Categories including Vehicles, IT, Land Improvements etc.
- Integrate climate change risk assessment into risk management framework (exposure, vulnerability, resilience, adaptation).

6.6 Lifecycle Activity Framework

6.6.1 Introduction

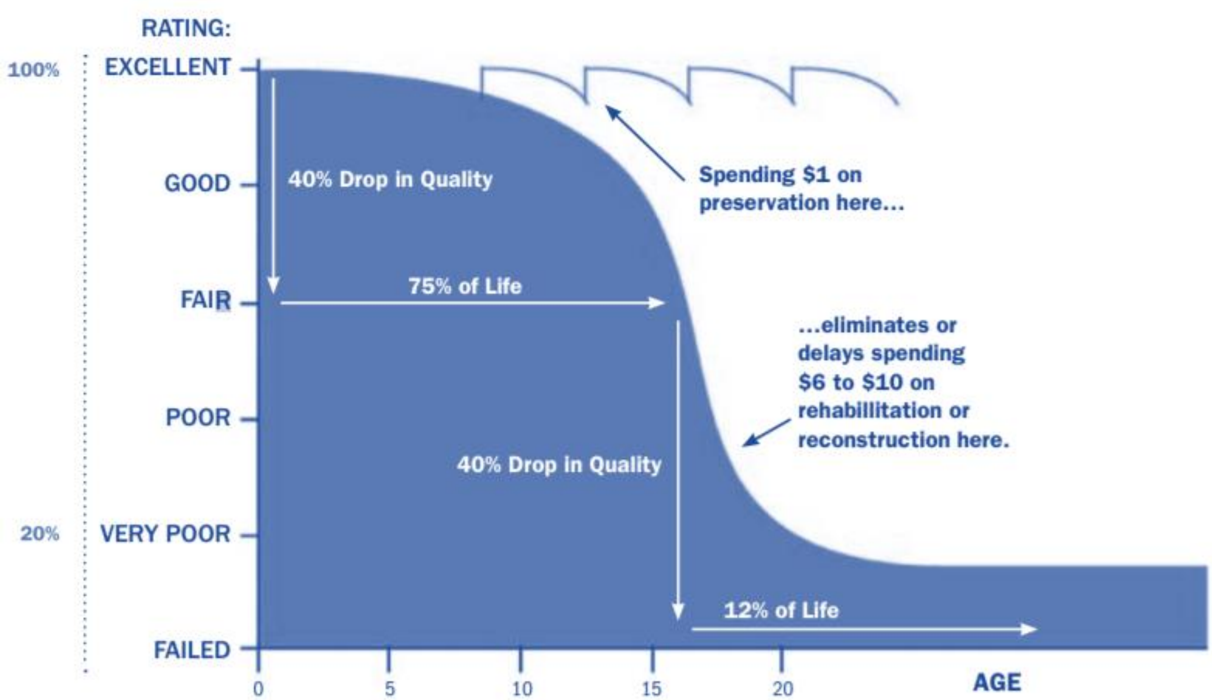
The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history, and environment. This deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk, and even service disruption. In order to ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a strategy to proactively manage the deterioration of assets.

6.6.2 Lifecycle Activity Management

Lifecycle activity management is the practice of managing the deterioration of your assets through the implementation of a maintenance, rehabilitation, and replacement strategy. An asset lifecycle strategy will ensure that you are doing the right thing to the right asset at the right time. Effective lifecycle activity management can extend the service life of assets and ensure that assets continue to meet service and performance requirements at the lowest total cost of ownership.

Figure 40 provides an example of the benefits of lifecycle activity management over the service life of an asset.

Figure 40 Deterioration Curve Outlining Benefits of Lifecycle Activities (Canadian Infrastructure Report Card 2016)



6.6.3 Developing a Lifecycle Activity Strategy

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

Table 39 Cost of Lifecycle Activity Types

Activity Type	Description	Example	Cost
Preventative Maintenance	Any activities that prevent defects or deteriorations from occurring	(Roads) Crack Seal	**$**
Rehabilitation	Any activities that rectify defects or deficiencies that are already present and may be affecting asset performance	(Roads) Mill & Resurface	**$$**
Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	(Roads) Full Reconstruction	**$$$**

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of preventative maintenance and rehabilitation, but at some point reconstruction or replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable the Town to make better decisions about caring for municipal assets.

6.6.4 Lifecycle Strategy and Asset Profile Development

Workshop Date: August 29th, 2017

On August 29th, 2017, PSD consultants and Town of Edson staff collaborated to develop customized lifecycle strategies that optimize maintenance, rehabilitation, and replacement activities for major infrastructure assets. At this time the Town has developed lifecycle strategies for paved road surfaces that have been used in this AMP to more accurately identify long-term capital requirements.

6.6.5 Recommendations

- Continue to develop and refine lifecycle strategies for core Asset Categories including roads, bridges, water, sewer, and storm.

- Integrate lifecycle strategies based on any upcoming studies or reports (e.g. Road Needs Study, BIMS Inspections).
- Update asset-specific deterioration curves as more reliable and accurate data becomes available.

