AMP2016

www.publicsectordigest.com

The 2016 Asset Management Plan for the

Town of Parry Sound

SUBMITTED BY THE PUBLIC SECTOR DIGEST INC. (PSD)
WWW.PUBLICSECTORDIGEST.COM
DECEMBER 2016

Content

List Of Figures

List Of Tables

Executive Summary

Infrastructure is inextricably linked to the economic, social and environmental advancement of a community. Municipalities own and manage nearly 60% of the public infrastructure stock in Canada. As analyzed in this asset management plan (AMP), the Town of Parry Sound's infrastructure portfolio comprises nine distinct infrastructure categories: road network, bridges & culverts, buildings, storm, water, waste water, land improvements, vehicles, and machinery & equipment. Together, these assets had a total valuation of $295 million in 2016, with its road network comprising 31% of the portfolio valuation, followed by waste water services at 23%.

Similar to other municipalities in Ontario, Parry Sound experienced a period of increasing levels of investment beginning in the 1960s, with more rapid increases in the mid-1980s. The majority of investment was made in roads, water and waste water assets. Since 2000, the municipality's infrastructure expenditures have totaled $136 million. The largest investments were made between 2000 and 2004, totalling nearly $55 million. Since 2015, the municipality's expenditures have totaled $4.4 million.

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.

Based on 2016 replacement cost, and a blend of age-based and observed data, while approximately 50% of the municipality's total asset portfolio as analysed in this AMP is in very good or good condition, more than 25% of the assets, with a valuation of $78 million, is in poor to very poor condition. This analysis is based on both observed field data and age-based data. While age is not a precise indicator of an asset's health, it can serve as a meaningful approximation in the absence of condition data and can serve as a signal. Approximately 80% of the municipality's assets , with a valuation of $223 million, have at least 10 years of useful life remaining. However, a significant portion, with a valuation of $36 million, remain in operation beyond their useful life. An additional 6% of assets valued at $16 million will reach the end of their useful life in the next five years.

In order for an AMP to be effectively put into action, 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.

We've developed recommendations and strategies to produce full funding for both tax and rate based asset categories.

The average annual investment requirement for the municipality's tax funded categories is $5,913,000. Annual revenue currently allocated to these assets for capital purposes is $1,287,000 leaving an annual deficit of $4,626,000. To put it another way, these infrastructure categories are currently funded at 22% of their long-term requirements. In 2016, the municipality has annual tax revenues of $11,972,000. The municipality will also see debt reductions of $140,000 over 10 years, $350,000 over 15 years, and $328,000 over 20 years. Our recommendations include capturing those decreases in cost and allocating them to the infrastructure deficit outlined above. Our strategy for full funding requires a 20 years phase-in period.

We recommend the following:

- when realized, reallocating the debt cost reductions of $382,000 to the infrastructure deficit as outlined above.
- increasing tax revenues by 1.8% 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.
- 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 water and wastewater categories is $2,667,000. Annual revenue currently allocated to these assets for capital purposes is $2,669,000, leaving an annual surplus of $2,000. To put it another way, these infrastructure categories are currently funded at 100.1% of their long-term requirements. In 2016, Parry Sound has annual waste water revenues of $2,835,000 and annual water revenues of $2,389,000. While its debt repayments will be decreasing, sanitary services are overfunded; as such, capturing these decreases is not necessary. For water services, our recommendations incorporate these debt reductions. Our strategy for full funding requires a five year phase-in period.

We recommend the following:

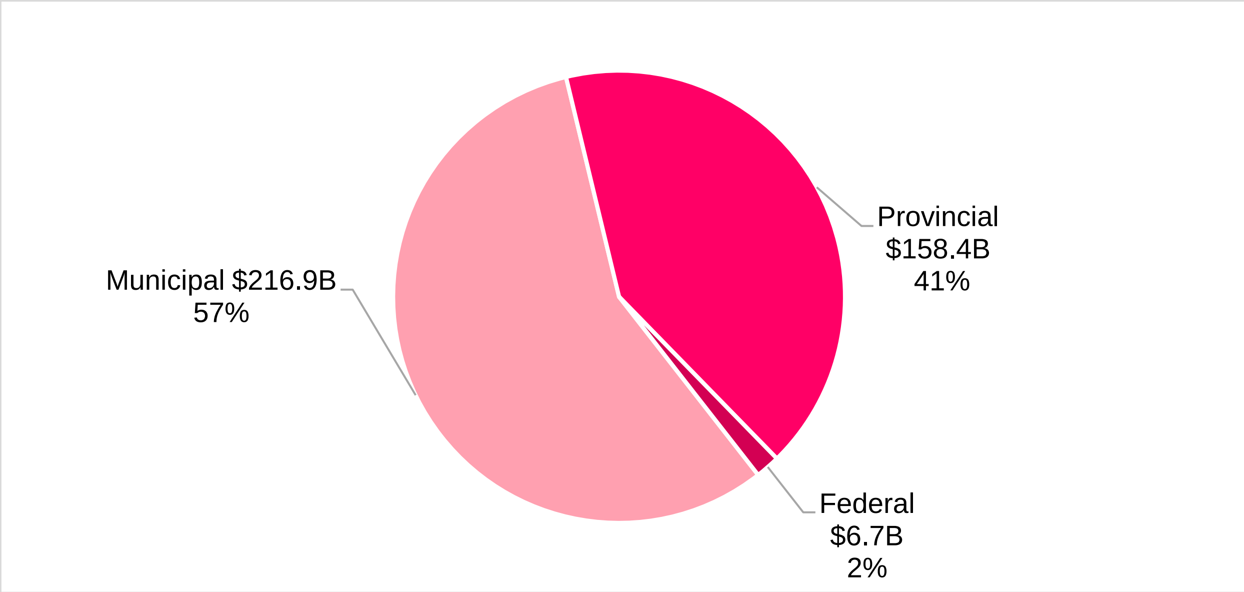
- consider reducing sanitary sewer rates by 9.4% during the next year's budget deliberations.
- when realized within the next 5 years, reallocating the first $265,000 in water service debt cost reductions to its infrastructure deficit. This will negate the need for any increase in water rates for capital purposes.
- when debt cost reductions are realized (other than in above), consider those reductions in the formation of the applicable year's operating budget.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the above recommendations.

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 very high 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 municipalities 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 total replacement cost of capital assets analyzed in this document. 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.
Life Cycle Analysis	Identify Maintenance and Renewal Strategies & Life Cycle Costs.
Service Level Targets	Define measurable Levels of Service Targets
Risk & Prioritization	Integrates all asset categories through risk and prioritization strategies.
Sustainable Financing	Identify sustainable Financing Strategies for all asset categories.
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 – THE INSTITUTE OF ASSET MANAGEMENT (IAM)

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 life cycles, 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 the Town of Parry Sound'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, useful life etc., summarizes the physical health of the capital assets, assess 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 stipulating the inclusion of all eligible asset categories. Previously, only core infrastructure categories were analyzed. The following asset categories are analysed in this document: road network; bridges & culverts; facilities; computer systems; equipment; fleet; and land improvements.

This AMP includes a detailed discussion of the state of local infrastructure and assets for each category; outlines industry standards levels of service and key performance indicators (KPIs); outlines asset management renewal strategy for major infrastructure; and provides financial strategy to mitigate funding shortfalls.

IV. Data and Methodology

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

1. Condition Data

Municipalities 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; therefore, while deficiencies may be presents at the individual level, imprecisions are minimized at the asset-class level as the data is aggregated.

As available, actual field condition data was used to make recommendations more precise. The value of condition data cannot be overstated as they provide a more accurate representation of the state of infrastructure.

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, aggregated, and an average for the previous three years is calculated, 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 municipalities face significant infrastructure backlogs. The infrastructure backlog is the accrued financial investment needed in the short-term to bring the assets to a state of good repair. This amount is identified for each asset 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 enumerated 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 facilitate communications, we've developed an Infrastructure Report Card that summarizes our findings in accessible language that municipalities can use for internal and external distribution. The report card is developed using two key, equally weighted factors:

TABLE 3 INFRASTRUCTURE REPORT CARD DESCRIPTION

Financial Capacity		A municipality's financial capacity is determined by how well it's meeting the average annual investment requirements (0-100%) for each infrastructure class.	
Asset Health		Using either field inspection data as available or age-based data, the asset health provide a grades for each infrastructure class based on the portion of assets in poor to excellent condition (0-100%). We use replacement cost to determine the weight of each condition group within the asset class.	
Letter Grade	**Rating**	**Performance and Financial Capacity**	**Description**
A	Very Good	Assets are fit for the future and the municipality is funding at least 90% of its annual needs.	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 existing infrastructure portfolio.
B	Good	Assets are adequate for now and the municipality is meeting 70-89% of its annual needs.	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	Assets require intervention and the municipality is meeting 60-69% of its annual needs.	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	Assets are at risk and the municipality is meeting between 40-59% of its annual needs.	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	Assets unfit for sustained service and the municipality is meeting less than 40% of its annual needs.	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 municipalities advance their asset management practices.

1. As available, we use field condition assessment data to determine both the state of infrastructure and develop the financial strategies. However, in the absence of observed data, we rely on the age of assets to estimate their physical condition.

2. 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.

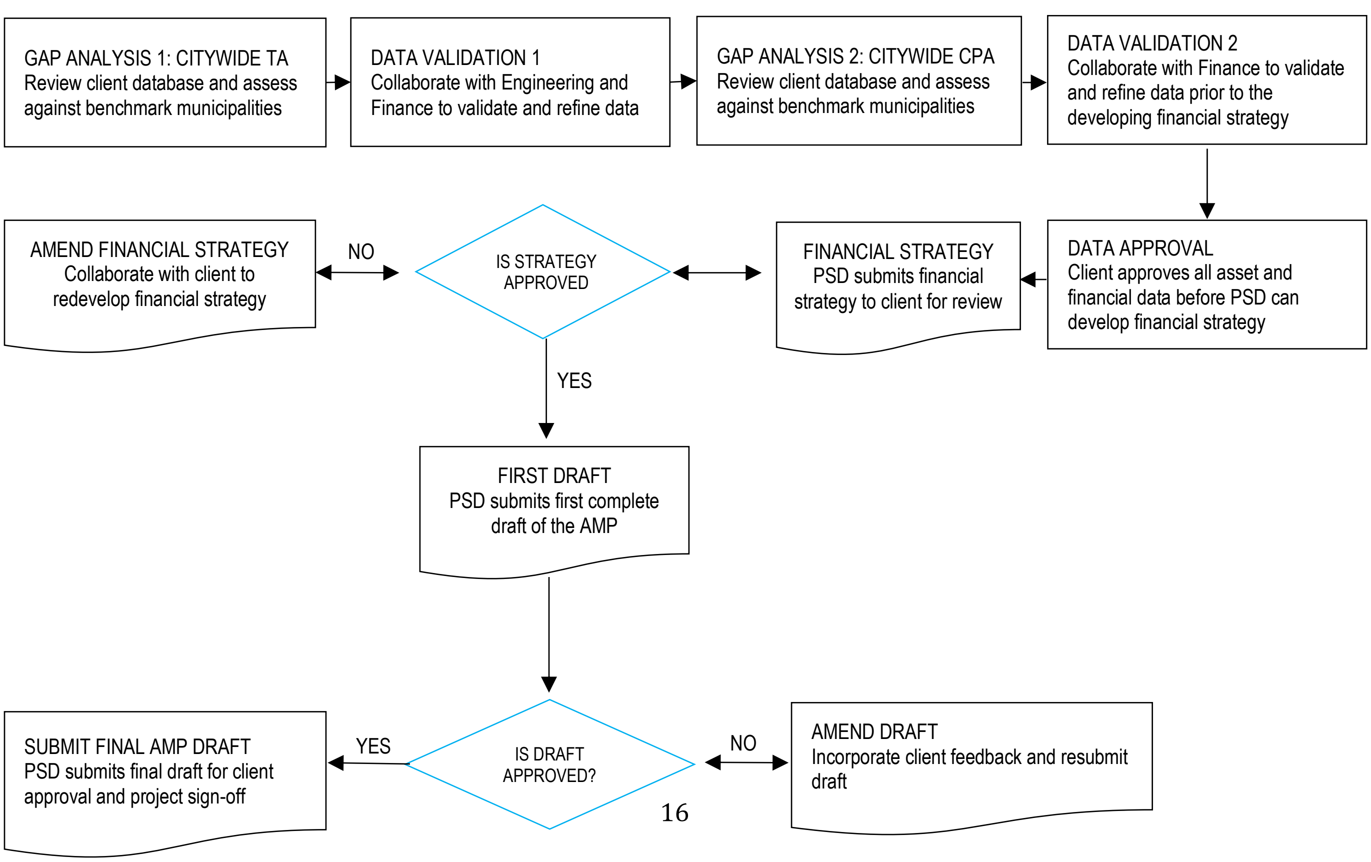
3. Our calculations and recommendations will reflect the best available data at the time this AMP was developed.

