AMP2016

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The 2016 Asset Management Plan for the

Municipality of Arran-Elderslie

SUBMITTED BY THE PUBLIC SECTOR DIGEST INC. (PSD)
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Contents

Executive Summary 5
I. Introduction & Context 7
II. Asset Management 8
1. Overarching Principles 9
III. AMP Objectives and Content 10
IV. Data and Methodology 11
1. Condition Data 11
2. Financial Data 12
3. Infrastructure Report Card 13
4. Limitations and Assumptions 14
5. Process 15
6. Data Confidence Rating 16
V. Summary Statistics 17
1. Asset Valuation 18
2. Source of Condition Data by Asset Class 20
3. Historical Investment in Infrastructure – All Asset Classes 21
4. Useful Life Consumption – All Asset Classes 22
5. Overall Condition – All Asset Classes 23
6. Financial Profile 24
7. Replacement Profile – All Asset Classes 25
8. Data Confidence 26
VI. State of Local Infrastructure 27
1. Road Network 28
2. Bridges & Culverts 35
3. Water System 42
4. Sanitary Services 49
5. Storm Network 56
6. Buildings & Facilities 63
7. Machinery & Equipment 70
8. Land Improvements 77
9. Vehicles 84
VII. Levels of Service 91
1. Guiding Principles for Developing LOS 91
2. Key Performance Indicators and Targets 92
3. Future Performance 96
4. Monitoring, Updating and Actions 97
VIII. Asset Management Strategies 98
1. Non-Infrastructure Solutions & Requirements 99
2. Condition Assessment Programs 99
3. Lifecycle Analysis Framework 105
4. Growth and Demand 111
5. Project Prioritization and Risk Management 111
IX. Financial Strategy 121
1. General Overview 121
2. Financial Profile: Tax Funded Assets 124
3. Financial Profile: Rate Funded Assets 128
4. Use of Debt 131
5. Use of Reserves 134
X. 2016 Infrastructure Report Card 135
XI. Appendix: Grading and Conversion Scales 136

List of Figures

Figure 1 Distribution of Net Stock of Core Public Infrastructure 7
Figure 2 Developing the AMP – Work Flow and Process 15
Figure 3 Asset Valuation by Class 18
Figure 4 2016 Ownership Per Household 19
Figure 5 Historical Investment in Infrastructure – All Asset Classes 21
Figure 6 Useful Life Remaining as of 2016 – All Asset Classes 22
Figure 7 Asset Condition Distribution by Replacement Cost as of 2016 – All Asset Classes 23
Figure 8 Annual Requirements by Asset Class 24
Figure 9 Infrastructure Backlog – All Asset Classes 24
Figure 10 Replacement Profile – All Asset Classes 25
Figure 11 Asset Valuation – Road Network 29
Figure 12 Historical Investment – Road Network 30
Figure 13 Useful Life Consumption - Road Network 31
Figure 14 Asset Condition – Road Network (Primarily Assessed) 32
Figure 15 Forecasting Replacement Needs – Road Network 33
Figure 16 Asset Valuation – Bridges & Culverts 36
Figure 17 Historical Investment – Bridges & Culverts 37
Figure 18 Useful Life Consumption – Bridges & Culverts 38
Figure 19 Asset Condition – Bridges & Culverts (Assessed) 39
Figure 20 Forecasting Replacement Needs – Bridges & Culverts 40
Figure 21 Asset Valuation – Water System 43
Figure 22 Historical Investment – Water System 44
Figure 23 Useful Life Consumption – Water System 45
Figure 24 Asset Condition – Water System (Assessed and Age-based) 46
Figure 25 Forecasting Replacement Needs – Water System 47
Figure 26 Asset Valuation – Sanitary Services 50
Figure 27 Historical Investment – Sanitary Services 51
Figure 28 Useful Life Consumption – Sanitary Services 52
Figure 29 Asset Condition – Sanitary Services (Assessed and Age-based) 53
Figure 30 Forecasting Replacement Needs – Sanitary Services 54
Figure 31 Asset Valuation – Storm Network 57
Figure 32 Historical Investment – Storm Network 58
Figure 33 Useful Life Consumption – Storm Network 59
Figure 34 Asset Condition – Storm Network (Primarily Age-based) 60
Figure 35 Forecasting Replacement Needs – Storm Network 61
Figure 36 Asset Valuation – Buildings & Facilities 64
Figure 37 Historical Investment – Buildings & Facilities 65
Figure 38 Useful Life Consumption – Buildings & Facilities 66
Figure 39 Asset Condition – Buildings & Facilities (Age-based) 67
Figure 40 Forecasting Replacement Needs – Buildings & Facilities 68
Figure 41 Asset Valuation – Machinery & Equipment 71
Figure 42 Historical Investment – Machinery & Equipment 72
Figure 43 Useful Life Consumption – Machinery & Equipment 73
Figure 44 Asset Condition – Machinery & Equipment (Age-based) 74
Figure 45 Forecasting Replacement Needs – Machinery & Equipment 75
Figure 46 Asset Valuation – Land Improvements 78
Figure 47 Historical Investment – Land Improvements 79
Figure 48 Useful Life Consumption – Land Improvements 80
Figure 49 Asset Condition - Land Improvements (Age-based) 81
Figure 50 Forecasting Replacement Needs – Land Improvements 82
Figure 51 Asset Valuation – Vehicles 85
Figure 52 Historical Investment – Vehicles 86
Figure 53 Useful Life Consumption – Vehicles 87
Figure 54 Asset Condition – Vehicles (Age-based) 88

Figure 55 Forecasting Replacement Needs – Vehicles 89
Figure 56 Comparing Age-based and Assessed Condition Data 100
Figure 57 Paved Road General Deterioration Profile 105
Figure 58 Sewer Main General Deterioration 108
Figure 59 Water Main General Deterioration 109
Figure 60 Bow Tie Risk Model 112
Figure 61 Distribution of Assets Based on Risk – All Asset Classes 116
Figure 62 Distribution of Assets Based on Risk – Road Network 116
Figure 63 Distribution of Assets Based on Risk – Bridges & Culverts 117
Figure 64 Distribution of Assets Based on Risk – Water System 117
Figure 65 Distribution of Assets Based on Risk – Sanitary Services 118
Figure 66 Distribution of Assets Based on Risk – Storm 118
Figure 67 Distribution of Assets Based on Risk – Buildings & Facilities 119
Figure 68 Distribution of Assets Based on Risk – Machinery & Equipment 119
Figure 69 Distribution of Assets Based on Risk – Land Improvements 120
Figure 70 Distribution of Assets Based on Risk – Vehicles 120
Figure 71 Cost Elements 122
Figure 72 Historical Prime Business Interest Rates 132

List of Tables

Table 1 Objectives of Asset Management 8
Table 2 Principles of Asset Management 9
Table 3 Infrastructure Report Card Description 13
Table 4 Source of Condition Data by Asset Class 20
Table 5 Data Confidence Ratings 26
Table 6 Key Asset Attributes – Road Network 28
Table 7 Key Asset Attributes – Bridges & Culverts 35
Table 8 Key Asset Attributes – Water 42
Table 9 Asset Inventory – Sanitary Services 49
Table 10 Asset Inventory – Storm Network 56
Table 11 Key Asset Attributes – Buildings & Facilities 63
Table 12 Asset Inventory – Machinery & Equipment 70
Table 13 Asset Inventory – Land Improvements 77
Table 14 Asset Inventory – Vehicles 84
Table 15 LOS Categories 91
Table 16 Key Performance Indicators – Road Network and Bridges & Culverts 92
Table 17 Key Performance Indicators – Buildings & Facilities 93
Table 18 Key Performance Indicators – Vehicles 93
Table 19 Key Performance Indicators – Water, Sanitary and Storm Networks 94
Table 20 Key Performance Indicators – Machinery & Equipment 95
Table 21 Key Performance Indicators – Land Improvements 95
Table 22 Asset Condition and Related Work Activity for Paved Roads 106
Table 23 Asset Condition and Related Work Activity for Sewer Mains 108
Table 24 Asset Condition and Related Work Activity for Water Mains 110
Table 25 Probability of Failure – All Assets 113
Table 26 Consequence of Failure – Roads 113
Table 27 Consequence of Failure – Bridges & Culverts 113
Table 28 Consequence of Failure – Water Mains 114
Table 29 Consequence of Failure – Sanitary Sewers 114
Table 30 Consequence of Failure – Storm Sewers 114
Table 31 Consequence of Failure – Buildings & Facilities 114
Table 32 Consequence of Failure – Machinery & Equipment 115
Table 33 Consequence of Failure – Land Improvements 115
Table 34 Consequence of Failure – Vehicles 115

Table 35 Infrastructure Requirements and Current Funding Available: Tax Funded Assets 124
Table 36 Tax Change Required for Full Funding 125
Table 37 Effect of Changes in OCIF Funding and Reallocating Decreases in Debt Costs 126
Table 38 Summary of Infrastructure Requirements and Current Funding Available 128
Table 39 Rate Change Required for Full Funding 129
Table 40 Revenue Options for Full Funding – Sanitary Sewer Network 129
Table 41 Revenue Options for Full Funding – Water Network 129
Table 42 Total Interest Paid as a Percentage of Project Costs 131
Table 43 Overview of Use of Debt 133
Table 44 Overview of Debt Costs 133
Table 45 Summary of Reserves Available 134
Table 46 2016 Infrastructure Report Card 135
Table 47 Asset Health Scale 136
Table 48 Financial Capacity Scale 137

Executive Summary

Infrastructure is inextricably linked to the economic, social and environmental advancement of a community. Municipality's own and manage nearly 60% of the public infrastructure stock in Canada. As analyzed in this asset management plan (AMP), the Municipality of Arran-Elderslie's infrastructure portfolio comprises the following asset classes: road network, bridges & culverts, buildings, storm, water, sanitary, machinery & equipment, land improvements, and vehicles. The asset classes analyzed in this asset management plan for the municipality had a total 2016 valuation of $219 million, of which roads comprised 45%, followed by water at 16%.

Strategic asset management is critical in extracting the highest total value from public assets at the lowest lifecycle cost. This AMP, the municipality's second following the completion of its first edition in 2013, details the state of infrastructure of the municipality's service areas and provides asset management and financial strategies designed to facilitate its pursuit of developing an advanced asset management program and mitigate long-term funding gaps.

In addition to observed field conditions, historical capital expenditures can assist the municipality in identifying impending infrastructure needs, and guide its medium- and long-term capital programs. The municipality has invested into its infrastructure consistently over the decades. Between 1980 and 1984, the period of largest investment, nearly $50 million was invested with $24 million being put into roads. Since 2015, $1.9 million has been invested primarily in water.

Based on 2016 replacement cost, and a combination of assessed and age-based data, 16% of assets, with a valuation of $34.6 million, are in poor to very poor condition; 66% are in good to very good condition. The municipality has provided condition assessment data for 71% of its assets based on 2016 replacement cost. 84% of the assets analyzed in this AMP have at least 10 years of useful life remaining. However, 8%, with a valuation of $17.1 million, remain in operation beyond their established useful life. An additional 3% will reach the end of their useful life within the next five years.

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 average annual investment requirement for tax funded categories is $6,477,000. Annual revenue currently allocated to these assets for capital purposes is $2,069,000, leaving an annual deficit of $4,408,000. To put it another way, these infrastructure categories are currently funded at 32% of their long-term requirements. In 2016, the municipality has annual tax revenues of $4,439,000. Our strategy includes full funding being achieved over 20 years by:

- increasing tax revenues by 4.7% each year for the next 20 years solely for the purpose of phasing in full funding to the tax funded asset classes covered in this AMP.
- allocating the current gas tax and OCIF revenue and scheduled increases to the infrastructure deficit as they occur.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

The average annual investment requirement for sanitary services and water services is $1,009,000. Annual revenue currently allocated to these assets for capital purposes is $1,403,000 leaving an annual surplus of $394,000. To put it another way, these infrastructure categories are currently funded at 139% of their long-term requirements. In 2016, Arran-Elderslie had annual sanitary revenues of $945,000 and annual water revenues of $1,332,000.

Before making any rate adjustments for these categories, it is recommended that the municipality develop a detailed project plan based on assessed asset condition as well as assess operational needs.

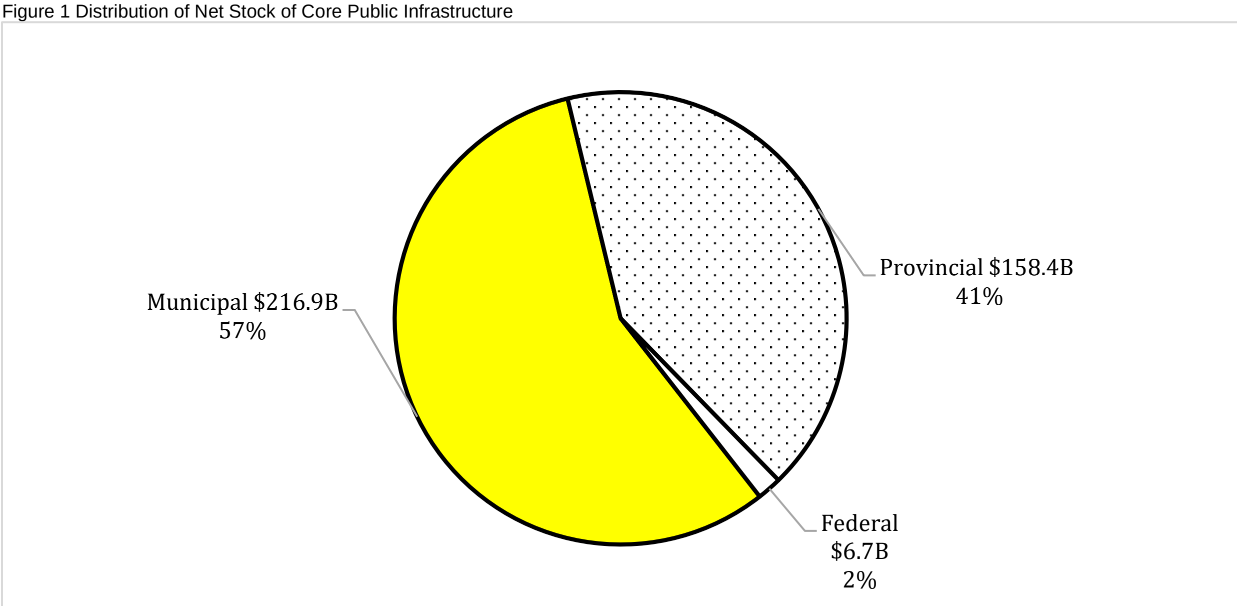
Although our financial strategies allow the municipality to meet its long-term funding requirements and reach fiscal sustainability, injection of additional revenues will be required to mitigate existing infrastructure backlogs.

A critical aspect of this asset management plan is the level of confidence the municipality has in the data used to develop the state of the infrastructure and form the appropriate financial strategies. The municipality has indicated a ____ degree of confidence in the accuracy, validity and completeness of the asset data for all categories analyzed in this asset management plan.

I. Introduction & Context

Across Canada, 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.[1]

Figure 1 Distribution of Net Stock of Core Public Infrastructure



Ontario's municipality's own more of the province's infrastructure assets than both the provincial and federal government. The asset portfolios managed by Ontario's municipalities are also highly diverse. The Municipality of Arran-Elderslie's capital assets portfolio, as analyzed in this asset management plan (AMP) is valued at $219 million using 2016 replacement costs. 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 the municipality manage these assets optimally in order to produce the highest total value for taxpayers. This asset management plan, (AMP) will assist the municipality in the pursuit of judicious asset management for its capital assets.

[1] Larry Miller, Updating Infrastructure In Canada: An Examination of Needs And Investments Report of the Standing Committee on Transport, Infrastructure and Communities, June 2015

II. Asset Management

Asset management can be best defined as an integrated business approach within an organization with the aim 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. It includes the planning, design, construction, operation and maintenance of infrastructure used to provide 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.

Table 1 Objectives of Asset Management

Inventory	Capture all asset types, inventories and historical data.
Current Valuation	Calculate current condition ratings and replacement values.
Lifecycle Analysis	Identify Maintenance and Renewal Strategies & Lifecycle Costs.
Service Level Targets	Define measurable Levels of Service Targets.
Risk & Prioritization	Integrates all asset classes through risk and prioritization strategies.
Sustainable Financing	Identify sustainable Financing Strategies for all asset classes.
Continuous Processes	Provide continuous processes to ensure asset information is kept current and accurate.
Decision Making & Transparency	Integrate asset management information into all corporate purchases, acquisitions and assumptions.
Monitoring & Reporting	At defined intervals, assess the assets and report on progress and performance.

1. Overarching Principles

The Institute of Asset Management (IAM) recommends the adoption of seven key principles for a sustainable asset management program. According to IAM, asset management must be:[2]

Table 2 Principles of Asset Management

Holistic	Asset management must be cross-disciplinary, total value focused.
Systematic	Rigorously applied in a structured management system.
Systemic	Looking at assets in their systems context, again for net, total value.
Risk-based	Incorporating risk appropriately into all decision-making.
Optimal	Seeking the best compromise between conflicting objectives, such as costs versus performance versus risks etc.
Sustainable	Plans must deliver optimal asset lifecycles, ongoing systems performance, environmental and other long term consequences.
Integrated	At the heart of good asset management lies the need to be joined-up. The total jigsaw puzzle needs to work as a whole - and this is not just the sum of the parts.

[2] "Key Principles", The Institute of Asset Management, *www.iam.org*

III. AMP Objectives and Content

This AMP is one component of Arran-Elderslie's overarching corporate strategy. It was developed to support the municipality's vision for its asset management practice and programs. It provides key asset attribute data, including current composition of the municipality's infrastructure portfolio, inventory, replacement costs, useful life etc., summarizes the physical health of the capital assets, enumerates the municipality's current capital spending framework, and outlines financial strategies to achieve fiscal sustainability in the long-term while reducing and eventually eliminating funding gaps.

As with the first edition of the municipality's asset management plan in 2013, this AMP is developed in accordance with provincial standards and guidelines, and new requirements under the Federal Gas Tax Fund (GTF) stipulating the inclusion of all eligible asset classes. Previously, only core infrastructure categories were analyzed. The following asset classes are analysed in this document: road network; bridges & culverts; water; sewer; storm; buildings; machinery & equipment; land improvements; and vehicles.

IV. Data and Methodology

The municipality's dataset for the asset classes analyzed in this AMP are maintained in PSD's CityWide® Tangible Assets module. This dataset includes key asset attributes and PSAB 3150 data, such as historical costs, in-service dates, field inspection data (as available), asset health, and replacement costs.

1. Condition Data

Municipality's implement a straight-line amortization schedule approach to depreciate their capital assets. In general, this approach may not be reflective of an asset's actual condition and the true nature of its deterioration, which tends to accelerate toward the end of the asset's lifecycle. However, it is a useful approximation in the absence of standardized decay models and actual field condition data and can provide a benchmark for future requirements. We analyze each asset individually prior to aggregation and reporting; therefore, many imprecisions that may be highlighted at the individual asset level are attenuated at the class level.

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 they provide a more accurate representation of the state of infrastructure. The type of condition data used for each class is indicated in Chapter V, Section 2.

2. Financial Data

In this AMP, the average annual requirement is the amount, based on current replacement costs, that municipalities should set aside annually for each infrastructure class 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; funding for the previous three years is analyzed as data is available. These figures are then assessed against the average annual requirements, and are used to calculate the annual funding shortfall (surplus) and for forming the financial strategies.

In addition to the annual shortfall, the majority of municipality's 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 class.

Only predictable sources of funding are used, e.g., tax and rate revenues, user fees, and other streams of income the municipality can rely on with a high degree of certainty. Government grants and other ad-hoc injections of capital are not included in this asset management plan given their unpredictability. As senior governments make greater, more predictable and permanent commitments to funding municipal infrastructure programs, e.g., the Federal Gas Tax Fund, future iterations of this asset management plan will account for such funding sources.

3. Infrastructure Report Card

The asset management plan is a complex document, but one with direct implications on the public, a group with varying degrees of technical knowledge. To make communications more meaningful and the AMP more accessible, we've developed an Infrastructure Report Card that summarizes our findings in common language that municipality's can use for internal and external distribution. The report card is developed using two key, equally weighted factors: Financial Capacity and Asset Health.

Table 3 Infrastructure Report Card Description

Financial Capacity		A municipality's financial capacity grade is determined by the level of funding available (0-100%) for each asset class 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 class.
Letter Grade	**Rating**	**Description**
A	Very Good	The asset is functioning and performing well; only normal preventative 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 is 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.

4. Limitations and Assumptions

Several limitations continue to persist as municipality's 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 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.

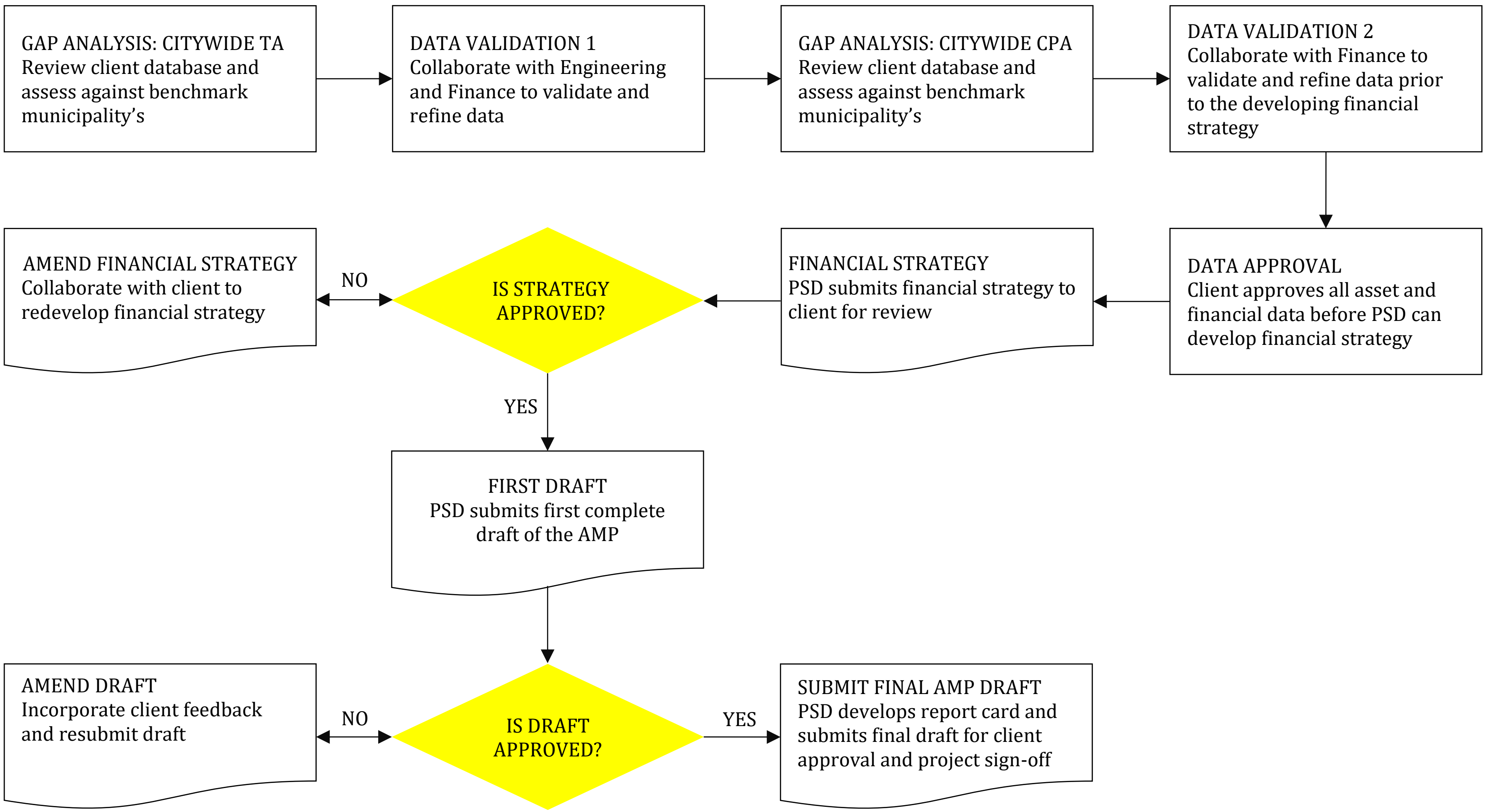
- Our calculations and recommendations will reflect the best available data at the time this AMP was developed.

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

5. Process

High data quality is the foundation of intelligent decision-making. Generally, there are two primary causes of poor decisions: inaccurate or incomplete data, and the misinterpretation of data used. The figure below illustrates an abbreviated version of our work order/work flow process between PSD and municipal staff. It is designed to ensure maximum confidence in the raw data used to develop the AMP, the interpretation of the AMP by all stakeholders, and ultimately, the application of the strategies outlined in this AMP.

Figure 2 Developing the AMP – Work Flow and Process



6. Data Confidence Rating

Staff confidence in the data used to develop the AMP can determine the extent to which recommendations are applied. Low confidence suggests uncertainty about the data and can undermine the validity of the analysis. High data confidence endorses the findings and strategies, and the AMP can become an important, reliable reference guide for interdepartmental communication as well as a manual for long-term corporate decision-making. Having a numerical rating for confidence also allows the municipality to track its progress over time and eliminate data gaps.

Data confidence in this AMP is determined using five key factors and is based on the City of Brantford's approach. Municipal staff provide their level of confidence (score) in each factor for major asset classes along a spectrum, ranging from 0, suggesting low confidence in the data, to 100 indicative of high certainty regarding inputs. The five factors used to calculate the municipality's data confidence ratings are:

F1	F2	F3	F4	F5
The data is up to date.	The data is complete and uniform.	The data comes from an authoritative source	The data is error free.	The data is verified by an authoritative source.

The municipality's self-assessed score in each factor is then used to calculate data confidence in each asset class using Equation 1 below.

$$Asset\ Class\ Data\ Confidence\ Rating = \sum(Score\ in\ each\ factor)\ \times(\frac{1}{5})$$

V. Summary Statistics

In this section, we aggregate technical and financial data across all asset classes analyzed in this AMP, and summarize the state of the infrastructure using key indicators, including asset condition, useful life consumption, and important financial measurements.

1. Asset Valuation

The asset classes analyzed in this asset management plan for the municipality had a total 2016 valuation of $219 million, of which roads comprised 45%, followed by water at 16%. The ownership per household (Figure 4) totaled $83,334 based on 3,022 households for all asset categories except for water services with 2,020 households and sewer services with 1,923 households.

Figure 3 Asset Valuation by Class

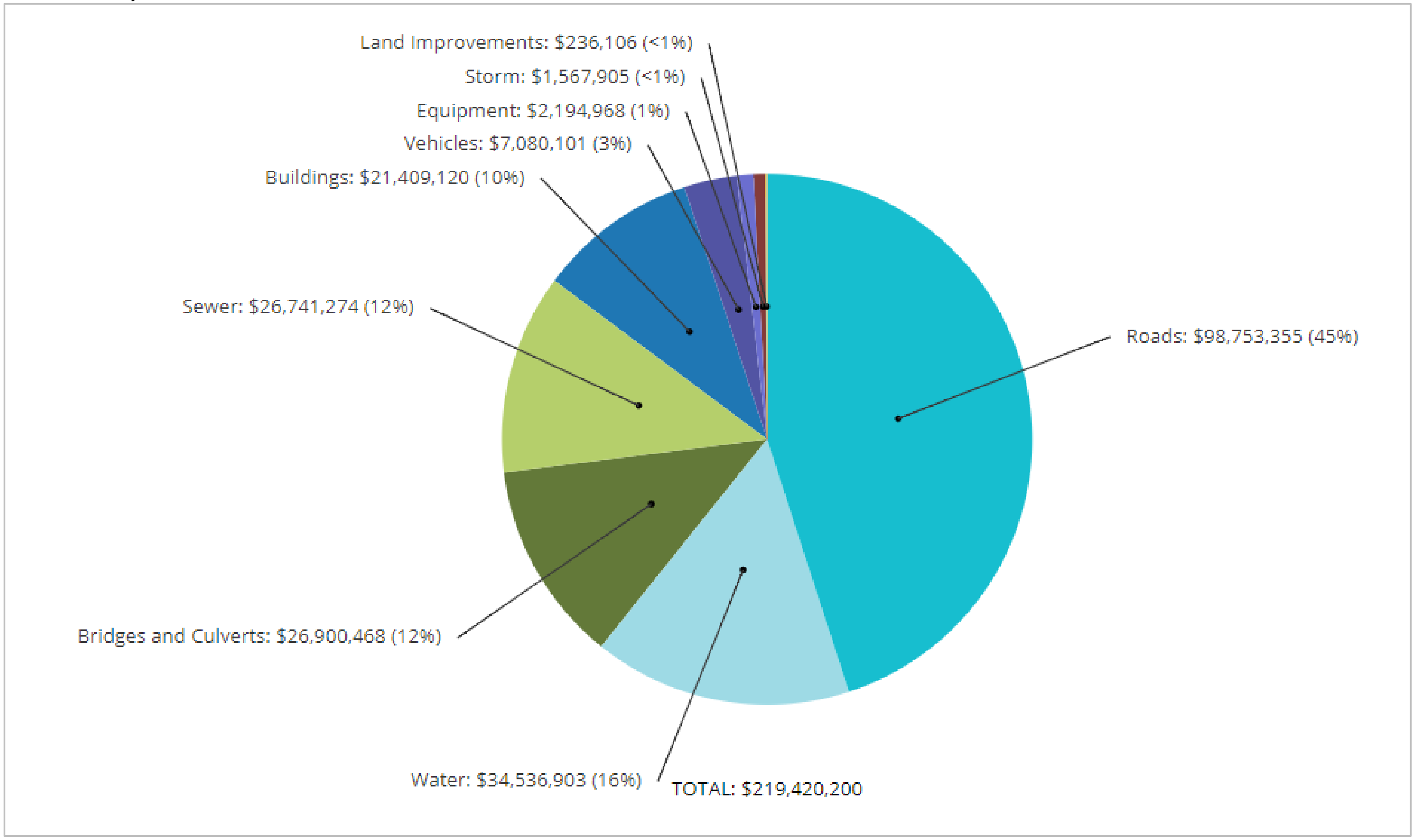
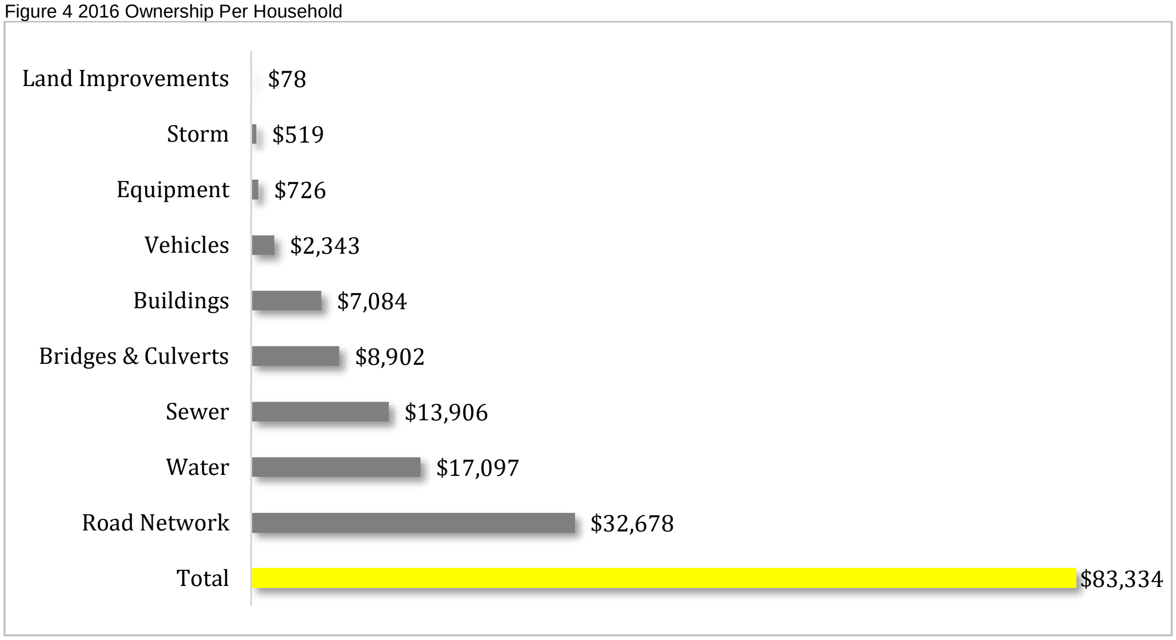


Figure 4 2016 Ownership Per Household



2. Source of Condition Data by Asset Class

Observed data will provide the most precise indication of an asset's physical health. In the absence of such information, the age of capital assets can be used as a meaningful approximation of the asset's condition. Table 4 indicates the source of condition data used for the various asset classes in this AMP. The municipality has condition data for 71% of all assets based on 2016 replacement cost.

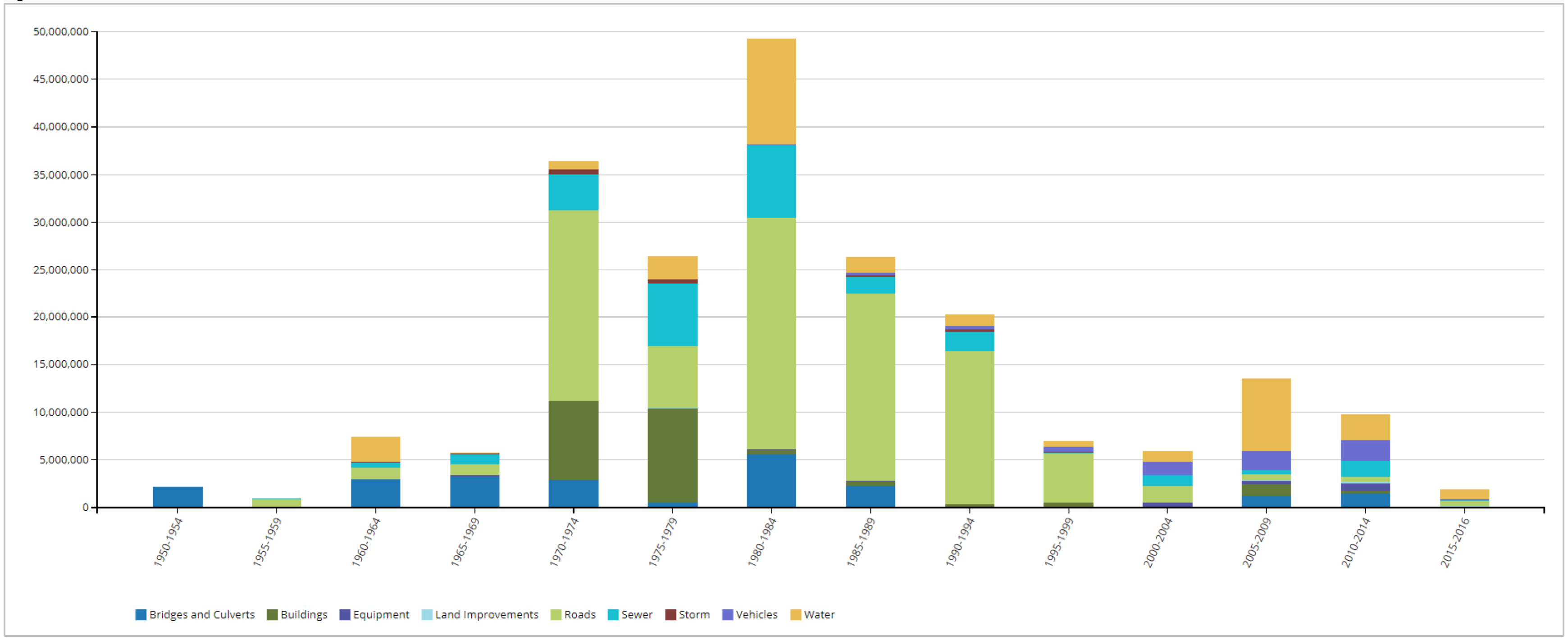
Table 4 Source of Condition Data by Asset Class

Asset class	Component	Percent Assessed based on 2016 Replacement Cost
Roads Network	Road Surface - HCB	98% Assessed
	Road Surface – LCB	100% Assessed
	Sidewalks	98% Assessed
	Signs	Age-Based
	Streetlights	21% Assessed
Bridges & Culverts	All	100% Assessed
Storm	Storm mains	5% Assessed
Sewer	Manholes	2% Assessed
	Sewer Device	12% Assessed
	Sewer mains	96% Assessed
	Remaining components	Age-based
Water	Blow off	100% Assessed
	Hydrants	99% Assessed
	Sample Station	100% Assessed
	Valve Chamber	100% Assessed
	Water Valve	100% Assessed
	Water mains	92% Assessed
	Remaining components	Age-Based
Equipment	All	Age-Based
Land Improvements	All	Age-Based
Vehicles	All	Age-Based
Buildings	All	Age-Based

3. Historical Investment in Infrastructure – All Asset Classes

In conjunction with condition data, two other measurements can augment staff understanding of the state of infrastructure and impending and long-term infrastucture needs: installation year profile, and useful life remaining. Using 2016 replacement costs, Figure 5 illustrates the historical invesments made in the asset classes analyzed in this AMP since 1950. Often, investment in critical infrastructure parallels population growth or other significant shifts in demographics; they can also fluctuate with provincial and federal stimulus programs. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 5 Historical Investment in Infrastructure – All Asset Classes

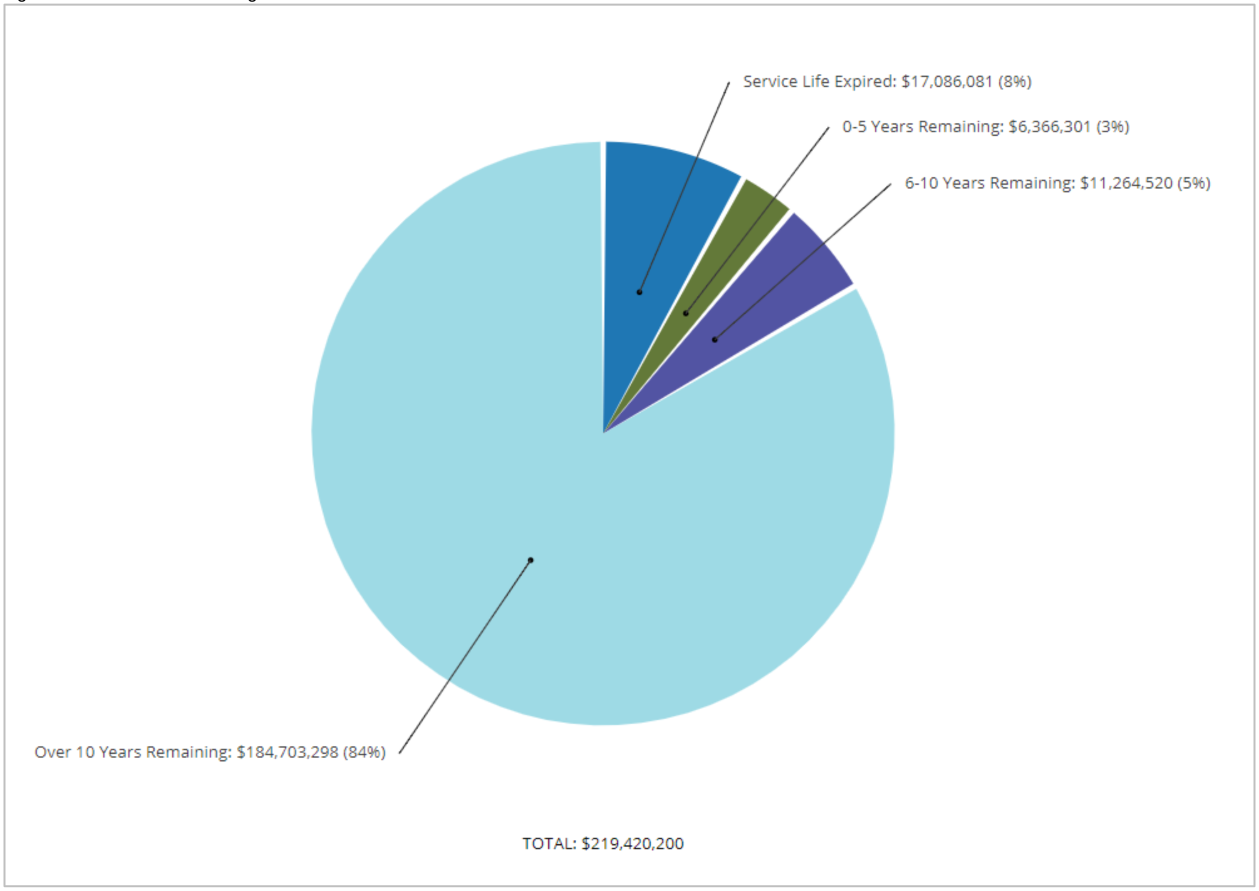


The municipality has invested into its infrastructure consistently over the decades. Between 1980 and 1984, the period of largest investment, nearly $50 million was invested with $24 million being put into roads. Since 2015, $1.9 million has been invested primarily in water.