6.7 Climate Change & Extreme Weather

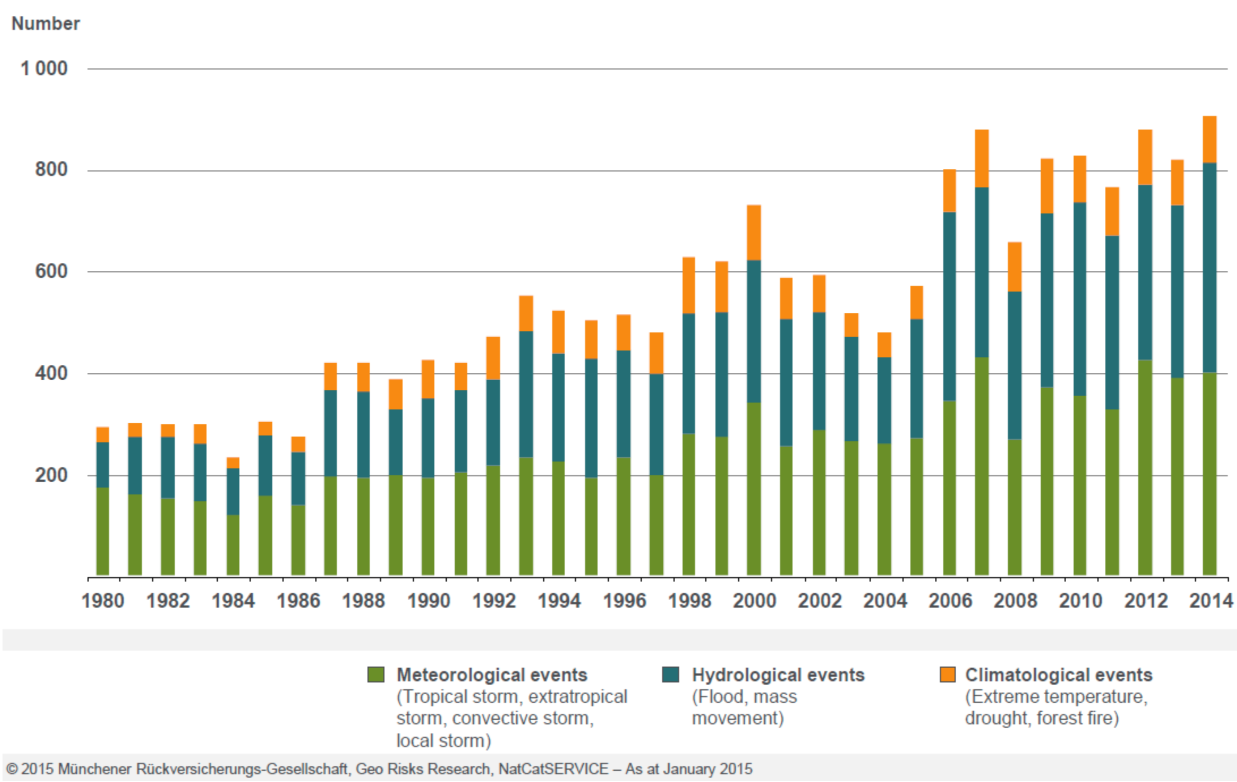
6.7.1 Introduction

The impacts of climate change present a momentous challenge to municipal infrastructure. As temperatures and sea levels rise, and extreme weather events occur with greater frequency, it is critical that municipalities attempt to understand the emerging threat of climate change and develop strategies to ensure that vital services and critical infrastructure continue to operate as expected. This will require consideration of four key factors of climate change (exposure, vulnerability, resilience, and adaptation) at every stage of an asset's lifecycle.

6.7.2 Threat of Climate Change

Globally, there has been a significant increase in weather-related loss events resulting in property damage and/or bodily injury (**Figure 41**). Municipal infrastructure is at particular risk to meteorological, hydrological, and climatological events leading to an increasing rate of asset deterioration, failure, and service disruption.

Figure 41 Weather related loss events worldwide 1980-2014



According to *Canada's Sixth National Report on Climate Change 2014* the type of climate threats that are most likely to impact the Town's infrastructure include:

Higher Average Annual Temperature

- Between 1948 and 2012, the annual average air surface temperature over Canada's landmass has increased by about 1.7ºC, approximately twice the global average.
- Average summer temperatures to rise by 2-4ºC with more warming in the winter
- Increase in instances of heatwaves
- Increase in average rainfall

Increase in Total Annual Precipitation

- There will be significant changes in precipitation between seasons, with winters becoming wetter and summer becoming drier
- Increased rate of ice and windstorms

Increase in Frequency of Extreme Weather Events

- It is expected that the frequency and severity of extreme weather events will change
- In some geographical areas, extreme weather events will occur with greater frequency and severity than others

6.7.3 Exposure & Vulnerability

Climate change exposure is the nature and degree to which a system is exposed to significant climate variations. Exposure is a combination of the probable range of a climate stressor and the physical characteristics of a geographical location. For example, for a coastal facility, its height above sea level correlates to the exposure of the asset to rising sea levels caused by the onset of climate change. Understanding the exposure of existing infrastructure and integrating climate change exposure into the planning and design process of asset management is a critical step towards minimizing the impacts the expected threats of climate change.

The Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as "the degree to which a system is susceptible, and unable to cope with, adverse effects of climate change, including climate variability and extremes". Vulnerability considers the structural strength, integrity, and function of assets or asset systems in terms of the potential for damage or functional disruption as a result of climate stressors.

6.7.4 Resilience & Adaptation

Resilience is used to refer to the capacity of a system to absorb disturbance without losing essential function. In the context of physical assets or asset systems, it is the ability of a system to continue to operate as a result of a built-in redundancy. For example, a Road

Network's ability to operate despite the loss of a single road or bridge, or the relative ease with which it can be replaced. The context for resilience is a combination of physical constraints on repair or replacement, socio-economic limitations, and system redundancy.

The IPCC defines adaptation as "the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". Adaptive strategies fall into three categories: protect, accommodate, and retreat. In a coastal region, a protection strategy might aim to protect assets from flooding by constructing hard or soft structures by installing sea walls, beach nourishment, or wetland restoration. Accommodation may call for preparing for periodic flooding by having operational plans inplace. Retreat involves no attempt to protect the asset. Under these conditions a facility or structure may be abandoned completely. Although applied specifically to coastal examples, these adaptive strategies may be generalized to all types of asset and asset geographical locations.

6.7.5 Expected Impact of Climate Change on Infrastructure

The International Institute for Sustainable Development identified the following impacts of climate change on municipal infrastructure in Canada:

Table 40 Impacts of Climate Change on Infrastructure (International Institute for Sustainable Development)

	Greater frequency of freeze-thaw cycles leading to thermal cracking, rutting, frost heave, and thaw weakening
	Soil instability, ground movement, and slope instability
	Triggered instability of embankments and pavement structures
	Shortened life expectancy of highways, roads, and rail
	Drier conditions affecting the lifecycle of bridges and culverts
	Reduced structural integrity of building components through mechanical, chemical, and biological degradation
	Increased corrosion and mold growth
	Damaged or flooded structures
	Reduced service life and functionality of components and systems
	Increased repair, maintenance, reserve fund contingencies, and energy costs
	Increased water demand and pressure on infrastructure
	Loss of potable water
	Increased risk of flooding; storm sewer infrastructure more frequently exceeded
	Rupture of drinking water lines, sewage lines, and sewage storage tanks
	Saltwater intrusion in groundwater aquifers

6.7.6 Recommendations

- Consider the impact of climate change on the estimated useful life of all assets
- Adjust lifecycle activity strategies for assets that are particularly exposed or vulnerable to the impacts of climate change.
- Develop policies that outline a commitment to consider the impact of climate change on existing infrastructure and future development.
- Include climate change considerations into the design and planning phase of asset lifecycle.
- Integrate impacts of climate change into risk management frameworks.
- Develop disaster mitigation plans in the event of infrastructure failure.

7.0 Levels of Service Framework

7.1.1 Introduction

The primary responsibility of a municipality is to ensure that they are providing adequate and sustainable services to their community. This outcome is generally supported by organizational objectives, mission statements, and official plans that outline the rationale for these activities.

To ensure that organizational objectives align with expected service outcomes, it is necessary to develop a process for the systematic measurement, monitoring, and evaluation of an organization's level of service. A level of service can be defined as a description of the service output for an activity or service area against which performance may be measured. To put it simply, a level of service is a measure of what a municipality is providing to its community.

7.1.2 Performance Measurement

Performance measurement is a key component of an effective level of service strategy. It allows the Town to analyze how well you are meeting the needs and expectations of your stakeholders, and identify where there are gaps that need to be addressed. Developing realistic levels of service using meaningful key performance indicators (KPIs) is instrumental in managing citizen expectations, identifying areas requiring higher investments, driving organizational performance, and securing the highest value for money from public assets.