4. 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.

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

V. Key Stats

In this section, we provide aggregate indicators to summarize key elements of the municipalities asset classes in this AMP.

1. Asset Valuation

The seven asset classes analyzed in this asset management plan for the municipality had a total 2016 valuation of $295 million, of which the road network comprised 31%. The cost per household totaled $116,774 based on 2,523 households.

FIGURE 3 2016 ASSET VALUATION BY CLASS

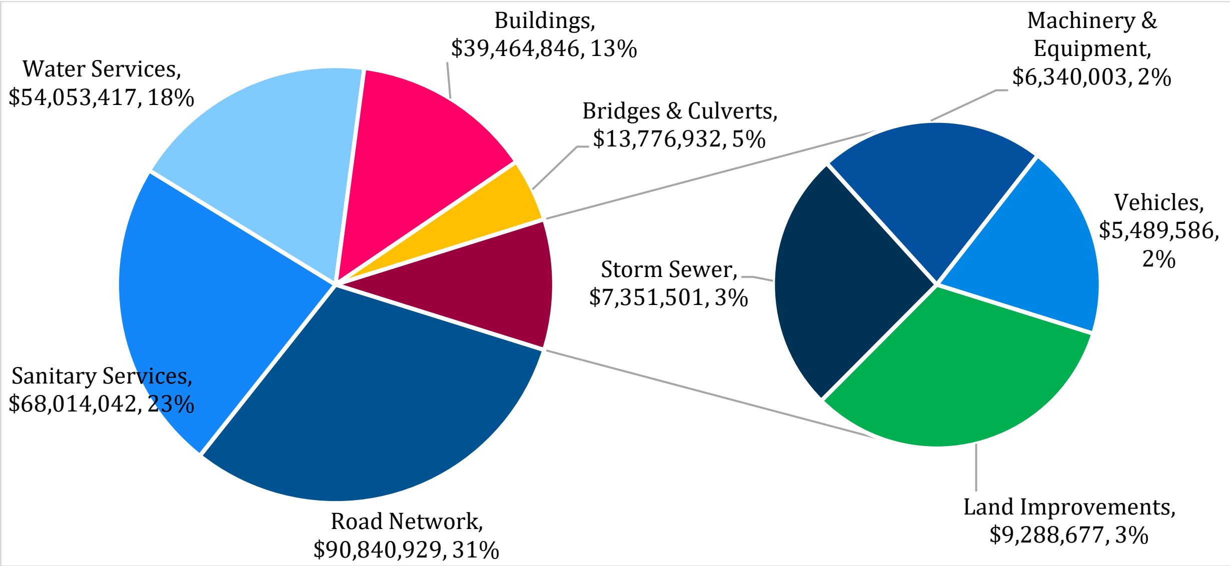
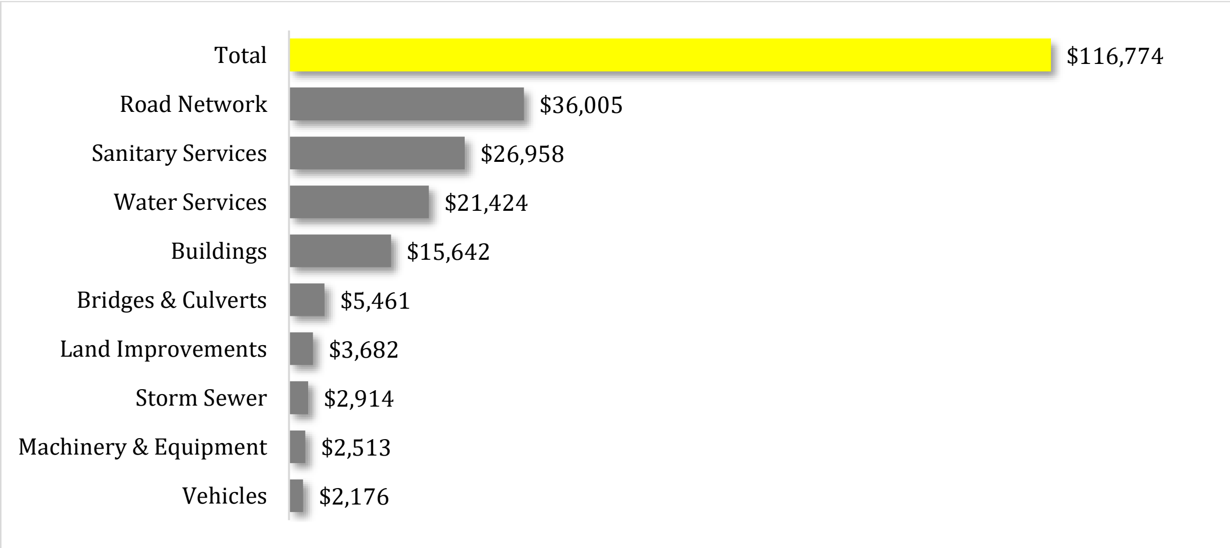


FIGURE 4 2016 COST PER HOUSEHOLD



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, 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 each of the nine asset classes in this AMP.

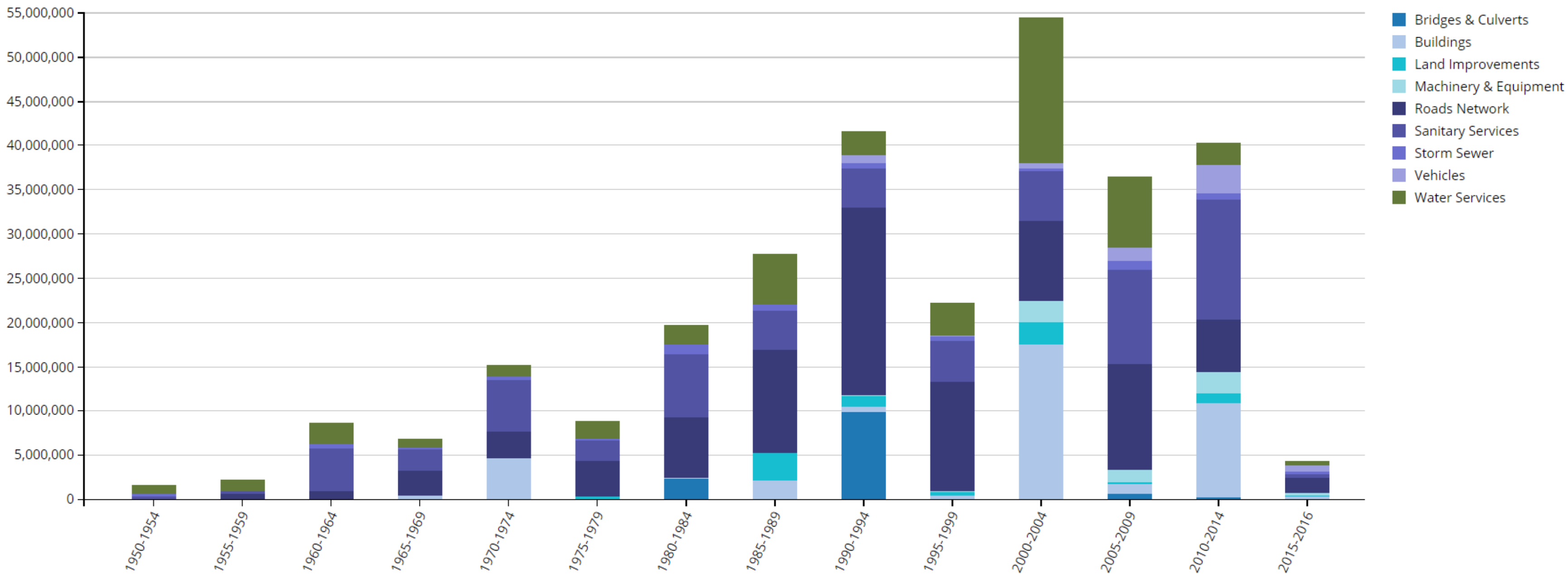
TABLE 4 SOURCE OF CONDITION DATA BY ASSET CLASS

Asset Class	Source of Condition Data
Road Network	Age-based
Bridges & Culverts	Assessed
Waste Water	Age-based
Water	Age-based
Storm	Age-based
Vehicles	Age-based
Machinery & Equipment	Age-based
Facilities	Age-based
Water & Waste Water	Age-based
Other	Age-based
Land improvements	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. The installation year profile in the figure below illustrates the historical invesments in infrastructure across key asset classes. Often, investment in critical infrastructure parallels population growth or other significant shifts in demographics.