4. Useful Life Consumption – All Asset Classes

While age is not a precise indicator of an asset's health, in the absence of observed condition assessment data, it can serve as a high-level, meaningful approxmiation and help guide replacement needs and facilitate strategic budgeting. Figure 6 shows the distibution of assets based on the percentage of useful life already consumed.

Figure 6 Useful Life Remaining as of 2016 – All Asset Classes

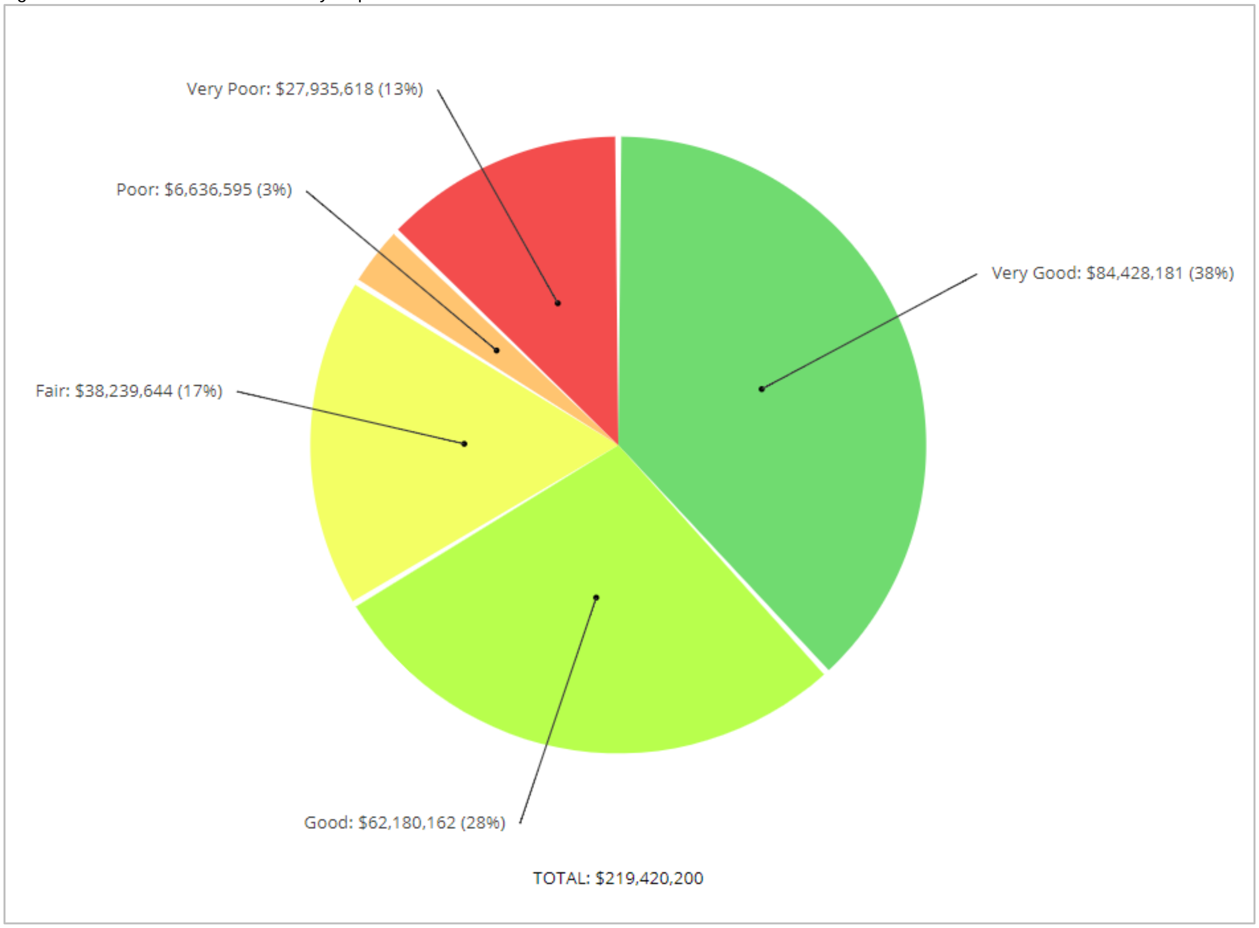


84% of the assets analyzed in this AMP have at least 10 years of useful life remaining. However, 8%, with a valuation of $17.1 million, remain in operation beyond their established useful life. An additional 3% will reach the end of their useful life within the next five years.

5. Overall Condition – All Asset Classes

Based on 2016 replacement cost, and a combination of assessed and age-based data, 16% of assets, with a valuation of $34.6 million, are in poor to very poor condition; 66% are in good to very good condition.

Figure 7 Asset Condition Distribution by Replacement Cost as of 2016 – All Asset Classes



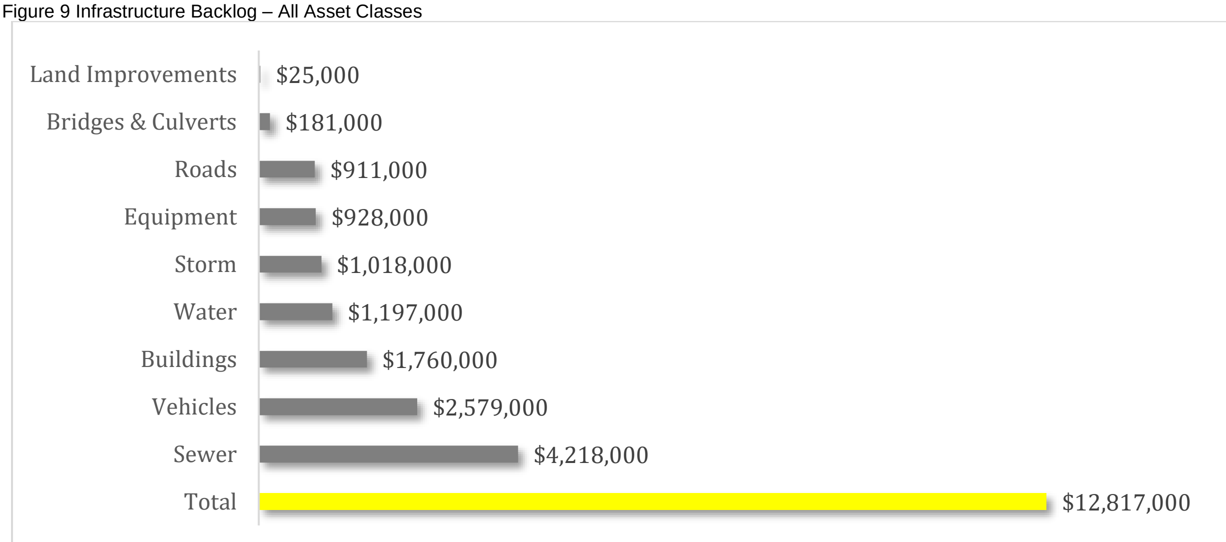
6. Financial Profile

This section details key high-level financial indicators for the municipality's asset classes.

Figure 8 Annual Requirements by Asset Class

The annual requirements represent the amount the municipality should allocate annually to each of its asset classes to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the municipality must allocate $7.5 million annually for the assets covered in this AMP.

Figure 9 Infrastructure Backlog – All Asset Classes

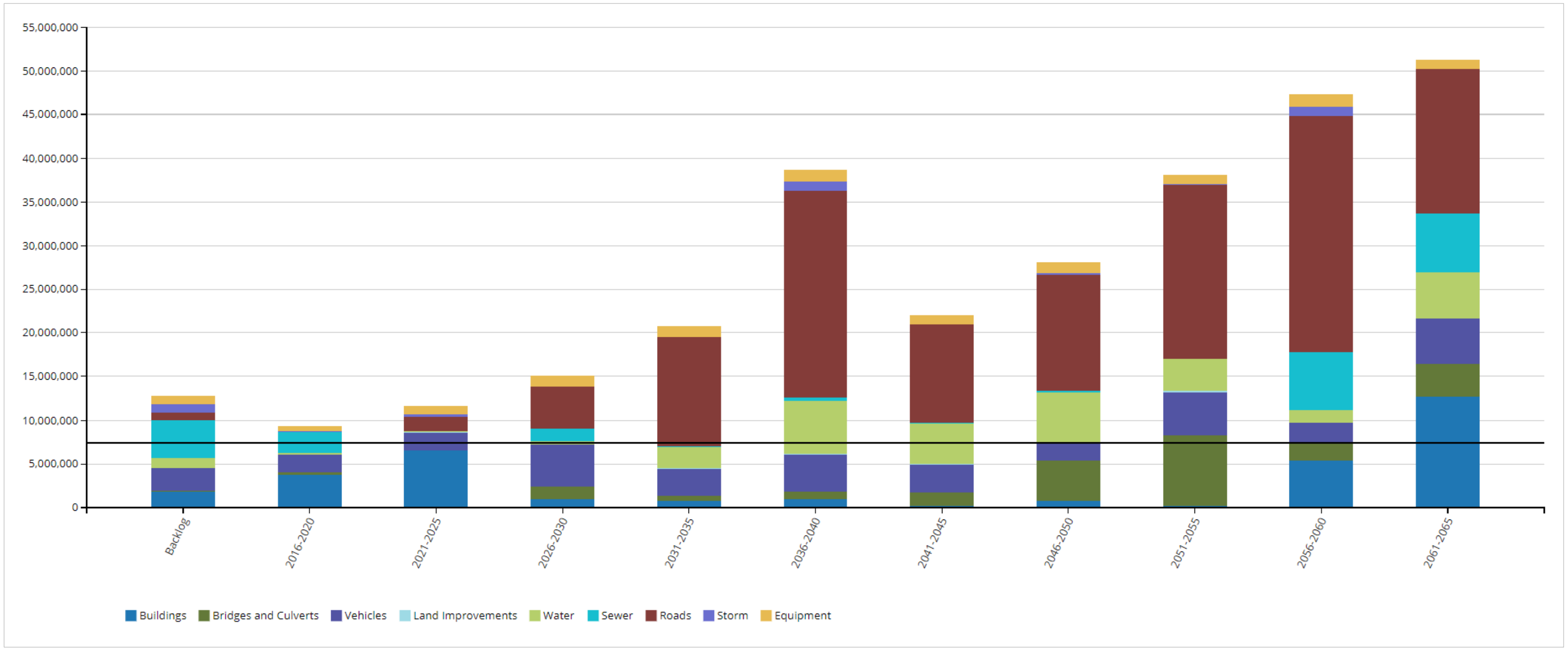


The municipality has a combined infrastructure backlog of $12.8 million, with sewer comprising 33%. The backlog represents the investment needed today to meet previously deferred replacement needs. In the absence of assessed data, the backlog represents the value of assets still in operation beyond their established useful life.

7. Replacement Profile – All Asset Classes

In this section, we illustrate the aggregate short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's asset classes. 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 useful life.

Figure 10 Replacement Profile – All Asset Classes



Based on a combination of assessed and age-base data, the municipality has a combined backlog of $12.8 million, of which sewer comprises $4.2 million. Aggregate replacement needs will total $9.3 million over the next five years. An additional $11.7 million will be required between 2021 and 2025. The municipality's aggregate annual requirements (indicated by the black line) total $7.5 million. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet the replacement needs for its various asset classes as they arise without the need for deferring projects and accruing annual infrastructure deficits. Currently, the municipality is funding 32% of the annual requirements for tax-funded assets and is over funding its rate-funded assets. See the 'Financial Strategy' chapter for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

8. Data Confidence

The municipality has a ___ degree of confidence in the data used to develop this AMP, receiving a weighted confidence rating of ___. This is indicative of significant effort in collecting and refining its data set.

Table 5 Data Confidence Ratings

Asset Class	The data is up-to-date.	The data is complete and uniform.	The data comes from an authoritative source.	The data is error free.	The data is verified by an authoritative source.	Average Confidence Rating
Road Network						
Bridges & Culverts						
Water Services						
Sanitary Services						
Storm Water						
Buildings & Facilities						
Machinery & Equipment						
Land Improvements						
Fleet						
					Overall Weighted Average Data Confidence Rating	

VI. State of Local Infrastructure

The state of local infrastructure includes the full inventory, condition ratings, useful life consumption data and the backlog and upcoming infrastructure needs for each asset class. As available, assessed condition data was used to inform the discussion and recommendations; in the absence of such information, age-based data was used as the next best alternative.

1. Road Network

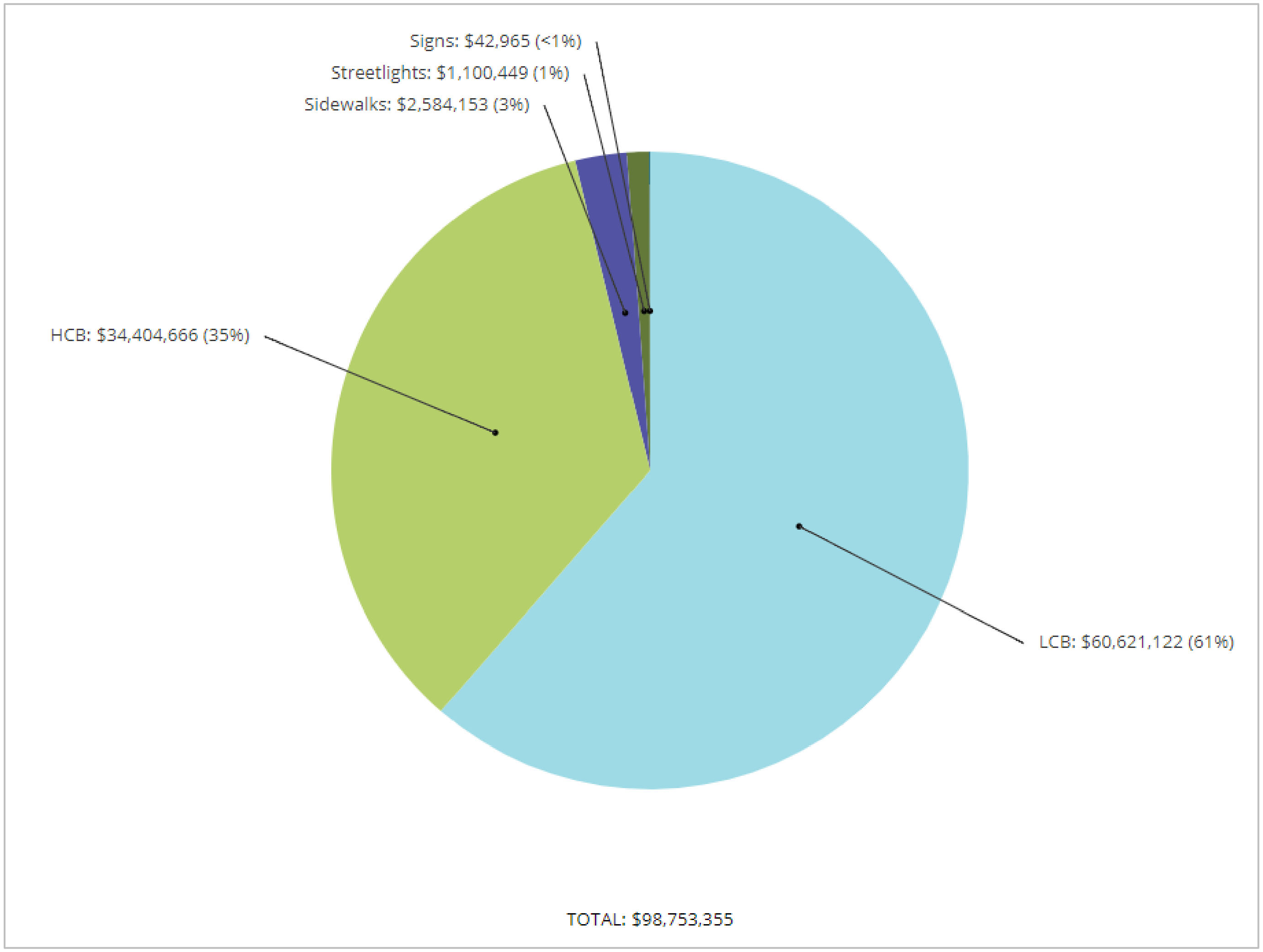
1.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 6 illustrates key asset attributes for the municipality's road network, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's roads assets are valued at $98.8 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 6 Key Asset Attributes – Road Network

Asset Type	Asset Component	Quantity	Useful Life (Years)	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Road Network	Gravel	202,944m	10	Not Planned for Replacement	N/A
	HCB	44,102m	30	CPI Tables	$34,404,666
	LCB	103,376m	20	CPI Tables	$60,621,122
	Sidewalks	34,988m	60	CPI Tables	$2,584,153
	Signs	2	15	CPI Tables	$42,965
	Streetlights	499	15, 20, 30	CPI Tables	$1,100,449
				Total	**$98,753,355**

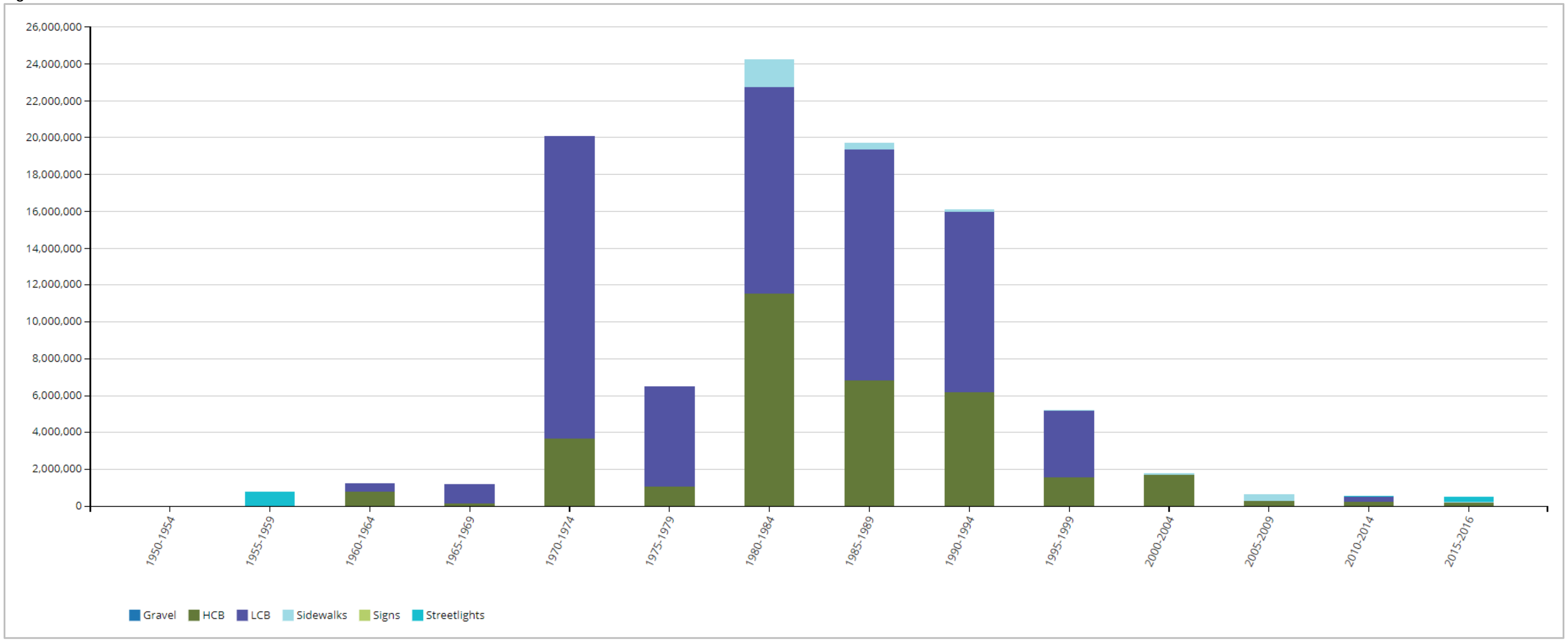
Figure 11 Asset Valuation – Road Network



1.2 Historical Investment in Infrastructure

Figure 12 shows the municipality's historical investments in its road network since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 1.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 12 Historical Investment – Road Network

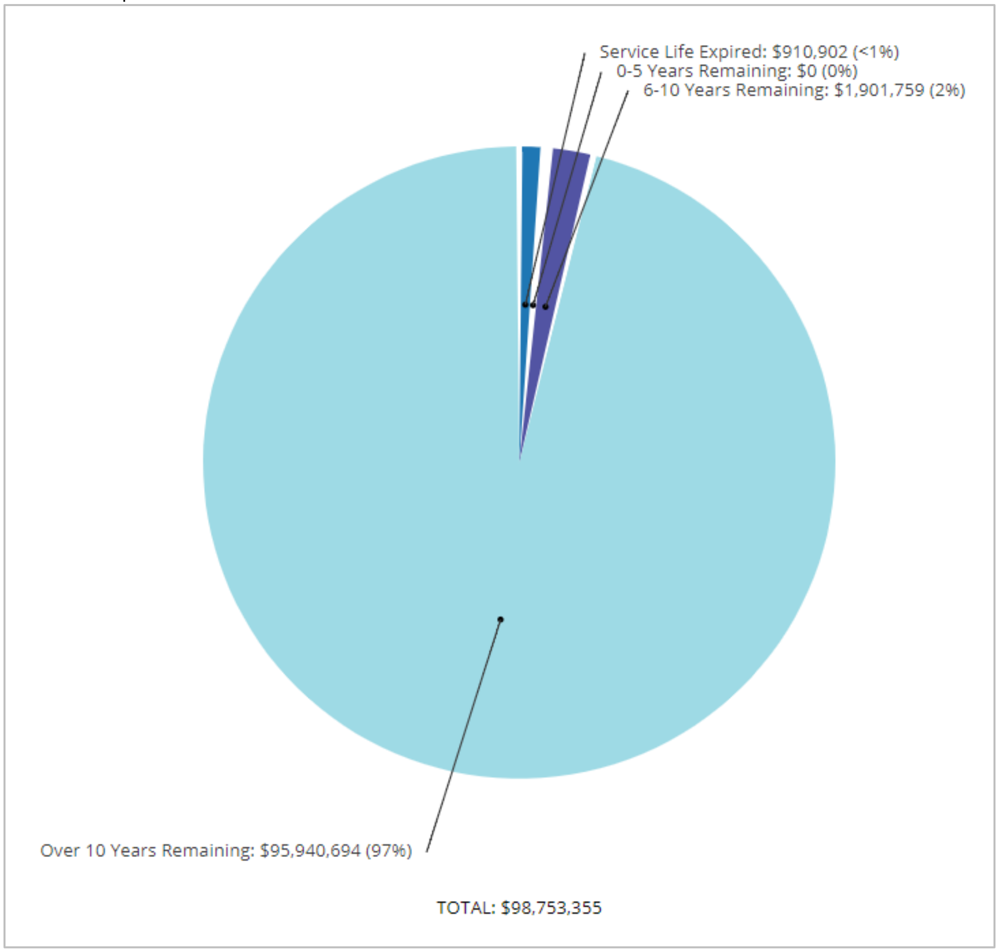


Investments in the municipality's road network have fluctuated since the 1950s. Investments increased sharply in the early 1970s and peaked in the period between 1980 and 1984. During this time $24 million was invested mainly into LCB and HCB road. Since 2015, $500,000 has been invested.

1.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 13 illustrates the useful life consumption levels as of 2016 for the municipality's road network.

Figure 13 Useful Life Consumption - Road Network

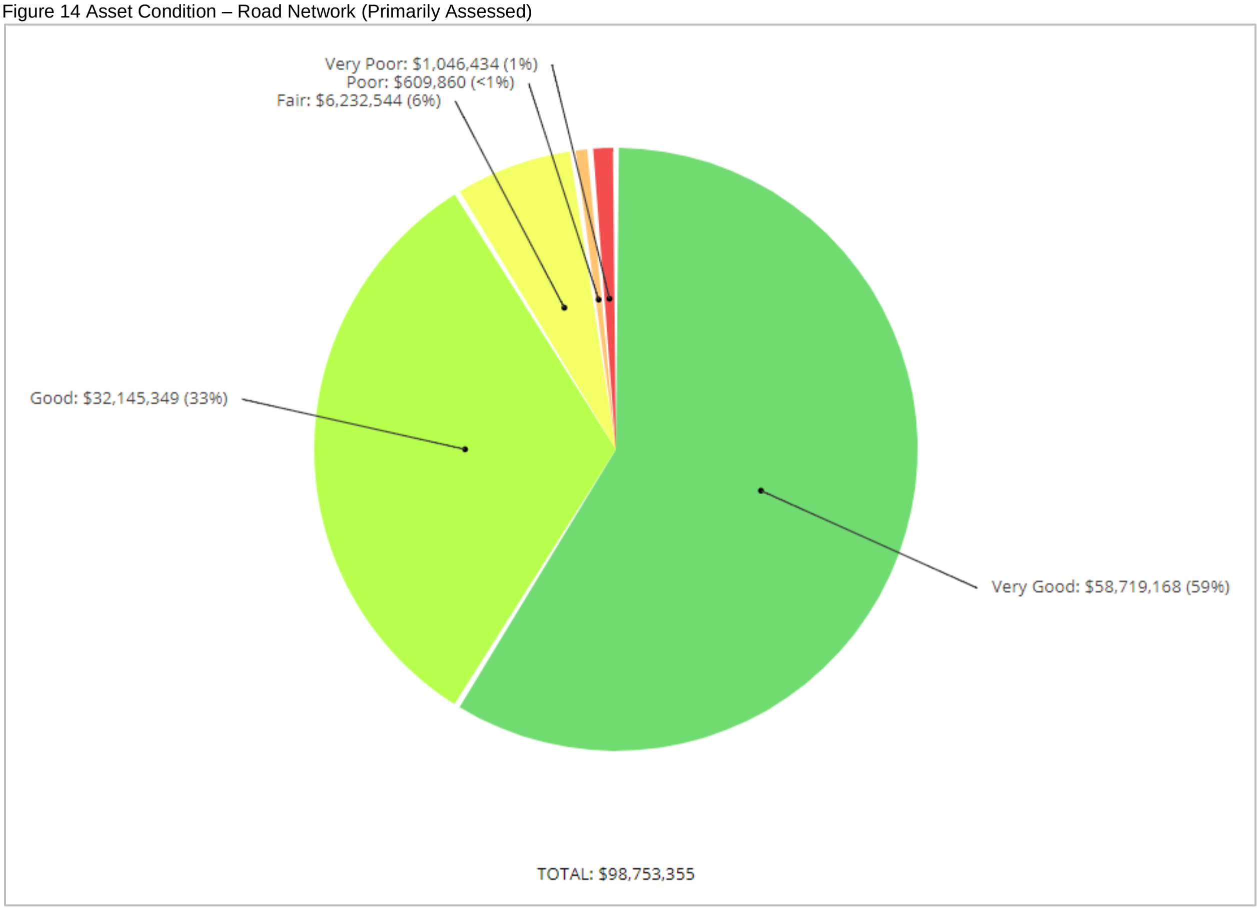


Nearly 100% of the municipality's road network has over 10 years of useful life remaining.

1.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's road network as of 2016. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has provided condition data for 100% of LCB roads, 98% of HCB road and sidewalks and 21% of streetlights.

Figure 14 Asset Condition – Road Network (Primarily Assessed)

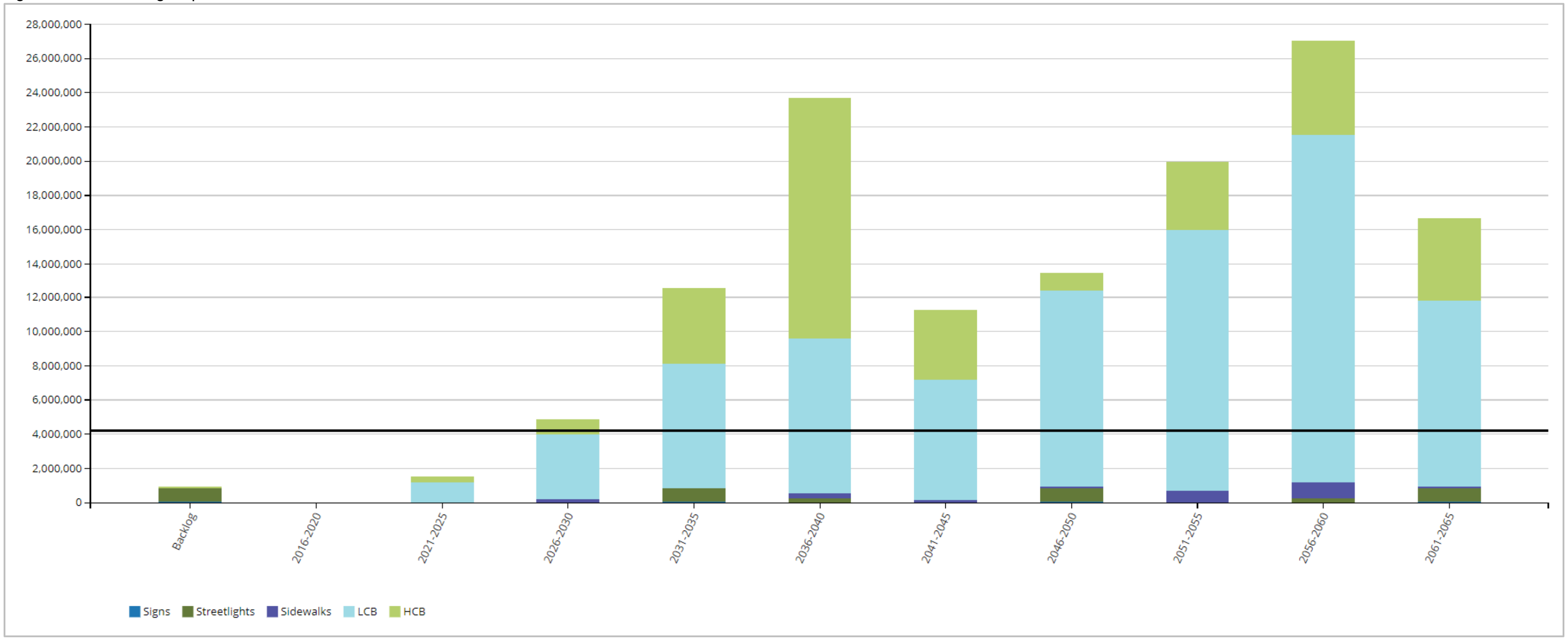


Based primarily on assessed condition data, 92% of assets, with a valuation of $90.9 million are in good to very good condition; less than 2% are in poor to very poor condition.

1.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality’s road network assets. The backlog is the aggregate 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 useful life.

Figure 15 Forecasting Replacement Needs – Road Network



Based primarily on assessed condition, the municipality has a backlog of $911,000 and replacement needs of $1.5 million between 2021-2025. The municipality’s annual requirements (indicated by the black line) for its road network total $4,293,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently allocating $1,028,000, leaving an annual deficit of $3,265,000. See the ‘Financial Strategy’ section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

1.6 Recommendations – Road Network

- The municipality should continue its condition assessments of road surfaces (HCB and LCB), and expand the program to incorporate all assets in order to more precisely estimate its actual financial requirements and field needs. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- The data collected through condition assessment programs should be integrated into a risk management framework which will guide prioritization of the backlog as well as short, medium, and long term replacement needs. See Section 4, 'Risk' in the 'Asset Management Strategies' chapter for more information.

- In addition to the above, a tailored lifecycle activity framework should also be developed to promote standard lifecycle management of the road network as outlined further within the "Asset Management Strategy" section of this AMP.

- Road network key performance indicators should be established and tracked annually as part of an overall level of service model. See Section 7 'Levels of Service'.

- The municipality is funding 24% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable funding levels.