To facilitate this process, it is useful to develop a framework for tracking and evaluating the levels of service being provided. This will require the translation of organizational objectives and expected service outcomes into key performance indicators that reflect evolving demand on infrastructure, the organization's fiscal capacity, and overall organizational objectives. A centralized database that outlines levels of service along with the KPIs that will allow you to assess whether a level of service is being met will assist with this process. The Town should then collect data on its current performance for the chosen KPIs and establish targets that reflect the current fiscal capacity of the municipality, its corporate and strategic goals, and changes in demographics that may place additional demand on service areas.

7.1.3 Guiding Principles and Core Values

As a guide to developing and measuring levels of service, it is useful to understand what the public values in the provision of municipal services. **Table 41** provides an overview of the values that the municipality should strive to accommodate when delivering services to the public. These are based on the values that the public generally expects to be delivered when a service is being provided to them.

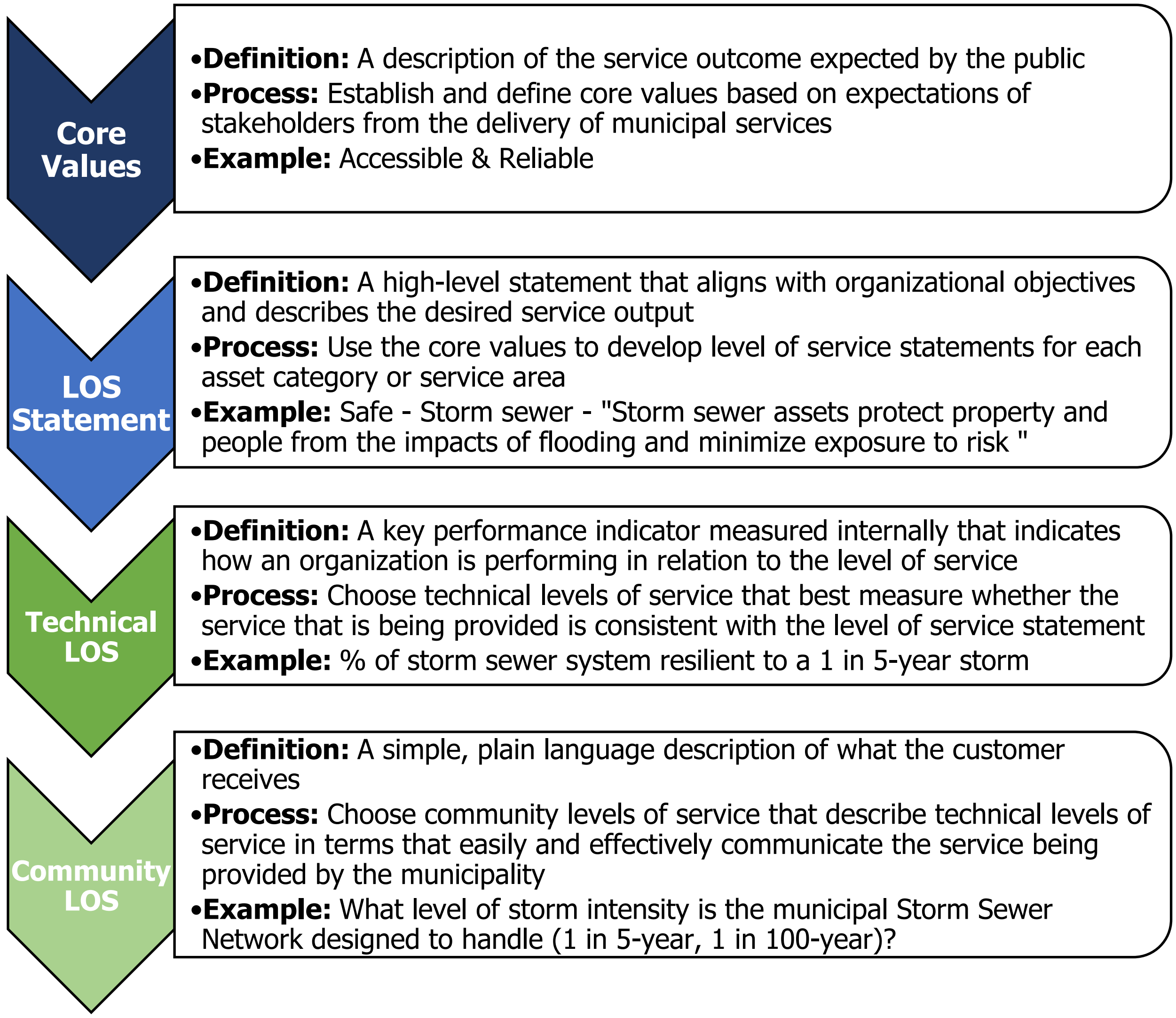
Table 41 Core Values Guiding Levels of Service

Value	Description
Accessible	Services are available and accessible for customers who require them.
Reliable	Services are provided with minimal service disruption and are available to customers in line with needs and expectations.
Safe	Services are delivered such that they minimize health, safety, and security risks.
Regulatory	Services meet regulatory requirements of all levels of government.
Affordable	Services are suitable for the intended function (fit for purpose).
Sustainable	Services are designed to be used efficiently and long-term plans are in place to ensure that they are available to all customers into the future.

7.1.4 Defining and Establishing Levels of Service

Figure 42 provides a basic guide to establishing levels of service.

Figure 42 Guide to Establishing Levels of Service



7.1.5 Selecting Technical Levels of Service

Deciding which KPIs to use when establishing technical levels of service is not a science, but there are a few key considerations to take into account. A good rule to follow in determining the best indicators is to use **SMART** system developed by the Institute of Public Works Engineering Australasia:

> KPIs should cover a **Specific** aspect of service, be **Measurable**, and have a clear plan for achieving targets (**Achievable**). They should also be **Relevant** to the level of service and strategic objective and have a clear timeframe for when targets will be achieved (**Timebound**).

7.1.6 Levels of Service Workshop

Workshop Date: July 24th, 2018

On July 24th, 2018 PSD met with Town staff to develop a customized levels of service framework. The initial presentation and discussion covered the importance of levels of service in an asset management program and the role that it should play in decision-making moving forward. From there the workshop focused on developing meaningful level of service statements, as well as technical and customer levels of service (included in the State of Local Infrastructure) that take into consideration the availability of data and the ability of these indicators to provide actionable data.

The Workshop concluded with an interview of Town staff on the various internal and external factors and trends that may affect their ability to provide expected levels of service in the future. The results of this interview are summarized in the following section.

7.1.7 Technical Levels of Service

The following tables outline the performance measures that the Town has selected to measure the current technical level of service provided to the community. At this time, staff are working towards measuring and collecting the data required to fill in this framework.