FIGURE 5 HISTORICAL INVESTMENT IN INFRASTRUCTURE - ALL ASSET CLASSES

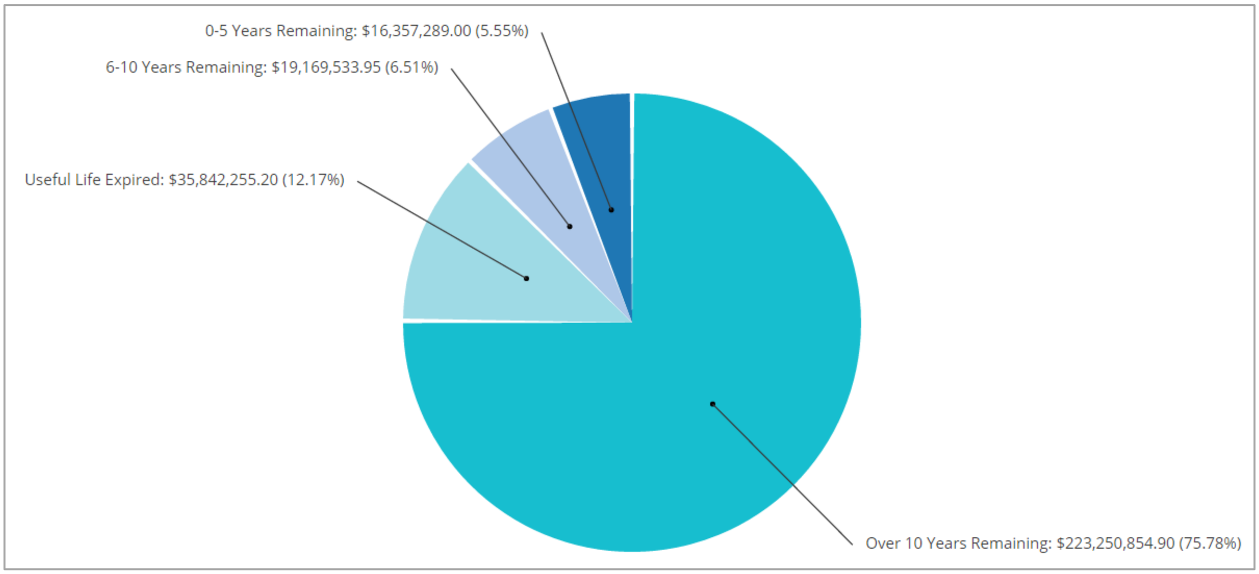


Similar to other municipalities in Ontario, Parry Sound experienced a period of increasing levels of investment beginning in the 1960s, with more rapid increases in the mid-1980s. The majority of investment was made in roads, water and waste water assets. Since 2000, the municipality's infrastructure expenditures have totaled $136 million. The largest investments were made between 2000 and 2004, totalling nearly $55 million. Since 2015, the municipality's expenditures have totaled $4.4 million.

4. Useful Life Consumption – All Asset Classes

While age is not a precise indicator of an asset's health, it can serve as a meaningful approxmiation in the absence of condition data and can serve as a signal. Figure 6 shows the distibution of assets based on the amount of useful life already consumed.

FIGURE 6 USEFUL LIFE REMAINING - ALL ASSET CLASSES

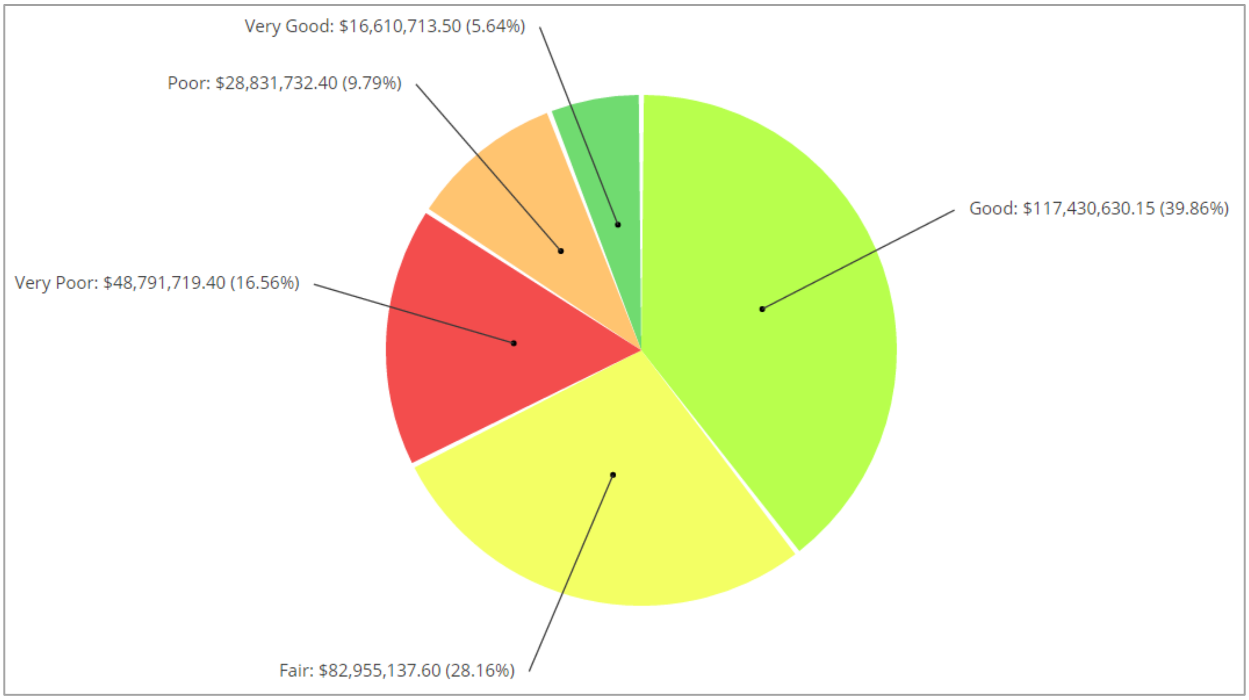


Approximately 80% of the municipality's assets , with a valuation of $223 million, have at least 10 years of useful life remaining. However, a significant portion, with a valuation of $36 million, remain in operation beyond their useful life. An additional 6% of assets valued at $16 million will reach the end of their useful life in the next five years.

5. Overall Condition – All Asset Classes

Based on 2016 replacement cost, and a blend of age-based and observed data, while approximately 50% of the municipality's total asset portfolio as analysed in this AMP is in very good or good condition, more than 25% of the assets, with a valuation of $78 million, is in poor to very poor condition.

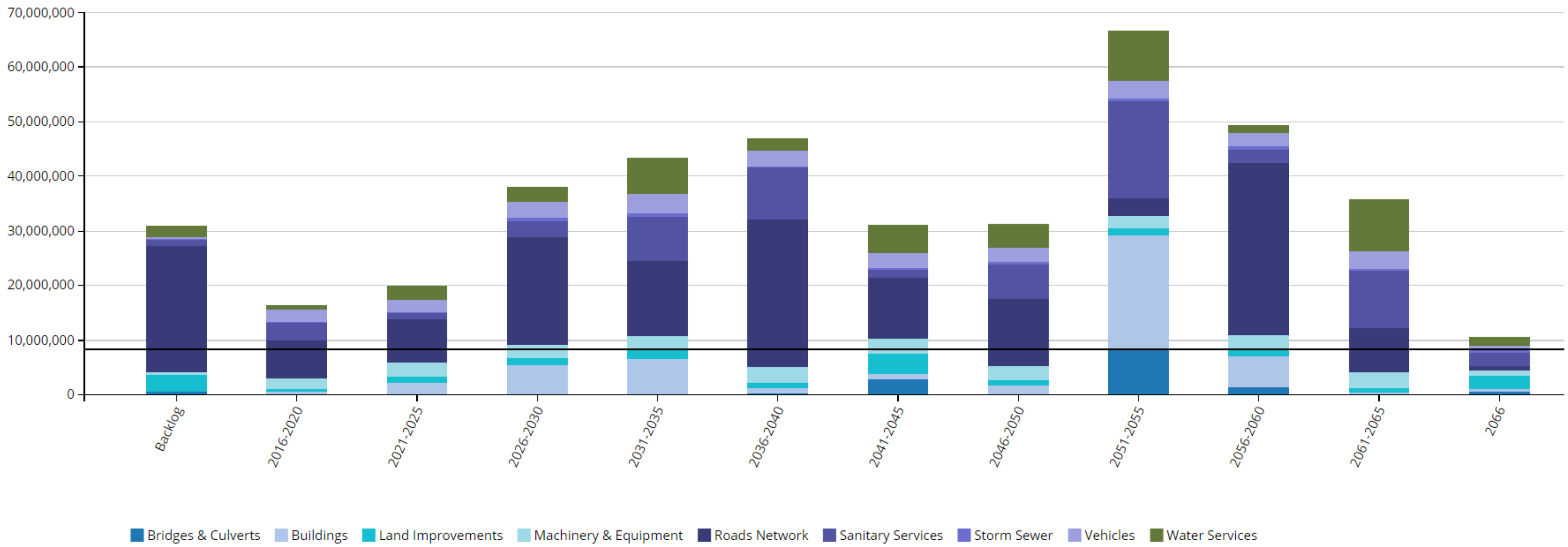
FIGURE 7 ASSET CONDITION DISTRIBUTION BY REPLACEMENT COST - ALL CLASSES



6. 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 nine asset classes. 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 8 REPLACEMENT PROFILE - ALL ASSET CLASSES



Based primarily on age data, the municipality has a combined backlog of more than $30 million, more than $23 million of which is attributed to roads. Aggregate replacement needs for the municipality's nine asset classes are forecasted to be $16 million over the next five years. An additional $20 million will be required between 2021 and 2025. The municipality's aggregate annual requirements (indicated by the black line) for its nine asset classes total $8,580,000. At this funding level, the municipality is allocating sufficient funds on an annual basis to meet the replacement needs for its various asset categories as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the municipality is currently allocating a combined $1,287,000 for its tax-based categories and $2,669,000 for its rate-based categories. While rate-based categories are, when combined, overfunded, tax-based categories have an annual deficit of $4,626,000. See the 'Financial Strategy' section for achieving 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. Data Confidence

The municipality has a very high degree of confidence in the data used to develop this AMP, receiving a weighted confidence rating of 83%. This is indicative of significant effort in collecting and refining its data set. The lowest data confidence rating was assigned to the municipality's storm assets.

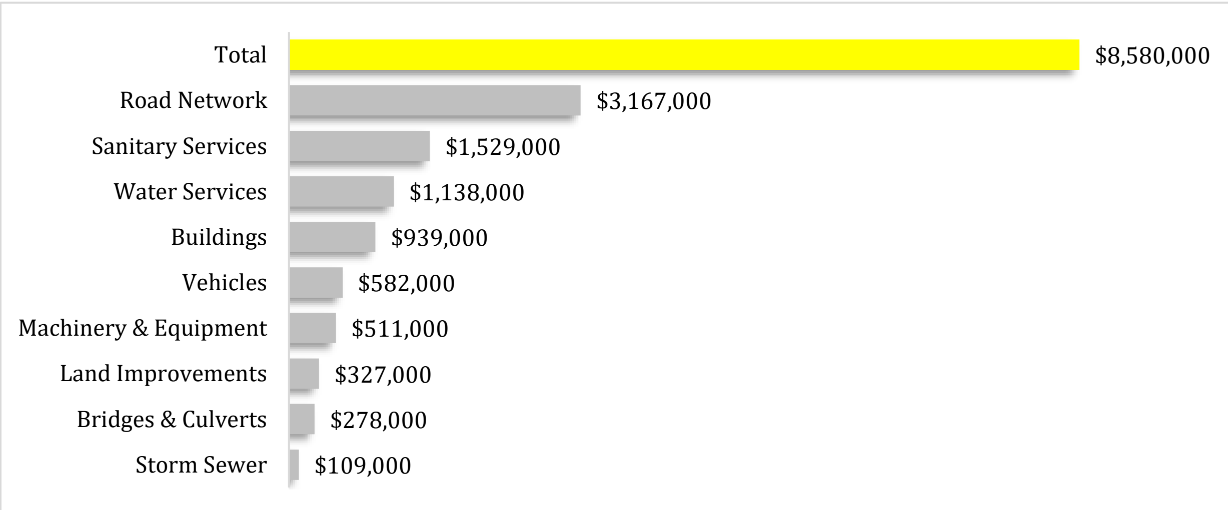
TABLE 5 DATA CONFIDENCE RATINGS

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	Weighted Average Data Confidence Rating
Road Network	90%	90%	80%	80%	70%	82%	25%
Bridges & Culverts	70%	70%	90%	70%	70%	74%	3%
Water	90%	90%	90%	80%	80%	86%	16%
Waste water	90%	80%	90%	80%	80%	84%	19%
Storm	70%	50%	80%	50%	60%	62%	2%
Facilities	90%	90%	80%	80%	80%	84%	11%
Land Improvements	90%	90%	90%	90%	90%	90%	3%
Vehicles	90%	90%	90%	90%	90%	90%	2%
Machinery & Equipment	80%	70%	80%	80%	80%	78%	2%
Overall Weighted Average Data Confidence Rating							83%