2. Bridges & Culverts

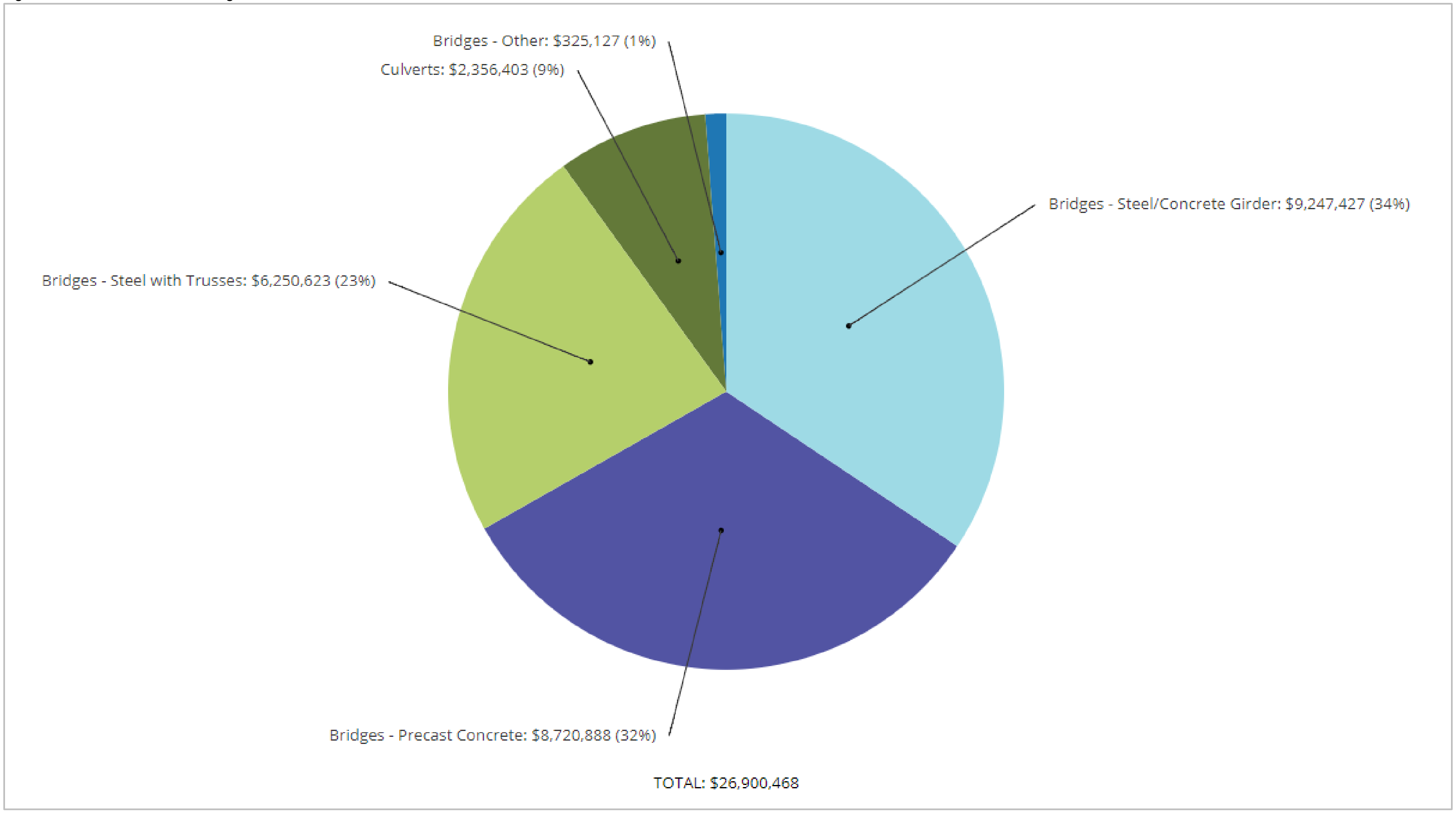
2.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 7 illustrates key asset attributes for the municipality's bridges & culverts, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's bridges & culverts assets are valued at $26.9 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 7 Key Asset Attributes – Bridges & Culverts

Asset Type	Asset Component	Quantity	Useful Life (Years)	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Bridges & Culverts	Bridges - Not capitalized	14	0, 40, 45, 50	Not Planned for Replacement	N/A
	Bridges - Other	1	20	CPI Tables	$325,127
	Bridges - Precast Concrete	12	30, 40, 50	CPI Tables	$8,720,888
	Bridges - Steel with Trusses	6	50	CPI Tables	$6,250,623
	Bridges - Steel/Concrete Girder	11	44, 45	CPI Tables	$9,247,427
	Culverts	15	40	CPI Tables	$2,356,403
	Culverts - Not capitalized	1	0	Not Planned for Replacement	N/A
				Total	**$26,900,468**

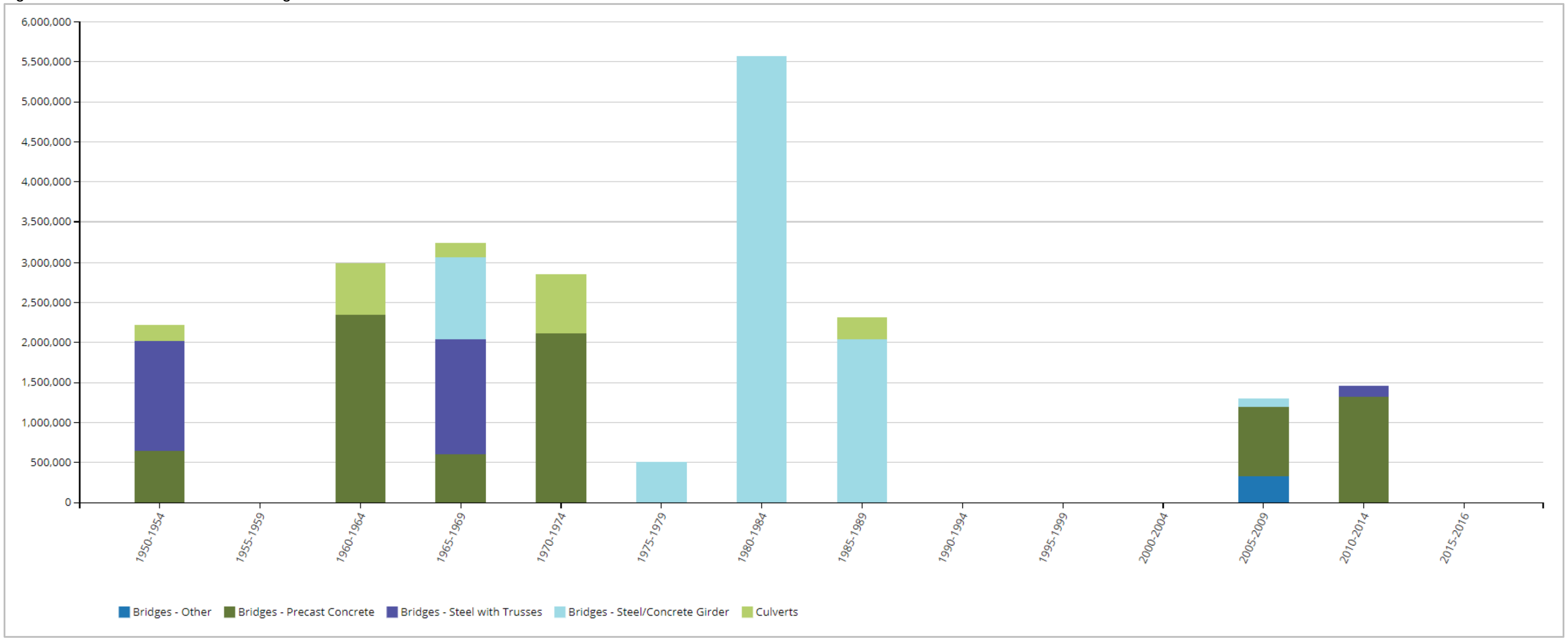
Figure 16 Asset Valuation – Bridges & Culverts



2.2 Historical Investment in Infrastructure

Figure 17 shows the municipality's historical investments in its bridges & culverts since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 2.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 17 Historical Investment – Bridges & Culverts

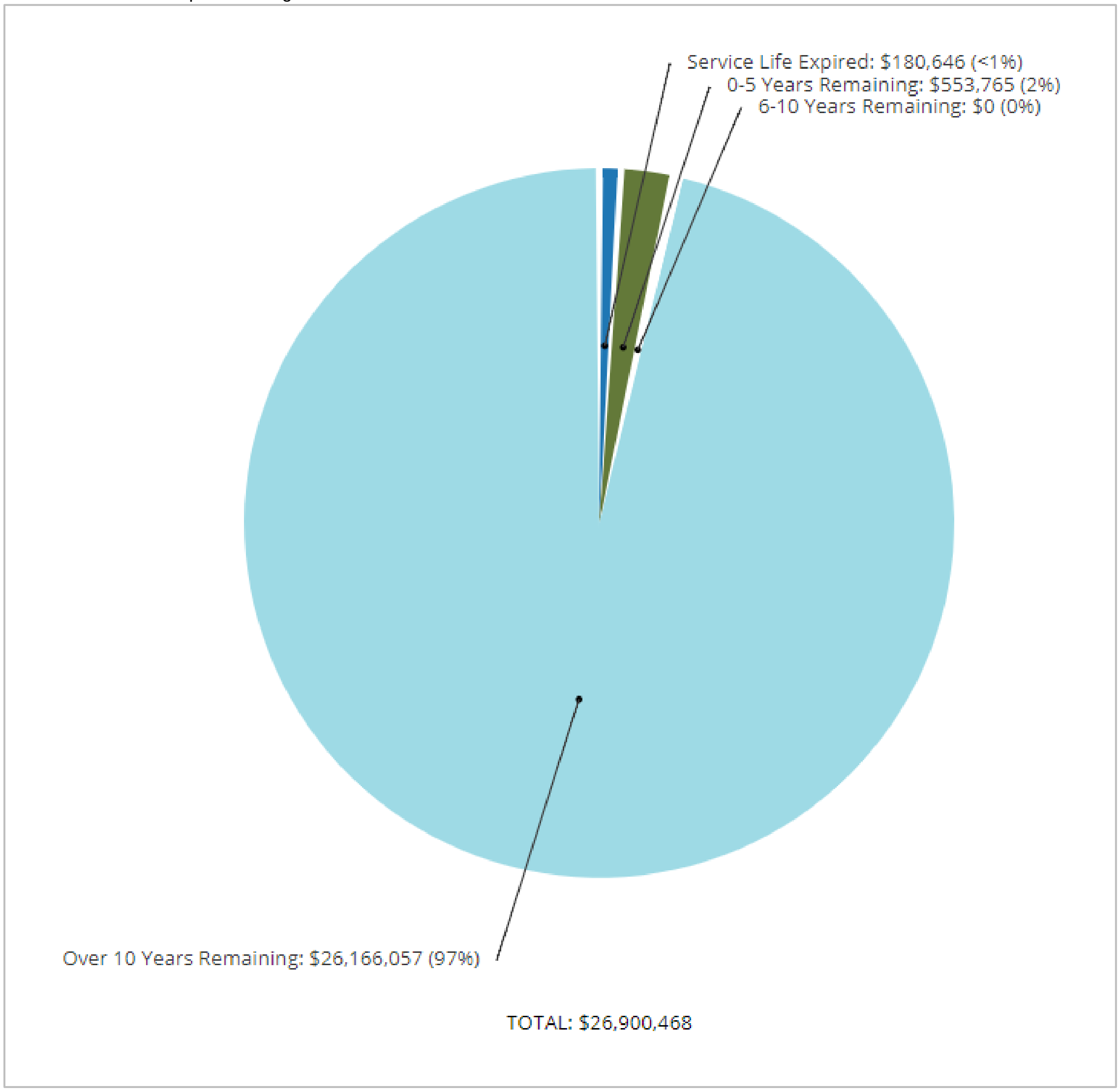


The municipality has invested sporadically in its bridges and culverts since the 1950s. In the early 1980s, the period of largest investment, $5.5 million was invested into steel/concrete girder bridges.

2.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 18 illustrates the useful life consumption levels as of 2016 for the municipality's bridges & culverts.

Figure 18 Useful Life Consumption – Bridges & Culverts

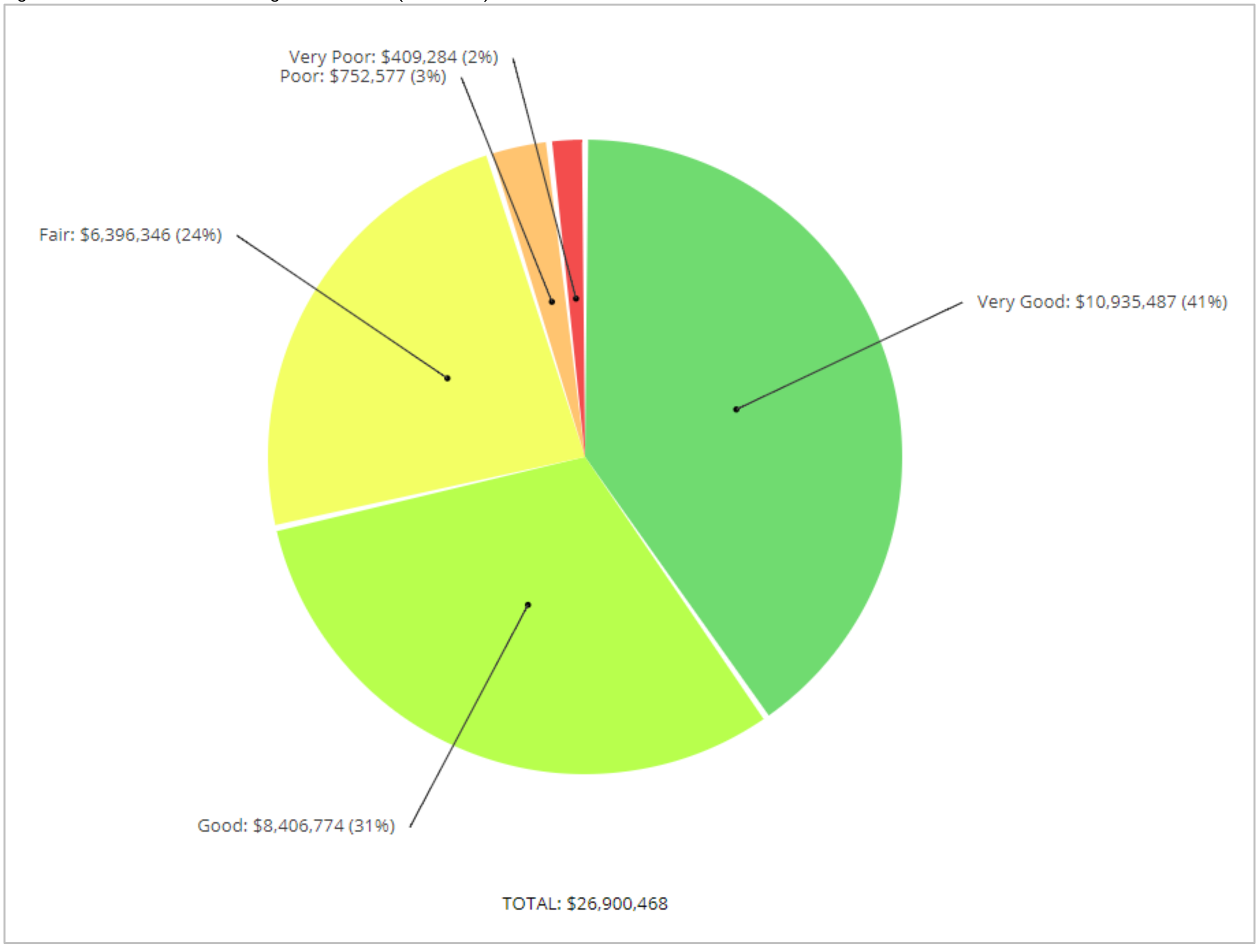


Nearly 100% of the assets have at least 10 years of useful life remaining.

2.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's bridges & culverts as of 2016. By default, we rely on observed field data adapted from OSIM inspections as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has provided condition assessment data for all bridge & culvert assets.

Figure 19 Asset Condition – Bridges & Culverts (Assessed)

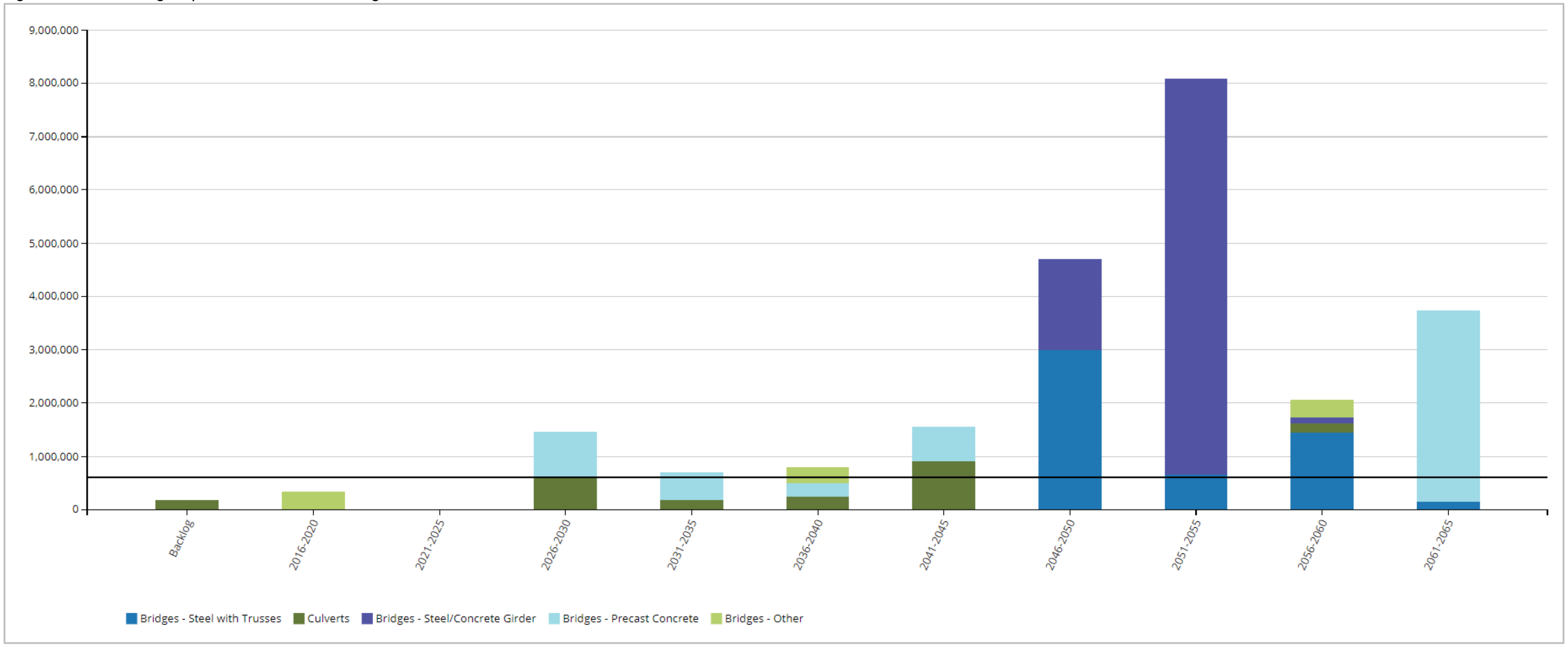


72% of the municipality's bridge & culvert assets, with a valuation of $19.3 million, are in good to very good condition. 5% are in poor to very poor condition.

2.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's bridges & culverts. The backlog is the aggregate 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 useful life.

Figure 20 Forecasting Replacement Needs – Bridges & Culverts



Based on assessed condition, the municipality has a backlog of $181,000 and forecasted replacement needs of $325,000 between 2016-2020. The municipality's annual requirements (indicated by the black line) for its bridges & culverts total $624,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently allocating $379,000 towards this asset category leaving an annual deficit of $245,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

2.6 Recommendations – Bridges & Culverts

- The results and recommendations from the OSIM inspections should be used to generate the short-and long-term capital and maintenance budgets for the bridge and large culvert structures. See Section VIII, 'Asset Management Strategies'.

- Bridge & culvert structure key performance indicators should be established and tracked annually as part of an overall level of service model. See Section VII 'Levels of Service'.

- The municipality is funding 61% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

3. Water System

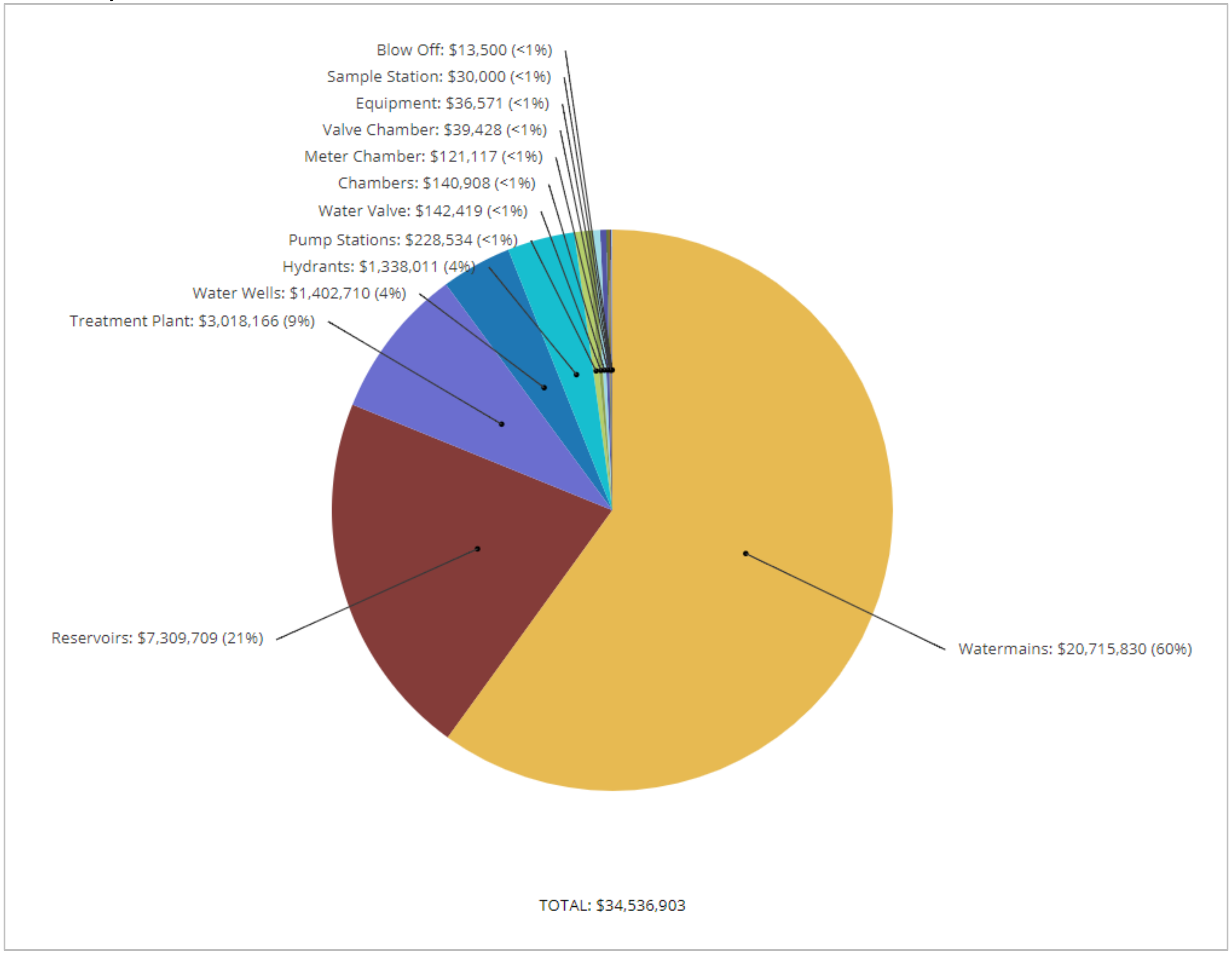
3.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 8 illustrates key asset attributes for the municipality's water system, including quantities of various assets, their useful life, replacement costs, and the valuation method by which the replacement costs were derived. In total, the municipality's water system assets are valued at $34.5 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 8 Key Asset Attributes – Water

Asset Type	Asset Component	Quantity	Useful Life (Years)	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Water System	Blow Off	9	50	User-Defined	$13,500
	Chambers	3	10, 50	User-Defined/ CPI Tables	$140,908
	Equipment	3	10, 15, 40	CPI Tables	$36,571
	Hydrants	212	25, 30, 50	User-Defined/ CPI Tables	$1,338,011
	Meter Chamber	1	15	CPI Tables	$121,117
	Pump Stations	2	40	CPI Tables	$228,534
	Reservoirs	4	60, 80	CPI Tables	$7,309,709
	Sample Station	10	10, 40	User-Defined	$30,000
	Treatment Plant	3	50	CPI Tables	$3,018,166
	Valve Chamber	4	50	User-Defined	$39,428
	Water Valve	88	10	User-Defined	$142,419
	Water Wells	9	100	CPI Tables	$1,402,710
	Mains 20 (mm)	230m	100	CPI Tables	$13,089
	Mains 25 (mm)	485m	100	User-Defined/ CPI Tables	$300,536
	Mains 30 (mm)	1,831m	100	CPI Tables	$244,346
	Mains 50 (mm)	481	100	User-Defined/ CPI Tables	$193,903
	Mains 75 (mm)	1,126m	100	User-Defined/ CPI Tables	$242,867
	Mains 100 (mm)	8,616m	100	User-Defined/ CPI Tables	$3,262,610
	Mains 150 (mm)	20,646m	100	User-Defined/ CPI Tables	$10,111,460
	Mains 200 (mm)	7,585m	100	User-Defined/ CPI Tables	$3,147,985
	Mains 250 (mm)	855	100	User-Defined/ CPI Tables	$218,707
	Mains 300 (mm)	5,292m	100	CPI Tables	$2,846,913
	Mains 600 (mm)	234	100	CPI Tables	$98,198
	Mains (blank) (mm)	90	100	CPI Tables	$35,217
				Total	**$34,536,903**

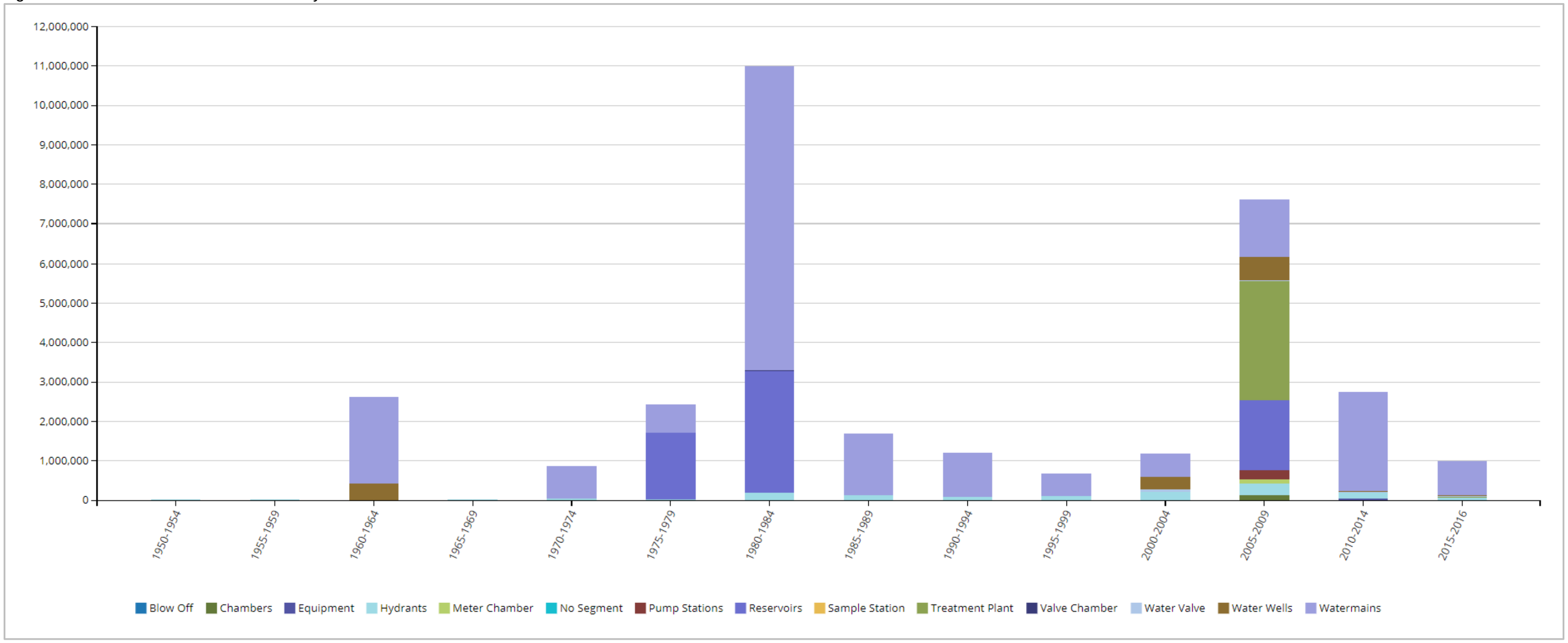
Figure 21 Asset Valuation – Water System



3.2 Historical Investment in Infrastructure

Figure 22 shows the municipality's historical investments in its water system since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 3.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 22 Historical Investment – Water System

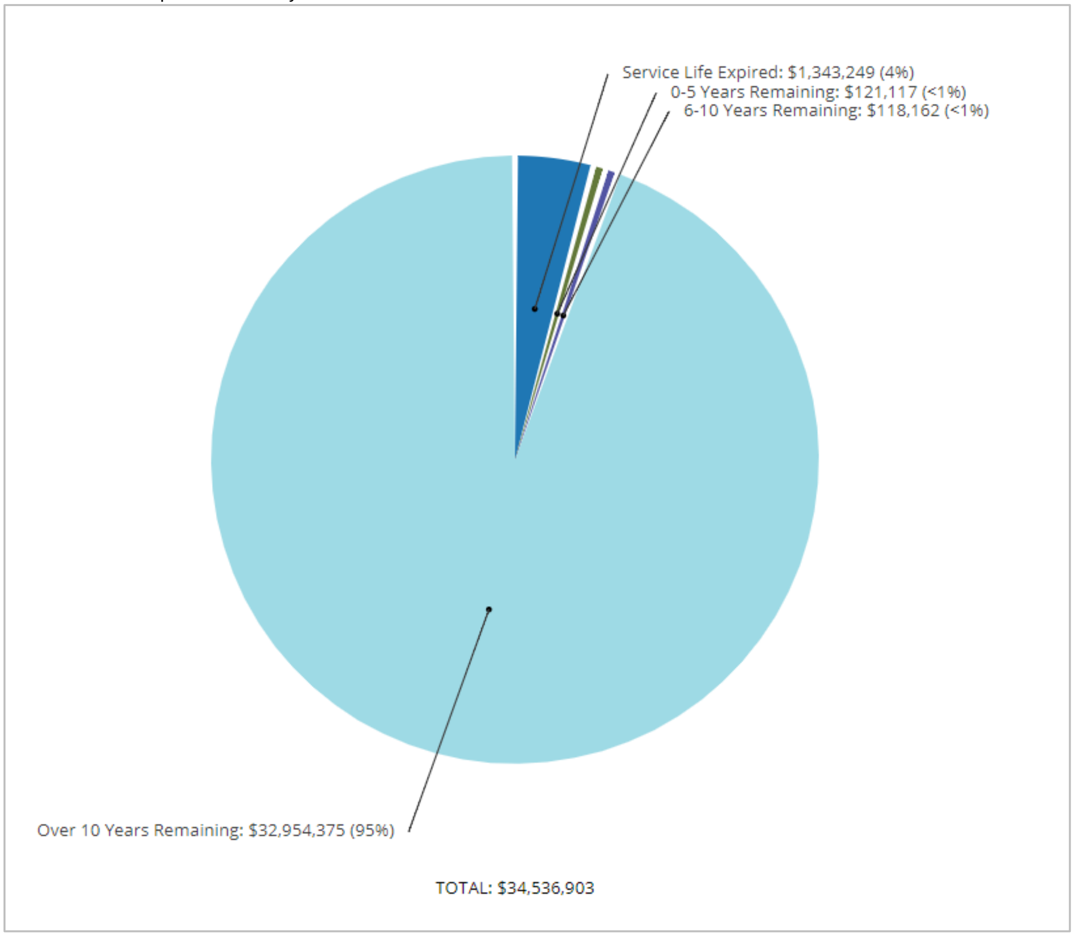


Investments in the water system have fluctuated since the 1950s. In the early 1980s, the period of largest investment into the water network, $11 million was invested with $7.7 million put into water mains.

3.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 23 illustrates the useful life consumption levels as of 2016 for the municipality's water system.

Figure 23 Useful Life Consumption – Water System

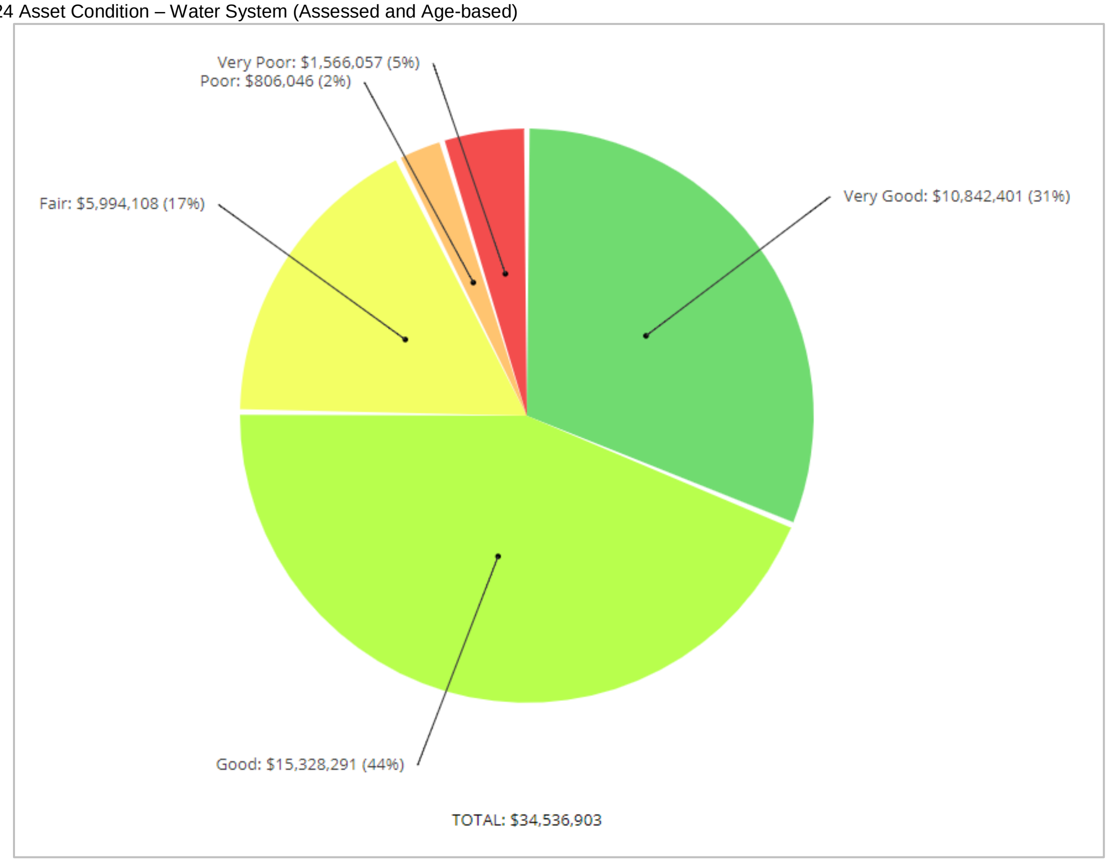


95% of assets have at least 10 years of useful life remaining while 4%, with a valuation of $1.3 million remain in operation beyond their estimated useful life.

3.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's water services as of 2016. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has provided condition data for 92% of its water mains and for 100% of blow offs, hydrants, sample stations, valve chambers, and water valves.

Figure 24 Asset Condition – Water System (Assessed and Age-based)

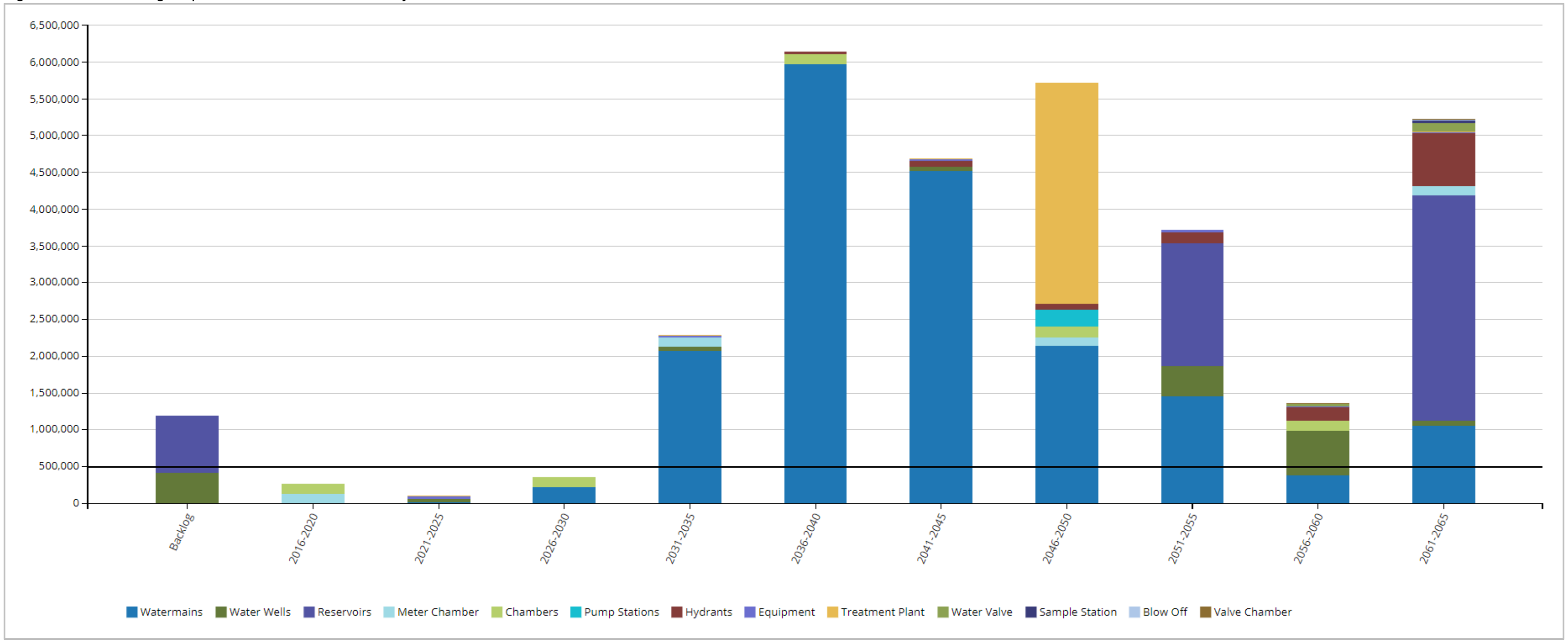


Based on a combination of assessed and age-based data, 75% of assets are in good to very good condition while 7%, with a valuation of $2.4 million, are in poor to very poor condition.

3.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's water system assets. The backlog is the aggregate 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 useful life.

Figure 25 Forecasting Replacement Needs – Water System



In addition to a backlog of $1.2 million, replacement needs are forecasted to be $267,000 in the next five years; an additional $96,000 is forecasted in replacement needs between 2021-2025. The municipality's annual requirements (indicated by the black line) for its water system total $508,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently allocating $855,000, leaving an annual surplus of $347,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

3.6 Recommendations – Water System

- The municipality should continue its condition assessment program and expand it to include other water system assets to more precisely estimate its financial requirements and field needs. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- The data collected through condition assessment programs should be integrated into a risk management framework which will guide prioritization of the backlog as well as short, medium, and long term replacement needs. See Section 4, 'Risk' in the 'Asset Management Strategies' chapter for more information.

- In addition to the above, a tailored lifecycle activity framework should also be developed to promote standard lifecycle management of the water system as outlined further within the "Asset Management Strategy" section of this AMP.

- Water distribution system key performance indicators should be established and tracked annually as part of an overall level of service model. See Section VII 'Levels of Service'.

- The municipality should assess its short-, medium- and long-term capital, and operations and maintenance needs.

- An appropriate percentage of the replacement costs should then be allocated for the municipality's O&M requirements.