Table 42 Technical Levels of Service - Water Network

Asset Category	Core Value	Performance Measure	Current Level of Service
Water Network	Accessible & Reliable	% of properties connected to the municipal water system	TBD
		# of main breaks	TBD
		% of properties where fire flow is available	TBD
	Safe & Regulatory	# of boil-water advisory days	TBD
		# of fluoride advisories	TBD
		# of water quality customer complaints / 1,000 people served	TBD
	Affordable	(Average annual residential water bill / average household income) * 100	TBD
		Operating Cost (includes treatment and distribution) per capita	TBD
	Sustainable	% of the water system that is in good or very good condition	87%
		% of the water system that is in poor or very poor condition	6%
		# of operating FTEs / per km length	TBD
		Annual capital reinvestment rate	0.57%

Table 43 Technical Levels of Service - Sanitary Sewer Network

Asset Category	Core Value	Performance Measure	Current Level of Service
Sanitary Sewer Network	Accessible & Reliable	% of properties connected to the municipal wastewater system	TBD
		% of sanitary sewers flushed	TBD
		# of sanitary sewer backups	TBD
	Safe & Regulatory	# of events per year where sewer flow in the municipal wastewater system exceeds system capacity	TBD
		# of effluent violations per year due to wastewater discharge	TBD
	Affordable	(Average annual residential sewer bill / average household income) * 100	TBD
		Operating Cost (includes treatment and collection) per capita	TBD
	Sustainable	% of the wastewater system that is in good or very good condition	33%
		% of the wastewater system that is in poor or very poor condition	44%
		# of operating FTEs / per km length	TBD
		Annual capital reinvestment rate	0.47%

Table 44 Technical Levels of Service - Storm Water Network

Asset Category	Core Value	Performance Measure	Current Level of Service
Storm Water Network	Accessible & Reliable	# of customer complaints of surface flooding	TBD
		% of stormsewer mains flushed	TBD
		% of catch basins cleaned	TBD
	Safe & Regulatory	% of the municipal stormwater management system resilient to a 1 in 25-year storm event	TBD
	Affordable	Operating Cost per capita	TBD
	Sustainable	% of the stormwater system that is in good or very good condition	78%
		% of the stormwater system that is in poor or very poor condition	3%
		Annual capital reinvestment rate	0.8%

Table 45 Technical Levels of Service Road Network

Asset Category	Core Value	Performance Measure	Current Level of Service
Road Network	Accessible & Reliable	Average # of hours to complete pothole repair requests	TBD
		# of planned road closures	TBD
		Average duration of planned road closures	TBD
	Safe & Regulatory	% of sidewalks inspected	TBD
		% of road network inspected	TBD
	Affordable	Operating costs for paved roads / lane-km (excluding snow removal)	TBD
		Operating costs for unpaved roads / lane-km (excluding snow removal)	TBD
		Snow removal costs / lane-km	TBD
	Sustainable	Annual capital reinvestment rate	0.9%
		# of operating FTEs / km length	TBD
		Average condition of roads in the municipality	Good (61%)

Table 46 Technical Levels of Service – Bridges & Culverts

Asset Category	Core Value	Performance Measure	Current Level of Service
Bridges & Culverts	Accessible & Reliable	% of bridges in the municipality with loading or dimensional restrictions	TBD
		# of planned bridge closures	TBD
		Average duration of planned bridge closures (days)	TBD
	Safe & Regulatory	% of bridges & structural culverts inspected	TBD
	Affordable	Operating and capital costs for bridges & structural culverts per year	TBD
	Sustainable	Annual capital reinvestment rate	0%
		Average bridge & structural culvert condition rating	Fair (44%)

7.1.8 Community Levels of Service

The following tables outline the qualitative descriptions that the Town has selected to measure the current community level of service provided to the community. This has been developed in preparation for the requirements outlined in O.Reg. 588/17. At this time, staff are working towards measuring and collecting the data required to fill in this framework. This work will be completed prior to the development of the Town's next AMP by July 1, 2021.

Table 47 Community Levels of Service - Water Network

Asset Category	Core Value	Qualitative Description	Current Level of Service
Water Network	Accessible & Reliable	Description (which may include maps) of the user groups or areas of the municipality that are connected to the municipal water system	TBD
	Safe & Regulatory	Description of boil-water advisories and service interruptions	TBD
	Affordable	What is the water rate per cubic metre?	TBD
	Sustainable	When was the last time that the Water Network AMP was reviewed?	TBD

Table 48 Community Levels of Service - Sanitary Sewer Network

Asset Category	Core Value	Qualitative Description	Current Level of Service
Sanitary Sewer Network	Accessible & Reliable	Description (which may include maps) of the user groups or areas of the municipality that are connected to the municipal wastewater system	TBD
	Safe & Regulatory	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	TBD
		Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	TBD
	Affordable	What is the sewer rate per cubic metre of water consumption?	TBD
	Sustainable	When was the last time that the Sanitary Sewer Network AMP was reviewed?	TBD

Table 49 Community Levels of Service Storm Water Network

Asset Category	Core Value	Qualitative Description	Current Level of Service
Storm Water Network	Accessible & Reliable	Description (which may include maps) 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	TBD
	Safe & Regulatory	What level of storm intensity is the municipal stormwater network designed to handle (e.g. 1 in 5-year)?	TBD
	Affordable	What is the operating cost to maintain the stormwater network per household?	TBD
	Sustainable	When was the last time that the Storm Water Network AMP was reviewed?	TBD

Table 50 Community Levels of Service - Road Network

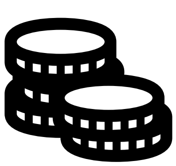
Asset Category	Core Value	Qualitative Description	Current Level of Service
Road Network	Accessible & Reliable	Description (which may include maps) of the road network in the municipality and its level of connectivity	TBD
	Safe & Regulatory	Description of internal maintenance standards for the road network	TBD
	Affordable	What is the operating cost to maintain the road network per capita?	TBD
	Sustainable	When was the last time the Road Network AMP was reviewed?	TBD

Table 51 Community Levels of Service – Bridges & Culverts

Asset Category	Core Value	Qualitative Description	Current Level of Service
Bridges & Culverts	Accessible & Reliable	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	TBD
	Safe & Regulatory	Description of the BIM inspection process	TBD
	Affordable	What is the combined operating and capital cost to maintain bridges and structural culverts per year?	TBD
	Sustainable	When was the last time the bridges & structural culverts AMP was reviewed?	TBD

7.2 Trends Impacting Levels of Service

The provision of desired levels of service is not simply a matter of proper asset management. There are a wide range of internal and external factors that may impact the ability of a municipality to provide reliable public services. As part of the Levels of Service Workshop, PSD interviewed Town staff to gain greater insight into the challenges and opportunities facing the municipality now and into the future. The following sections summarize the results of this interview:



Fiscal Capacity

Maintaining municipal infrastructure and providing desired levels of service requires the allocation of adequate financial resources. Fiscal capacity and budget constraints are a constant concern for staff across all departments attempting to manage the maintenance and rehabilitation of municipal infrastructure. Staff remarked that because of the distinct lack of available funds most asset management practices have become reactive by default. While there is a keen understanding of the benefits of a proactive approach to managing the lifecycle of infrastructure assets, there simply is not enough funding to engage in more proactive maintenance, rehabilitation, and replacement activities. Managing the infrastructure deficit is a key concern, not only for Edson, but all municipalities. Capital funding is often negatively impacted by increasing operating costs. With a lack of adequate funding available to complete all required activities, it is critical that Town staff develop and support a network-wide risk assessment framework to prioritize infrastructure projects and ensure that limited funds are dispersed effectively to achieve the greatest benefit to the community.