8. Financial Profile

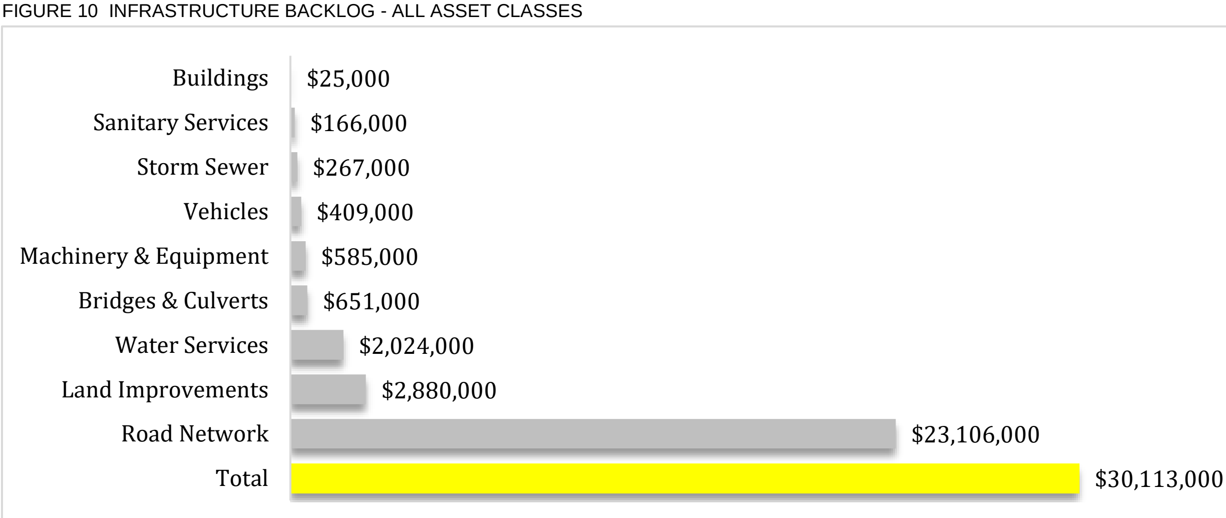
This section details key financial indicators related to the municipality's asset classes as analyzed in this asset management plan.

FIGURE 9 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 need as they arise and prevent infrastructure backlogs. In total, the municipality must allocate $8.6 million annually for the assets covered in this AMP.

FIGURE 10 INFRASTRUCTURE BACKLOG - ALL ASSET CLASSES



The municipality has a combined infrastructure backlog of $30 million, with roads comprising 77%. The backlog represents the investment needed today to meet previously deferred replacement needs. This data is based on assessed condition as available, and age-based data in the absence of such information.

VI. State of Local Infrastructure

In this section, we detail key indicators for each class discussed in this asset management plan. 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.

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 cost were derived. In total, the municipality's roads assets are valued at $91 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

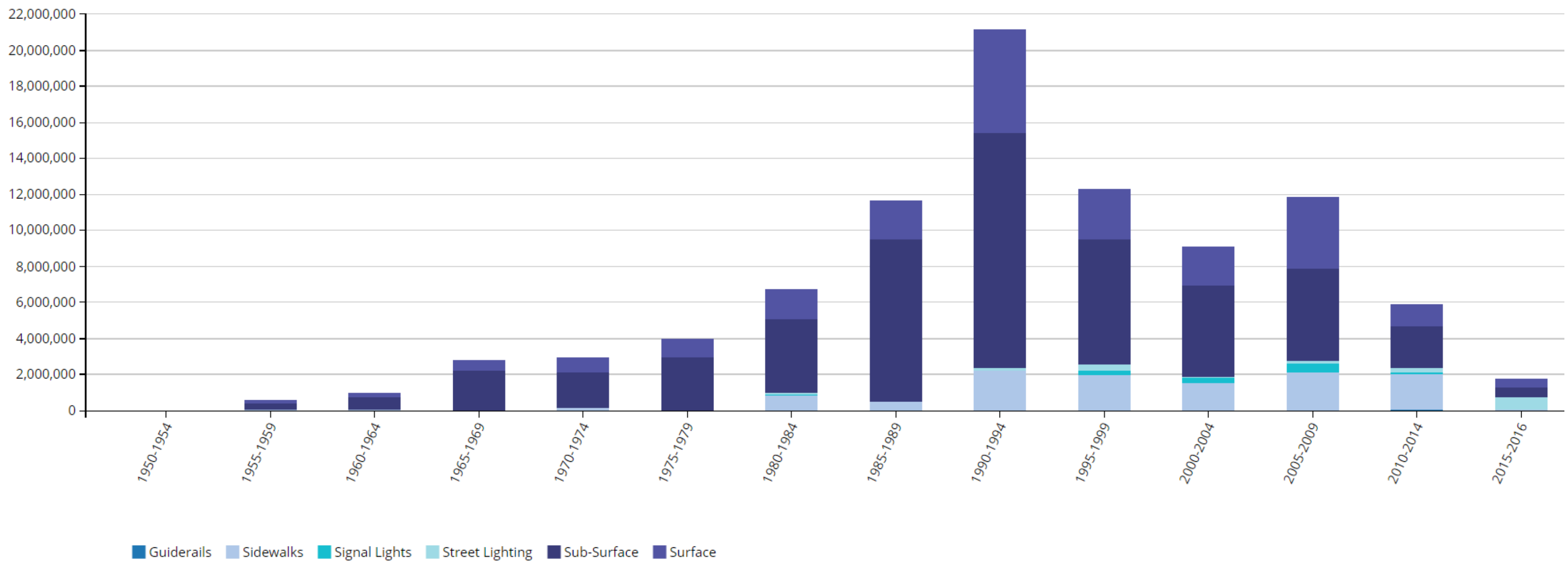
TABLE 6 KEY ASSET ATTRIBUTES – ROADS

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Road Network	Guiderails	5 units	20	NRBCPI (Toronto)	$45,703
	Sidewalks	137 units	20	NRBCPI (Toronto)	$11,492,351
	Signal Lights	16 units	10/30	NRBCPI (Toronto)	$1,393,716
	Street Lighting	1,258 units	15/30	NRBCPI (Toronto)	$1,290,004
	Sub-Surface	53,315m	40	$1,017/m	$54,221,355
	Surface	52,825m	20	$424/m	$22,397,800
				Total	$90,840,929

1.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of road network assets using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 11 HISTORICAL INVESTMENT – ROAD NETWORK

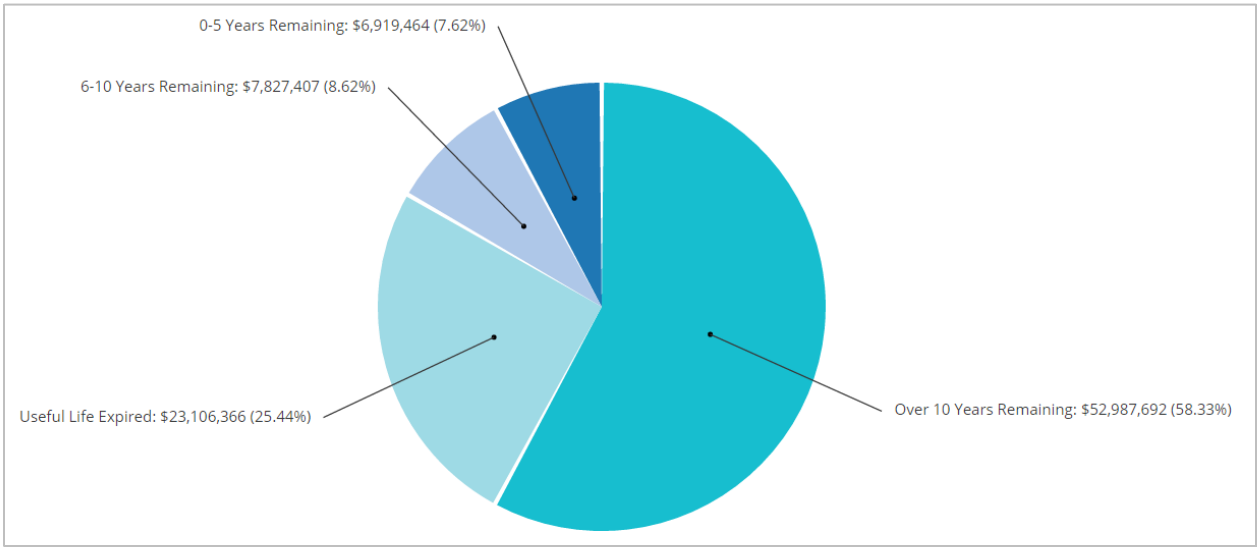


Similar to its overall infrastructure investment, and paralleling many other municipalities in Ontario, the municipality made consistent investment in its roads beginning in the 1950. These expenditures escalated through the next four decades, peaking at $21 million between 1990 and 1994, with sub-surface comprising $13 million. Since 2000, the municipality has invested heavily in its road network, with expenditures totalling $29 million.

1.5 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 12 illustrates the useful life consumption levels for the municipality's road network.