- The municipality is overfunding (168%) its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

4. Sanitary Services

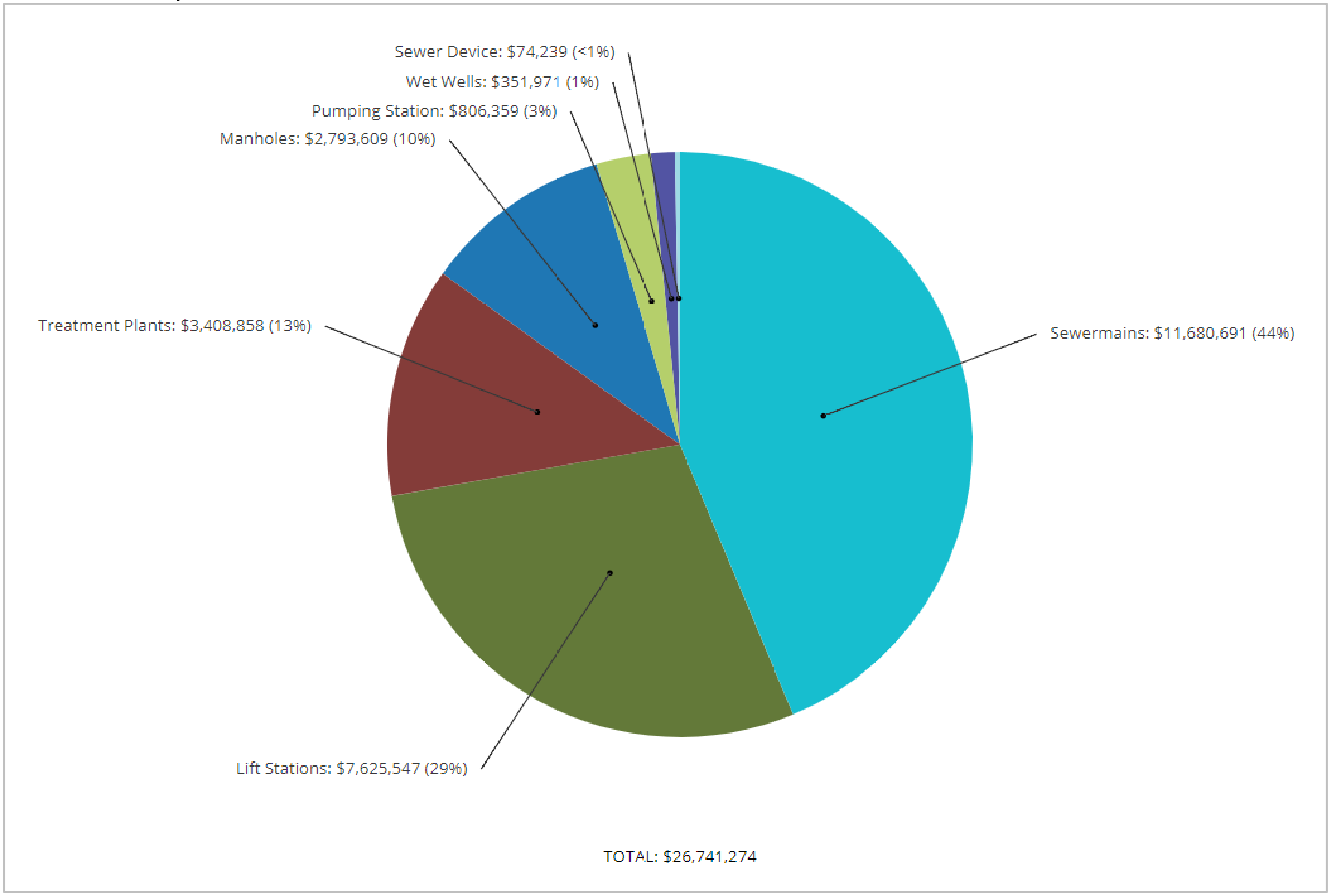
4.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 9 illustrates key asset attributes for the municipality's sanitary services portfolio, including quantities of various assets, their useful life, replacement costs, and the valuation method by which the replacement costs were derived. In total, the municipality's sanitary services assets are valued at $26.7 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 9 Asset Inventory – Sanitary Services

Asset Type	Asset Component	Quantity	Useful Life (Years)	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Sanitary Services	Lift Stations	4	40	CPI Tables	$7,625,547
	Manholes	441	40, 50	CPI Tables	$2,793,609
	Pumping Station	3	5, 10, 40	CPI Tables	$806,359
	Sewer Device	3	10, 30, 50	CPI Tables	$74,239
	Mains 150 (mm)	885m	30, 50, 100	CPI Tables	$22,842
	Mains 200 (mm)	32,812m	30, 50, 75, 100	CPI Tables	$9,644,952
	Mains 250 (mm)	5,154m	30, 50, 75, 100	CPI Tables	$652,617
	Mains 300 (mm)	933m	30, 50, 75, 100	CPI Tables	$340,556
	Mains 350 (mm)	180m	50, 100	CPI Tables	$18,654
	Mains 375 (mm)	80m	30, 50, 100	CPI Tables	$582
	Mains 380 (mm)	298m	100	CPI Tables	$392,768
	Mains 400 (mm)	542m	50, 100	CPI Tables	$545,560
	Mains 405 (mm)	220m	100	CPI Tables	$60,430
	Mains 450 (mm)	76m	100	CPI Tables	$1,730
	Treatment Plants	5	10, 40, 50	CPI Tables	$3,408,858
	Wet Wells	2	40	CPI Tables	$351,971
				Total	**$26,741,274**

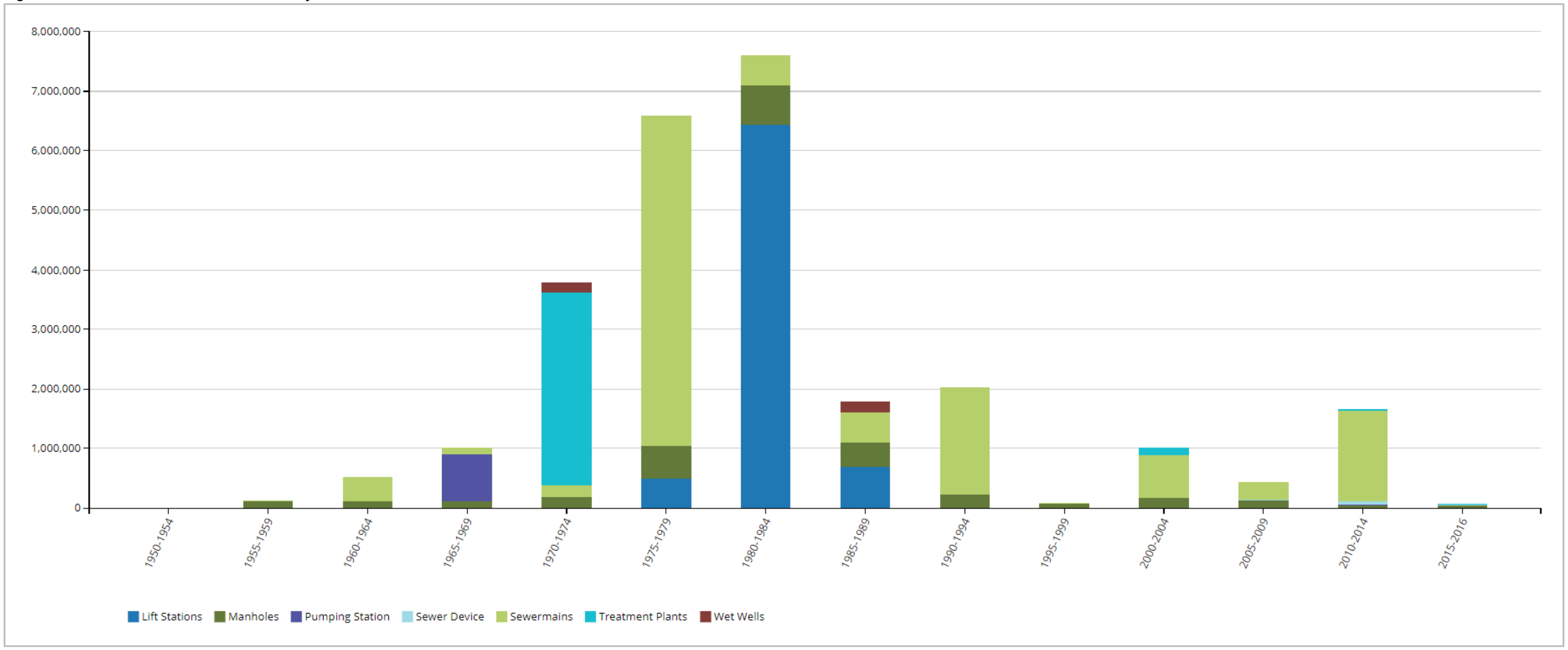
Figure 26 Asset Valuation – Sanitary Services



4.2 Historical Investment in Infrastructure

Figure 27 shows the municipality's historical investments in its sanitary services since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 4.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 27 Historical Investment – Sanitary Services

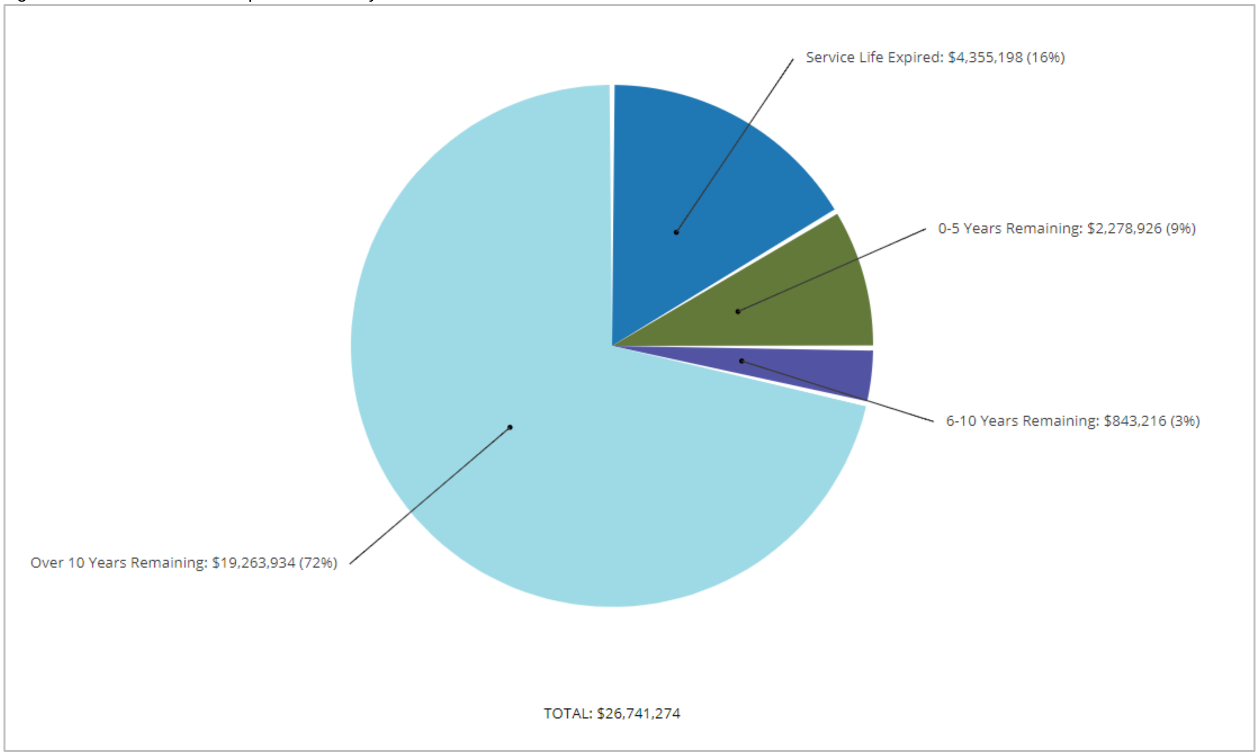


Investments into the municipality's sanitary assets have fluctuated since the 1950s. Investments peaked in the early 1980s at $7.6 million. During this time $6.4 million was put into lift stations.

4.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 28 illustrates the useful life consumption levels as of 2016 for the municipality's sanitary services.

Figure 28 Useful Life Consumption – Sanitary Services

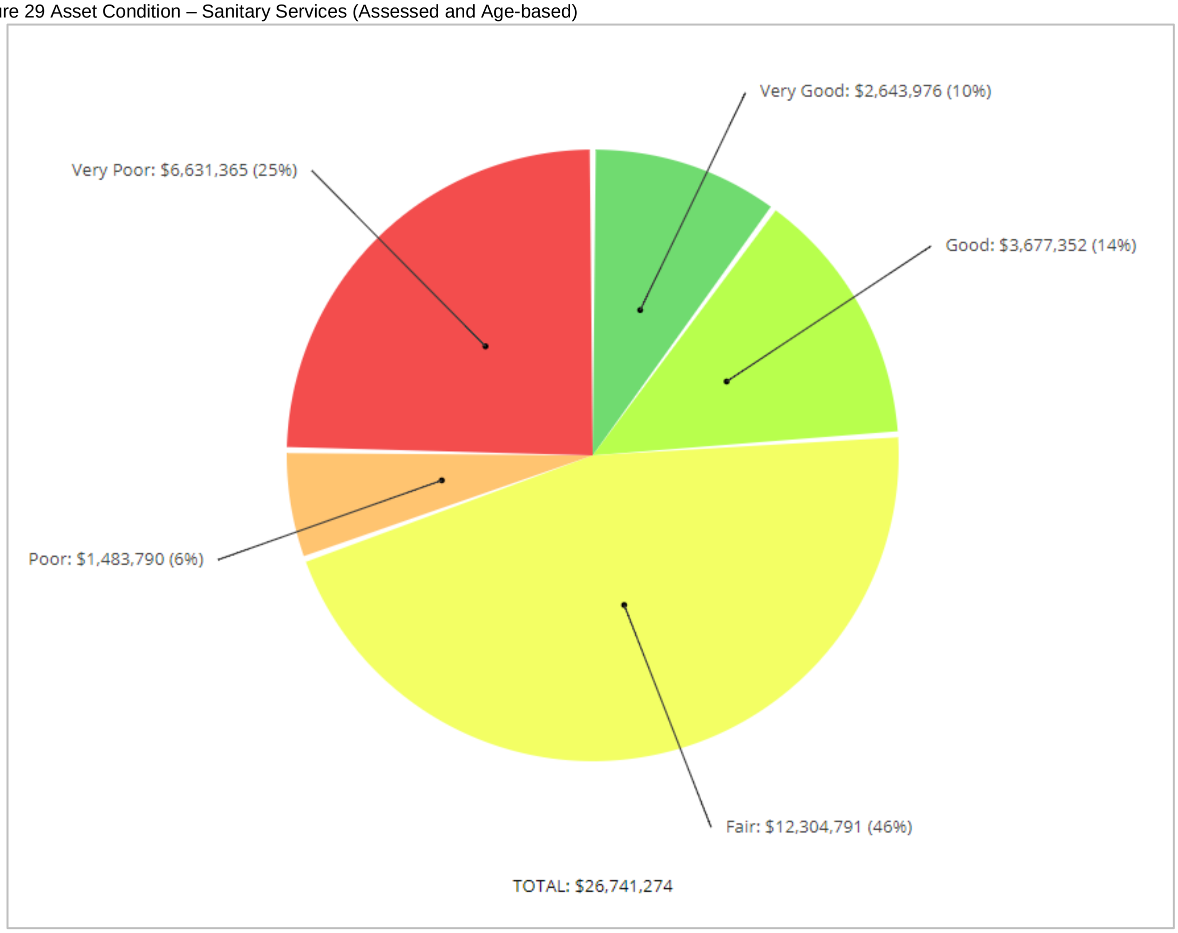


While 72% of assets have over 10 years of useful life remaining, 16%, with a valuation of $4.4 million, remain in operation beyond their estimated useful life. An additional 9% will reach the end of their useful life within the next five years.

4.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's sanitary services as of 2016. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has provided condition data for 96% of its sewer mains, 12% of sewer devices and 2% of manholes.

Figure 29 Asset Condition – Sanitary Services (Assessed and Age-based)

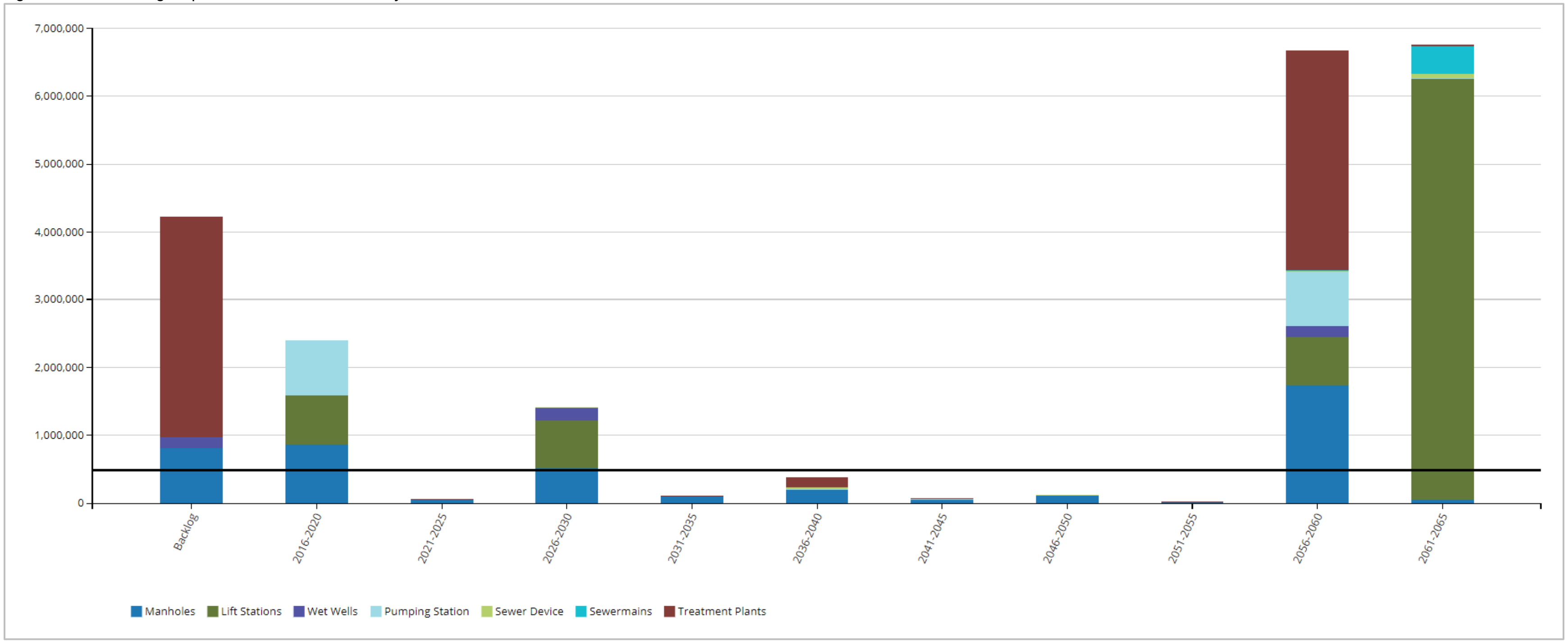


A combination of assessed and age-based data indicates that 24% of the assets are in good to very good condition, while 31%, with a valuation of $8.1 million, are in poor to very poor condition.

4.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's sanitary services assets. The backlog is the aggregate 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 useful life.

Figure 30 Forecasting Replacement Needs – Sanitary Services



A combination of assessed and age-based data indicates a backlog of $4.2 million and five-year replacement needs of $2.4 million. An additional $67,000 will be needed between 2021-2025. The municipality's annual requirements (indicated by the black line) for its sanitary assets total $501,000. At this level, funding would be sustainable and replacement needs could be met as they arise without the need for deferring projects. The municipality is currently allocating $548,000, leaving an annual surplus of $47,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

4.6 Recommendations – Sanitary Services

- The municipality should continue its condition assessment program and expand it to additional components to better define actual asset health and field needs; this will assist in the prioritization of the short- and long-term capital budget. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- The data collected through condition assessment programs should be integrated into a risk management framework which will guide prioritization of the backlog as well as short, medium, and long term replacement needs. See Section 4, 'Risk' in the 'Asset Management Strategies' chapter for more information.

- In addition to the above, a tailored lifecycle activity framework should also be developed to promote standard lifecycle management of the sanitary system as outlined further within the "Asset Management Strategy" section of this AMP.

- Sanitary collection system key performance indicators should be established and tracked annually as part of an overall level of service model. See Section VII 'Levels of Service'.

- The municipality should assess its short-, medium- and long-term operations and maintenance needs. An appropriate percentage of the replacement costs should then be allocated for the municipality's O&M requirements.

- The municipality is overfunding (109%) its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

5. Storm Network

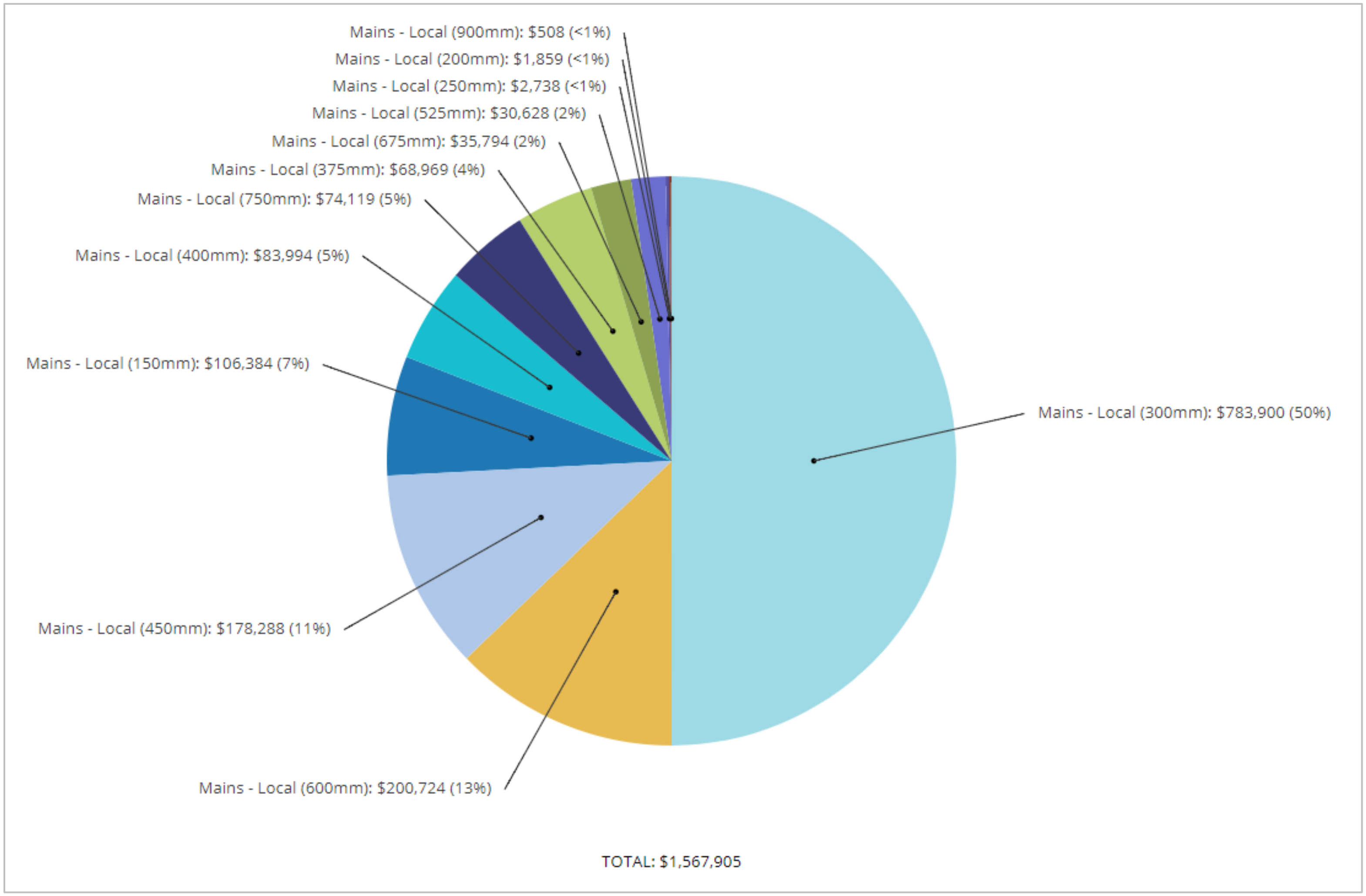
5.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 10 illustrates key asset attributes for the municipality's storm network, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's storm assets are valued at $1.6 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 10 Asset Inventory – Storm Network

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Storm Network	Mains - Local (150mm)	315m	20, 50	CPI Tables	$106,384
	Mains - Local (200mm)	110m	10, 30	CPI Tables	$1,859
	Mains - Local (250mm)	32.5m	30	CPI Tables	$2,738
	Mains - Local (300mm)	5,167.2m	20, 30, 40, 50	CPI Tables	$783,900
	Mains - Local (375mm)	577.1m	20, 30, 40	CPI Tables	$68,969
	Mains - Local (400mm)	780m	20, 30	CPI Tables	$83,994
	Mains - Local (450mm)	395m	20	CPI Tables	$178,288
	Mains - Local (525mm)	80m	20	CPI Tables	$30,628
	Mains - Local (600mm)	425m	20	CPI Tables	$200,724
	Mains - Local (675mm)	75m	20	CPI Tables	$35,794
	Mains - Local (750mm)	130m	20, 50	CPI Tables	$74,119
	Mains - Local (900mm)	40m	50	CPI Tables	$508
				Total	**$1,567,905**

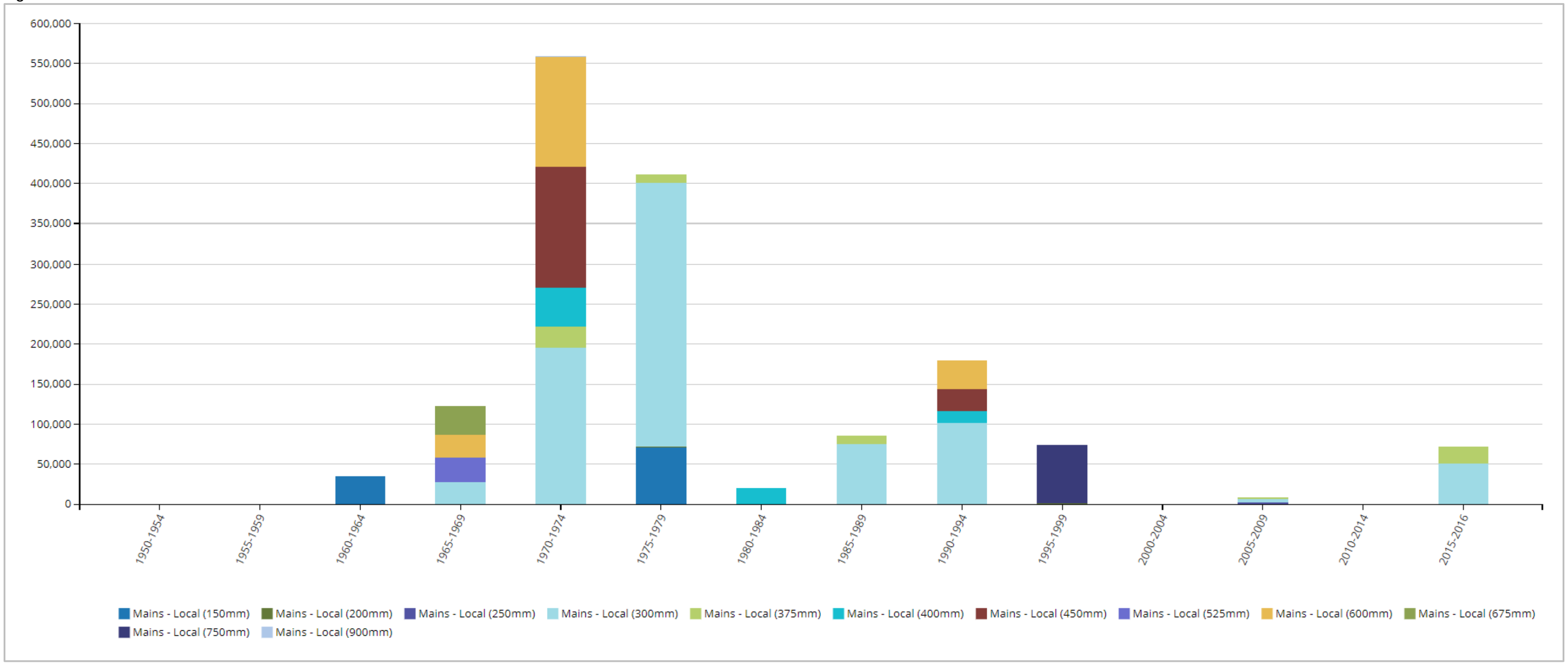
Figure 31 Asset Valuation – Storm Network



5.2 Historical Investment in Infrastructure

Figure 32 shows the municipality's historical investments in its storm network since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 5.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 32 Historical Investment – Storm Network

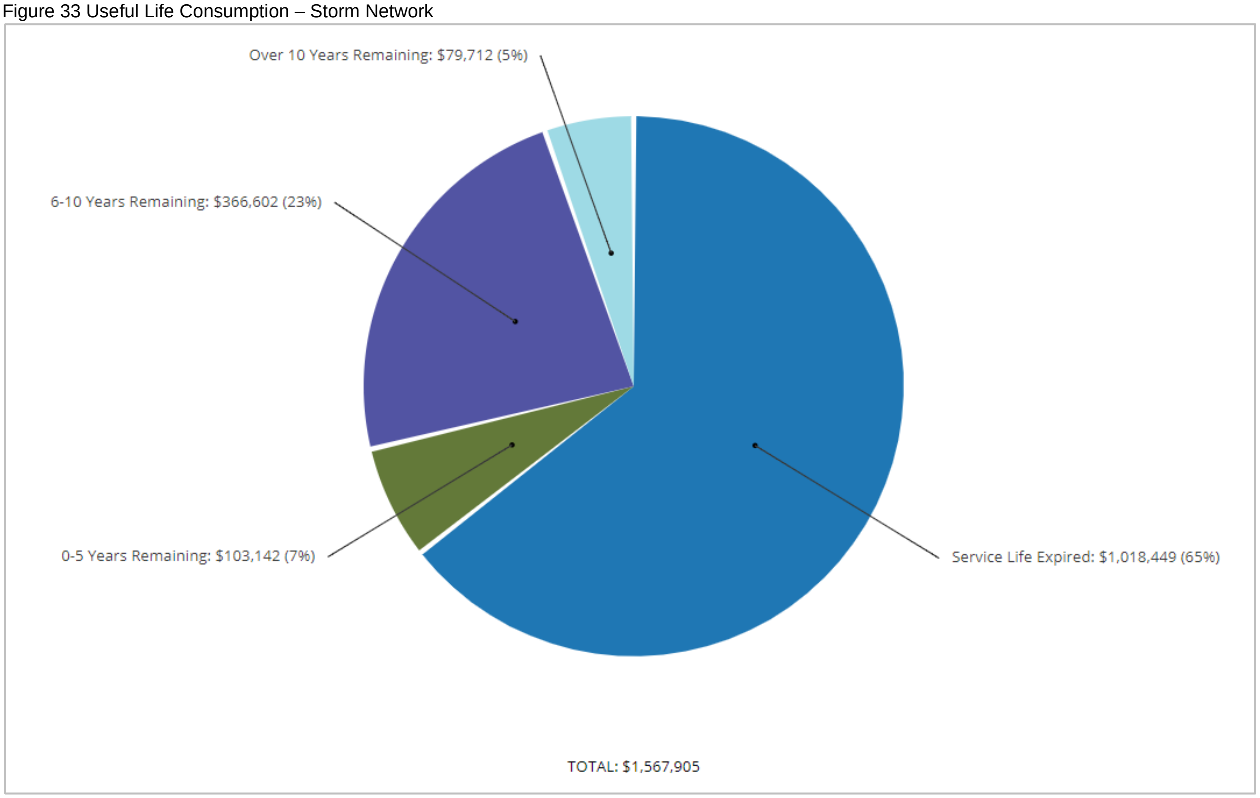


Investments into the municipality's storm assets have fluctuated since the 1960s. Investments peaked in the early 1970s at over $550,000. Since 2015, $72,000 has been invested into storm mains.

5.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 33 illustrates the useful life consumption levels as of 2016 for the municipality's storm assets.

Figure 33 Useful Life Consumption – Storm Network

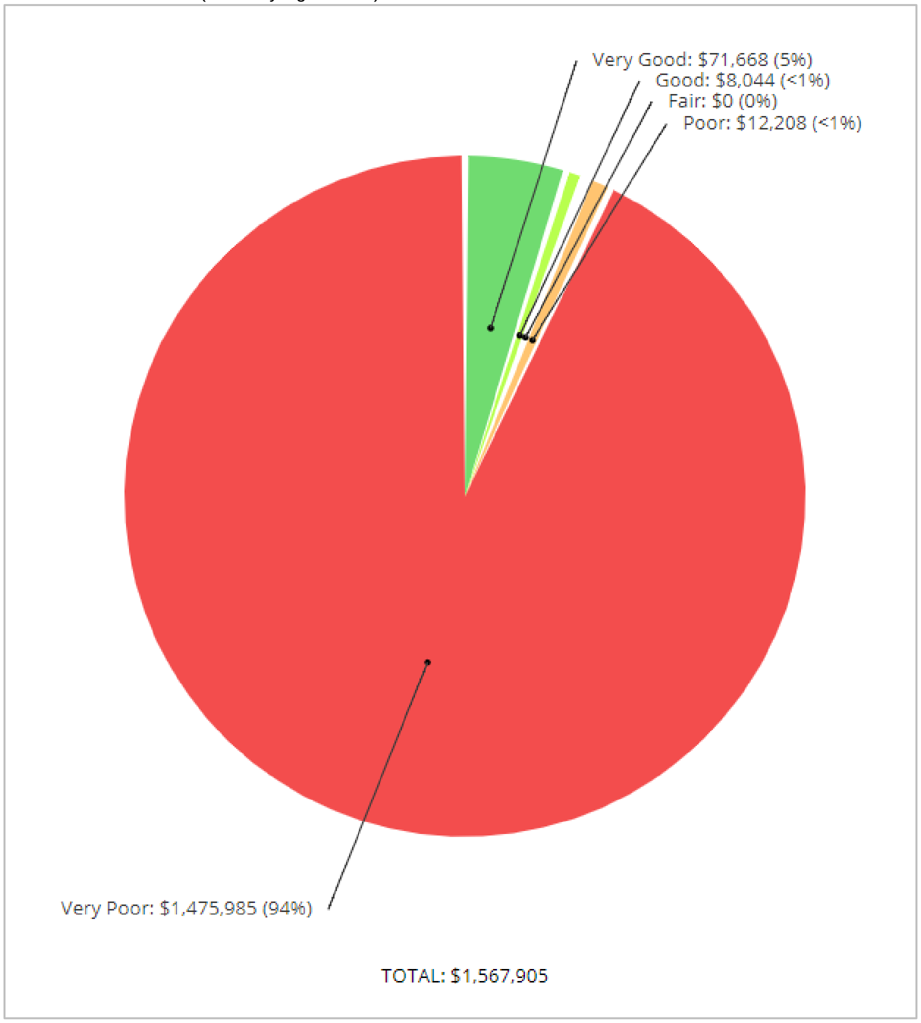


While 5% of assets have over 10 years of useful life remaining, 65%, with a valuation of $1 million, remain in operation beyond their estimated useful life. An additional 7% will reach the end of their useful life within the next five years.

5.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's storm services as of 2016. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has provided condition data for 5% of its storm assets.

Figure 34 Asset Condition – Storm Network (Primarily Age-based)

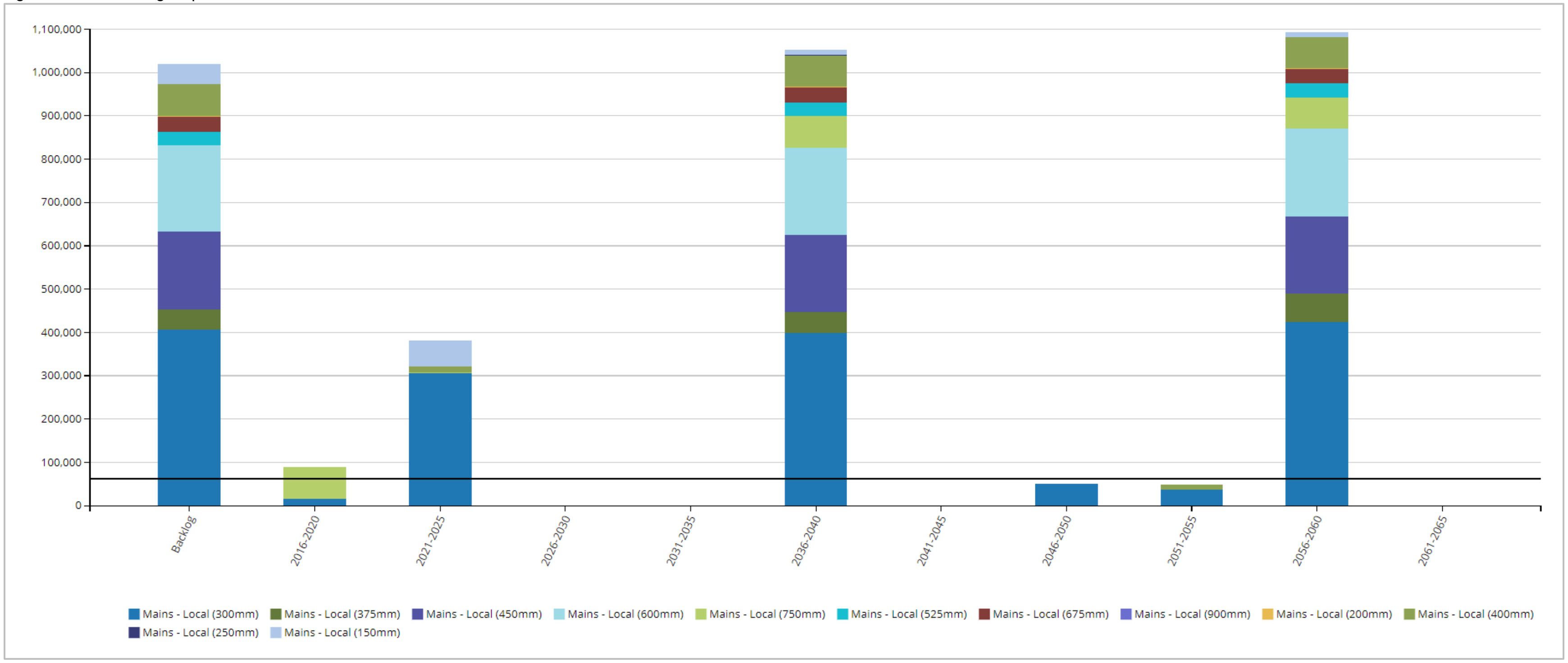


Primarily age-based data indicates that 94% of the assets, with a valuation of $1.5 million, are in very poor condition. Less than 6% are in good to very good condition.

5.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's storm assets. The backlog is the aggregate 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 useful life.

Figure 35 Forecasting Replacement Needs – Storm Network



Primarily assessed data indicates a backlog of $1 million and five-year replacement needs of $89,000. An additional $381,000 will be needed between 2021-2025. The municipality's annual requirements (indicated by the black line) for storm assets total $64,000. At this level, funding would be sustainable and replacement needs could be met as they arise without the need for deferring projects. The municipality is currently not allocating any funding towards this asset category. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

5.6 Recommendations – Storm Network

- Primarily age-based data indicates a backlog of $1 million and 10-year replacement needs of $470,000. The municipality should implement a condition assessment program for its storm mains to better define field needs and to assist the prioritization of the short and long term capital budget. See Section 2, ‘Condition Assessment Programs’ in the ‘Asset Management Strategies’ chapter.

- Based on the above information, the municipality should assess its short-, medium- and long-term capital, operations, and maintenance needs.

- An appropriate percentage of the replacement value of the assets should be allocated for the municipality’s O&M requirements.