Municipalities typically have few means at their disposal to raise adequate and sustainable funding to meet operational and capital requirements. As a result, they are heavily dependent on both provincial and federal grant programs to maintain and replace municipal infrastructure. Any fluctuations in annual grant funding can have a dramatic impact on provided services. In recent years, staff have observed a decrease in grant funding opportunities and expect additional programs to expire soon. As a result, those programs that are still available are found to be highly competitive both within Alberta and across the country. Nevertheless, staff apply to as many available grant funding programs as possible. In the absence of reliable grant funding programs, the Town will have to explore how existing revenue sources can be leveraged to ensure that existing municipal infrastructure is adequately maintained.

Aging Infrastructure

The condition and performance of municipal infrastructure assets directly correlates to the quality of services a municipality can deliver to its residents. Aging and deteriorating assets increasingly remain in service past their estimated service lives due to a lack of fiscal capacity to replace or rehabilitate as needed. Staff expressed concern about the current state of underground infrastructure because some water and sewer mains are currently in critical condition. There is some concern that Council is less inclined to see these types of projects as particularly attractive, which may further contribute to their continued underfunding. Due to age and rapid deterioration there is concern that many will need to be replaced soon and that planning will be required to ensure that adequate funding is allocated to address these needs. In addition to underground infrastructure there was also concern about the current condition of buildings and community facilities. Additional capital investment may be required in order to meet both the existing desires of citizens and as a tool to attract population growth and economic activity.

Demographic Change and Expected Growth

Municipal demographics can also serve as an infrastructure demand driver and, as a result, can change how a municipality decides to allocate its resources. Population growth is also a significant demand driver for existing assets and may require the municipality to construct new infrastructure to parallel community expectations.

While the Town has a Municipal Development Plan that identifies expected future growth it has not been formally integrated into it's asset management planning to date. Over time these growth projections should be accounted for in short-, medium-, and long-term capital projections to better identify the costs associated with population growth. However, staff also observed that growth has been stagnant since the economic downturn. In fact, some infrastructure that was developed to accommodate expected growth has been left underutilized.

Community Expectations

The general public will often have their own opinions about how a public service should be delivered. Municipal staff are tasked with balancing requests from the public with the reality of available funding to provide the best service possible at the lowest total cost. This can be a difficult task as there is often a significant gap between expectations and reality. Town staff remarked that there has been a noticeable increase in service expectations in recent years. Particularly, for snow removal, parks and recreation facilities, and programming. Managing these expectations can be a tricky task, but it can also be made easier through the development of a level of service framework and the use of community and technical levels of service to better communicate the scope and resources required to provide adequate services to the community.

Organizational Change and Capacity

Managing municipal assets and delivering public services requires adequate organizational capacity. The availability of staff to facilitate these projects is a concern for many municipalities. Town staff remarked that there has been significant organizational restructuring in recent years that has led to the creation of new departments and roles. While this has been a challenging period of transition it is agreed that this has led to positive outcomes and ultimately created a more efficient and financially prudent organization that is better equipped to accommodate evolving service expectations.

Succession planning is one of the key challenges that an aging municipal workforce faces as senior staff progress towards possible retirement. The loss of knowledge and experience that accompanies staff departures can have a dramatic impact on the ability of an organization to continue operations and provide services to the level that has previously been expected. In Edson, many members of the senior management team are nearing retirement and there is an expectation of considerable turnover within the next two years. It is critical that the knowledge and experience of these employees is preserved and/or transferred to existing staff who can take on these roles and ensure that levels of service are managed consistently and effectively. Fortunately, staff remarked that there are succession planning strategies in place and that the Town's middle management team is full of young, capable individuals.

7.3 Recommendations

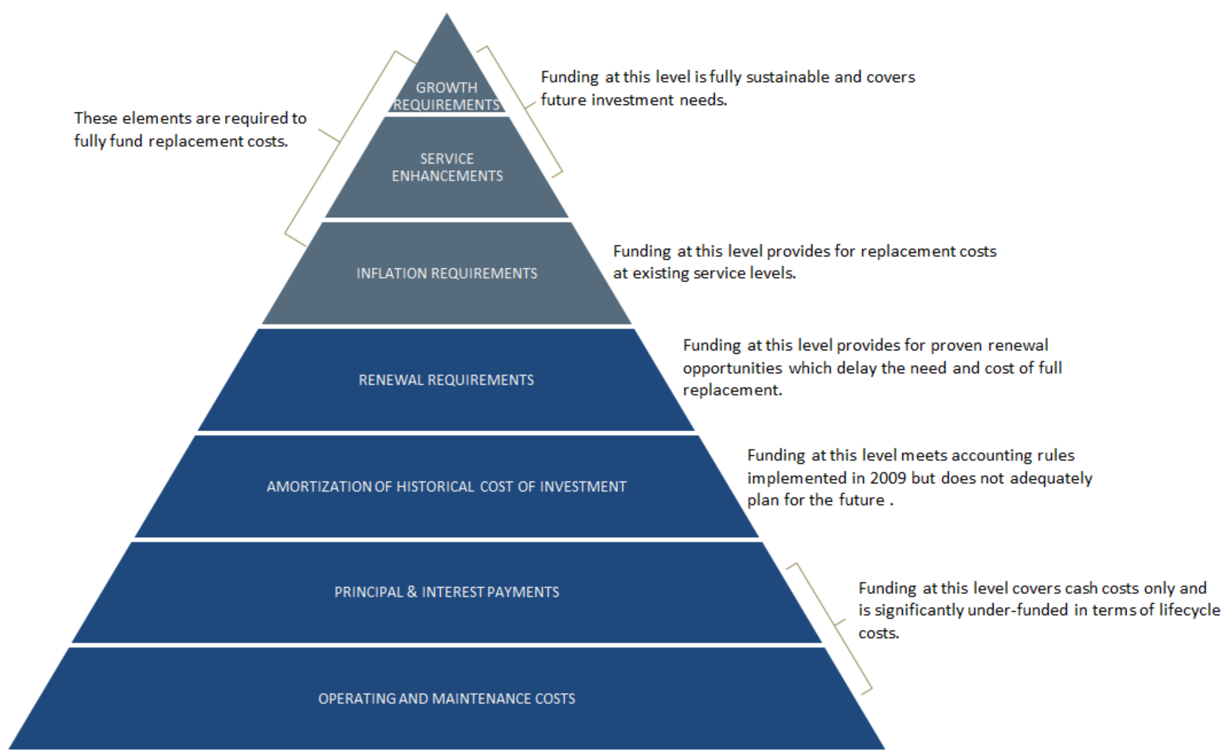
- Begin to measure current levels of service as part of a comprehensive performance measurement framework.
- Once current levels of service have been measured, establish target levels of service.
- Evaluate levels of service on an annual basis and adjust targets in collaboration with Council in an effort to balance community expectations, cost, risk, and performance.
- Communicate provided levels of service with the public and engage in public consultation to identify emerging perceptions and priorities.