FIGURE 12 USEFUL LIFE CONSUMPTION - ROAD NETWORK

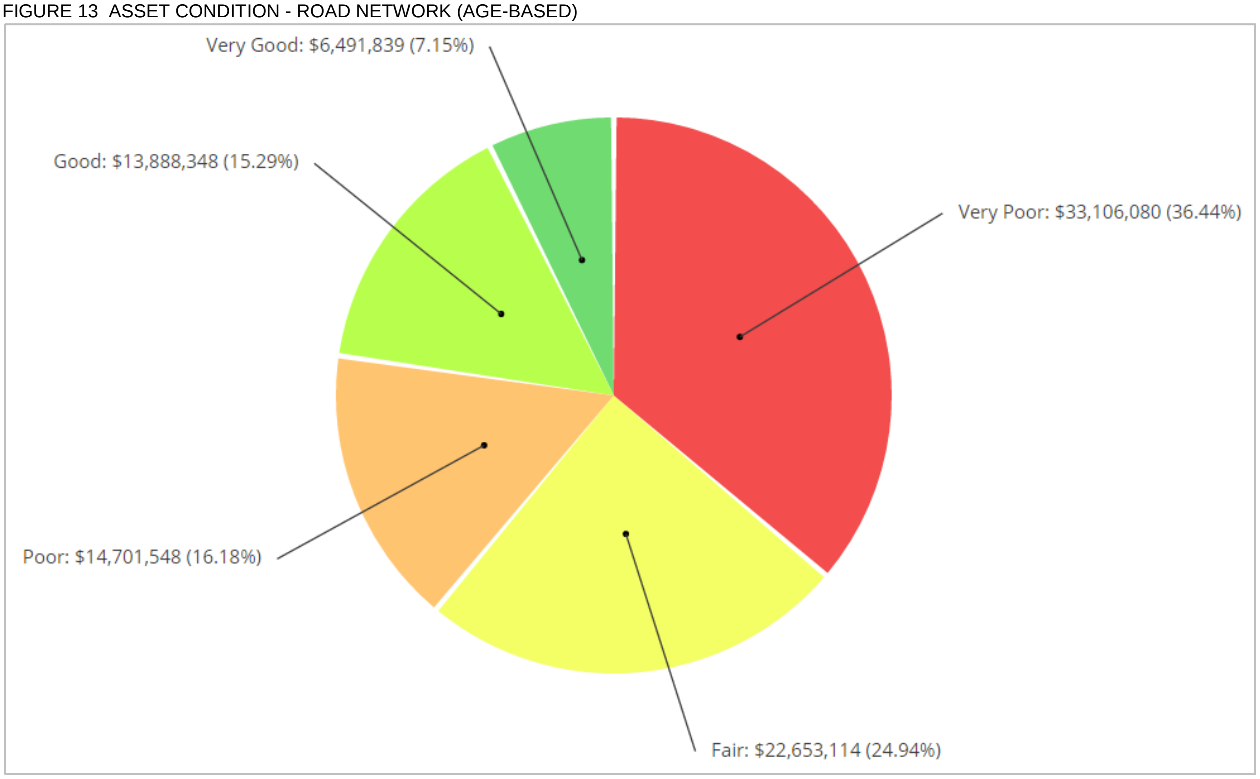


While nearly 60% of the municipality's road network assets have at least 10 years remaining, more than 25%, with a valuation of $23 million, remain in operation beyond their useful life. An additional 8% of assets valued at $7 million will reach the end of their useful life in the next five years.

1.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's roads network. 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 indicated it conducts roads patrol on a regular basis. However, condition data has not been linked to the TCA assets and therefore was not used for the purpose of this AMP. The municipality hopes to link this data going into the future.

FIGURE 13 ASSET CONDITION - ROAD NETWORK (AGE-BASED)

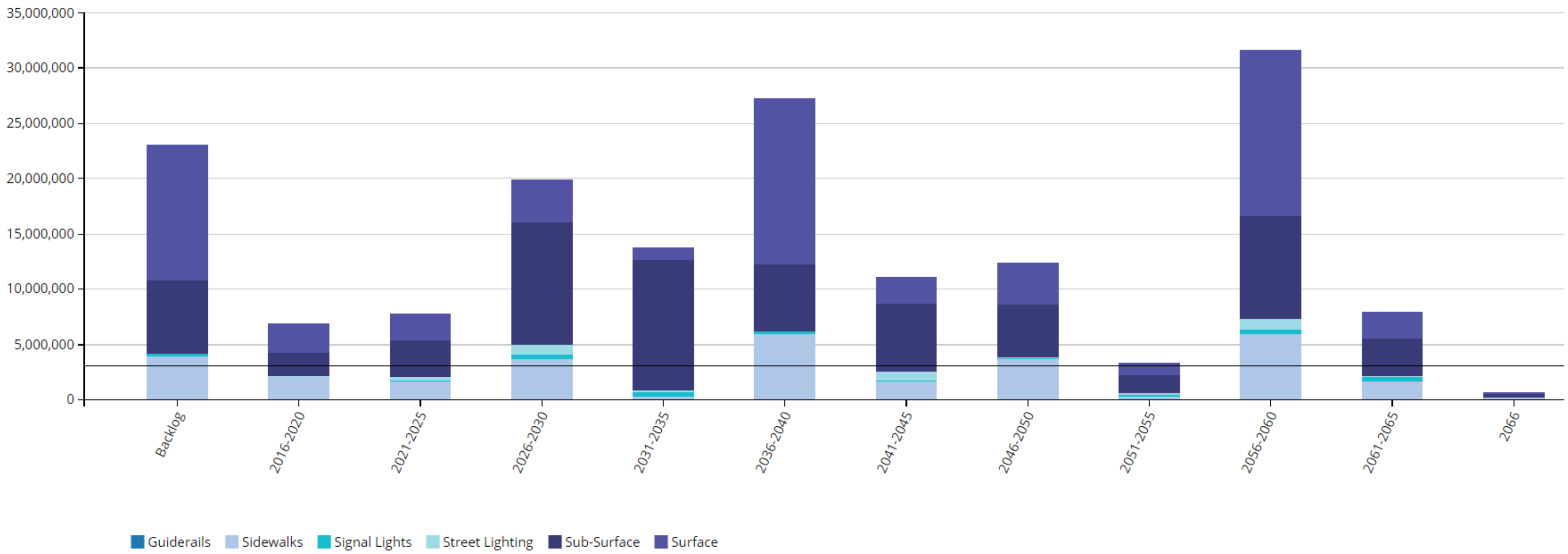


More than 50% of the municipality's roads assets, valued at $48 million, are in poor to very poor condition; less than 25% are in good to very good condition, indicative of impending replacement needs.

1.7 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 14 FORECASTING REPLACEMENT NEEDS - ROAD NETWORK



In addition to the backlog of $23 million, investments needs for the road network assets are forecasted to be $7 million over the next five years. An additional $8 million will be required between 2021 and 2025. The municipality's annual requirements (indicated by the black line) for its road network total $3,167,000. At this funding level, the municipality is 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 $581,000, leaving an annual deficit of $2,586,000. See the 'Financial Strategy' section for achieving 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.

1.8 Recommendations – Roads

- The majority of the municipality's roads portfolio is in poor to very poor condition. While the municipality conducts a regular road patrol, the data is not managed in a database. The current backlog alone requires that more than 25% of the road network be replaced. As such, the municipality should implement a more comprehensive condition assessment program for roads and sidewalks to further 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.

- In addition to the above, a continued cycle of condition assessment data should be captured on a periodic basis to maintain data accuracy and currency. Having this data entered into the asset management software will benefit the municipality going forward.

- While the municipality's confidence in its data is high, there is no formal data verification policy in place. To maintain a high degree of data confidence a data verification policy should be established.

- 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'.

- Once the above data sets and key performance indicators have been established this Asset Management plan should be updated accordingly.

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 $13.8 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

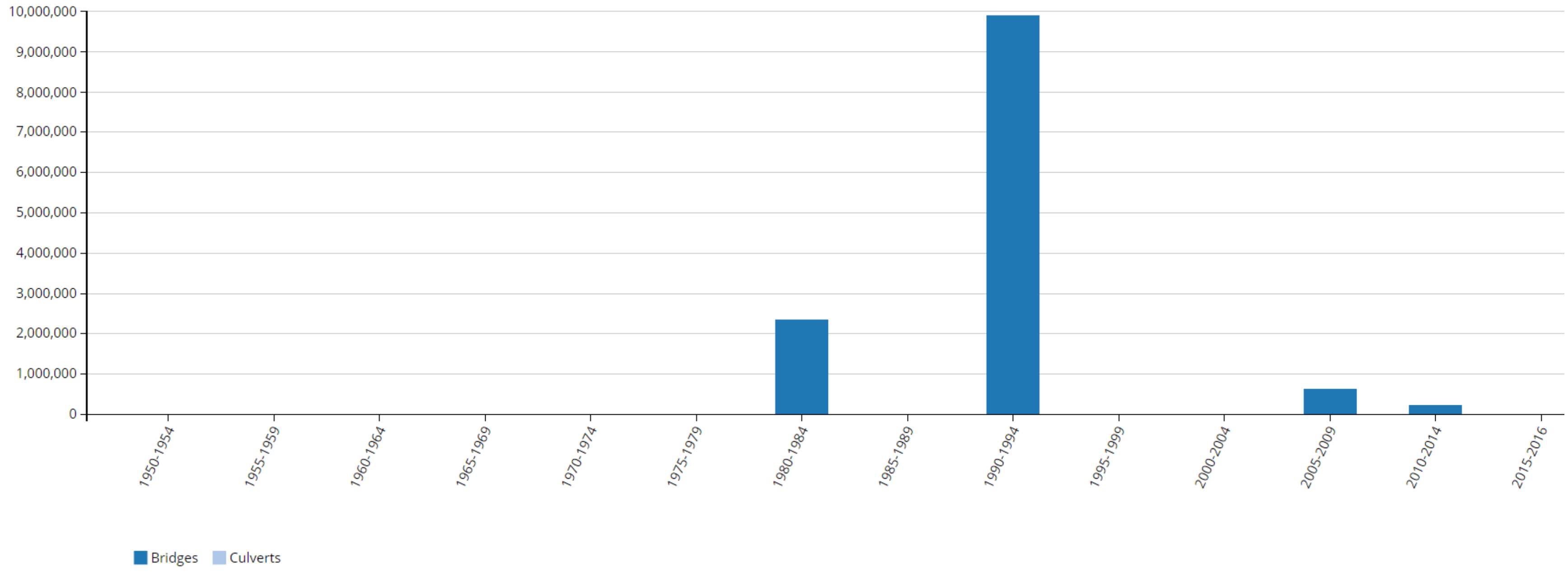
TABLE 7 KEY ASSET ATTRIBUTES – BRIDGES & CULVERTS

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Bridges & Culverts	Bridges	6 structures	50	NRBCPI (Toronto)	$13,751,095
	Culverts	3 structures	80	NRBCPI (Toronto)	$25,837
				Total	$13,776,932

2.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of bridges & culverts using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 15 HISTORICAL INVESTMENT - BRIDGES & CULVERTS