- Storm network key performance indicators should be established and tracked annually as part of an overall level of service model. See Section VII ‘Levels of Service’.

- The municipality is not funding any portion of its long-term requirements on an annual basis. See the ‘Financial Strategy’ section on how to achieve more sustainable and optimal funding levels.

6. Buildings & Facilities

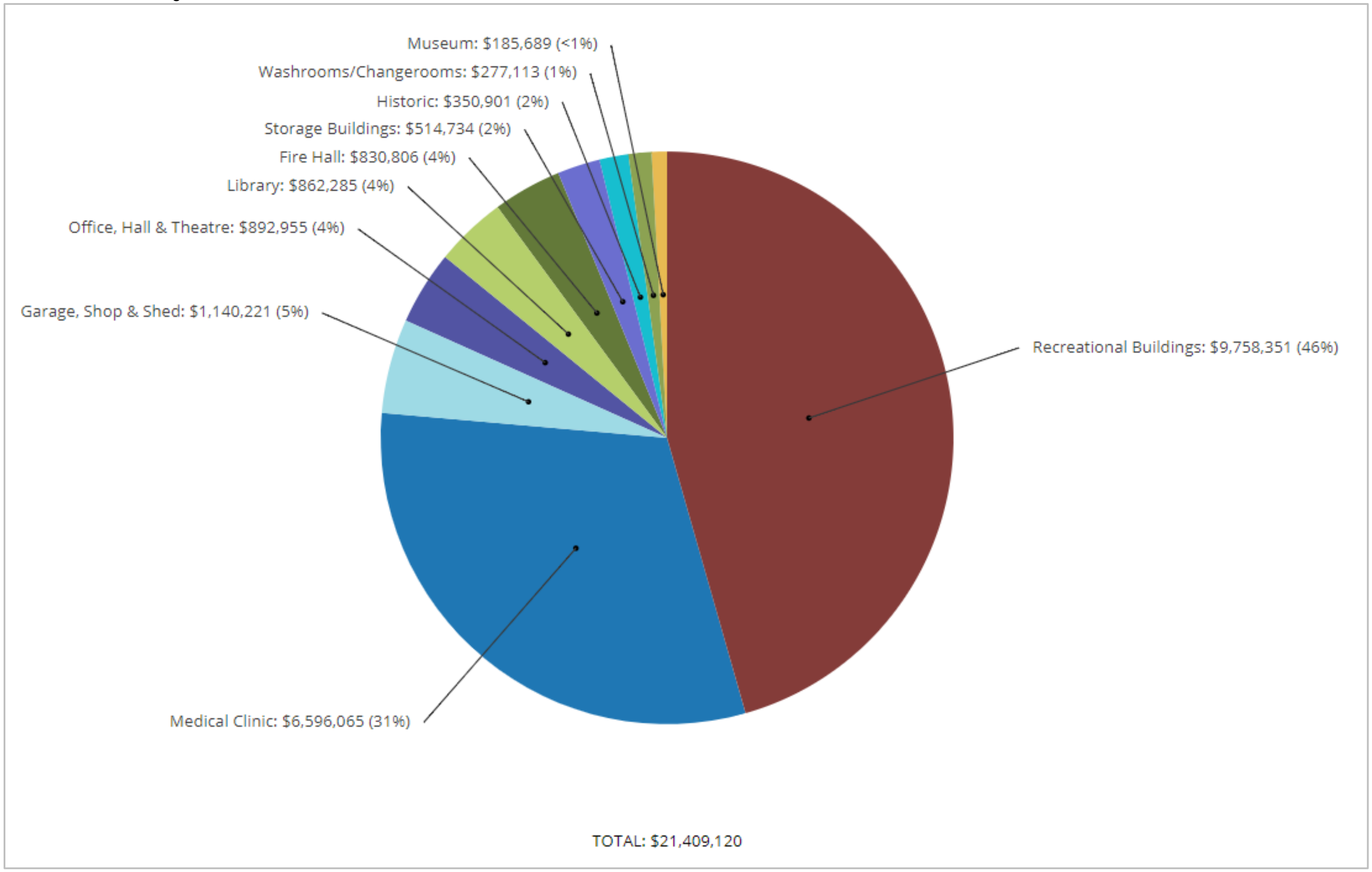
6.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 11 illustrates key asset attributes for the municipality's buildings & facilities, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's buildings assets are valued at $21.4 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 11 Key Asset Attributes – Buildings & Facilities

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Buildings & Facilities	Fire Hall	3	10, 40	CPI Tables	$830,806
	Garage, Shop & Shed	10	10, 20, 25, 30, 40, 50	CPI Tables	$1,140,221
	Library	3	40	CPI Tables	$862,285
	Medical Clinic	2	30, 40	CPI Tables	$6,596,065
	Museum	1	40	CPI Tables	$185,689
	Office, Hall & Theatre	2	40	CPI Tables	$892,955
	Historic	2	40	CPI Tables	$350,901
	Recreational Buildings	35	10, 15, 20, 21.5, 30, 40	CPI Tables	$9,758,351
	Storage Buildings	6	30, 40	CPI Tables	$514,734
	Washrooms/Changerooms	3	40	CPI Tables	$277,113
				Total	$21,409,120

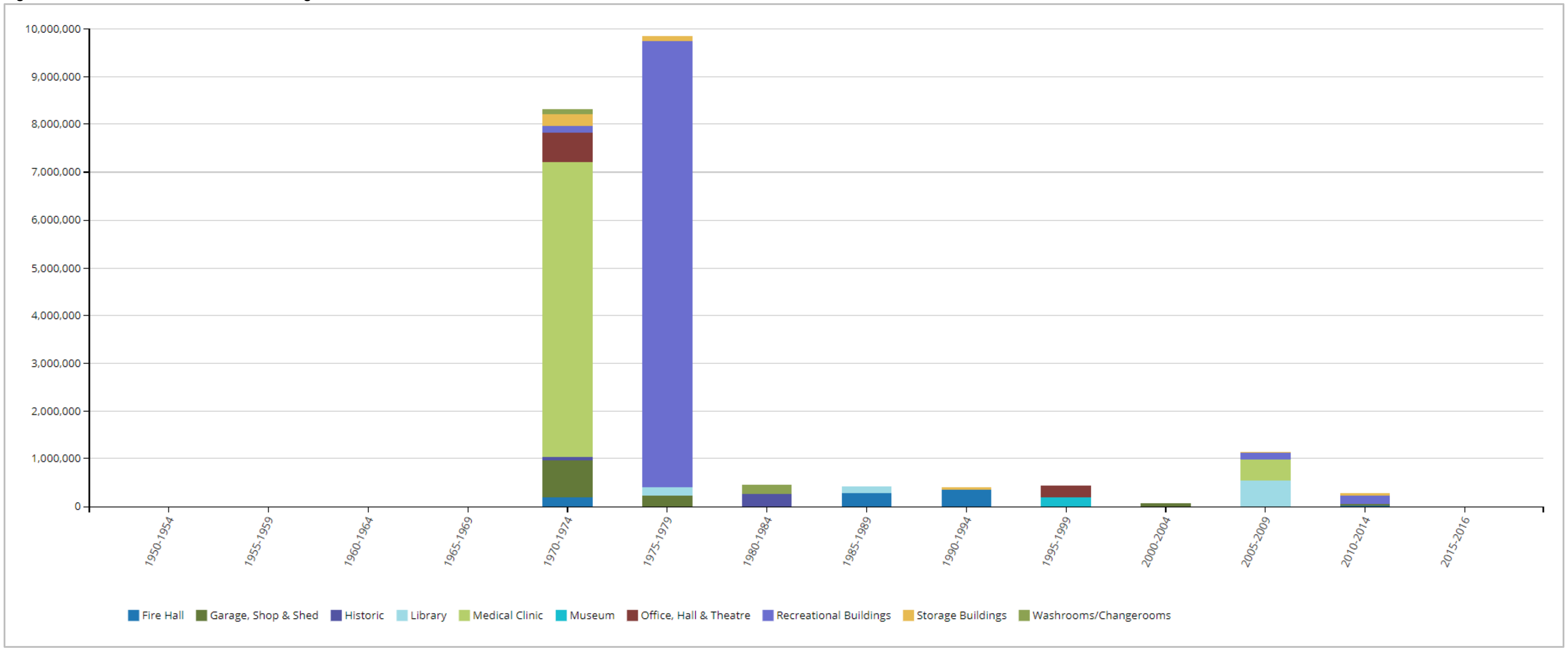
Figure 36 Asset Valuation – Buildings & Facilities



6.2 Historical Investment in Infrastructure

Figure 37 shows the municipality's historical investments in its buildings & facilities since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 6.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 37 Historical Investment – Buildings & Facilities

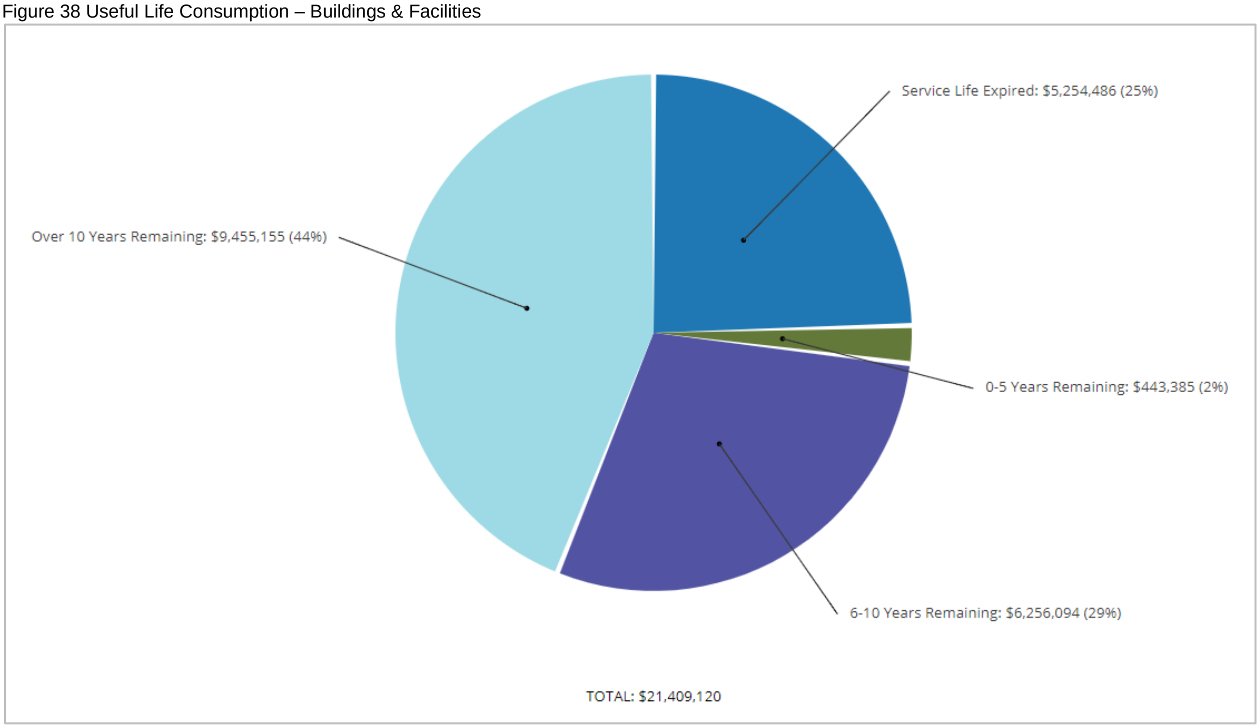


The municipality's investments into its building assets have fluctuated since the 1970s. Between 1975 and 1979, the period of largest investment, nearly $10 million was invested with $9.3 million put into recreation buildings.

6.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 38 illustrates the useful life consumption levels as of 2016 for the municipality's buildings assets.

Figure 38 Useful Life Consumption – Buildings & Facilities

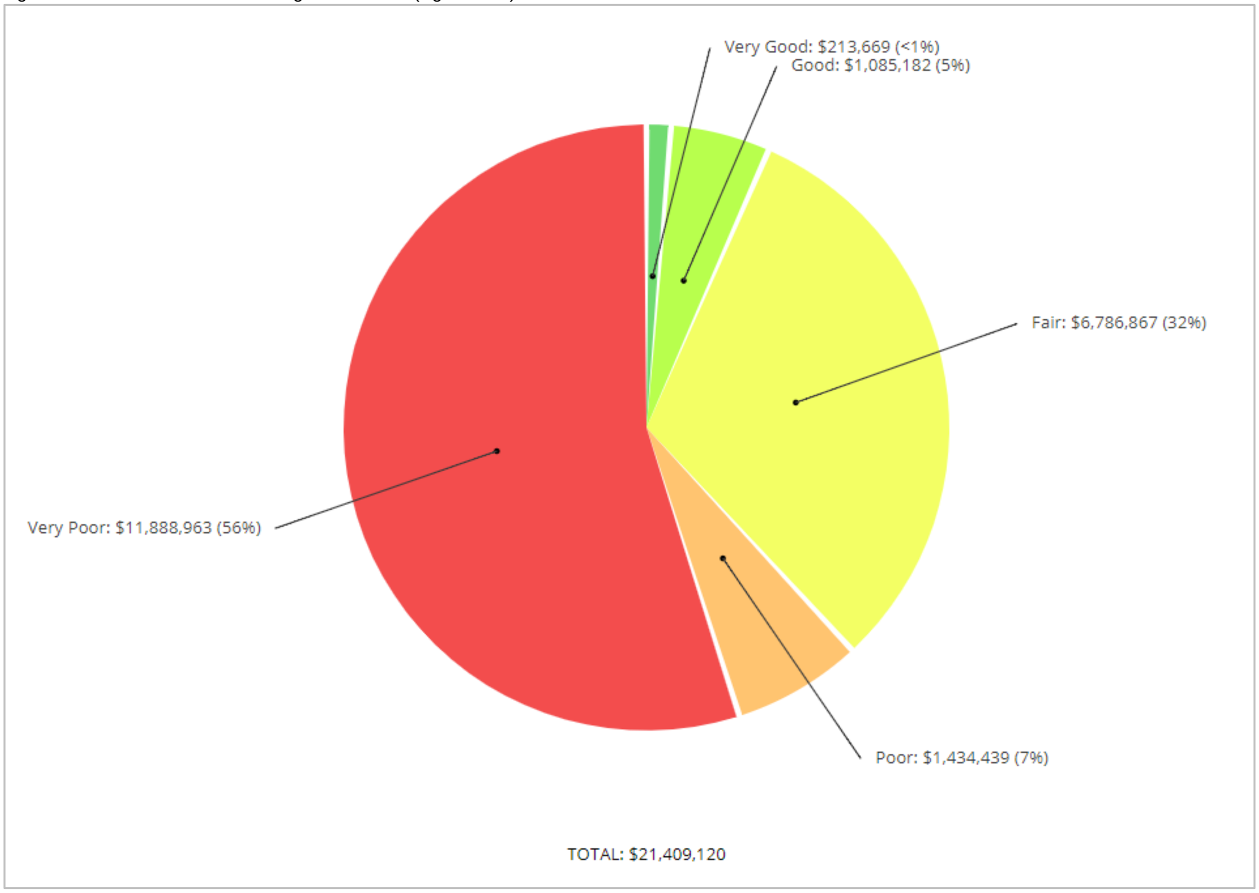


44% of the municipality's buildings & facilities have at least 10 years of useful life remaining. However, 25%, with a valuation of $5.3 million remain in operation beyond their established useful life.

6.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's buildings assets. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has not provided condition data for any of its building assets.

Figure 39 Asset Condition – Buildings & Facilities (Age-based)

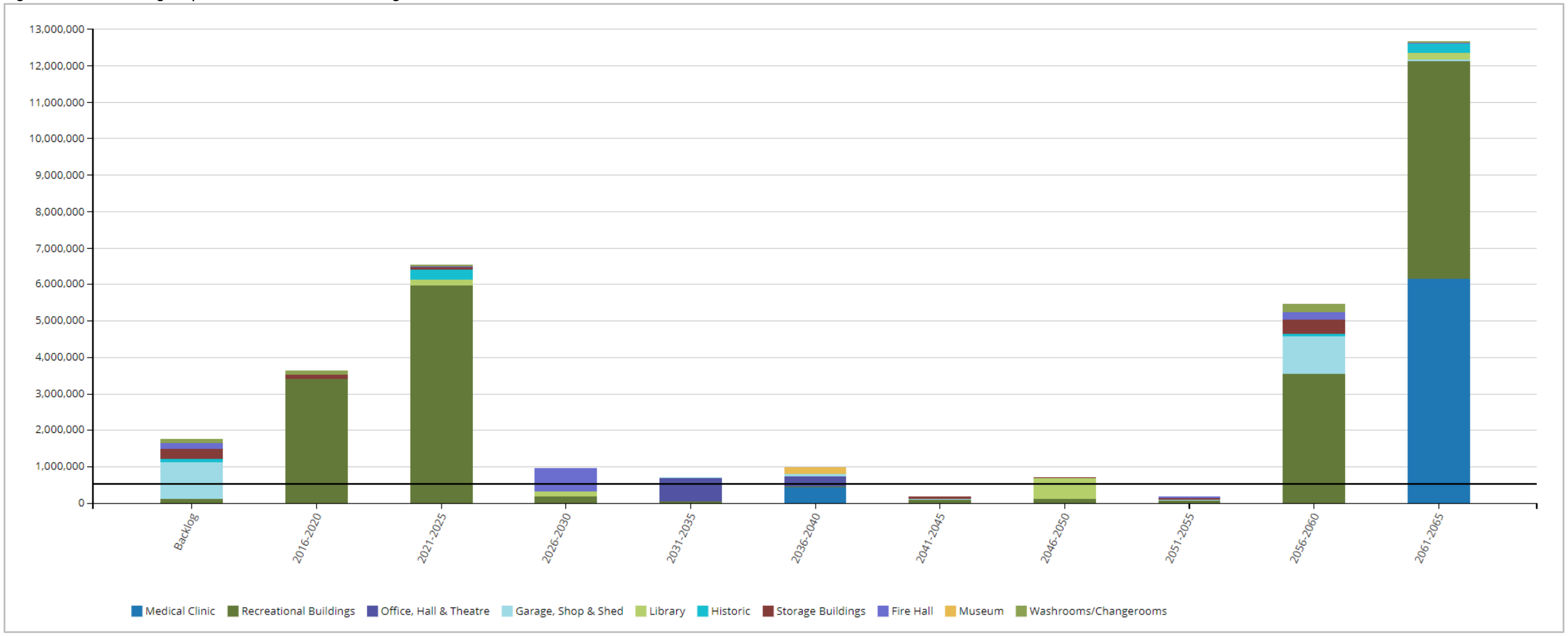


Age-based data indicates that 63% of building assets, with a valuation of $13.3 million, are in poor to very poor condition; less than 6% are in good to very good condition.

6.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's buildings assets. The backlog is the aggregate 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 useful life.

Figure 40 Forecasting Replacement Needs – Buildings & Facilities



Age-based data indicates a backlog of $1.8 million and five year replacement needs of $3.7 million. An additional $6.5 million is forecasted for 2021-2025. The municipality's annual requirements (indicated by the black line) for its buildings total $550,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. The municipality is currently allocating $273,000, leaving an annual deficit of $277,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

6.6 Recommendations – Buildings & Facilities

- Age-based data indicates a backlog of $1.8 million and significant 10-year replacement needs of $10.2 million. The municipality should implement a component based condition inspection program for its facilities to better estimate future financial needs. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- Using the above information, the municipality should assess its short-, medium- and long-term capital, and operations and maintenance needs.

- An appropriate percentage of the replacement costs should then be allocated for the municipality's O&M requirements.

- Facility key performance indicators should be established and tracked annually as part of an overall level of service model. See Chapter VII, 'Levels of Service'.

- The municipality is funding 50% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

7. Machinery & Equipment

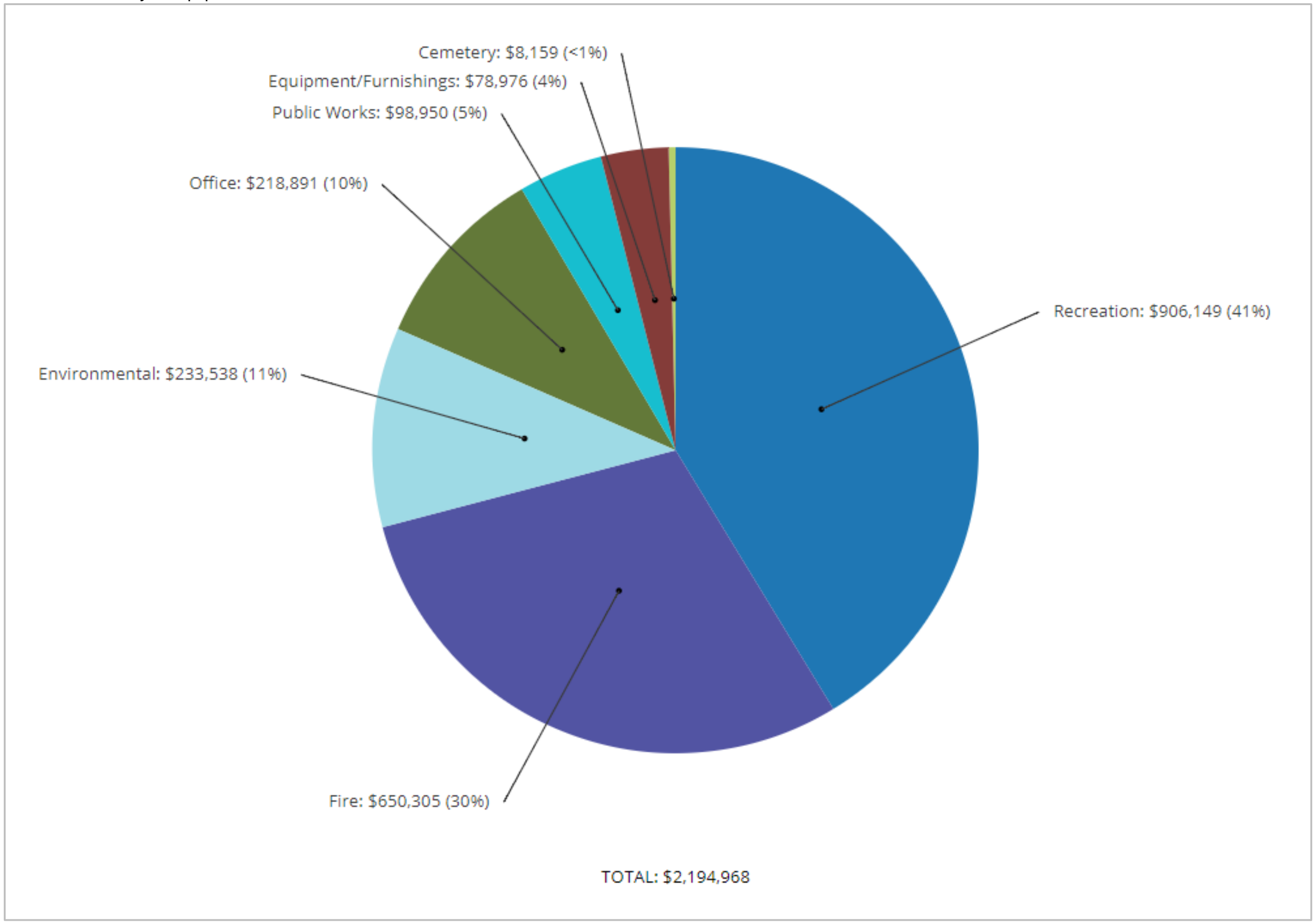
7.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 12 illustrates key asset attributes for the municipality's machinery & equipment, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's machinery & equipment assets are valued at $2.2 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 12 Asset Inventory – Machinery & Equipment

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Machinery & Equipment	Cemetery	1	10	CPI Tables	$8,159
	Environmental	23	4, 5, 10, 13, 15, 30	CPI Tables	$233,538
	Equipment/Furnishings	36	4, 5, 10, 15, 20	CPI Tables	$78,976
	Fire	231	4, 5, 10, 12, 15, 30	CPI Tables	$650,305
	Office	33	4, 5, 10, 15, 20	CPI Tables	$218,891
	Public Works	19	10, 15, 20	CPI Tables	$98,950
	Recreation	44	5, 10, 15, 20, 30	CPI Tables	$906,149
				Total	$2,194,968

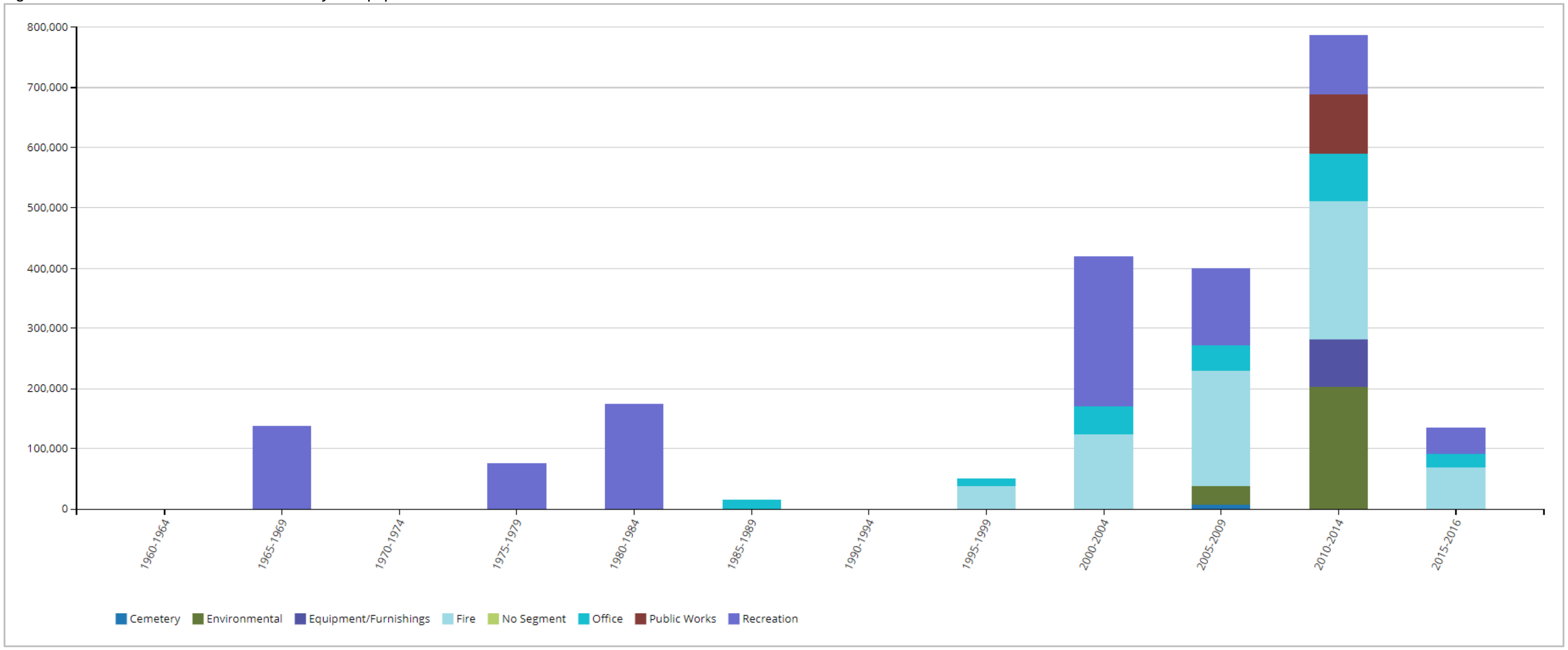
Figure 41 Asset Valuation – Machinery & Equipment



7.2 Historical Investment in Machinery & Equipment

Figure 42 shows the municipality's historical investments in its machinery & equipment since 1960. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 7.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 42 Historical Investment – Machinery & Equipment

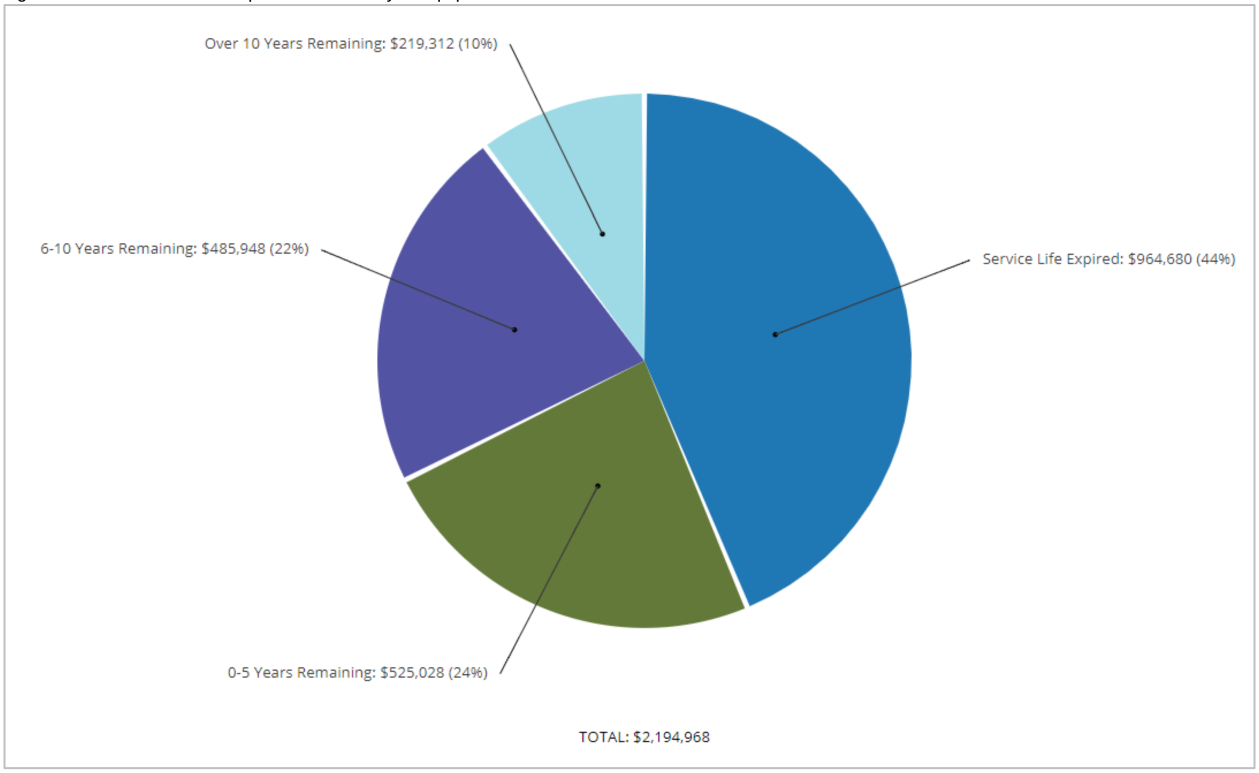


The municipality has invested sporadically into its machinery & equipment portfolio since the 1960s. Investments increased in the early 2000s and peaked between 2010-2014 at nearly $800,000.

7.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 43 illustrates the useful life consumption levels as of 2016 for the municipality's machinery & equipment assets.

Figure 43 Useful Life Consumption – Machinery & Equipment

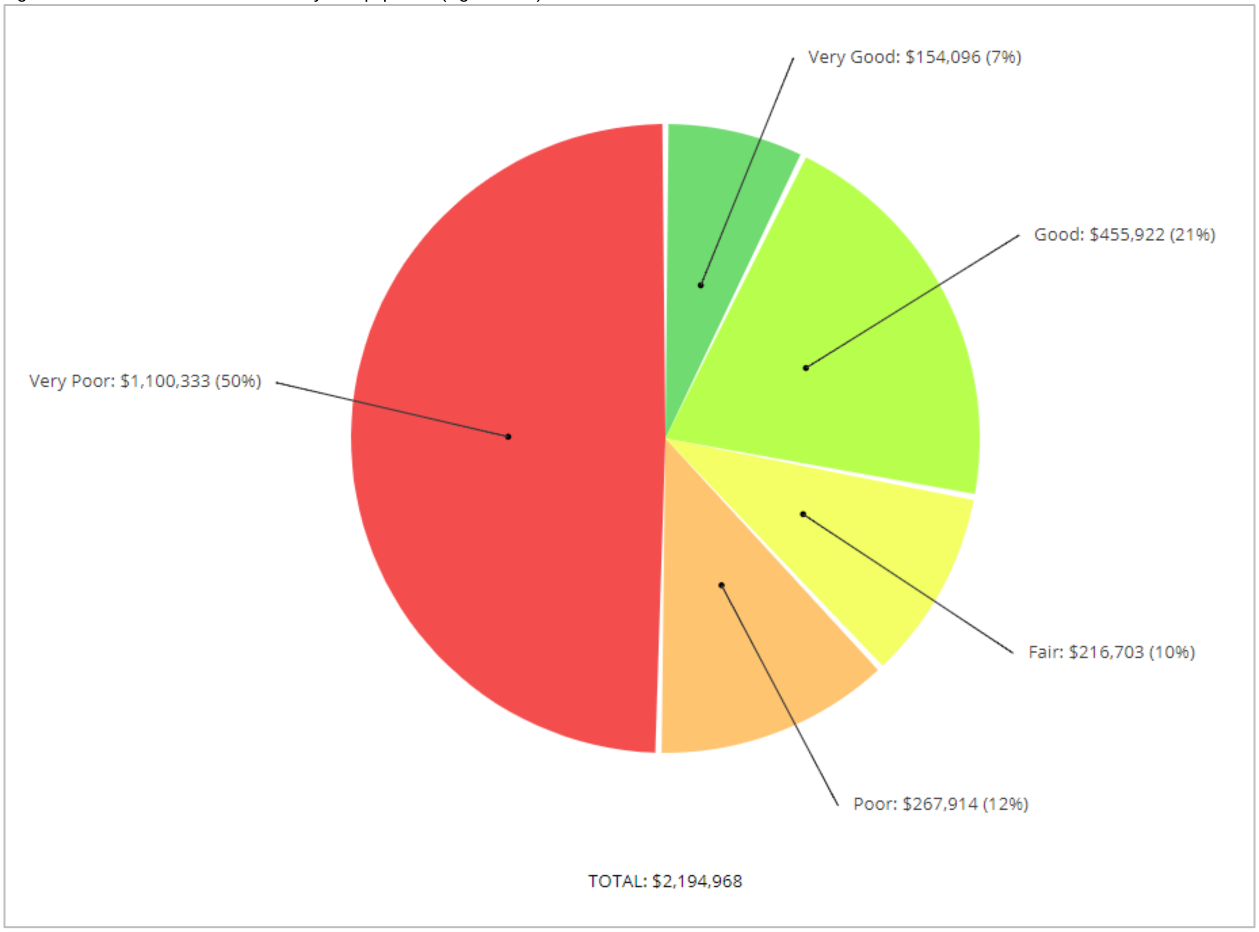


While 10% of assets have at least 10 years of useful life remaining, 44%, with a valuation of $965,000, remain in operation beyond their useful life. An additional 24% will reach the end of their useful life within the next five years.

7.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's machinery & equipment assets as of 2016. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has not provided condition data.

Figure 44 Asset Condition – Machinery & Equipment (Age-based)

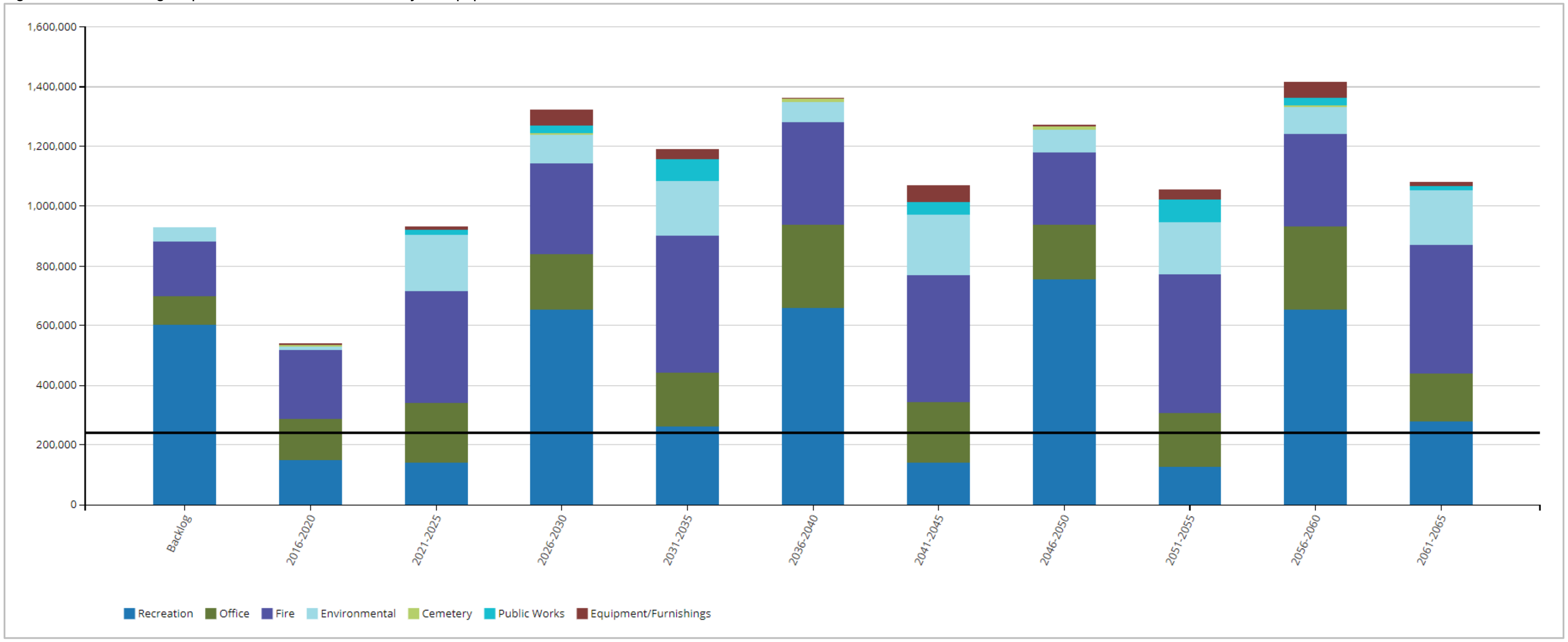


Based on age data, 62% of assets, with a valuation of $1.4 million, are in poor to very poor condition; 28% are in good to very good condition.

7.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's machinery & equipment assets. The backlog is the aggregate 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 useful life.