8.0 Financial Strategy

In order for an asset management plan to be effective and meaningful, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the Town of Edson to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

8.1 Financial Strategy Overview

The following pyramid depicts the various cost elements and resulting funding levels that should be incorporated into a financial strategy based on best practices.



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

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels (none identified for this plan)
    d. Requirements of anticipated growth (none identified for this plan)

2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves
    d. Debt
    e. Development charges

3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods

4. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants

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

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

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

This financial strategy includes recommendations that avoid long-term funding deficits.

8.2 Funding Objective

We have developed two scenarios that would enable Edson to achieve full funding within 5 to 20 years for the following assets:

1. **Tax Funded Assets**: Road Network, Bridges, Storm Water Network, Machinery & Equipment, Buildings and Vehicles

2. **Rate Funded Assets**: Sanitary Sewer Network, Water Network

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

The two scenarios are as follows:

1. **End of Life Scenario:** Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Activities Scenario:** Based on the assumption that lifecycle activities are performed at the optimal time to extend the estimated useful life of assets at the lowest cost; assets are replaced at the end of the extended estimated useful life.

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

8.3 Financial Profile: Tax Funded Assets

8.3.1 Current Funding Position – End of Life Scenario

Table 52 and **Table 53** outline, by asset category, Edson' average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Table 52 Summary of Infrastructure Requirements & Current Funding Available

Asset Category	Average Annual Investment Required	2018 Annual Funding Available					Annual Deficit/Surplus
		Taxes	Gas Tax	Municipal Sustainability Initiative	BMTG	Total Funding Available	
Road Network	3,795,000	45,000	464,000	325,000	126,000	960,000	2,835,000
Storm Water Network	869,000	45,000	0	325,000	126,000	496,000	373,000
Bridges & Culverts	194,000	0	0	0	0	0	194,000
Buildings	1,500,000	60,000	0	0	0	60,000	1,440,000
Machinery & Equipment	753,000	57,000	0	0	0	57,000	696,000
Vehicles	311,000	235,000	0	0	0	235,000	76,000
Land Improvements	811,000	35,000	0	200,000	0	235,000	576,000
Total:	**8,233,000**	**477,000**	**464,000**	**850,000**	**252,000**	**2,043,000**	**6,190,000**

Under the end of life scenario, the average annual investment requirement for the above categories is $8,233,000. Annual revenue currently allocated to these assets for capital purposes is $2,043,000 leaving an annual deficit of $6,190,000. Put differently, under an end of life scenario, these infrastructure classes are currently funded at 25% of their long-term requirements.

8.3.2 Full Funding Requirements – End of Life Scenario

In 2017, Edson had annual tax revenues of $10,732,000. As illustrated in **Table 53**, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Table 53 Tax Change Required for Full Funding – End of Life Scenario

Asset Category	Tax Change Required for Full Funding
Road Network	26.4%
Storm Water Network	3.5%
Bridges & Culverts	1.8%
Buildings	13.4%
Machinery & Equipment	6.5%
Vehicles	0.7%
Land Improvements	5.4%
Total:	**57.7%**

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

a) As illustrated in **Table 66**, Edson's debt payments for these asset categories will be decreasing by $78,000 over the next 5 years and by $370,000 over the next 10 years. Although not shown in the table, debt payment decreases will be $412,000 over both the next 15 and 20 years respectively.

Our analysis of this scenario includes capturing the above changes and allocating them to the infrastructure deficit outlined above.

Table 54 outlines this concept and presents a number of options:

Table 54 Effect of Reallocating Decreases in Debt Costs

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	6,190,000	6,190,000	6,190,000	6,190,000	6,190,000	6,190,000	6,190,000	6,190,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-78,000	-370,000	-412,000	-412,000
Resulting Infrastructure Deficit:	6,190,000	6,190,000	6,190,000	6,190,000	6,112,000	5,820,000	5,778,000	5,778,000
Resulting Tax Increase Required	57.7%	57.7%	57.7%	57.7%	57.0%	54.2%	53.8%	53.8%
Annually:	11.5%	5.8%	3.8%	2.9%	11.4%	5.4%	3.6%	2.7%

8.3.3 Current Funding Position – Lifecycle Activities Scenario

As described in this report, investing in a lifecycle activity strategy (as opposed to an end of life replacement strategy) would enable Edson to lower its average annual capital requirements by $1,148,000. The table below summarizes the difference:

Table 55 Annual Capital Requirements Comparison - End of Life vs Lifecycle Activities

	Annual Capital Requirements		
	End of Life	Lifecycle Activities	Change
Road Network	3,795,000	2,647,000	1,148,000
Storm Water Network	869,000	869,000	0
Bridges & Culverts	194,000	194,000	0
Buildings	1,500,000	1,500,000	0
Machinery & Equipment	753,000	753,000	0
Vehicles	311,000	311,000	0
Land Improvements	811,000	811,000	0
Total:	**8,233,000**	**7,085,000**	**1,148,000**
Note:			
Change is net of annual cost of lifecycle activities			

Table 56 and **Table 57** restate, by asset category, Edson's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes under the lifecycle activities scenario. The

bottom-line difference to the information presented in the end of life scenario is that annual requirements and the annual deficit both decrease by $1,148,000. Current funding remains unchanged.

Table 56 Summary of Infrastructure Requirements & Current Funding Available - Lifecycle Activities Scenario

Asset Class	Average Annual Investment Required	2018 Annual Funding Available					Annual Deficit/Surplus
		Taxes	Gas Tax	Municipal Sustainability Initiative	BMTG	Total Funding Available	
Road Network	2,647,000	45,000	464,000	325,000	126,000	960,000	1,687,000
Storm Water Network	869,000	45,000	0	325,000	126,000	496,000	373,000
Bridges & Culverts	194,000	0	0	0	0	0	194,000
Buildings	1,500,000	60,000	0	0	0	60,000	1,440,000
Machinery & Equipment	753,000	57,000	0	0	0	57,000	696,000
Vehicles	311,000	235,000	0	0	0	235,000	76,000
Land Improvements	811,000	35,000	0	200,000	0	235,000	576,000
Total:	**7,085,000**	**477,000**	**464,000**	**850,000**	**252,000**	**2,043,000**	**5,042,000**

Under the lifecycle activities scenario, the average annual investment requirement for the above categories is $7,085,000. Annual revenue currently allocated to these assets for capital purposes is $2,043,000 leaving an annual deficit of $5,042,000. In other words, under a lifecycle activities scenario, these infrastructure classes are currently funded at 29% of their long-term requirements.

In 2018, Edson had annual tax revenues of $10,732,000. As illustrated in **Table 57**, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Table 57 Tax Change Required for Full Funding - Lifecycle Activities Scenario

Asset Category	Tax Change Required for Full Funding
Road Network	15.7%
Storm Water Network	3.5%
Bridges & Culverts	1.8%
Buildings	13.4%
Machinery & Equipment	6.5%
Vehicles	0.7%
Land Improvements	5.4%
Total:	**47.0%**

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

a) As illustrated in **Table 66**, Edson's debt payments for these asset categories will be decreasing by $78,000 over the next 5 years and by $370,000 over the next 10 years. Although not shown in the table, debt payment decreases will both be $412,000 over the next 15 and 20 years respectively.