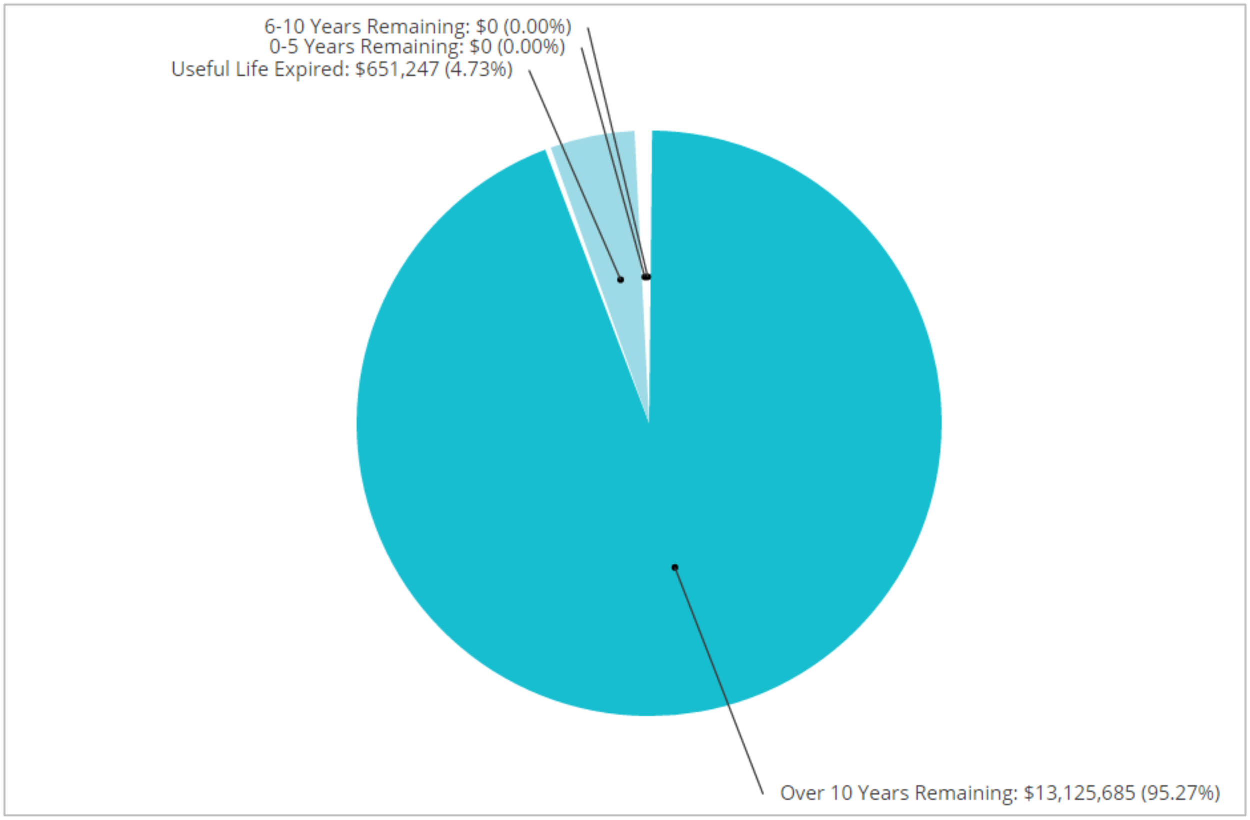


Investments in bridges & culverts totaled nearly $10 million in the early 1990s. Over the last 25 years, less than $1 million has been allocated to the municipality's bridges & culverts, reflecting the relatively minor replacement requirements since initial construction and acquisitions.

2.5 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 16 illustrates the useful life consumption levels for the municipality's bridges & culverts.

FIGURE 16 USEFUL LIFE CONSUMPTION – BRIDGES & CULVERTS

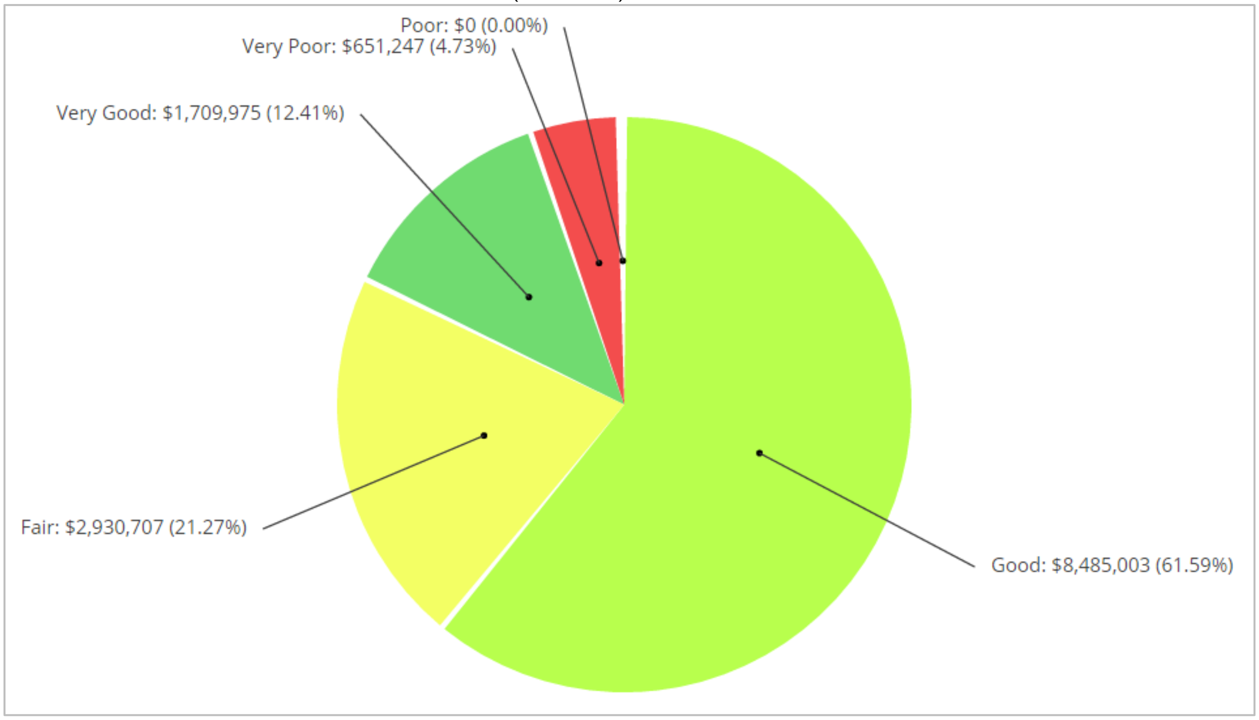


More than 95% of the municipality's bridges & culverts have at least 10 years of useful life remaining. However, 5% of assets, with a valuation of $651,000 will reach the end of their useful life in the next five years.

2.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's bridges & culverts. 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.

FIGURE 17 ASSET CONDITION – BRIDGES & CULVERTS (ASSESSED)

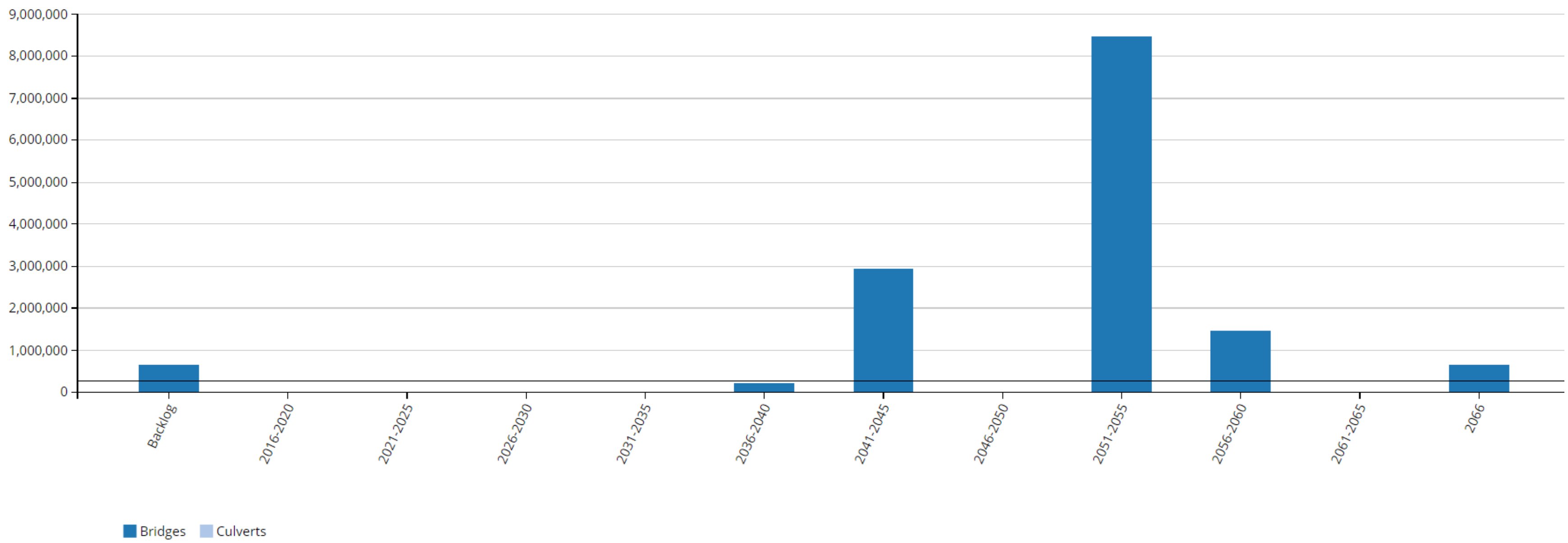


Nearly 75% of bridges & culverts assets are in good to very good condition; however, 5%, with a valuation of $651,000 are in very poor condition.

2.7 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 18 FORECASTING REPLACEMENT NEEDS - BRIDGES & CULVERTS



In addition to a backlog of $651,000, as assets reach the end of their useful life, replacement needs will begin to increase in 2036. These expenditures will rise rapidly between 2051 and 2055 totaling $8.5 million. The municipality's annual requirements (indicated by the black line) for its bridges & culverts total $278,000. At this funding level, the municipality is 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 $46,000, leaving an annual deficit of $232,000. See the 'Financial Strategy' section for achieving 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.

2.8 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'.

3. Water

3.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 8 illustrates key asset attributes for the municipality's water services assets, 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 services assets are valued at $54 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