Figure 45 Forecasting Replacement Needs – Machinery & Equipment



In addition to an age-based backlog of $928,000, the municipality's replacement needs total $542,000 in the next five years. An additional $932,000 will be required between 2021-2025. The municipality's annual requirements (indicated by the black line) for its machinery & equipment total $243,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently allocating $307,000, leaving an annual surplus of $64,000. See the 'Financial Strategy' section for maintaining a sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

7.6 Recommendations – Machinery & Equipment

- Age-based data indicates a backlog of $928,000 and 10-year replacement needs of $1.5 million. The municipality should implement a component based condition inspection program to better define financial requirements for its machinery and equipment. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- Using the above information, the municipality should assess its short-, medium- and long-term capital, and operations and maintenance needs.

- An appropriate percentage of the replacement costs should then be allocated for the municipality's O&M requirements.

- The municipality is overfunding (126%) its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to maintain sustainable and optimal funding levels.

8. Land Improvements

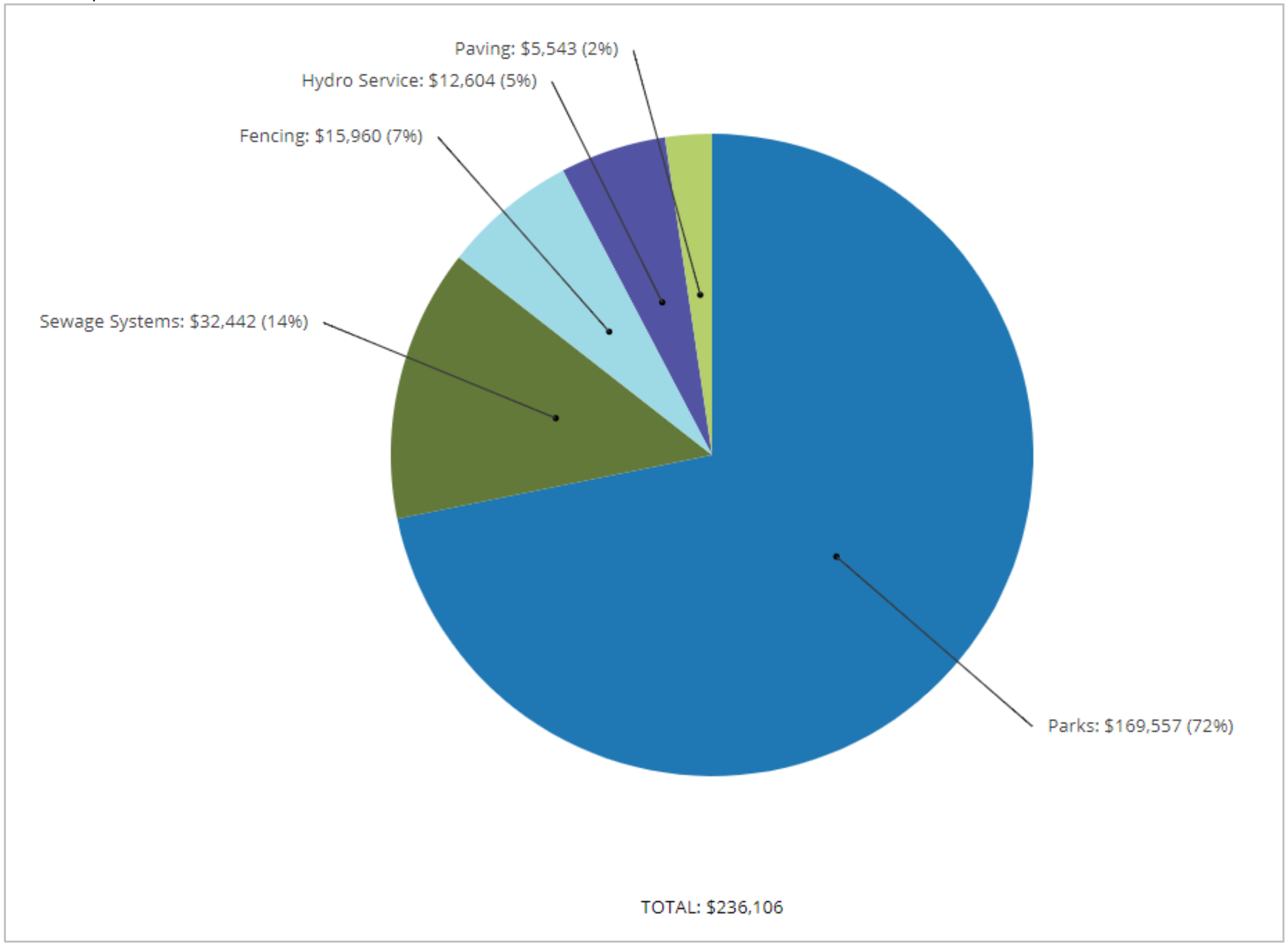
8.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 13 illustrates key asset attributes for the municipality's land improvements, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's land improvements assets are valued at $236,000 based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 13 Asset Inventory – Land Improvements

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Land Improvements	Fencing	1	10	CPI Tables	$15,960
	Hydro Service	1	20	CPI Tables	$12,604
	Parks	21	5, 10, 15, 20, 21.5, 30	CPI Tables	$169,557
	Paving	1	20	CPI Tables	$5,543
	Sewage Systems	2	20, 40	CPI Tables	$32,442
				Total	**$236,106**

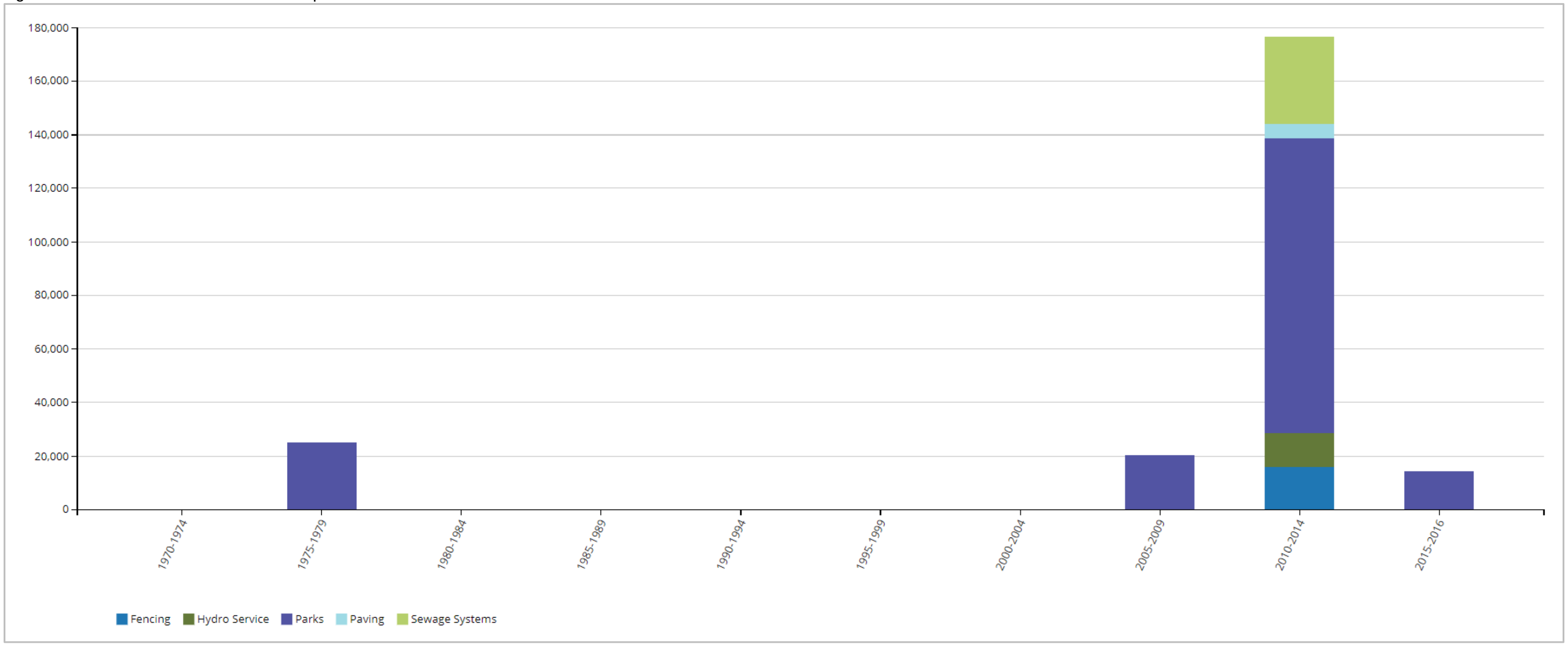
Figure 46 Asset Valuation – Land Improvements



8.2 Historical Investment in Infrastructure

Figure 47 shows the municipality's historical investments in its land improvements since 1970. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 8.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 47 Historical Investment – Land Improvements

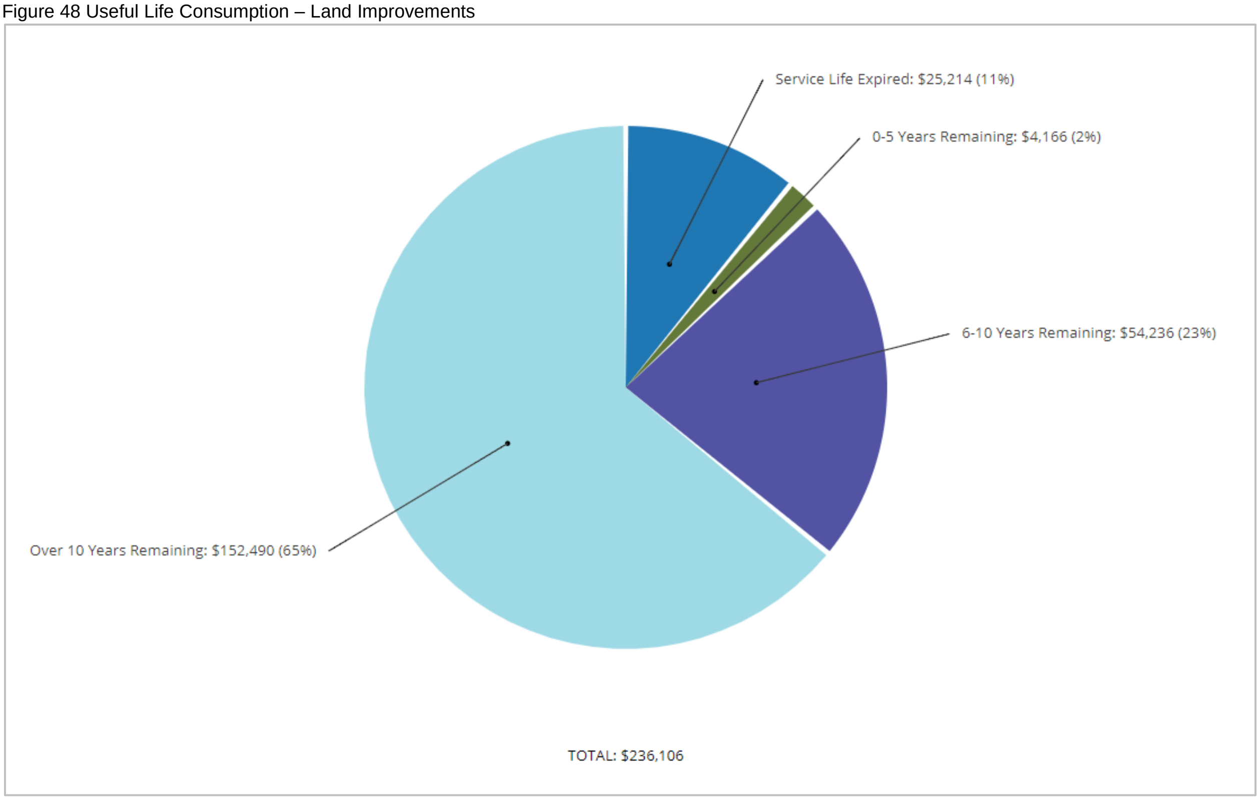


Expenditures in land improvements have been minimal across the decades. Between 2010 and 2014, the period of largest investment, $177,000 was invested with a focus on parks.

8.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 48 illustrates the useful life consumption levels as of 2016 for the municipality's land improvement assets.

Figure 48 Useful Life Consumption – Land Improvements

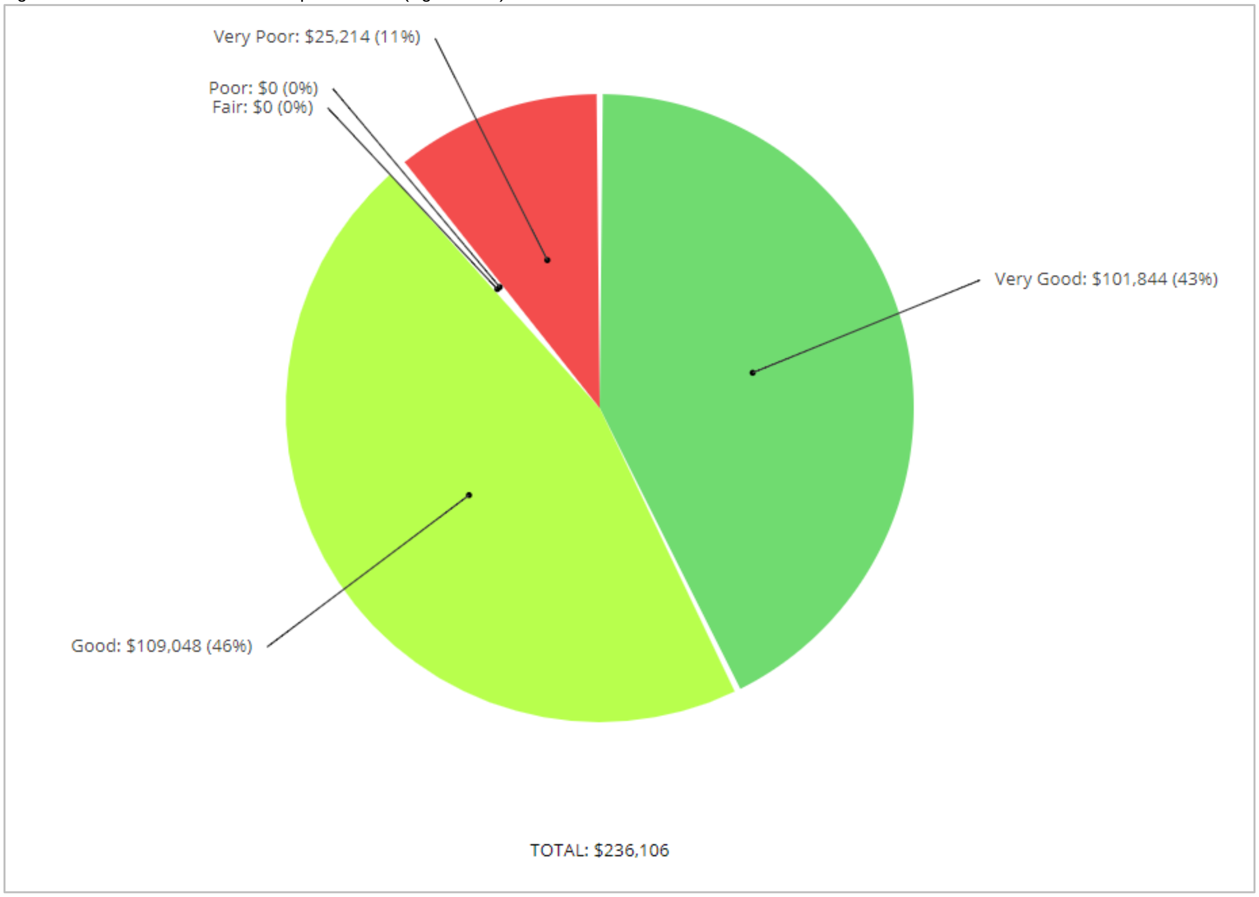


While 65% of the municipality's land improvement assets, with a valuation of $152,000, have at least 10 years of useful life remaining, 11% remain in operation beyond their useful life. An additional 2% will reach the end of their useful life within the next five years.

8.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the municipality's land improvement assets. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has not provided condition data for its land improvement assets.

Figure 49 Asset Condition - Land Improvements (Age-based)

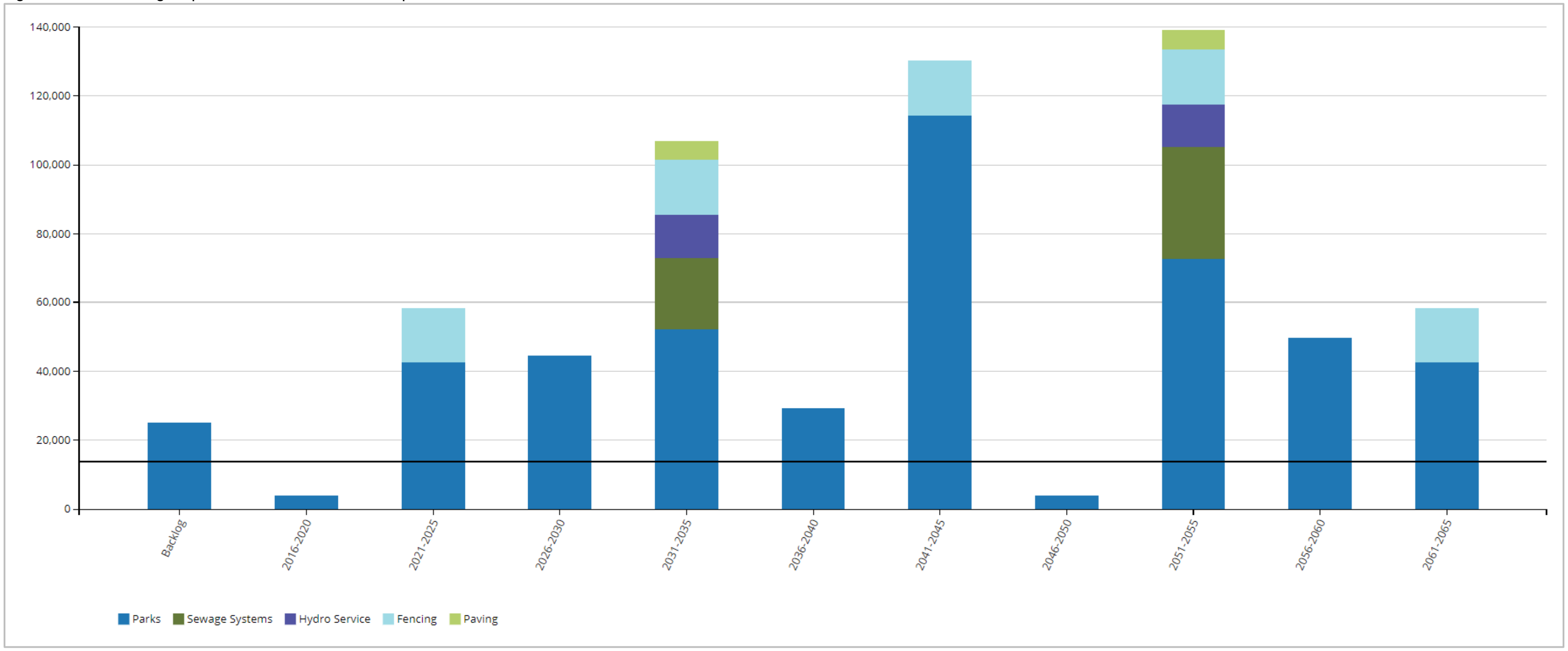


Based on age data, 89% of the municipality's land improvement assets, with a valuation of $211,000, are in good to very good condition; 11% are in very poor condition.

8.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's land improvements assets. The backlog is the aggregate 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 useful life.

Figure 50 Forecasting Replacement Needs – Land Improvements



Age-based data shows a backlog of $25,000. In addition, the municipality's replacement needs will total $4,000 over the next 5 years with an additional $58,000 required between 2021-2025. The municipality's annual requirements (indicated by the black line) for its land improvements total $14,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently not allocating any funding towards this asset category. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

8.6 Recommendations – Land Improvements

- In time, the municipality should implement a condition assessment program for its land improvement assets to better estimate actual condition levels. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- Using the above information, the municipality should assess its short-, medium- and long-term capital and operations and maintenance needs.

- An appropriate percentage of the replacement costs should then be allocated for the municipality's O&M requirements.

- The municipality is not funding any portion of its long-term replacement needs on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels

9. Vehicles

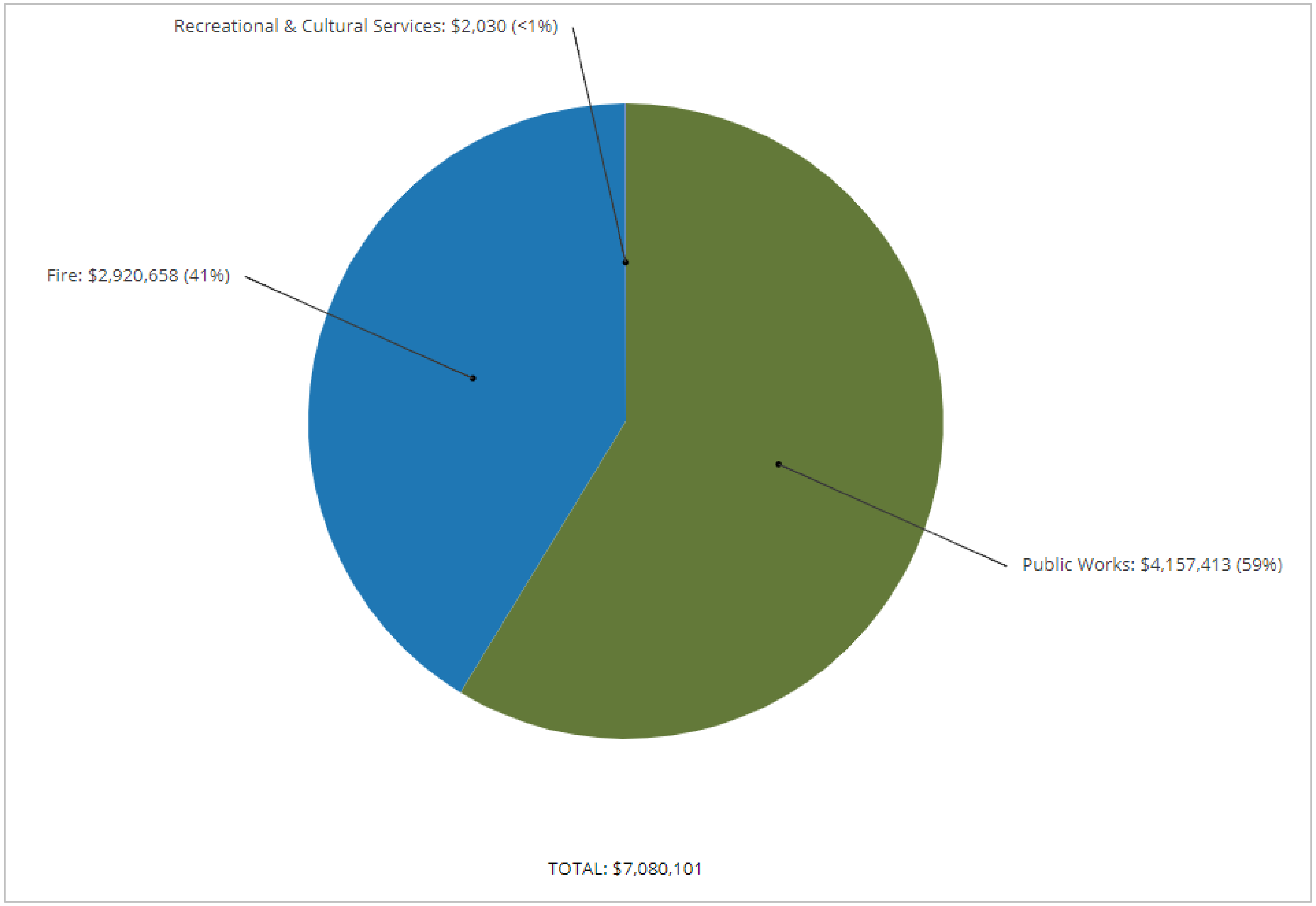
9.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 14 illustrates key asset attributes for the municipality's vehicles portfolio, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the municipality's vehicles assets are valued at $7.1 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the municipality.

Table 14 Asset Inventory – Vehicles

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Vehicles	Fire	14	5, 12, 20	CPI Tables	$2,920,658
	Public Works	45	5, 8, 10, 12, 40	CPI Tables	$4,157,413
	Recreational & Cultural Services	1	20	CPI Tables	$2,030
				Total	$7,080,101

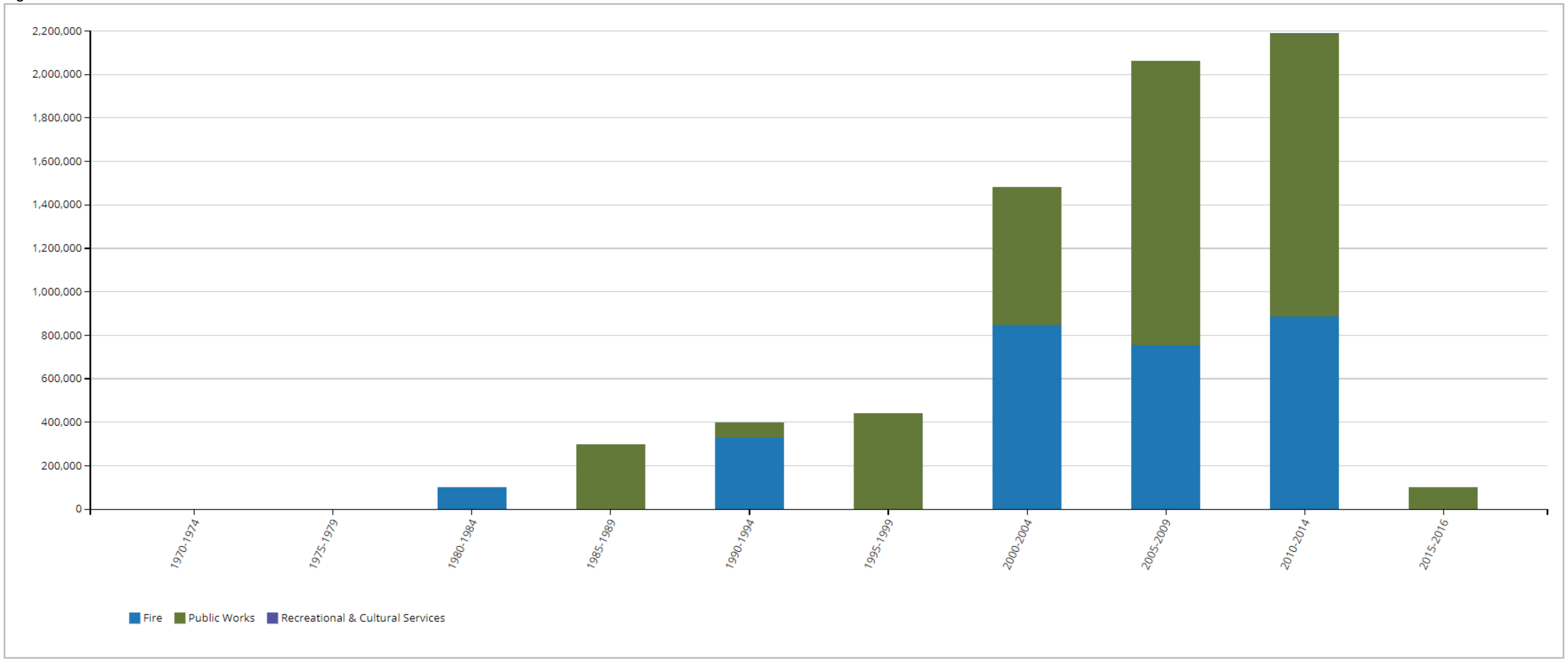
Figure 51 Asset Valuation – Vehicles



9.2 Historical Investment in Infrastructure

Figure 52 shows the municipality's historical investments in its vehicles portfolio since 1970. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 9.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 52 Historical Investment – Vehicles

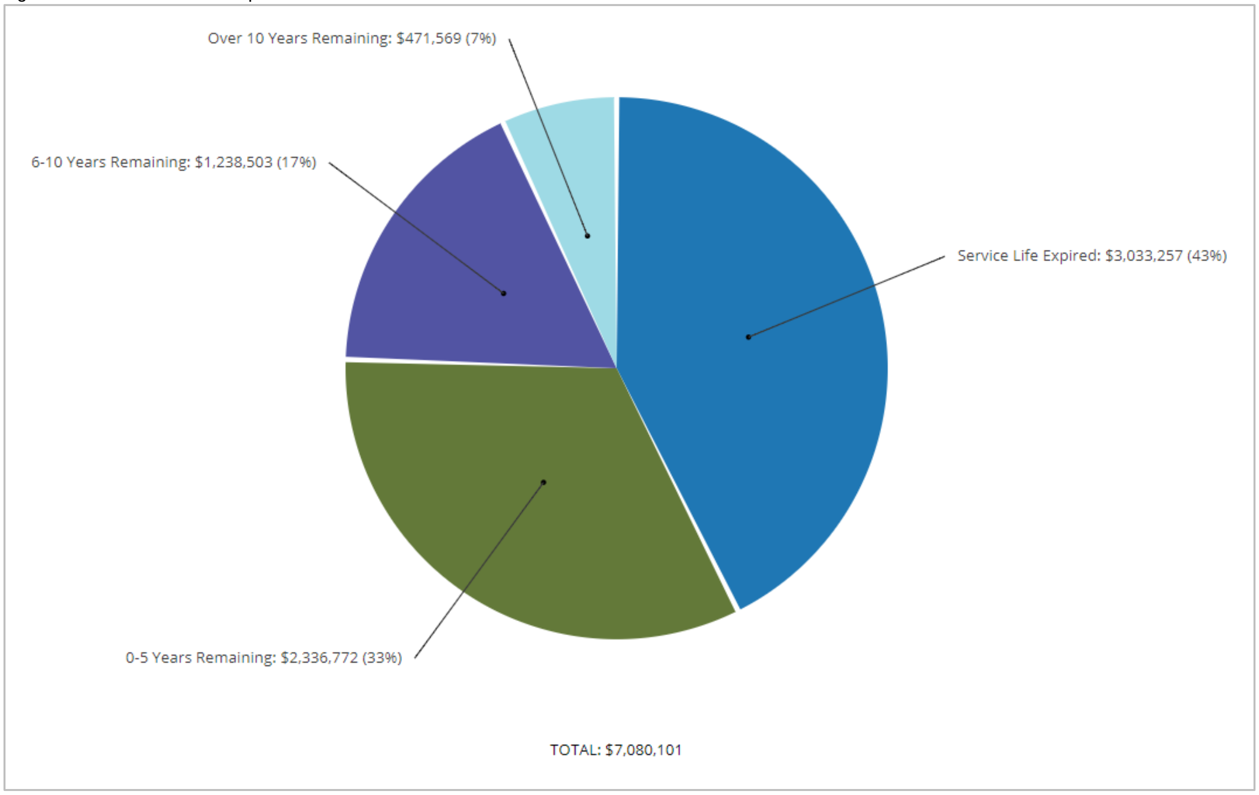


Investments in vehicles quickly increased starting in the 1980s. In 2010-2014, the period of largest investment, $2.2 million was invested with $1.3 million put into public works vehicles.

9.3 Useful Life Consumption

In conjunction with historical spending patterns and observed condition data, understanding the consumption rate of assets based on industry established useful life standards provides a more complete profile of the state of a community's infrastructure. Figure 53 illustrates the useful life consumption levels as of 2016 for the municipality's vehicles.

Figure 53 Useful Life Consumption – Vehicles

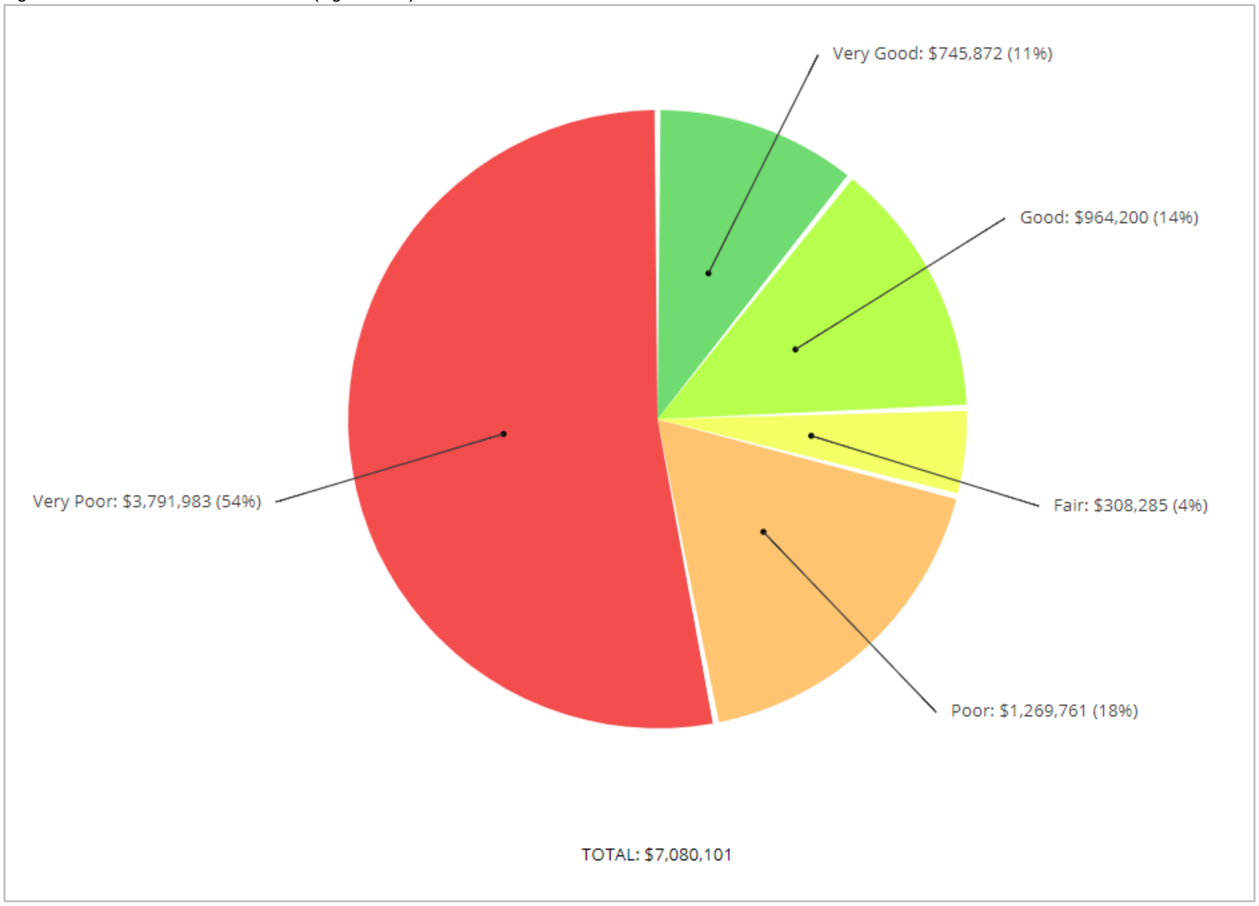


While 7% of assets have over 10 years of useful life remaining, 43%, with a valuation of $3 million remain in operation beyond their useful life. An additional 33% will reach the end of their useful life within the next five years.

9.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's vehicles assets as of 2016. By default, we rely on observed field data as provided by the municipality. In the absence of such information, age-based data is used as a proxy. The municipality has not provided condition data.

Figure 54 Asset Condition – Vehicles (Age-based)

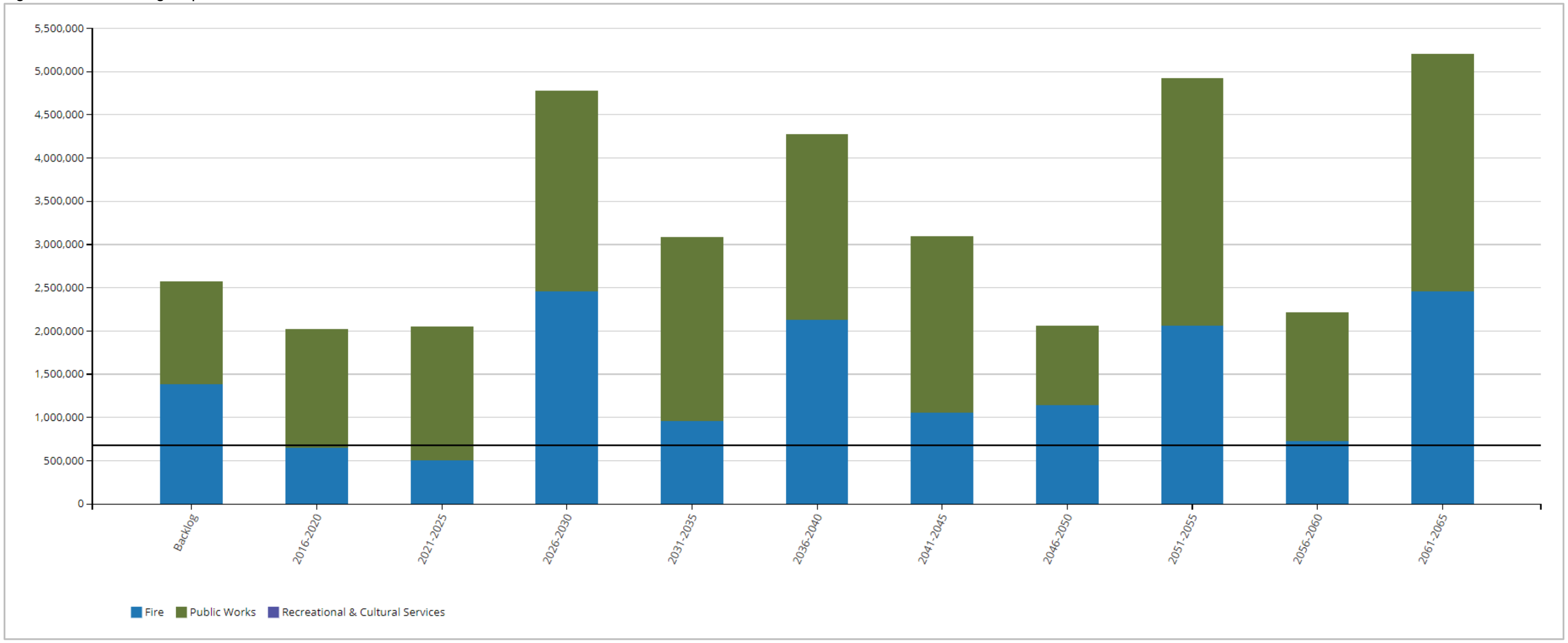


Age-based data shows that 72% of the municipality's vehicle assets are in poor to very poor condition; 25%, with a valuation of $1.7 million are in good to very good condition.