Our analysis of this scenario includes capturing the above changes and allocating them to the infrastructure deficit outlined above. **Table 58** outlines this concept and presents a number of options.

Table 58 Effect of Reallocating Decreases in Debt Costs - Lifecycle Activities Scenario

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	5,042,000	5,042,000	5,042,000	5,042,000	5,042,000	5,042,000	5,042,000	5,042,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-78,000	-370,000	-412,000	-412,000
Resulting Infrastructure Deficit:	5,042,000	5,042,000	5,042,000	5,042,000	4,964,000	4,672,000	4,630,000	4,630,000
Tax Increase Required	47.0%	47.0%	47.0%	47.0%	41.5%	38.7%	38.3%	38.3%
Annually:	9.4%	4.7%	3.1%	2.4%	9.3%	4.4%	2.9%	2.2%

8.3.4 Financial Strategy Recommendations

Table 59 summarizes the key financial differences between the end of life scenario and the lifecycle activities scenario:

Table 59 Budget Scenario Comparison - Tax-Funded Assets

				Annual Tax Change Required			
Scenario	Annual Requirement	Current Annual Funding	Current Annual Deficit	5 Years	10 Years	15 Years	20 Years
End of Life	8,233,000	2,043,000	6,190,000	11.4%	5.4%	3.6%	2.7%
Lifecycle Activities	7,085,000	2,043,000	5,042,000	9.3%	4.4%	2.9%	2.2%
Change:	**1,148,000**	**0**	**1,148,000**	**2.1%**	**1.0%**	**0.7%**	**0.5%**

Considering all of the above information, we recommend the lifecycle activities strategy and the 20-year option in **Table 58** that includes the funding changes. This involves full funding being achieved over 20 years by:

a) increasing tax revenues by 2.2% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP

b) when realized, reallocating the debt cost reductions of $412,000 to the infrastructure deficit as outlined above

c) allocating the current non-tax revenue as outlined in **Table 58** (see note below)

d) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding cannot be incorporated into an AMP unless there are firm commitments in place.

2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $12,244,000 as identified in **Figure 8**. Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

8.4 Financial Profile: Rate Funded Assets

8.4.1 Current Funding Position – End of Life Scenario

Table 60 and **Table 61** outline, by asset category, Edson' average annual capital requirements, current funding positions and funding increases required to achieve full funding on assets funded by rates.

Table 60 Summary of Infrastructure Requirements & Current Funding Available – End of Life Scenario

Asset Category	Average Annual Investment Required	2018 Annual Funding Available				Annual Deficit/Surplus
		Rates	Less: Allocated to Operations	Other	Total Funding Available	
Sanitary Sewer Network	2,357,000	1,153,000	-983,000	496,000	666,000	1,691,000
Water Network	1,184,000	1,219,000	-1,219,000	496,000	496,000	688,000
Total:	**3,541,000**	**2,372,000**	**-2,202,000**	**992,000**	**1,162,000**	**2,379,000**

Under the end of life replacement scenario, the average annual capital requirement for the Water Network and Sanitary Sewer Network is $3,541,000. Annual revenue currently allocated to these assets for capital purposes is $1,162,000 leaving an annual deficit of $2,379,000. To put it another way, these infrastructure categories are currently funded at 33% of their long-term capital requirements.

In 2018, Edson has annual sanitary revenues of $1,153,000 and annual water revenues of $1,219,000. As illustrated in **Table 61**, without consideration of any other sources of revenue, full funding would require the following changes over time:

Table 61 Rate Increase Required for Full Funding

Asset Category	Tax Change Required for Full Funding
Sanitary Sewer Network	146.7%
Water Network	56.4%

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

a) As illustrated in **Table 66**, Edson's debt payments for sanitary services will be decreasing by $4,000 over the next 5 years and by $8,000 over the next 10 years. Although not shown in the table, debt payment decreases will be $8,000 over the next 15 years and $702,000 over the next 20 years. For water services, the amounts are $4,000, $7,000, $177,000 and $177,000 respectively.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined above. **Table 62** and **Table 63** outline this concept and presents a number of options:

Table 62 Allocation Without Change in Costs – End of Life Scenario

	Sanitary Sewer Network				Water Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,691,000	1,691,000	1,691,000	1,691,000	688,000	688,000	688,000	688,000
Rate Increase Required	146.7%	146.7%	146.7%	146.7%	56.4%	56.4%	56.4%	56.4%
Annually:	**29.3%**	**14.7%**	**9.8%**	**7.3%**	**11.3%**	**5.6%**	**3.8%**	**2.8%**

Table 63 Allocation with Change in Costs - End of Life Scenario

	Sanitary Sewer Network				Water Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,691,000	1,691,000	1,691,000	1,691,000	688,000	688,000	688,000	688,000
Change in Debt Costs	-4,000	-8,000	-8,000	-702,000	-4,000	-7,000	-177,000	-177,000
Resulting Infrastructure Deficit:	1,687,000	1,683,000	1,683,000	989,000	684,000	681,000	511,000	511,000
Resulting Rate Increase Required	146.3%	146.0%	146.0%	85.8%	56.1%	55.9%	41.9%	41.9%
Annually:	29.3%	14.6%	9.7%	4.3%	11.2%	5.6%	2.8%	2.1%

8.4.2 Financial Strategy Recommendations

Considering all of the above information, we recommend the 20-year option in **Table 63** that includes the reallocations. This involves full funding being achieved over 20 years by:

d) when realized, reallocating the debt cost reductions of $702,000 for sanitary services and $177,000 for water services to the applicable infrastructure deficit.

e) increasing rate revenues by 4.3% for sanitary services and 2.1% for water services each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.

f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.

2. We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

3. Any increase in rates required for operations would be in addition to the above recommendations.

Although this option achieves full funding on an annual basis and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $0 for sanitary services and $48,000 for water services. Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

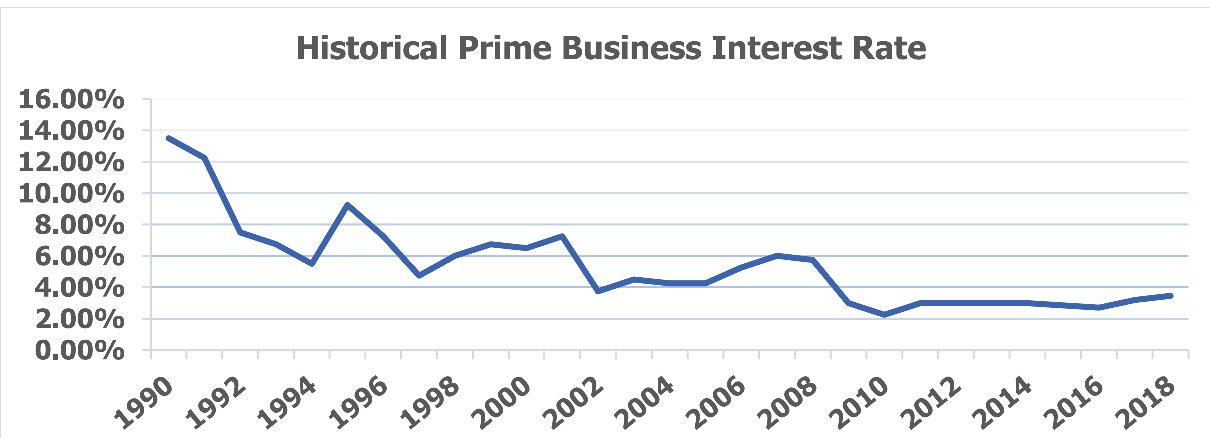
8.5 Use of Debt

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% 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 take into account the time value of money or the effect of inflation on delayed projects.