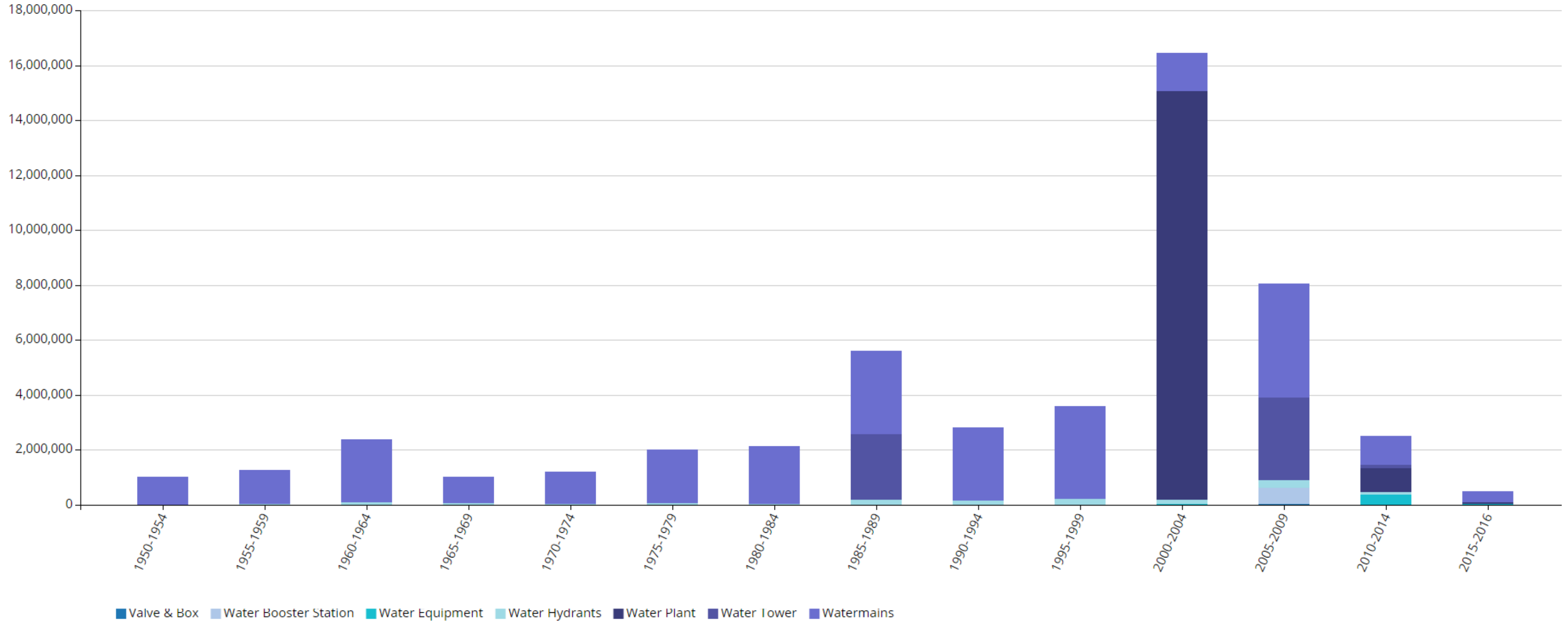
TABLE 8 KEY ASSET ATTRIBUTES – WATER

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Water Services	Valve & Box	46 units	30	$1,540/unit	$70,840
	Hydrants	205 units	40	$7,330/unit	$1,502,650
	Watermains - 400 mm	15m	80	$610/m	$9,150
	Watermains - 375 mm	250m	80	$610/m	$152,500
	Watermains - 300 mm	9,086m	80	$610/m	$5,542,460
	Watermains - 250 mm	1,955m	80	$610/m	$1,192,550
	Watermains - 200 mm	21,471m	80	$610/m	$13,097,310
	Watermains - 150 mm	10,088m	80	$610/m	$6,153,680
	Watermains - 100 mm	4,731m	80	$610/m	$2,885,910
	Watermains - 50 mm	150m	80	$610/m	$91,500
	Watermains - Unknown	1,700m	80	$610/m	$1,037,000
	Watermains - Unknown	2 units	80	NRBCPI (Toronto)	$66,970
	Water Equipment	18 units	3/5/10/15/20	CPI (Ontario)	$424,042
	Water Plant	1 structure (18 components)	5/10/20/40/60	NRBCPI (Toronto)	$15,776,478
	Water Booster Station	1 structure (5 components)	10/40/58/60	NRBCPI (Toronto)	$564,206
	Water Tower	1 structure (5 components)	15/25/50/75	NRBCPI (Toronto)	$5,486,171
				Total	$54,053,417

3.2 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of water assets using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 19 HISTORICAL INVES TMENT – WATER NETWORK

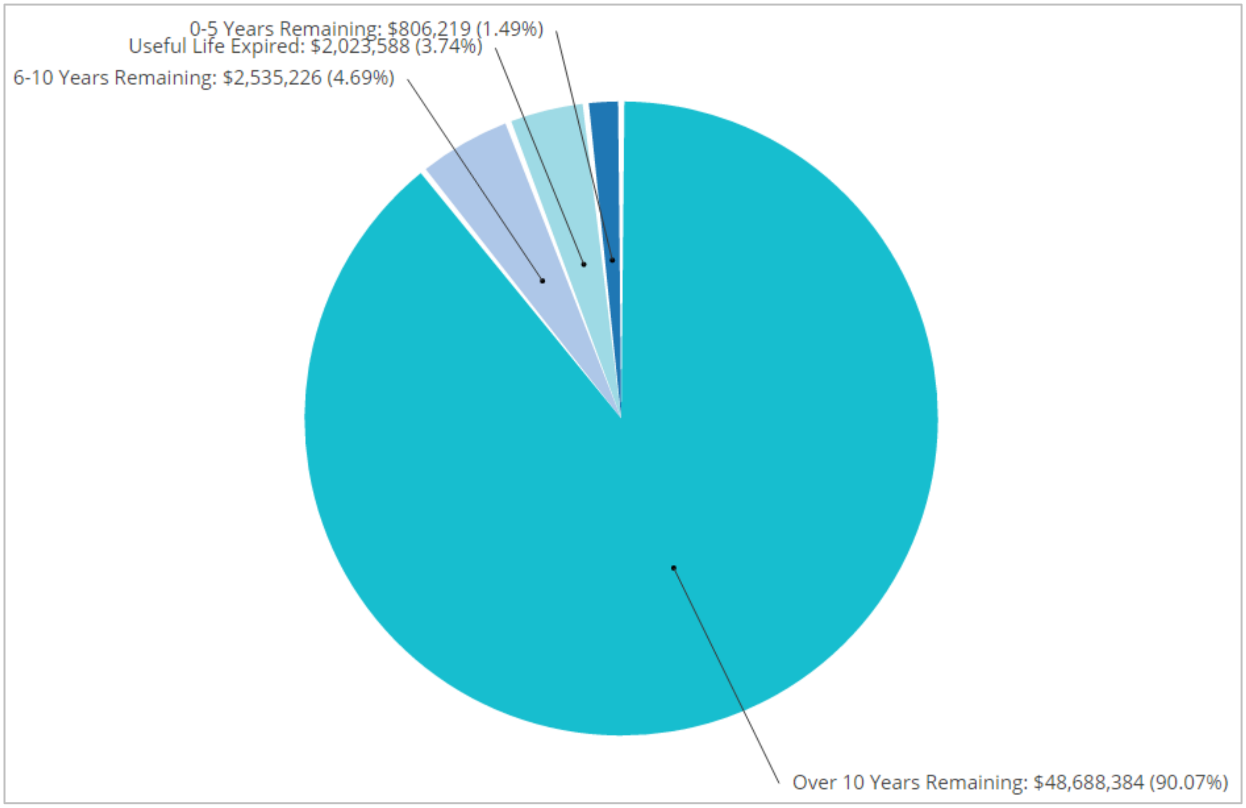


While no direct relationship with historical population changes or investments in other infrastructure is evident, the municipality's expenditures on water services remained relatively consistent from the 1950s until 2000. Between 1985 and 1989, expenditures totaled $5.6, with a water tower comprising $2.4 million of the investments; more than $3 million was allocated to mains. Between 2000 and 2004, the period of highest investment, nearly $15 million was spent on the municipality's water plant. Since 2005, investments have totaled approximately $11 million .

3.3 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 20 illustrates the useful life consumption levels for the municipality's water services.

FIGURE 20 USEFUL LIFE CONSUMPTION – WATER NETWORK

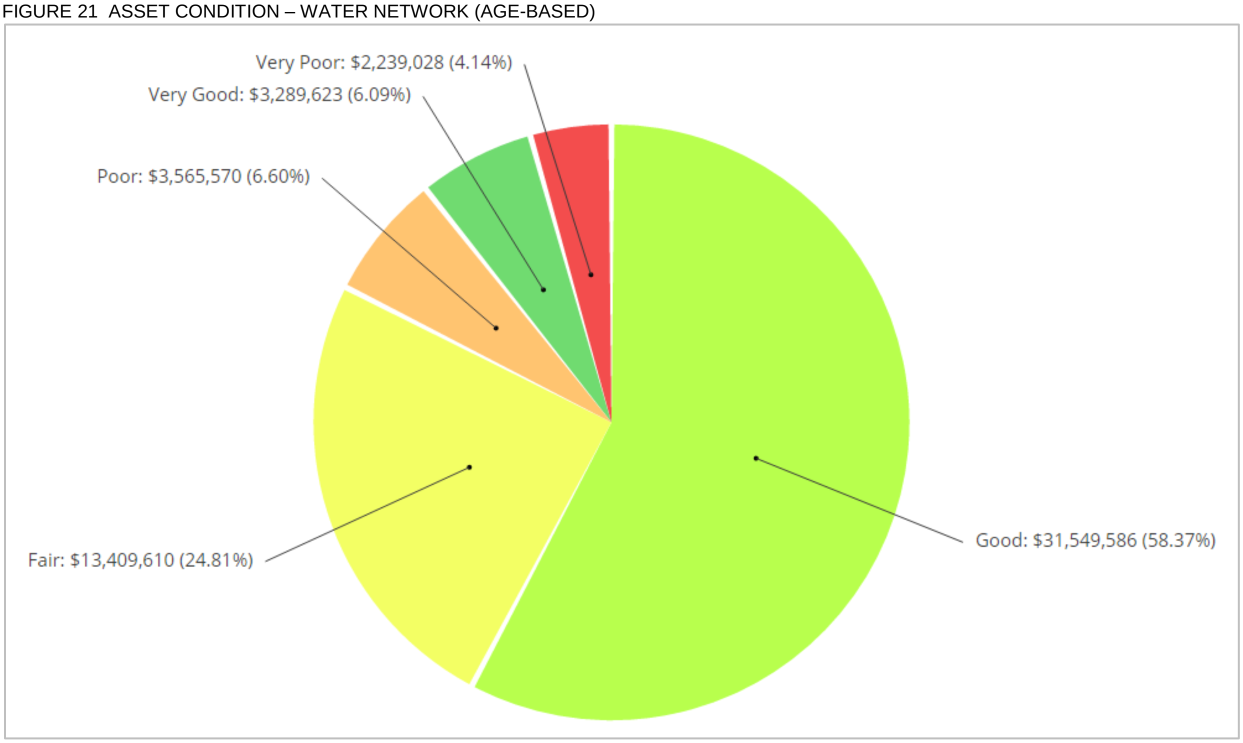


More than 90% of the municipality's water services assets have at least 10 years of useful life remaining. However, 4%, with a valuation of more than $2 million remain in operation beyond their useful life. An additional 1% of assets, valued at nearly $1 million will reach the end of their useful life in the next five years.

3.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's water services. 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 21 ASSET CONDITION – WATER NETWORK (AGE-BASED)

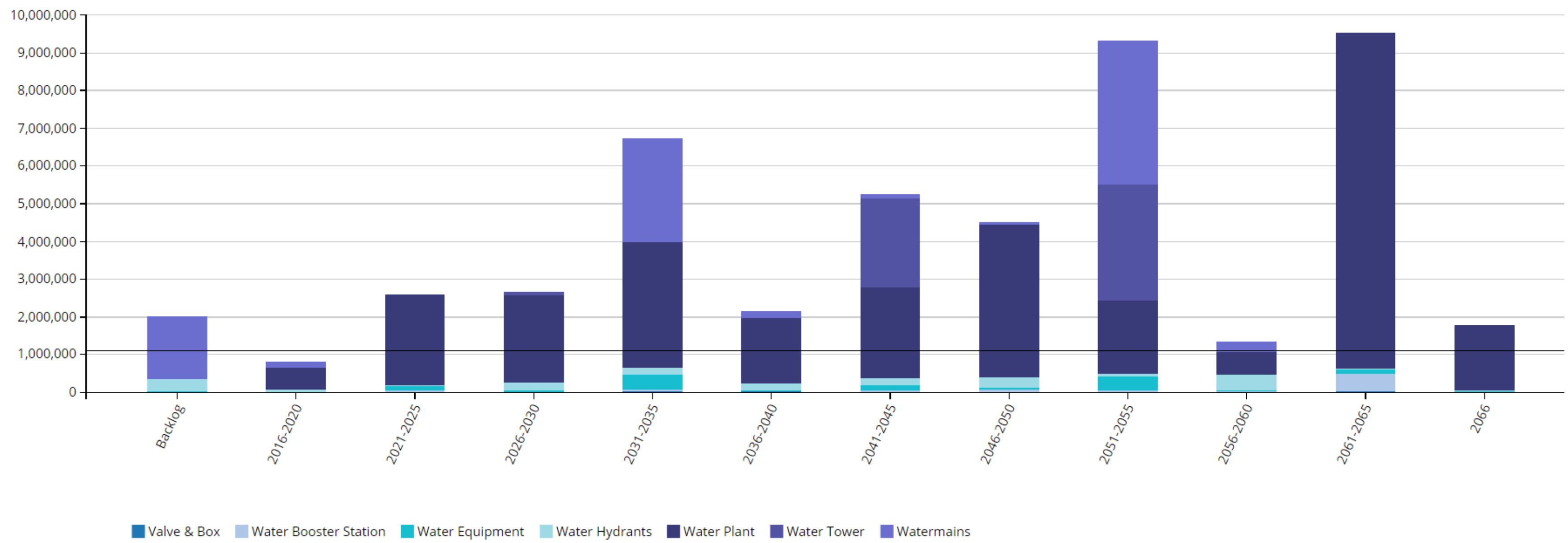


While nearly 65% of water assets, valued at $35 million, are in good to very good condition, more than 10%, with a valuation of $5.8 million are in poor to very poor condition.