9.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's vehicles assets. The backlog is the aggregate 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 useful life.

Figure 55 Forecasting Replacement Needs – Vehicles



In addition to an age-based backlog of $2.6 million, replacement needs will total $2 million over the next five years with an additional $2 million required between 2021-2025. The municipality's annual requirements (indicated by the black line) for its vehicles total $689,000. At this funding level, the municipality would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently allocating $82,000, leaving an annual deficit of $607,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the municipality to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

9.6 Recommendations – Vehicles

- A preventative maintenance and lifecycle assessment program should be established for the fleet class to gain a better understanding of current condition and performance as well as the short- and medium-term replacement needs. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- Using the above information, the municipality should assess its short-, medium- and long-term capital and operations and maintenance needs.

- An appropriate percentage of the replacement costs should then be allocated for the municipality's O&M requirements.

- The municipality is funding 12% of its long-term replacement needs on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

VII. Levels of Service

The two primary risks to a municipality's financial sustainability are the total lifecycle costs of infrastructure, and establishing levels of service (LOS) that exceed its financial capacity. In this regard, municipality's face a choice: overpromise and underdeliver; under promise and overdeliver; or promise only that which can be delivered efficiently without placing inequitable burden on taxpayers. In general, there is often a trade-off between political expedience and judicious, long-term fiscal stewardship.

Developing realistic LOS using meaningful key performance indicators (KPIs) can be instrumental in managing citizen expectations, identifying areas requiring higher investments, driving organizational performance and securing the highest value for money from public assets. However, municipality's face diminishing returns with greater granularity in their LOS and KPI framework. That is, the objective should be to track only those KPIs that are relevant and insightful and reflect the priorities of the municipality.

1. Guiding Principles for Developing LOS

Beyond meeting regulatory requirements, levels of service established should support the intended purpose of the asset and its anticipated impact on the community and the municipality. LOS generally have an overarching corporate description, a customer oriented description, and a technical measurement. Many types of LOS, e.g., availability, reliability, safety, responsiveness and cost effectiveness, are applicable across all service areas in a municipality. The following LOS categories are established as guiding principles for the LOS that each service area in the municipality should strive to provide internally to the municipality and to residents/customers. These are derived from the Town of Whitby's *Guide to Developing Service Area Asset Management Plans*.

Table 15 LOS Categories

LOS Category	Description
Reliable	Services are predictable and continuous; services of sufficient capacity are convenient and accessible to the entire community.
Cost Effective	Services are provided at the lowest possible cost for both current and future customers, for a required level of service, and are affordable.
Responsive	Opportunities for community involvement in decision making are provided; and customers are treated fairly and consistently, within acceptable timeframes, demonstrating respect, empathy and integrity.
Safe	Services are delivered such that they minimize health, safety and security risks.
Suitable	Services are suitable for the intended function (fit for purpose).
Sustainable	Services preserve and protect the natural and heritage environment.

2. Key Performance Indicators and Targets

In this section, we identify industry standard KPIs for major infrastructure classes that the municipality can incorporate into its performance measurement and for tracking its progress over future iterations of its AMPs. The municipality should develop appropriate and achievable targets that reflect evolving demand on infrastructure, its fiscal capacity and the overall corporate objectives.

Table 16 Key Performance Indicators – Road Network and Bridges & Culverts

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value – Completion of strategic plan objectives (related to roads, and bridges & culverts)
Financial Indicators	– Annual revenues compared to annual expenditures – Annual replacement value depreciation compared to annual expenditures – Cost per capita for roads, and bridges & culverts – Maintenance cost per square metre – Revenue required to maintain annual network growth – Total cost of borrowing vs. total cost of service
Tactical	– Overall Bridge Condition Index (BCI) as a percentage of desired BCI – Percentage of road network rehabilitated/reconstructed – Percentage of paved road lane kilometres rated as poor to very poor – Percentage of bridges and large culverts rated as poor to very poor – Percentage of asset class value spent on O&M
Operational Indicators	– Percentage of roads inspected within the last five years – Percentage of bridges and large culverts inspected within the last two years – Operating costs for paved lane per kilometres – Operating costs for bridge and large culverts per square metre – Percentage of customer requests with a 24-hour response rate

Table 17 Key Performance Indicators – Buildings & Facilities

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value – Completion of strategic plan objectives (related to buildings & facilities)
Financial Indicators	– Annual revenues compared to annual expenditures – Annual replacement value depreciation compared to annual expenditures – Revenue required to meet growth related demand – Repair and maintenance costs per square metre – Energy, utility and water cost per square metre
Tactical	– Percentage of component value replaced – Percent of facilities rated poor or critical – Percentage of facilities replacement value spent on O&M – Facility utilization rate – $Utilization\ Rate = \frac{Occupied\ Space}{Facility\ Usable\ Area}$
Operational Indicators	– Percentage of facilities inspected within the last five years – Number/type of service requests – Percentage of customer requests addressed within 24 hours

Table 18 Key Performance Indicators – Vehicles

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value – Completion of strategic plan objectives (related to vehicles)
Financial Indicators	– Annual revenues compared to annual expenditures – Annual replacement value depreciation compared to annual expenditures – Cost per capita for vehicles – Revenue required to maintain annual fleet portfolio growth – Total cost of borrowing vs. total cost of service
Tactical	– Percentage of all vehicles replaced – Average age of vehicles – Percent of vehicles rated poor or critical – Percentage of vehicles replacement value spent on O&M
Operational Indicators	– Average downtime per vehicles category – Average utilization per vehicles category and/or each vehicle – Ratio of preventative maintenance repairs vs. reactive repairs – Percent of vehicles that received preventative maintenance – Number/type of service requests – Percentage of customer requests addressed within 24 hours

Table 19 Key Performance Indicators – Water, Sanitary and Storm Networks

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value – Completion of strategic plan objectives (related to water, sanitary and storm)
Financial Indicators	– Annual revenues compared to annual expenditures – Annual replacement value depreciation compared to annual expenditures – Total cost of borrowing compared to total cost of service – Revenue required to maintain annual network growth
Tactical	– Percentage of water, sanitary and storm network rehabilitated/reconstructed – Annual percentage of growth in water, sanitary and storm network – Percentage of mains where the condition is rated poor or critical for each network – Percentage of water, sanitary and storm network replacement value spent on O&M
Operational Indicators	– Percentage of water, sanitary and storm network inspected – Operating costs for the collection of wastewater per kilometre of main – Number of wastewater main backups per 100 kilometres of main – Operating costs for storm water management (collection, treatment, and disposal) per kilometre of drainage system. – Operating costs for the distribution/transmission of drinking water per kilometre of water distribution pipe – Number of days when a boil water advisory issued by the medical officer of health, applicable to a municipal water supply, was in effect – Number of water main breaks per 100 kilometres of water distribution pipe in a year – Number of customer requests received annually per water, sanitary and storm – Percentage of customer requests addressed within 24 hours per water, sanitary and storm network

Table 20 Key Performance Indicators – Machinery & Equipment

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value – Completion of strategic plan objectives (related to machinery & equipment)
Financial Indicators	– Annual revenues compared to annual expenditures – Annual replacement value depreciation compared to annual expenditures – Cost per capita for machinery & equipment – Revenue required to maintain annual portfolio growth – Total cost of borrowing vs. total cost of service
Tactical	– Percentage of all machinery & equipment replaced – Average age of machinery & equipment assets – Percent of machinery & equipment rated poor or critical – Percentage of vehicles replacement value spent on O&M
Operational Indicators	– Average downtime per machinery & equipment asset – Ratio of preventative maintenance repairs vs. reactive repairs – Percent of machinery & equipment that received preventative maintenance – Number/type of service requests

Table 21 Key Performance Indicators – Land Improvements

Level	KPI (Reported Annually)
Strategic	– Percentage of total reinvestment compared to asset replacement value – Completion of strategic plan objectives (related to land improvements)
Financial Indicators	– Annual revenues compared to annual expenditures – Annual replacement value depreciation compared to annual expenditures – Cost per capita for supplying parks, playgrounds, etc. – Repair and maintenance costs per square metre
Tactical	– Percent of land improvements rated poor or critical – Percentage of replacement value spent on O&M – Parkland per capita
Operational Indicators	– Percentage of land improvements inspected within the last five years – Number/type of service requests – Percentage of customer requests addressed within 24 hours

3. Future Performance

In addition to a municipality's financial capacity and legislative requirements, many factors, internal and external, can influence the establishment of LOS and their associated KPI. These can include the municipality's overarching mission as an organization, the current state of its infrastructure and the wider social, political and macroeconomic context. The following factors should inform the development of most levels of service targets and their associated KPIs:

Strategic Objectives and Corporate Goals
The municipality's long-term direction is outlined in its corporate and strategic plans. This direction will dictate the types of services it aims to deliver to its residents and the quality of those services. These high-level goals are vital in identifying strategic (long-term) infrastructure priorities and as a result, the investments needed to produce desired levels of service.

State of the Infrastructure
The current state of capital assets will determine the quality of services the municipality can deliver to its residents. As such, levels of service should reflect the existing capacity of assets to deliver those services, and may vary (increase) with planned maintenance, rehabilitation or replacement activities and timelines.

Community Expectations
The general public will often have qualitative and quantitative insights regarding the levels of service a particular asset or a network of assets should deliver, e.g., what a road in 'good' condition should look like or the travel time between destinations. The public should be consulted in establishing LOS; however, the discussions should be centered on clearly outlining the lifecycle costs associated with delivering any improvements in LOS.

Economic Trends
Macroeconomic trends will have a direct impact on the LOS for most infrastructure services. Fuel costs, fluctuations in interest rates and the purchasing power of the Canadian dollar can impede or accelerate any planned growth in infrastructure services.

Demographic Changes
The composition of residents in a municipality can also serve as an infrastructure demand driver, and as a result, can change how a municipality allocates its resources (e.g., an aging population may require diversion of resources from parks and sports facilities to additional wellbeing centers). Population growth is also a significant demand driver for existing assets (lowering LOS), and may require the municipality to construct new infrastructure to parallel community expectations.

Environmental Change
Forecasting for infrastructure needs based on climate change remains an imprecise science. However, broader environmental and weather patterns have a direct impact on the reliability of critical infrastructure services.

4. Monitoring, Updating and Actions

The municipality should collect data on its current performance against the KPIs listed and establish targets that reflect the current fiscal capacity of the municipality, its corporate and strategic goals, and as feasible, changes in demographics that may place additional demand on its various asset classes. For some asset classes, e.g., minor equipment, furniture, etc., cursory levels of service and their respective KPIs will suffice. For major infrastructure classes, detailed technical and customer-oriented KPIs can be critical. Once this data is collected and targets are established, the progress of the municipality should be tracked annually.

VIII. Asset Management Strategies

The asset management strategy section will outline an implementation process that can be used to identify and prioritize renewal, rehabilitation and maintenance activities. This will assist in the development of a 10-year capital plan, including growth projections, to ensure the best overall health and performance of the municipality's infrastructure. This section includes an overview of condition assessment, the lifecycle interventions required, and prioritization techniques, including risk, to determine which capital projects should move forward into the budget first.

1. Non-Infrastructure Solutions & Requirements

The municipality should explore, as requested through the provincial requirements, which non-infrastructure solutions should be incorporated into the budgets for its infrastructure services. 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 a portion of the capital budget should be dedicated for these items in each programs budget.

It is recommended, under this category of solutions, that the municipality should develop and implement holistic condition assessment programs for all asset classes. 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.

2. Condition Assessment Programs

The foundation of an intelligent asset management practice is based on having comprehensive and reliable information on the current condition of the infrastructure. Municipality's need to have a clear understanding regarding the performance and condition of their assets, as all management decisions regarding future expenditures and field activities should be based on this knowledge. An incomplete understanding of an asset may lead to its untimely failure or premature replacement.

Some benefits of holistic condition assessment programs within the overall asset management process are listed below:

- understanding of overall network condition leads to better management practices
- allows for the establishment of rehabilitation programs
- prevents future failures and provides liability protection
- potential reduction in operation/maintenance costs
- accurate current asset valuation
- allows for the establishment of risk assessment programs
- establishes proactive repair schedules and preventive maintenance programs
- avoids unnecessary expenditures
- extends asset service life therefore improving level of service
- improves financial transparency and accountability
- enables accurate asset reporting which, in turn, enables better decision making

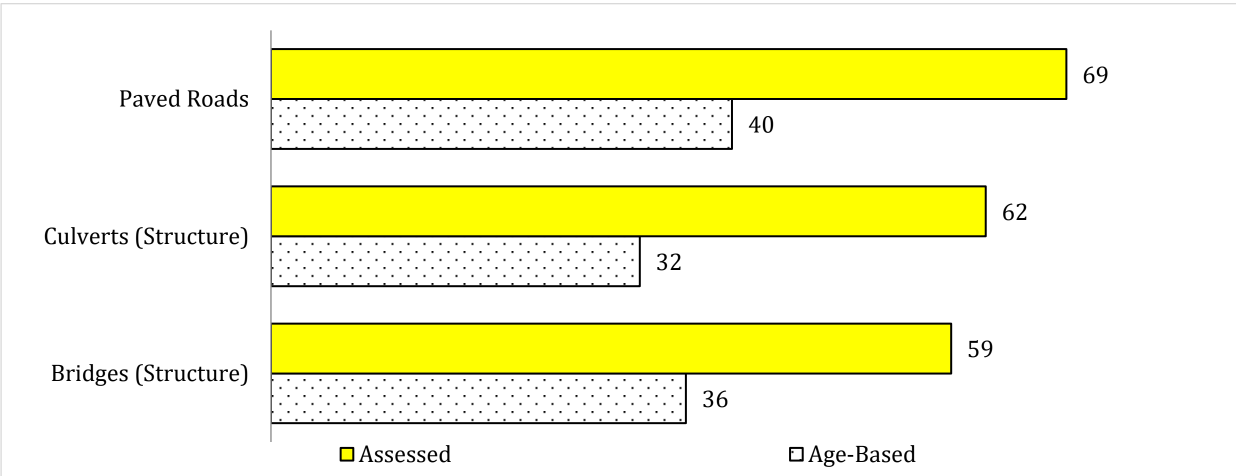
Condition assessment can involve different forms of analysis such as subjective opinion, mathematical models, or variations thereof, and can be completed through a very detailed or very cursory approach. When establishing the condition assessment for an entire asset class, a cursory approach (metrics such as good, fair, poor, very poor) is used. This is an economical strategy that will still provide up to date information, and will allow for detailed assessment or follow-up inspections on those assets captured as poor or critical condition later.

The Impact of Condition Assessments

In 2015, PSD published a study in partnership with the Association of Municipality's of Ontario (AMO). The report, *The State of Ontario's Roads and Bridges: An Analysis of 93 Municipality's*, 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 group, 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. In other words, age-based measurements maybe underestimating the condition of assets by as much as 30%.

Figure 56 Comparing Age-based and Assessed Condition Data



2.1 Pavement Network

Typical industry pavement inspections are performed by consulting firms using specialized assessment vehicles equipped with various electronic sensors and data capture equipment. The vehicles will drive the entire road network and typically collect two different types of inspection data: surface distress data and roughness data.

Surface distress data involves the collection of multiple industry standard surface distresses, which are captured either electronically using sensing detection equipment mounted on the van, or visually by the van's inspection crew. Roughness data capture involves the measurement of the roughness of the road, measured by lasers that are mounted on the inspection van's bumper, calibrated to an international roughness index.

Another option for a cursory level of condition assessment is for municipal road crews to perform simple windshield surveys as part of their regular patrol. Many municipality's have created data collection inspection forms to assist this process and to standardize what presence of defects would constitute a good, fair, poor, or critical score. Lacking any other data for the complete road network, this can still be seen as a good method and will assist greatly with the overall management of the road network.

It is recommended that the municipality continue its pavement condition assessment program and that a portion of capital funding is dedicated to this.

2.2 Bridges & Culverts

Ontario municipalities are mandated by the Ministry of Transportation to inspect all structures that have a span of 3 meters or more, according to the OSIM (Ontario Structure Inspection Manual).

Structure inspections must be performed by, or under the guidance of, a structural engineer, must be performed on a biennial basis (once every two years), and include such information as structure type, number of spans, span lengths, other key attribute data, detailed photo images, and structure element by element inspection, rating and recommendations for repair, rehabilitation, and replacement.

The best approach to develop a 10-year needs list for the municipality's structure portfolio relies on the structural engineer who performs the inspections to also produce a maintenance requirements report, and rehabilitation & replacement requirements report as part of the overall assignment. In addition to defining the overall needs requirements, the structural engineer should identify those structures that will require more detailed investigations and non-destructive testing techniques. Examples of these investigations are:

- Detailed deck condition survey
- Non-destructive delamination survey of asphalt covered decks
- Substructure condition survey
- Detailed coating condition survey
- Underwater investigation
- Fatigue investigation
- Structure evaluation

Through the OSIM recommendations and additional detailed investigations, a 10-year needs list can be developed for the municipality's bridges.

2.3 Buildings & Facilities

The most popular and practical type of buildings & facilities assessment involves qualified groups of trained industry professionals (engineers or architects) performing an analysis of the condition of a group of facilities and their components, that may vary in terms of age, design, construction methods and materials. This analysis can be done by walk-through inspection (the most accurate approach), mathematical modeling or a combination of both. The following asset classifications are typically inspected:

- **Site Components** – property around the facility and outdoor components such as utilities, signs, stairways, walkways, parking lots, fencing, courtyards and landscaping
- **Structural Components** – physical components such as the foundations, walls, doors, windows, roofs
- **Electrical Components** – all components that use or conduct electricity such as wiring, lighting, electric heaters, and fire alarm systems
- **Mechanical Components** – components that convey and utilize all non-electrical utilities within a facility such as gas pipes, furnaces, boilers, plumbing, ventilation, and fire extinguishing systems
- **Vertical Movement** – components used for moving people between floors of buildings such as elevators, escalators and stair lifts

Once collected, this information can be uploaded into the CityWide®, the municipality's asset management and asset registry software database in order for short- and long-term repair, rehabilitation and replacement reports to be generated to assist with programming the short- and long-term maintenance and capital budgets.

It is recommended that the municipality establish a facilities condition assessment program for its water and sanitary facilities, and establish supplementary condition assessment protocols for other buildings & facilities. It is also recommended that a portion of capital funding is dedicated to this.

2.4 Vehicles and Machinery & Equipment

The typical approach to optimizing the maintenance expenditures of vehicles and machinery & equipment, is through routine vehicle and component inspections, routine servicing, and a routine preventative maintenance program. Most makes and models of vehicles and machinery assets are supplied with maintenance manuals that define the appropriate schedules and routines for typical maintenance and servicing, and also more detailed restoration or rehabilitation protocols.

The primary goal of sound maintenance is to avoid or mitigate the consequence of failure of equipment or parts. An established preventative maintenance program serves to ensure this, as it will consist of scheduled inspections and follow up repairs of vehicles and machinery & equipment in order to decrease breakdowns and excessive downtimes.

A good preventative maintenance program will include partial or complete overhauls of equipment at specific periods, including oil changes, lubrications, fluid changes and so on. In addition, workers can record equipment or part deterioration so they can schedule to replace or repair worn parts before they fail.

The ideal preventative maintenance program would move progressively further away from reactive repairs and instead towards the prevention of all equipment failure before it occurs. It is recommended that a preventative maintenance routine is defined and established for all vehicles and machinery & equipment assets, and that a software application is utilized for the overall management of the program.

2.5 Water System

Unlike sewer mains, it is often prohibitively difficult to inspect water mains from the inside due to the constant and high-pressure flow of water. A physical inspection requires a disruption of service to residents, can be an expensive exercise and is time consuming to set up. It is recommended practice that physical inspection of water mains typically occurs only for high-risk, large transmission mains within the system, and only when there is a requirement. There are a number of high tech inspection techniques in the industry for large diameter pipes but these should be researched first for applicability as they are quite expensive. Examples include remote eddy field current (RFEC), ultrasonic and acoustic techniques, impact echo (IE), and Georadar.

For the majority of pipes within the distribution network, gathering key information in regards to the main and its environment can supply the best method to determine a general condition. Key data that may be used, along with weighting factors, to determine an overall condition score include age, material type, breaks, hydrant flow inspections and soil condition.

It is recommended that the municipality continue its watermain assessment program, and that a portion of capital funding is dedicated to this .

2.6 Sewer Network Inspection (Sanitary and Storm)

The most popular and practical type of sanitary and storm sewer assessment is the use of Closed Circuit Television Video (CCTV). The process involves a small robotic crawler vehicle with a CCTV camera attached that is lowered down a maintenance hole into the sewer main to be inspected.

The vehicle and camera then travel the length of the pipe, providing a live video feed to a truck on the road above where a technician/inspector records defects and information regarding the pipe. A wide range of construction or deterioration problems can be captured, including open/displaced joints, presence of roots, infiltration & inflow, cracking, fracturing, exfiltration, collapse, deformation of pipe and more. Therefore, sewer CCTV inspection is an effective tool for locating and evaluating structural defects and general condition of underground pipes.

Even though CCTV is an excellent option for inspection of sewers, it is a fairly costly process and does take significant time to inspect a large volume of pipes.

Another option in the industry today is the use of Zoom Camera equipment. This is very similar to traditional CCTV, however, a crawler vehicle is not used. Rather, in its place, a camera is lowered down a maintenance hole attached to a pole like piece of equipment. The camera is then rotated towards each connecting pipe and the operator above progressively zooms in to record all defects and information about each pipe. The downside to this technique is the further down the pipe the image is zoomed, the less clarity is available to accurately record defects and measurement. The upside is the process is far quicker and significantly less expensive and an assessment of the manhole can be provided as well. Also, it is important to note that 80% of pipe deficiencies generally occur within 20 metres of each manhole.

It is recommended that the municipality expand its sewer mains assessment program to include storm mains and that a portion of capital funding is dedicated to this.

2.7 Parks and Land Improvements

CSA standards provide guidance on the process and protocols in regards to the inspection of parks and their associated assets, e.g., play spaces and equipment. The land improvements inspection will involve qualified groups of trained industry professionals (operational staff or landscape architects) performing an analysis of the condition of a group of land improvement assets and their components. The most accurate way of determining the condition requires a walk-through to collect baseline data. The following key asset classifications are typically inspected:

- **Physical Site Components –** physical components on the site of the park such as fences, utilities, stairways, walkways, parking lots, irrigation systems, monuments, fountains
- **Recreation Components –** physical components such as playgrounds, bleachers, back stops, splash pads, and benches
- **Land Site Components** – land components on the site of the park such as landscaping, sports fields, trails, natural areas, and associated drainage systems
- **Minor Park Facilities –** small facilities within the park site such as: sun shelters, washrooms, concession stands, change rooms, storage sheds

It is recommended that the municipality establish a parks condition assessment program and that a portion of capital funding is dedicated to this.

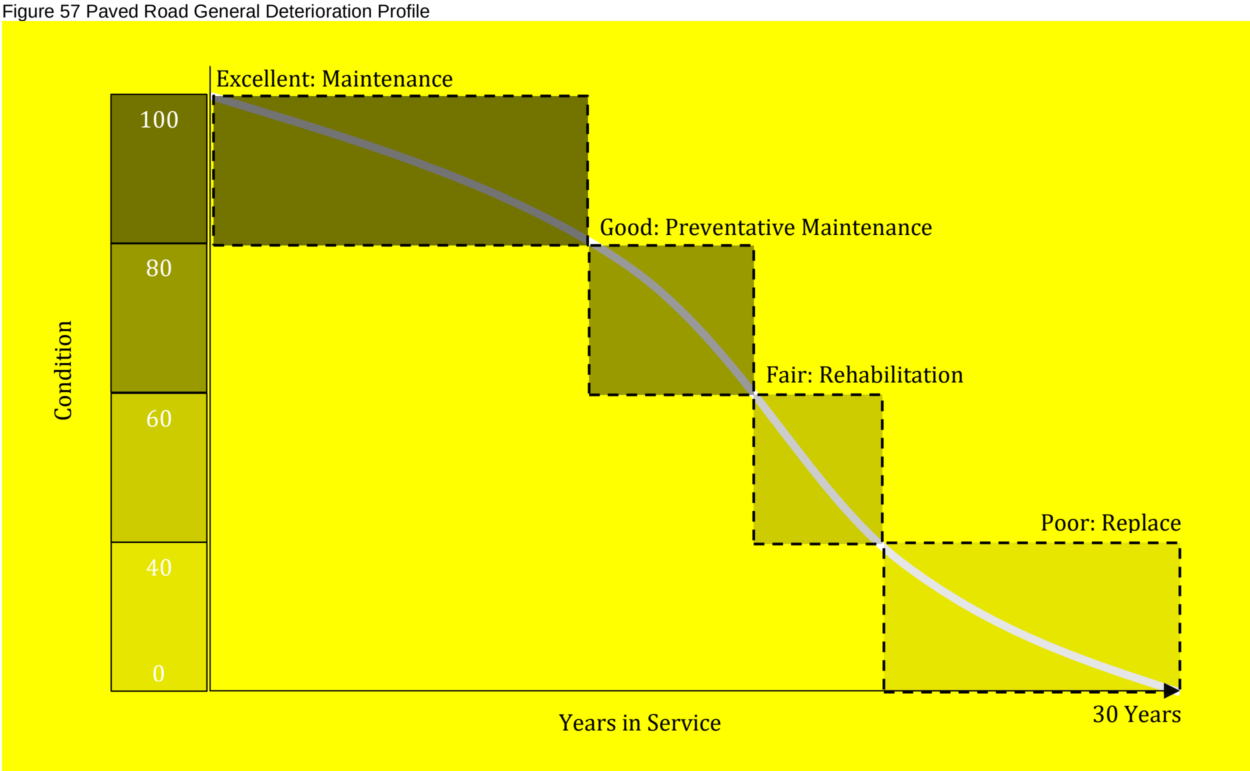
3. Lifecycle Analysis Framework

An industry review was conducted to determine which lifecycle activities can be applied at the appropriate time in an asset's life, to provide the greatest additional life at the lowest cost. In the asset management industry, this is simply put as doing the right thing to the right asset at the right time. If these techniques are applied across entire asset networks or portfolios (e.g., the entire road network), the municipality can gain the best overall asset condition while expending the lowest total cost for those programs.

3.1 Paved Roads

The following analysis has been conducted at a fairly high level, using industry standard activities and costs for paved roads. With future updates of this asset management strategy, the municipality may wish to run the same analysis with a detailed review of municipality activities used for roads and the associated local costs for those work activities. All of this information can be entered into the CityWide® software suite in order to perform updated financial analysis as more detailed information becomes available. The following diagram depicts a general deterioration profile of a road with a 30-year life.

Figure 57 Paved Road General Deterioration Profile



As shown above, during the road's lifecycle, there are various windows available for work activity that will maintain or extend the life of the asset. These windows are: maintenance; preventative maintenance; rehabilitation; and replacement or reconstruction.

The windows or thresholds for when certain work activities should be applied to also coincide approximately with the condition state of the asset as shown below:

Table 22 Asset Condition and Related Work Activity for Paved Roads

Condition	Condition Range	Work Activity
Very Good (Maintenance only phase)	81-100	– Maintenance only
Good (Preventative maintenance phase)	61-80	– Crack sealing – Emulsions
Fair (Rehabilitation phase)	41-60	– Resurface - mill & pave – Resurface - asphalt overlay – Single & double surface treatment (for rural roads)
Poor (Reconstruction phase)	21-40	– Reconstruct - pulverize and pave – Reconstruct - full surface and base reconstruction
Very Poor (Reconstruction phase)	0-20	– Critical includes assets beyond their useful lives which make up the backlog. They require the same interventions as the 'poor' category above.

With future updates of this asset management strategy, the municipality may wish to review the above condition ranges and thresholds for when certain types of work activity occur, and adjust to better suit the municipality's work program. Also note: when adjusting these thresholds, it actually adjusts the level of service provided and ultimately changes the amount of money required. These thresholds and condition ranges can be updated and a revised financial analysis can be calculated. These adjustments will be an important component of future asset management plans, as the province requires each municipality to present various management options within the financing plan.

It is recommended that the municipality establish a lifecycle activity framework for the various classes of paved road within their transportation network.

3.2 Bridges & Culverts

The best approach to develop a 10-year needs list for the municipality's bridge structure portfolio relies on the structural engineer who performs the inspections to develop a maintenance requirements report, a rehabilitation and replacement requirements report and identify additional detailed inspections as required.

3.3 Buildings & Facilities

The best approach to develop a 10-year needs list for the municipality's facilities portfolio would be to have the engineers, operational staff or architects who perform the facility inspections to also develop a complete portfolio maintenance requirements report and rehabilitation and replacement requirements report, and also identify additional detailed inspections and follow up studies as required. This may be performed as a separate assignment once all individual facility audits/inspections are complete.

The above reports could be considered the beginning of a 10-year maintenance and capital plan; however, within the facilities industry, there are other key factors that should be considered to determine over all priorities and future expenditures. Some examples would be functional and legislative requirements, energy conservation programs and upgrades, customer complaints and health and safety concerns, and customer expectations balanced with willingness-to-pay initiatives.

It is recommended that the municipality establish a prioritization framework for the facilities asset class that incorporates the key components outlined above.

3.4 Vehicles and Machinery & Equipment

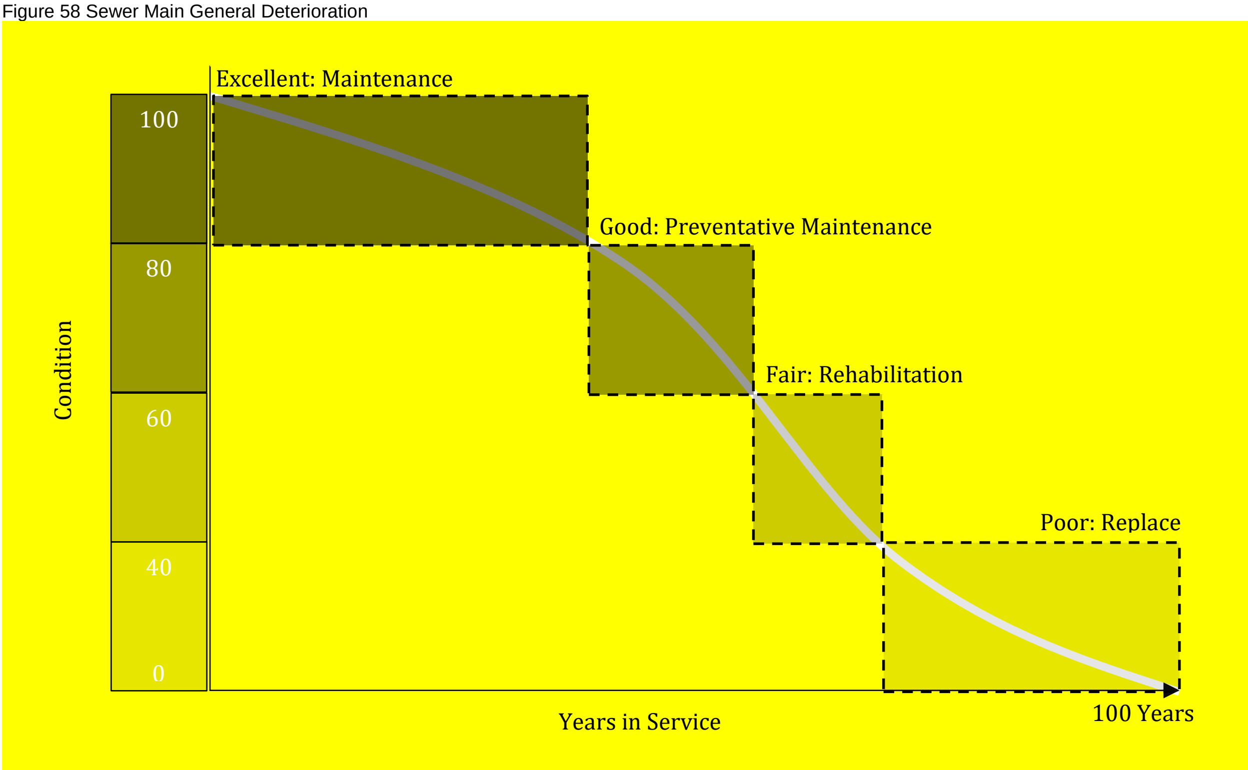
The best approach to develop a 10-year needs list for the municipality's vehicles and machinery & equipment portfolio would first be through a defined preventative maintenance program, and secondly, through an optimized lifecycle vehicle replacement schedule. The preventative maintenance program would serve to determine budget requirements for operating and minor capital expenditures for renewal of parts, and major refurbishments and rehabilitations. An optimized replacement program will ensure a vehicle or equipment asset is replaced at the correct point in time in order to minimize overall cost of ownership, minimize costly repairs and downtime, while maximizing potential re-sale value. There is significant benchmarking information available within the vehicles industry in regards to vehicle lifecycles which can be used to assist in this process. Once appropriate replacement schedules are established, the short- and long-term budgets can be funded accordingly.

There are, of course, functional aspects of vehicles management that should also be examined in further detail as part of the long-term management plan, such as vehicles utilization and incorporating green vehicles, etc. It is recommended that the municipality establish a prioritization framework for the vehicles asset class that incorporates the key components outlined above.

3.5 Sanitary and Storm Sewers

The following analysis has been conducted at a fairly high level, using industry standard activities and costs for sanitary and storm sewer rehabilitation and replacement. With future updates of this asset management strategy, the municipality may wish to run the same analysis with a detailed review of activities used for sewer mains and the associated local costs for those work activities. This information can be input into the CityWide® software suite in order to perform updated financial analysis as more detailed information becomes available. The following diagram depicts a general deterioration profile of a sewer main with a 100-year life.

Figure 58 Sewer Main General Deterioration



As shown above, during the sewer main's lifecycle there are various windows available for work activity that will maintain or extend the life of the asset. These windows are: maintenance; major maintenance; rehabilitation; and replacement or reconstruction. The windows or thresholds for when certain work activities should be applied also coincide approximately with the condition state of the asset as shown below:

Table 23 Asset Condition and Related Work Activity for Sewer Mains

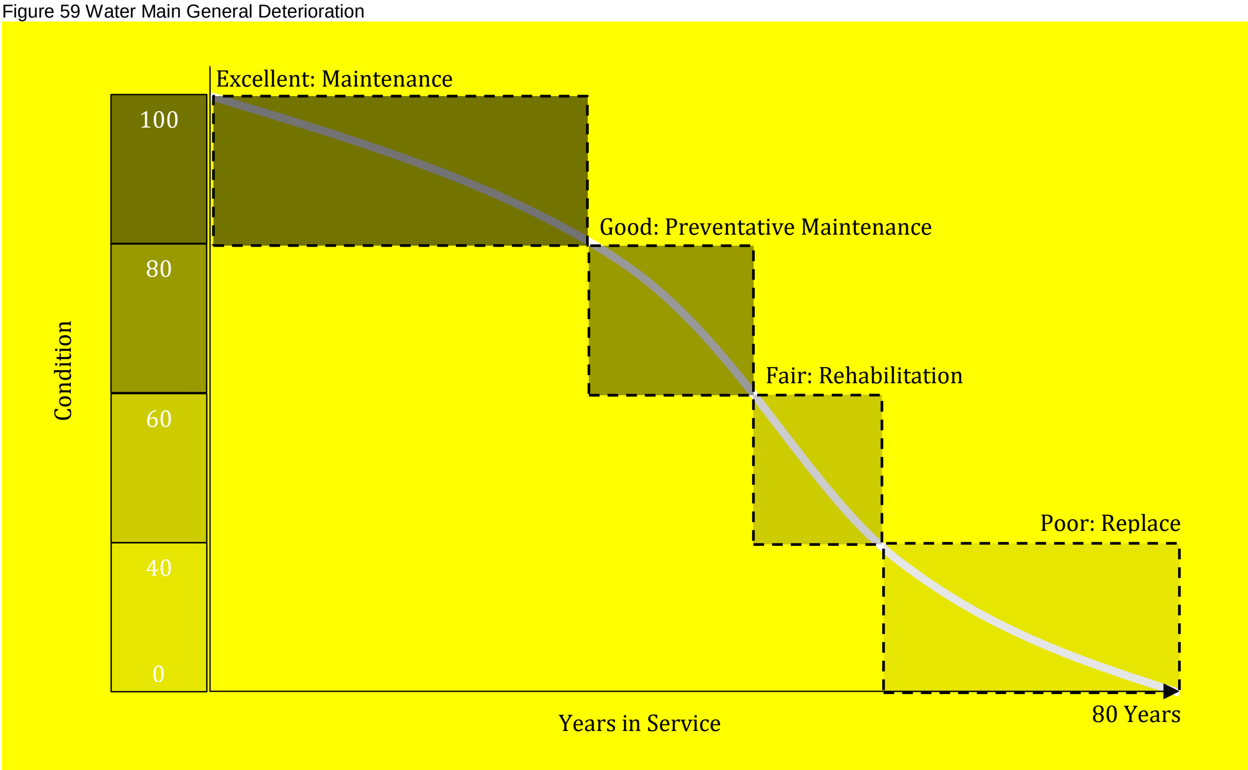
Condition	Condition Range	Work Activity
Very Good (Maintenance only phase)	81-100	– Maintenance only (cleaning & flushing etc.)
Good (Preventative maintenance phase)	61-80	– Mahhole repairs – Small pipe section repairs
Fair (Rehabilitation phase)	41-60	– Structural relining
Poor (Reconstruction phase)	21-40	– Pipe replacement
Very Poor (Reconstruction phase)	0-20	– Critical includes assets beyond their useful lives which make up the backlog. They require the same interventions as the "poor" category above.

With future updates of this asset management strategy the municipality may wish to review the above condition ranges and thresholds for when certain types of work activity occur, and adjust to better suit the municipality's work program. Also note: when adjusting these thresholds, it actually adjusts the level of service provided and ultimately changes the amount of money required. These adjustments will be an important component of future asset management plans, as the province requires each municipality to present various management options within the financing plan.