Table 64 Total Interest Paid as a % of Project Costs

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

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



As illustrated in **Table 64**, a change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

Table 65 and **Table 66** outline how Edson has historically used debt for investing in the asset categories as listed. There is currently $14,209,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $1,291,000.

Table 65 Overview of Use of Debt

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2013	2014	2015	2016	2017
Road Network	2,364,000	451,000	0	0	0	0
Storm Water Network	26,000	44,000	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Buildings	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Land Improvements	4,000	6,000	0	0	0	0
Total Tax Funded:	**2,394,000**	**501,000**	**0**	**0**	**0**	**0**
Sanitary Sewer Network	1,827,000	57,000	0	0	0	0
Water Network	9,988,000	76,000	0	0	10,325,000	0
Total Rate Funded:	**11,815,000**	**133,000**	**0**	**0**	**10,325,000**	**0**

Table 66 Overview of Debt Costs

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2018	2019	2020	2021	2022	2023	2028
Road Network	406,000	406,000	406,000	384,000	370,000	331,000	42,000
Storm Water Network	5,000	5,000	5,000	5,000	5,000	2,000	0
Bridges & Culverts	0	0	0	0	0	0	0
Buildings	0	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0	0
Land Improvements	1,000	1,000	1,000	1,000	1,000	1,000	0
Total Tax Funded:	**412,000**	**412,000**	**412,000**	**390,000**	**376,000**	**334,000**	**42,000**
Sanitary Sewer Network	177,000	177,000	177,000	177,000	177,000	173,000	170,000
Water Network	702,000	702,000	702,000	702,000	702,000	698,000	694,000
Total Rate Funded:	**879,000**	**879,000**	**879,000**	**879,000**	**879,000**	**871,000**	**864,000**

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

8.6 Use of Reserves

8.6.1 Available Reserves

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

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

By asset category, **Table 67** outlines the details of the reserves currently available to Edson.

Table 67 Summary of Reserves Available

Asset Category	Balance at December 31, 2017
Road Network	403,000
Storm Water Network	465,000
Bridges & Culverts	0
Buildings	10,752,000
Machinery & Equipment	913,000
Vehicles	436,000
Land Improvements	187,000
Total Tax Funded:	**13,156,000**
Sanitary Sewer Network	573,000
Water Network	403,000
Total Rate Funded:	**976,000**

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

a) breadth of services provided
b) age and condition of infrastructure
c) use and level of debt
d) economic conditions and outlook

e) internal reserve and debt policies.

The reserves in **Table 67** are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Edson' judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

8.6.2 Recommendation

As Edson updates its AMP and expands it to include other asset categories, we recommend that future planning should include determining what its long-term reserve balance requirements are and a plan to achieve such balances.

Appendix A: Infrastructure Report Card Description

Table 68 Infrastructure Report Card Description

Current Financial Capacity		A municipality's financial capacity grade is determined by the level of funding available (0-100%) for each asset category for the purpose of meeting the average annual investment requirements.
Asset Health		Using either field inspection data as available or age-based data, the asset health component of the report card uses condition (0-100%) to estimate how capable assets are in performing their required functions. We use replacement cost to determine the weight of each condition group within the asset category.
Letter Grade	Rating	Description
A	Very Good	The asset is functioning and performing well; only normal preventive maintenance is required. The municipality is fully prepared for its long-term replacement needs based on its existing infrastructure portfolio.
B	Good	The municipality is well prepared to fund its long-term replacement needs but requires additional funding strategies in the short-term to begin to increase its reserves.
C	Fair	The asset's performance or function has started to degrade, and repair/rehabilitation is required to minimize lifecycle cost. The municipality is underpreparing to fund its long-term infrastructure needs. The replacement of assets in the short- and medium-term will likely be deferred to future years.
D	Poor	The asset's performance and function metrics are below the desired level and immediate repair/rehabilitation is required. The municipality is not well prepared to fund its replacement needs in the short-, medium- or long-term. Asset replacements will be deferred and levels of service may be reduced.
F	Very Poor	The municipality is significantly underfunding its short-term, medium-term, and long-term infrastructure requirements based on existing funds allocation. Asset replacements will be deferred indefinitely. The municipality may have to divest some of its assets (e.g., bridge closures, arena closures) and levels of service will be reduced significantly.

Table 69 Asset Health Grading Scale

Letter Grade	Rating	Description
A	Excellent	Asset is new or recently rehabilitated
B	Good	Asset is no longer new but is fulfilling its function. Preventive maintenance is beneficial at this stage.
C	Fair	Deterioration is evident but asset continues to full its function. Preventive maintenance is beneficial at this stage.
D	Poor	Significant deterioration is evident, and service is at risk.
F	Very Poor	Asset is beyond expected life and has deteriorated to the point that it may no longer be fit to fulfill its function.

Table 70 Current Financial Capacity Grade Scale

Letter Grade	Rating	Funding percent	Timing Requirements	Description
A	Excellent	90-100 percent	☑ Short Term ☑Medium Term ☑Long Term	The municipality is fully prepared for its short-, medium- and long-term replacement needs based on existing infrastructure portfolio.
B	Good	70-89 percent	☑Short Term ☑Medium Term ☒Long Term	The municipality is well-prepared to fund its short-term and medium-term replacement needs but requires additional funding strategies in the long-term to begin to increase its reserves.
C	Fair	60-69 percent	☑Short Term ☒Medium Term ☒Long Term	The municipality is underprepared to fund its medium- to long-term infrastructure needs. The replacement of assets in the medium-term will likely be deferred to future years.
D	Poor	40-59 percent	☒/☑ Short Term ☒Medium Term ☒Long Term	The municipality is not well prepared to fund its replacement needs in the short-, medium- or long-term. Asset replacements will be deferred and levels of service may be reduced.
F	Very Poor	0-39 percent	☒Short Term ☒Medium Term ☒Long Term	The municipality is significantly underfunding its short-term, medium-term, and long-term infrastructure requirements based on existing funds allocation. Asset replacements will be deferred indefinitely. The municipality may have to divest some of its assets (e.g., bridge closures, arena closures) and levels of service will be reduced significantly.