3.6 Water System

As with roads and sewers, the following analysis has been conducted at a high level, using industry standard activities and costs for water main rehabilitation and replacement. The following diagram depicts a general deterioration profile of a water main with an 80-year life.

Figure 59 Water Main General Deterioration



As shown above, during the water main's lifecycle, there are various windows available for work activity that will maintain or extend the life of the asset. These windows are: maintenance; major maintenance; rehabilitation; and replacement or reconstruction. The windows or thresholds for when certain work activities should be applied also coincide approximately with the condition state of the asset as shown in Table 24.

Table 24 Asset Condition and Related Work Activity for Water Mains

Condition	Condition Range	Work Activity
Very Good (Maintenance only phase)	81-100	– Maintenance only (cleaning & flushing etc.)
Good (Preventative maintenance phase)	61-80	– Water main break repairs – Small pipe section repairs
Fair (Rehabilitation phase)	41-60	– Structural water main relining
Poor (Reconstruction phase)	21-40	– Pipe replacement
Very Poor (Reconstruction phase)	0-20	– Critical includes assets beyond their useful lives which make up the backlog. They require the same interventions as the “poor” category above.

4. Growth and Demand

Growth is a critical infrastructure demand driver for most infrastructure services. As such, the municipality must not only account for the lifecycle cost for its existing asset portfolio, but those of any anticipated and forecasted capital projects associated specifically with growth. The population for Arran-Elderslie has remained virtually unchanged since 2011 and is 6,803 based on 2016 Census Data. The municipality should consider future population changes and determine the impact on expected levels of service and determine any asset growth or enhancements that may be required.

5. Project Prioritization and Risk Management

Generally, infrastructure needs exceed municipal capacity. As such, municipality's rely heavily on provincial and federal programs and grants to finance important capital projects. Fund scarcity means projects and investments must be carefully selected based on the state of infrastructure, economic development goals, and the needs of an evolving and growing community. These factors, along with social and environmental considerations will form the basis of a robust risk management framework.

5.1 Defining Risk Management

From an asset management perspective, risk is a function of the consequences of failure (e.g., the negative economic, financial, and social consequences of an asset in the event of a failure); and, the probability of failure (e.g., how likely is the asset to fail in the short- or long-term). The consequences of failure are typically reflective of:

– **An asset's importance in an overall system**:
  For example, the failure of an individual computer workstation for which there are readily available substitutes is much less consequential and detrimental than the failure of a network server or telephone exchange system.

– **The criticality of the function performed**:
  For example, a mechanical failure on a road construction equipment may delay the progress of a project, but a mechanical failure on a fire pumper truck may lead to immediate life safety concerns for fire fighters, and the public, as well as significant property damage.

– **The exposure of the public and/or staff to injury or loss of life**:
  For example, a single sidewalk asset may demand little consideration and carry minimum importance to the municipality's overall pedestrian network and performs a modest function. However, members of the public interact directly with the asset daily and are exposed to potential injury due to any trip hazards or other structural deficiencies that may exist.

The probability of failure is generally a function of an asset's physical condition, which is heavily influenced by the asset's age and the amount of investment that has been made in the maintenance and renewal of the asset throughout its life.

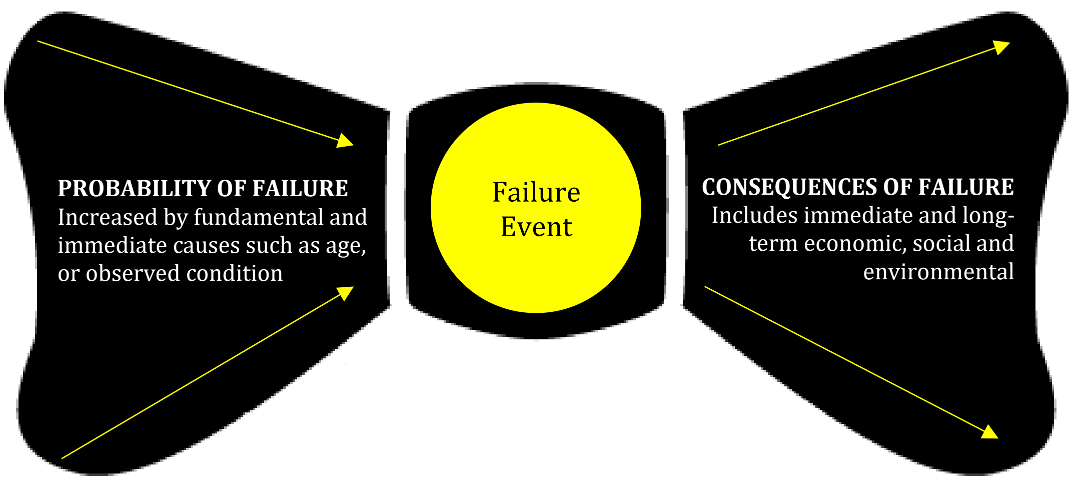
Risk mitigation is traditionally thought of in terms of safety and liability factors. In asset management, the definition of risk should heavily emphasize these factors but should be expanded to consider the risks to the municipality's ability to deliver targeted levels of service

- The impact that actions (or inaction) on one asset will have on other related assets
- The opportunities for economic efficiency (realized or lost) relative to the actions taken

5.2 Risk Matrices

Using the logic above, a risk matrix will illustrate each asset's overall risk, determined by multiplying the probability of failure (PoF) scores with the consequence of failure (CoF) score, as illustrated in the table that follow. This can be completed as a holistic exercise against any data set by determining which factors (or attributes) are available and will contribute to the PoF or CoF of an asset. Figure 60 (known as a bowtie model in the risk industry) illustrates this concept. The probability of failure is increased as more and more factors collude to cause asset failure.

Figure 60 Bow Tie Risk Model



Probability of Failure

In this AMP, the probability of a failure event is predicted by the condition of the asset.

Table 25 Probability of Failure – All Assets

Asset Classes	Condition Rating	Probability of Failure
ALL	0-20 Very Poor	5 – Very High
	21-40 Poor	4 – High
	41-60 Fair	3 – Moderate
	61-80 Good	2 – Low
	81-100 Excellent	1 – Very Low

Consequence of Failure

The consequence of failure for the asset classes analyzed in this AMP will be determined either by the replacement costs of assets, or other attributes as relevant. These attributes include material types, classifications, or size. Asset classes for which replacement cost is used include: bridges & culverts, buildings & facilities, land improvements, vehicles, and machinery & equipment. This approach is premised on the assumption that the higher the replacement cost, the larger (and likely more important) the asset, requiring a higher risk scoring.

Assets for which other attributes are used include: water, wastewater, storm and roads. Attributes are selected based on their impact on service delivery. For linear infrastructure, pipe diameter is used to estimate a suitable consequence of failure score as it reflects the potential upstream service area affected. Scoring for roads, the risk is based on classification as it reflects the traffic volumes and number of people affected.

Table 26 Consequence of Failure – Roads

Road Classification	Consequence of failure
Gravel	Score of 1
Roads – LCB	Score of 3
Roads - HCB	Score of 5

Table 27 Consequence of Failure – Bridges & Culverts

Replacement Value	Consequence of failure
Up to $200k	Score of 1
$201 to $400k	Score of 2
$401 to $800k	Score of 3
$801 to $1.2Million	Score of 4
$1.2 Million and over	Score of 5

Table 28 Consequence of Failure – Water Mains

Pipe Diameter	Consequence of Failure
Less than 50mm	Score of 1
51–100mm	Score of 2
101–150mm	Score of 3
151–299mm	Score of 4
300mm and over	Score of 5

Table 29 Consequence of Failure – Sanitary Sewers

Pipe Diameter	Consequence of failure
Less than 200mm	Score of 1
200-299mm	Score of 2
300-350mm	Score of 3
351-400mm	Score of 4
401mm and over	Score of 5

Table 30 Consequence of Failure – Storm Sewers

Pipe Diameter	Consequence of Failure
Less than 300mm	Score of 1
300–350mm	Score of 2
351–400mm	Score of 3
401–600mm	Score of 4
601mm and over	Score of 5

Table 31 Consequence of Failure – Buildings & Facilities

Replacement Value	Consequence of failure
Up to $50k	Score of 1
$51k to $100k	Score of 2
$101k to $250k	Score of 3
$251k to $1 million	Score of 4
Over $1 million	Score of 5

Table 32 Consequence of Failure – Machinery & Equipment

Replacement Value	Consequence of failure
Up to $2k	Score of 1
$2k to $5k	Score of 2
$5k to $8k	Score of 3
$8k to $15k	Score of 4
Over $15k	Score of 5

Table 33 Consequence of Failure – Land Improvements

Replacement Value	Consequence of failure
Up to $5k	Score of 1
$5k to $10k	Score of 2
$10k to $15k	Score of 3
$15k to $25k	Score of 4
Over $25k	Score of 5

Table 34 Consequence of Failure – Vehicles

Replacement Value	Consequence of failure
Up to $15k	Score of 1
$15k to $40k	Score of 2
$40k to $110k	Score of 3
$110k to $250k	Score of 4
Over $250k	Score of 5

The risk matrices that follow show the distribution of assets within each asset class according to the probability and likelihood of failure scores as discussed above.

Figure 61 Distribution of Assets Based on Risk – All Asset Classes

Consequence \ Probability	1	2	3	4	5
5	139 Assets 27,576 m, unit(s), m2 $26,067,674	110 Assets 17,704 m, m2, unit(s) $20,326,773	22 Assets 5,667 unit(s), m, m2 $13,060,134	8 Assets 425 m, unit(s) $396,093	35 Assets 439 unit(s), m $12,061,934
4	35 Assets 7,143 unit(s), m, m2 $6,278,132	27 Assets 3,146 m, m2, unit(s) $5,783,248	13 Assets 712 unit(s), m2, m $5,274,920	11 Assets 11 unit(s) $2,321,003	39 Assets 929 unit(s), m $6,188,186
3	138 Assets 78,172 m, m2, unit(s) $45,467,639	102 Assets 39,837 m, m2, unit(s) $25,328,271	23 Assets 7,016 m2, m, unit(s) $12,924,320	16 Assets 634 unit(s), m $1,209,287	42 Assets 2,117 unit(s), m $2,133,962
2	75 Assets 11,595 m, m2, unit(s) $3,622,937	174 Assets 25,103 unit(s), m, m2 $6,788,619	61 Assets 8,282 unit(s), m $5,816,208	17 Assets 2,974 m, m2, unit(s) $1,253,957	75 Assets 4,894 unit(s), m $2,090,655
1	335 Assets 3,293 m, unit(s), m2 $2,991,799	163 Assets 18,401 unit(s), m, m2 $3,953,251	71 Assets 3,271 unit(s), m, m2 $1,164,062	87 Assets 3,415 unit(s), m2, m $1,456,254	347 Assets 767 unit(s), m $5,460,881

Figure 62 Distribution of Assets Based on Risk – Road Network

Consequence \ Probability	1	2	3	4	5
5	109 Assets 22,582 m, unit(s) $18,633,418	89 Assets 15,427 m $12,126,072	13 Assets 4,834 m $3,247,597	3 Assets 420 m $220,756	2 Assets 165 m $176,823
4	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
3	62 Assets 68,344 m, unit(s) $39,617,384	20 Assets 30,142 m $18,352,619	6 Assets 4,830 m $2,651,119	0 Assets - $0	0 Assets - $0
2	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
1	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0

Figure 63 Distribution of Assets Based on Risk – Bridges & Culverts

Consequence \ Probability	1	2	3	4	5
5	3 Assets 1,087 m2 $4,127,025	2 Assets 814 m2 $3,035,459	2 Assets 320 m2 $2,992,135	0 Assets - $0	0 Assets - $0
4	4 Assets 784 m2, unit(s) $3,890,502	2 Assets 698 m2 $2,803,486	1 Assets 108 m2 $1,030,649	0 Assets - $0	0 Assets - $0
3	4 Assets 649 m2 $2,302,712	1 Assets 215 m2 $646,057	3 Assets 503 m2 $1,638,620	0 Assets - $0	0 Assets - $0
2	1 Assets 130 m2 $375,185	3 Assets 176 unit(s), m2 $776,627	2 Assets 2 unit(s) $552,737	2 Assets 240 m2 $670,582	1 Assets 1 unit(s) $228,638
1	2 Assets 88 m2 $240,063	9 Assets 9 unit(s) $1,145,145	1 Assets 1 unit(s) $182,205	1 Assets 1 unit(s) $81,995	1 Assets 1 unit(s) $180,646

Figure 64 Distribution of Assets Based on Risk – Water System

Consequence \ Probability	1	2	3	4	5
5	23 Assets 3,903 m, unit(s) $2,887,817	9 Assets 1,365 m, unit(s) $4,605,749	1 Assets 260 m $234,734	0 Assets - $0	0 Assets - $0
4	27 Assets 6,088 m $1,929,812	13 Assets 2,352 m, unit(s) $1,436,880	1 Assets 1 unit(s) $3,078,337	0 Assets - $0	0 Assets - $0
3	63 Assets 8,616 m, unit(s) $3,394,418	63 Assets 8,922 m $5,885,135	9 Assets 1,677 m, unit(s) $2,225,320	5 Assets 623 m $108,679	6 Assets 809 m $174,493
2	12 Assets 1,988 m $647,829	31 Assets 4,041 m, unit(s) $2,676,749	10 Assets 1,412 m $300,697	11 Assets 2,561 m $535,268	2 Assets 224 m $48,315
1	278 Assets 968 m, unit(s) $1,982,525	47 Assets 1,451 m, unit(s) $723,778	18 Assets 355 m, unit(s) $155,020	2 Assets 191 unit(s), m $162,098	10 Assets 10 unit(s) $1,343,249

Figure 65 Distribution of Assets Based on Risk – Sanitary Services

Consequence \ Probability	1	2	3	4	5
5	0 Assets - $0	1 Assets 76 m $1,730	1 Assets 220 m $60,430	0 Assets - $0	0 Assets - $0
4	1 Assets 267 m $105,453	1 Assets 80 m $582	3 Assets 573 m $832,875	0 Assets - $0	1 Assets 1 unit(s) $3,241,091
3	6 Assets 559 m $40,252	5 Assets 524 m $318,958	1 Assets 1 unit(s) $6,205,071	1 Assets 1 unit(s) $702,818	0 Assets - $0
2	58 Assets 8,978 m, unit(s) $2,307,234	116 Assets 20,770 m $3,204,811	42 Assets 6,857 m $4,785,524	0 Assets - $0	1 Assets 1 unit(s) $488,887
1	14 Assets 14 unit(s) $191,037	18 Assets 347 unit(s), m $151,271	33 Assets 182 unit(s), m $420,891	73 Assets 73 unit(s) $780,972	318 Assets 318 unit(s) $2,901,387

Figure 66 Distribution of Assets Based on Risk – Storm

Consequence \ Probability	1	2	3	4	5
5	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	4 Assets 245 m $110,421
4	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	10 Assets 900 m $409,640
3	0 Assets - $0	1 Assets 16 m $1,347	0 Assets - $0	0 Assets - $0	11 Assets 1,270 m $131,520
2	0 Assets - $0	1 Assets 47 m $3,959	0 Assets - $0	1 Assets 170 m $12,208	48 Assets 4,645 m $716,161
1	4 Assets 376 unit(s), m $71,668	1 Assets 33 m $2,738	0 Assets - $0	0 Assets - $0	5 Assets 425 m $108,243

Figure 67 Distribution of Assets Based on Risk – Buildings & Facilities

Consequence \ Probability	1	2	3	4	5
5	0 Assets - $0	0 Assets - $0	1 Assets 1 unit(s) $6,168,264	0 Assets - $0	3 Assets 3 unit(s) $9,338,239
4	0 Assets - $0	2 Assets 2 unit(s) $978,642	1 Assets 1 unit(s) $261,438	3 Assets 3 unit(s) $1,264,428	4 Assets 4 unit(s) $1,204,204
3	0 Assets - $0	0 Assets - $0	1 Assets 1 unit(s) $185,689	1 Assets 1 unit(s) $141,053	7 Assets 17 unit(s) $1,067,797
2	1 Assets 1 unit(s) $50,685	0 Assets - $0	2 Assets 2 unit(s) $132,884	0 Assets - $0	4 Assets 4 unit(s) $278,723
1	14 Assets 22 unit(s) $162,984	13 Assets 1,769 unit(s) $106,540	1 Assets 1 unit(s) $38,592	1 Assets 1 unit(s) $28,958	0 Assets - $0

Figure 68 Distribution of Assets Based on Risk – Machinery & Equipment

Consequence \ Probability	1	2	3	4	5
5	3 Assets 3 unit(s) $120,958	8 Assets 21 unit(s) $213,491	3 Assets 31 unit(s) $105,835	5 Assets 5 unit(s) $175,337	21 Assets 21 unit(s) $822,376
4	1 Assets 1 unit(s) $8,546	7 Assets 12 unit(s) $73,839	7 Assets 29 unit(s) $71,621	3 Assets 3 unit(s) $37,279	18 Assets 18 unit(s) $182,199
3	2 Assets 2 unit(s) $11,306	11 Assets 17 unit(s) $68,389	3 Assets 4 unit(s) $18,501	7 Assets 7 unit(s) $46,676	9 Assets 12 unit(s) $57,398
2	2 Assets 10 unit(s) $7,418	21 Assets 67 unit(s) $76,914	4 Assets 8 unit(s) $14,488	2 Assets 2 unit(s) $8,622	9 Assets 9 unit(s) $32,601
1	5 Assets 53 unit(s) $5,868	20 Assets 38 unit(s) $23,289	6 Assets 10 unit(s) $6,258	0 Assets - $0	4 Assets 4 unit(s) $5,759

Figure 69 Distribution of Assets Based on Risk – Land Improvements

Consequence \ Probability	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	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
3	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
2	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
1	7 Assets 14 unit(s) $101,844	8 Assets 11 unit(s) $109,048	0 Assets - $0	0 Assets - $0	1 Assets 1 unit(s) $25,214

Figure 70 Distribution of Assets Based on Risk – Vehicles

Consequence \ Probability	1	2	3	4	5
5	1 Assets 1 unit(s) $298,456	1 Assets 1 unit(s) $344,272	1 Assets 1 unit(s) $251,139	0 Assets - $0	5 Assets 5 unit(s) $1,614,075
4	2 Assets 3 unit(s) $343,819	2 Assets 2 unit(s) $489,819	0 Assets - $0	5 Assets 5 unit(s) $1,019,296	6 Assets 6 unit(s) $1,151,052
3	1 Assets 1 unit(s) $101,567	1 Assets 1 unit(s) $55,766	0 Assets - $0	2 Assets 2 unit(s) $210,061	9 Assets 9 unit(s) $702,754
2	0 Assets - $0	2 Assets 2 unit(s) $49,559	1 Assets 1 unit(s) $29,878	1 Assets 1 unit(s) $27,277	10 Assets 10 unit(s) $297,330
1	1 Assets 1 unit(s) $2,030	2 Assets 2 unit(s) $24,784	2 Assets 2 unit(s) $27,268	2 Assets 2 unit(s) $13,127	2 Assets 2 unit(s) $26,772

IX. Financial Strategy

1. General Overview

In order for an AMP 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 municipality to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service and projected growth requirements.

Figure 71 Cost Elements

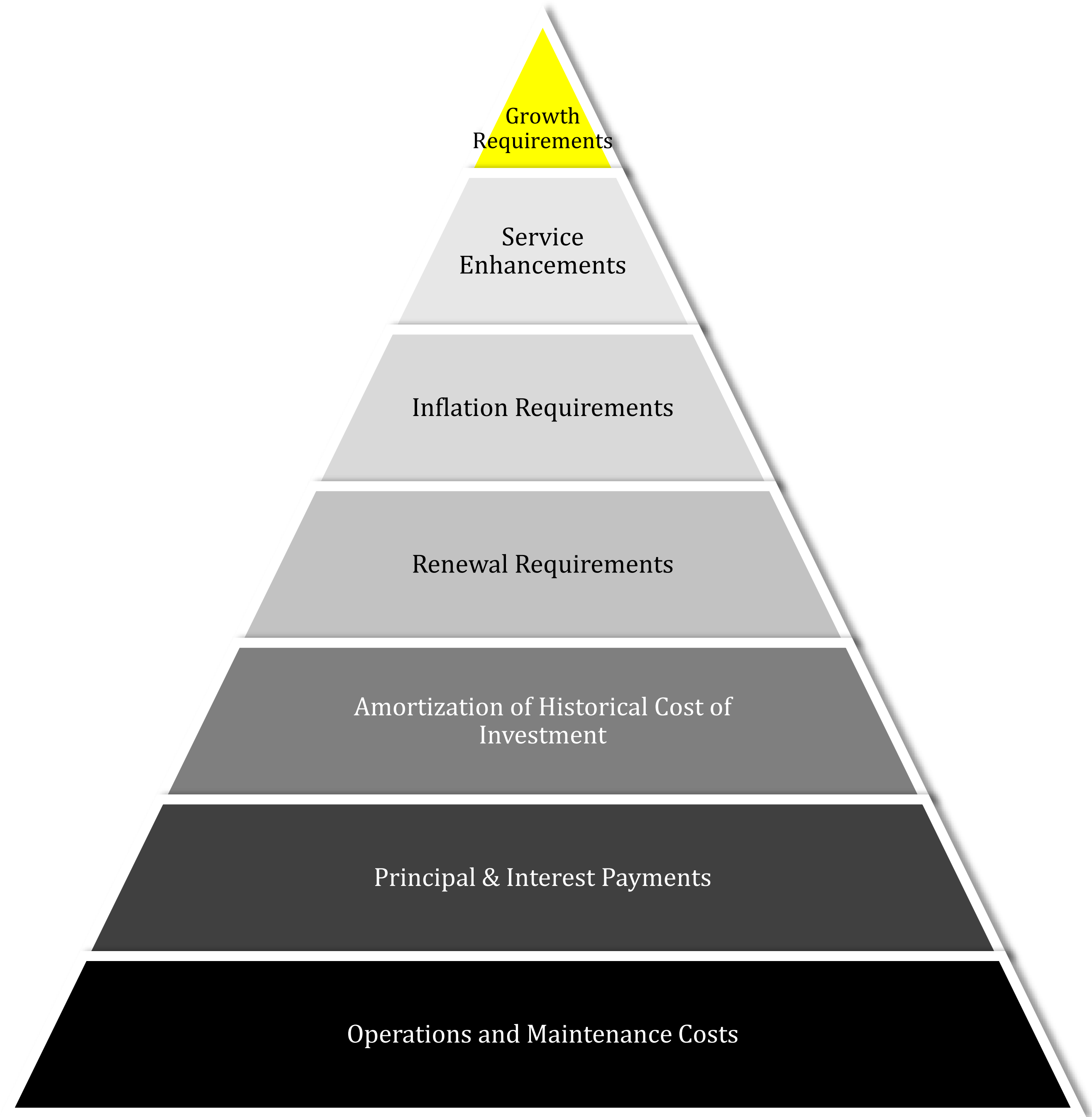


Figure 71 depicts the various cost elements and resulting funding levels that should be incorporated into AMPs that are based on best practices. Municipality's meeting their operational and maintenance needs, and debt obligations are funding only their cash cost. Funding at this level is severely deficient in terms of lifecycle costs.

Meeting the annual amortization expense based on the historical cost of investment will ensure municipality's adhere to accounting rules implemented in 2009; however, funding is still deficient for long-term needs. As municipality's graduate to the next level and meet renewal requirements, funding at this level ensures that need and cost of full replacement is deferred. If municipality's meet inflation requirements, they're positioning themselves to meet replacement needs at existing levels of service. In the final level, municipality's that are funding for service enhancement and growth requirements are fiscally sustainable and cover future investment needs.

This report develops a financial plan by presenting several scenarios for consideration and culminating with final recommendations. It includes recommendations that avoid long-term funding deficits. As outlined below, the scenarios presented model different combinations of the following components:

- the financial requirements (as documented in the SOTI section of this report) for existing assets, existing service levels, requirements of contemplated changes in service levels (none identified for this plan), and requirements of anticipated growth (none identified for this plan)
- use of traditional sources of municipal funds including tax levies, user fees, reserves, debt, and development charges
- use of non-traditional sources of municipal funds, e.g., reallocated budgets
- use of senior government funds, such as the Federal Gas Tax Fund, Ontario Community Infrastructure Fund (OCIF)

If the financial plan component of an AMP 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:

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

2. Financial Profile: Tax Funded Assets

2.1 Funding Objective

We have developed scenarios that would enable the municipality to achieve full funding within five to 20 years for the following assets: road network; bridges & culverts; storm network; buildings & facilities; machinery & equipment; land improvement; and vehicles. For each scenario developed, we have included strategies, where applicable, regarding the use of tax revenues, user fees, reserves and debt.

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, in essence, could last forever.

2.2 Current Funding Position

Table 35 and Table 36 outline, by asset class, the municipality's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Table 35 Infrastructure Requirements and Current Funding Available: Tax Funded Assets

Asset class	Average Annual Investment Required	Total Funding Available in 2016					Annual Deficit/Surplus
		Taxes	Gas Tax	OCIF	Other	Total Funding Available	
Road Network	4,293,000	174,000	169,000	93,000	592,000	1,028,000	3,265,000
Bridges & Culverts	624,000	166,000	0	0	213,000	379,000	245,000
Storm Sewer System	64,000	0	0	0	0	0	64,000
Machinery & Equipment	243,000	86,000	0	0	221,000	307,000	-64,000
Buildings	550,000	52,000	0	0	221,000	273,000	277,000
Land Improvements	14,000	0	0	0	0	0	14,000
Vehicles	689,000	32,000	0	0	50,000	82,000	607,000
Total	6,477,000	510,000	169,000	93,000	1,297,000	2,069,000	4,408,000

2.3 Recommendations for Full Funding

The average annual investment requirement for tax funded categories is $6,477,000. Annual revenue currently allocated to these assets for capital purposes is $2,069,000, leaving an annual deficit of $4,408,000. To put it another way, these infrastructure categories are currently funded at 32% of their long-term requirements.

In 2016, the municipality has annual tax revenues of $4,439,000. As illustrated in Table 36, without consideration of any other sources of revenue, full funding would require the following tax change over time:

Table 36 Tax Change Required for Full Funding

Asset class	Tax Change Required for Full Funding
Road Network	73.6%
Bridges & Culverts	5.5%
Storm Sewer System	1.4%
Machinery & Equipment	-1.4%
Buildings	6.2%
Land Improvements	0.3%
Vehicles	13.7%
Total	99.3%

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

- Arran-Elderslie's formula based OCIF grant is scheduled to grow from $93,000 in 2016 to $326,000 in 2019.
- Normally our recommendations include allocating any decrease in debt costs to the infrastructure deficit. As illustrated in Table 44, Arran-Elderslie's debt payments for these asset categories is $0 so this option is not available.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit. Table 37 outlines this concept and presents a number of options.

Table 37 Effect of Changes in OCIF Funding and 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	4,408,000	4,408,000	4,408,000	4,408,000	4,408,000	4,408,000	4,408,000	4,408,000
Change in OCIF Grant	N/A	N/A	N/A	N/A	-233,000	-233,000	-233,000	-233,000
Changes in Debt Costs	N/A	N/A	N/A	N/A	0	0	0	0
Resulting Infrastructure Deficit	4,408,000	4,408,000	4,408,000	4,408,000	4,175,000	4,175,000	4,175,000	4,175,000
Resulting Tax Increase Required:								
Total Over Time	**99.3%**	**99.3%**	**99.3%**	**99.3%**	**94.1%**	**94.1%**	**94.1%**	**94.1%**
Annually	19.9%	9.9%	6.6%	5.0%	18.8%	9.4%	6.3%	4.7%

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

- increasing tax revenues by 4.7% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- allocating the current gas tax and OCIF revenue as outlined in Table 35.
- allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
- reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

- As in the past, **periodic** senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula based funding, if applicable, since this funding is a multi-year commitment.
- 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 $911,000 for paved roads, $181,000 for bridges & culverts, $1,018,000 for storm sewers, $928,000 for machinery & equipment, $1,760,000 for facilities, $25,000 for land improvements and $2,579,000 for vehicles. Prioritizing future projects will require the current data to be replaced by condition based data. Although our recommendations include no further use of debt, the results of the condition based analysis may require otherwise.

3. Financial Profile: Rate Funded Assets

3.1 Funding Objective

We have developed scenarios that would enable the municipality to achieve full funding within five to 20 years for the following assets: water, and sanitary. For each scenario developed we have included strategies, where applicable, regarding the use of tax revenues, user fees, reserves and debt.

3.2 Current Funding Position

Table 38 and Table 39 outline, by asset class, the municipality's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by rates.

Table 38 Summary of Infrastructure Requirements and Current Funding Available

Asset class	Average Annual Investment Required	Total Funding Available in 2016				Annual Deficit/Surplus
		Rates	To Operations	Other	Total Funding Available	
Sanitary Services	501,000	945,000	-397,000	0	548,000	-47,000
Water System	508,000	1,332,000	-477,000	0	855,000	-347,000
Total	1,009,000	2,277,000	-874,000	0	1,403,000	-394,000

3.3 Recommendations for Full Funding

The average annual investment requirement for sanitary services and water services is $1,009,000. Annual revenue currently allocated to these assets for capital purposes is $1,403,000 leaving an annual surplus of $394,000. To put it another way, these infrastructure categories are currently funded at 139% of their long-term requirements.

In 2016, Arran-Elderslie had annual sanitary revenues of $945,000 and annual water revenues of $1,332,000. As illustrated in Table 39, without consideration of any other sources of revenue, full funding would require the following increases over time:

Table 39 Rate Change Required for Full Funding

Asset class	Rate Change Required for Full Funding
Sanitary Services	-5.0%
Water System	-26.1%

In the tables belowTable 40, we have expanded the above scenario to present multiple options.

Table 40 Revenue Options for Full Funding – Sanitary Sewer Network

	Sanitary Sewer Network			
	5 Years	10 Years	15 Years	20 Years
Annual Rate Change Required	-1.0%	-0.5%	-0.3%	-0.3%

Table 41 Revenue Options for Full Funding – Water Network

	Water Network			
	5 Years	10 Years	15 Years	20 Years
Annual Rate Change Required	-5.2%	-2.6%	-1.7%	-1.3%

At least two factors need to be quantified before implementing the above reductions:

– Age based data shows a pent-up investment demand of $4,218,000 for sanitary services and $1,197,000 for water services. Prioritizing future projects will require the age based data to be replaced by condition based data. The results of the condition based analysis may identify different pent up investment requirements.

  As a result, rates should not be decreased until a detailed work plan is developed for these projects based on their actual condition. A corresponding financial plan can then be developed taking into account that there are $2,688,000 of reserves available for sanitary infrastructure and $5,264,000 of reserves for water infrastructure (as noted in Table 45).

- 42% of sanitary revenues and 36% of water revenues are currently allocated to operations as opposed to capital. Overall rates should not be decreased until longer term operational requirements are determined and taken into account. This will avoid the complications of lowering rates for capital purposes and then possibly increasing them for operational requirements.

We recommend that the required work for the points above be completed in order to determine what rate reductions can be achieved and over what period those reductions can be implemented.

Considering all of the above information, we recommend the following:

- the required work for the points above be completed in order to determine what rate reductions can be achieved and over what period those reductions can be implemented.
- ensuring that any surpluses experienced are allocated to the appropriate reserves.
- ensuring that any reductions implemented in the future take into account applicable inflation indexes for the intervening period of time.
- ensuring that, once rates are reduced to the level required for full funding, subsequent rates are adjusted by the applicable inflation index on an annual basis.

Notes:

- As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula based funding, if applicable, since this funding is a multi-year commitment.
- We realize that raising rate 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.
- 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 $4,218,000 for sanitary services and $1,197,000 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.

4. Use of Debt

For reference purposes, Table 42 outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[3] 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.

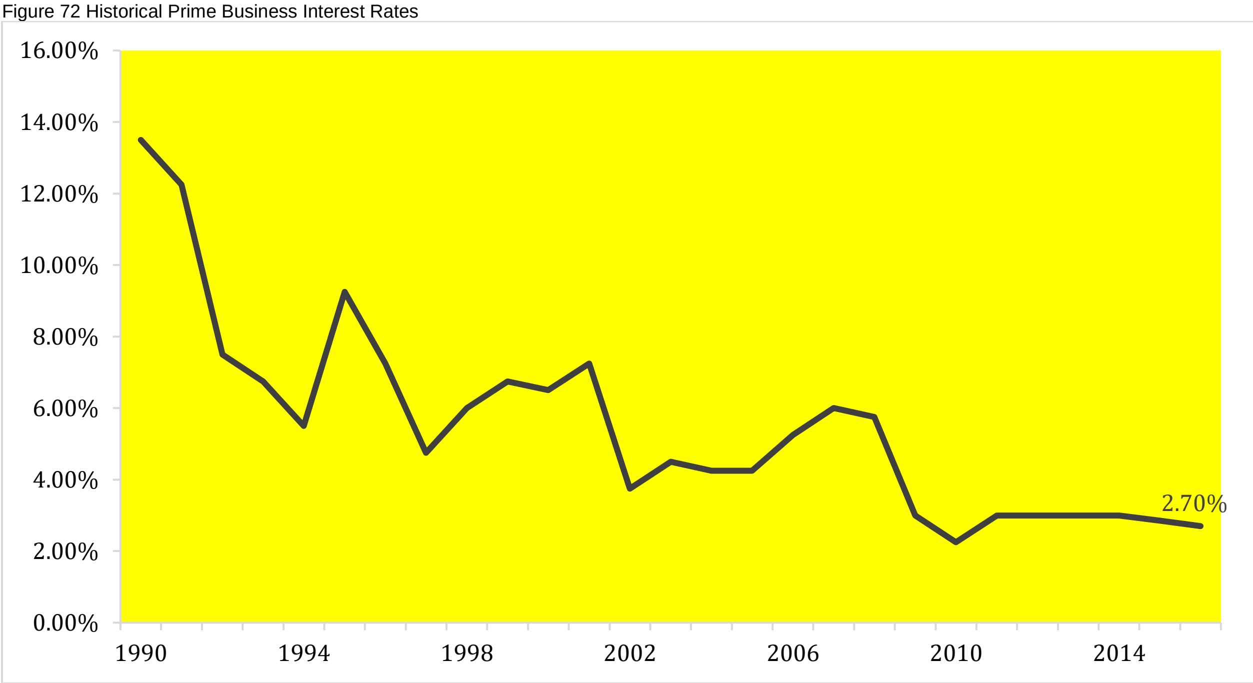
Table 42 Total Interest Paid as a Percentage of Project Costs

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%

[3] Current municipal Infrastructure Ontario rates for 15 year money is 2.8%.

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:

Figure 72 Historical Prime Business Interest Rates



As illustrated in Table 42 , 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 43 and Table 44 outline how Arran-Elderslie has historically used debt for investing in the asset classes as listed. There is currently $0 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $0, well within its provincially prescribed maximum of $2,185,000.

Table 43 Overview of Use of Debt

Asset class	Debt at December 31st, 2015	Use of Debt in Last Five Years				
		2011	2012	2013	2014	2015
Road Network	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Storm Sewer System	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Facilities	0	0	0	0	0	0
Land Improvements	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Total Tax Funded	0	0	0	0	0	0
Sanitary Services	0	0	0	0	0	0
Water Services	0	0	0	0	0	0
Total Rate Funded	0	0	0	0	0	0

Table 44 Overview of Debt Costs

Asset class	Principal & Interest Payments in Next Ten Years						
	2016	2017	2018	2019	2020	2021	2026
Road Network	0	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Storm Sewer System	0	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0	0
Facilities	0	0	0	0	0	0	0
Land Improvements	0	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0	0
Total Tax Funded	0	0	0	0	0	0	0
Sanitary Services	0	0	0	0	0	0	0
Water Services	0	0	0	0	0	0	0
Total Rate Funded	0	0	0	0	0	0	0

The revenue options outlined in this plan allow Arran-Elderslie to fully fund its long-term infrastructure requirements without further use of debt. However, project prioritization based on replacing age-based data with observed data for several tax funded and rate funded classes may require otherwise.

5. Use of Reserves

5.1 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include: the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors; financing one-time or short-term investments; accumulating the funding for significant future infrastructure investments; managing the use of debt; and, normalizing infrastructure funding requirements. By infrastructure class, Table 45 outlines the details of the reserves currently available to Arran-Elderslie.

Table 45 Summary of Reserves Available

Asset class	Balance at December 31st, 2015
Road Network	1,095,000
Bridges & Culverts	1,011,000
Storm Sewer System	0
Machinery & Equipment	1,093,000
Facilities	1,093,000
Land Improvements	75,000
Vehicles	104,000
Total Tax Funded	4,471,000
Sanitary Services	2,688,000
Water Services	5,264,000
Total Rate Funded	7,952,000

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: breadth of services provided, age and condition of infrastructure, use and level of debt, economic conditions and outlook, and internal reserve and debt policies.

The reserves in Table 45 are available for use by applicable asset classes during the phase-in period to full funding. This, coupled with Arran-Elderslie's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short to medium-term.

5.2 Recommendation

As Arran-Elderslie updates its AMP, we recommend that future planning should include determining what its long-term reserve balance requirements are and a plan to achieve such balances.

X. 2016 Infrastructure Report Card

The following infrastructure report card illustrates the municipality's performance on the two key factors: Asset Health and Financial Capacity. Appendix 1 provides the full grading scale and conversion chart, as well as detailed descriptions, for each grading level.

Table 46 2016 Infrastructure Report Card

Asset class	Asset Health Grade	Funding Percentage	Financial Capacity Grade	Average Asset Class Grade	Comments
Roads	B	24%	F	D	Based on 2016 replacement cost, and a combination of assessed and age-based data, 16% of assets, with a valuation of $34.6 million, are in poor to very poor condition; 66% are in good to very good condition. Tax-funded categories are funded at 32% while rate-funded categories are funded at 139%.
Bridges & Culverts	B	61%	D	C	
Water System	C	168%	A	B	
Sanitary Services	D	109%	A	C	
Storm	F	0%	F	F	
Buildings & Facilities	F	50%	D	F	
Machinery & Equipment	D	126%	A	C	
Land Improvements	B	0%	F	D	
Vehicles	D	12%	F	F	
		Average Asset Health Grade	C		
		Average Financial Capacity Grade	F		
		Overall Grade for the Municipality	D		

XI. Appendix: Grading and Conversion Scales

Table 47 Asset Health 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. Preventative maintenance is beneficial at this stage.
C	Fair	Deterioration is evident but asset continues to full its function. Preventative 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 48 Financial Capacity 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.