3.7 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's water 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 22 FORECASTING REPLACEMENT NEEDS – WATER NETWORK



In addition to a backlog totaling $2 million, the municipality's replacement needs will total more than $3.4 million over the next 10 years. Between 2031 and 2035, replacement needs will have increase to $6.7 million. Generally, these replacement needs are forecasted to fluctuate over the next 50 years, peaking at more than $9 million between 2051-2055 and 2061-2066. The municipality's annual requirements (indicated by the black line) for its water services total $1,138,000. At this funding level, the municipality is 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 $873,000, leaving an annual deficit of $265,000. See the 'Financial Strategy' section for achieving 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.

3.8 Recommendations – Water

- Similar to bridges & culverts, water services are uniquely consequential to a community's wellbeing. While the municipality's water facilities undergo inspections, its mains do not have condition data available. As such, the municipality should establish a condition assessment program. This will provide a more accurate assessment of the physical health of the mains and the financial requirements related to the municipality's water network, including more precise estimation of the backlog of $2 million. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- Condition data generated from the above initiative should be integrated with a risk management framework. Together, this data should be used to systematically prioritize short-, medium-, and long-term replacement needs for the municipality's water assets. See Section 4, 'Risk' in the 'Asset Management Strategies' chapter.

- While the municipality's confidence in its data is high, there is no formal data verification policy in place. To maintain a high degree of data confidence over time and minimize deficiencies, the municipality should establish a systematic data verification policy.

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

4. Waste Water

4.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 9 illustrates key asset attributes for the municipality's waste water assets, 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 services assets are valued at $68 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

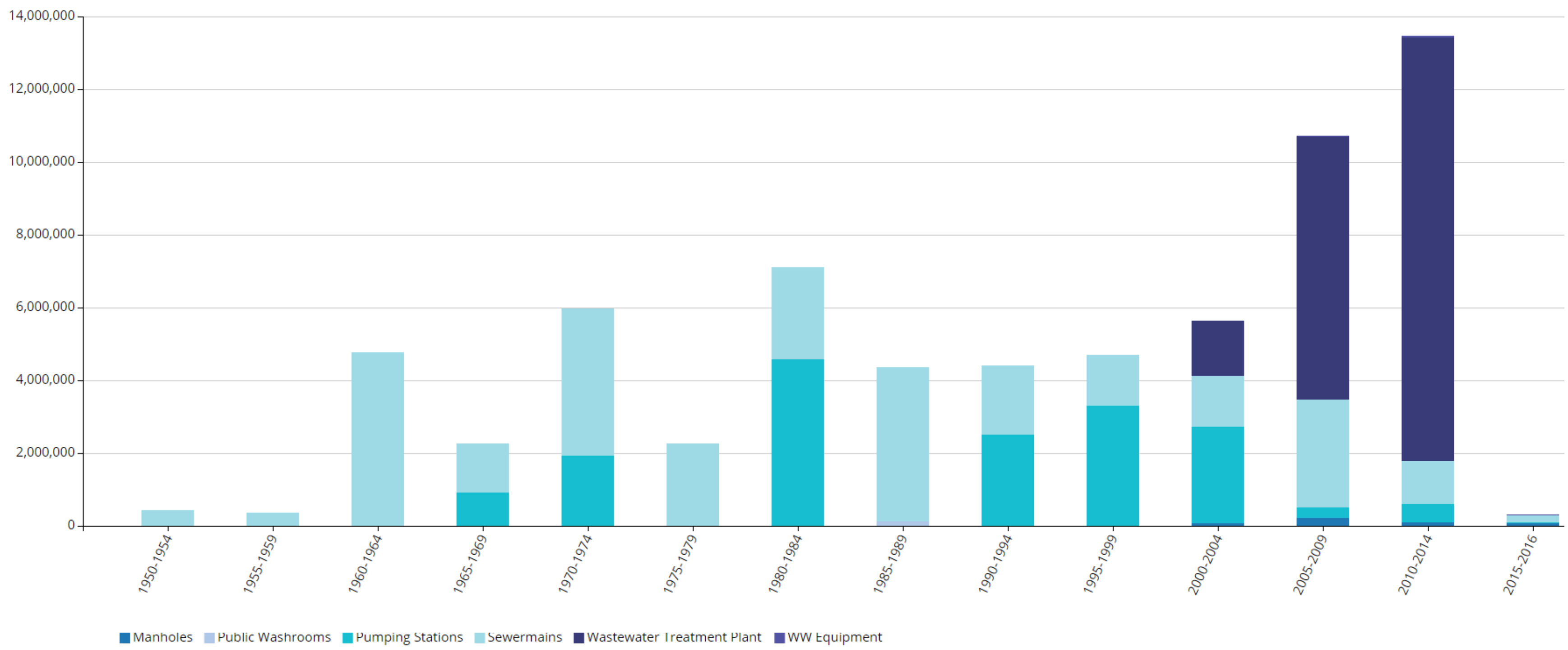
TABLE 9 ASSET INVENTORY - WASTE WATER

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Waste Water Services	Sewermains - 450 mm	2,099m	80	$630/unit	$1,322,370
	Sewermains - 400 mm	42m	80	$630/unit	$26,460
	Sewermains - 375 mm	325m	80	$630/unit	$204,750
	Sewermains - 350 mm	91m	80	$630/unit	$57,330
	Sewermains - 300 mm	3,260m	80	$630/unit	$2,053,800
	Sewermains - 250 mm	1,918m	80	$630/unit	$1,208,340
	Sewermains - 200 mm	37,792m	80	$630/unit	$23,808,960
	Sewermains - 150 mm	1,227m	80	$630/unit	$773,010
	Sewermains - 100 mm	1,000m	80	$630/unit	$630,000
	Sewermains - 75 mm	150m	80	$630/unit	$94,500
	Sewermains - Unknown	7m	80	$630/unit	$4,410
	Sewermains - Unknown	4 units	80	NRBCPI (Toronto)	$77,836
	Manholes	41 units	50	$11,230/unit	$460,430
	Public Washroom	1 structure (2 components)	15/25/75	NRBCPI (Toronto)	$119,529
	Pumping Stations	15 structures (112 components)	10/20/30/40/50/60	NRBCPI (Toronto)	$16,697,741
	Wastewater Treatment Plant	9 structures (31 components)	20/30/40/50/60	NRBCPI (Toronto)	$20,402,308
	WW Equipment	13 units	3/5/10/20	CPI (Ontario)	$72,268
				Total	$68,014,042

4.2 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of waste water assets using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 23 HISTORICAL INVESTMENT – WASTE WATER

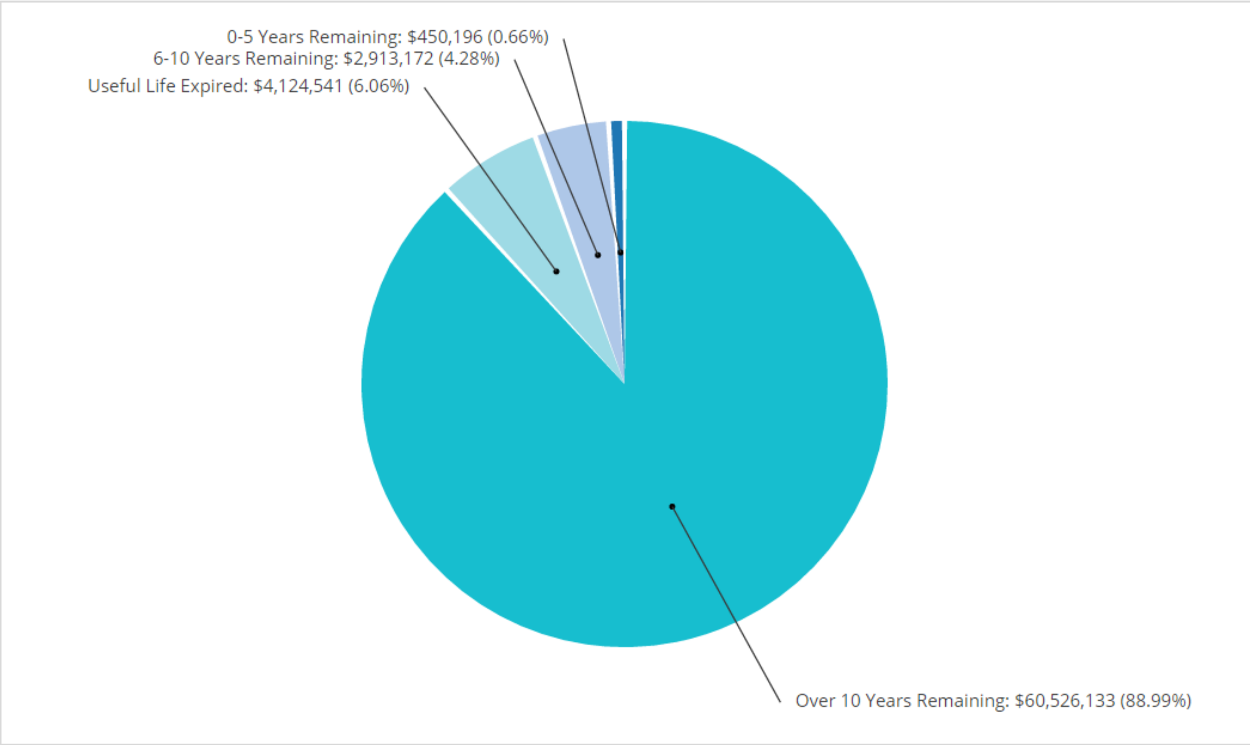


The municipality's investments in waste water increased sharply in the early 1960s and fluctuated for two decades. Beginning in the mid-1980s, expenditures began to increase, with investments totalling more than $30 million between 2000 and 2014; waste water treatment structures comprised more than $20 million of these expenditures.

4.5 Useful Life Consumption

In this section, we detail the extent to which assets have consumed their useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 24 illustrates the useful life consumption levels for the municipality's waste water services .

FIGURE 24 USEFUL LIFE CONSUMPTION – WASTE WATER

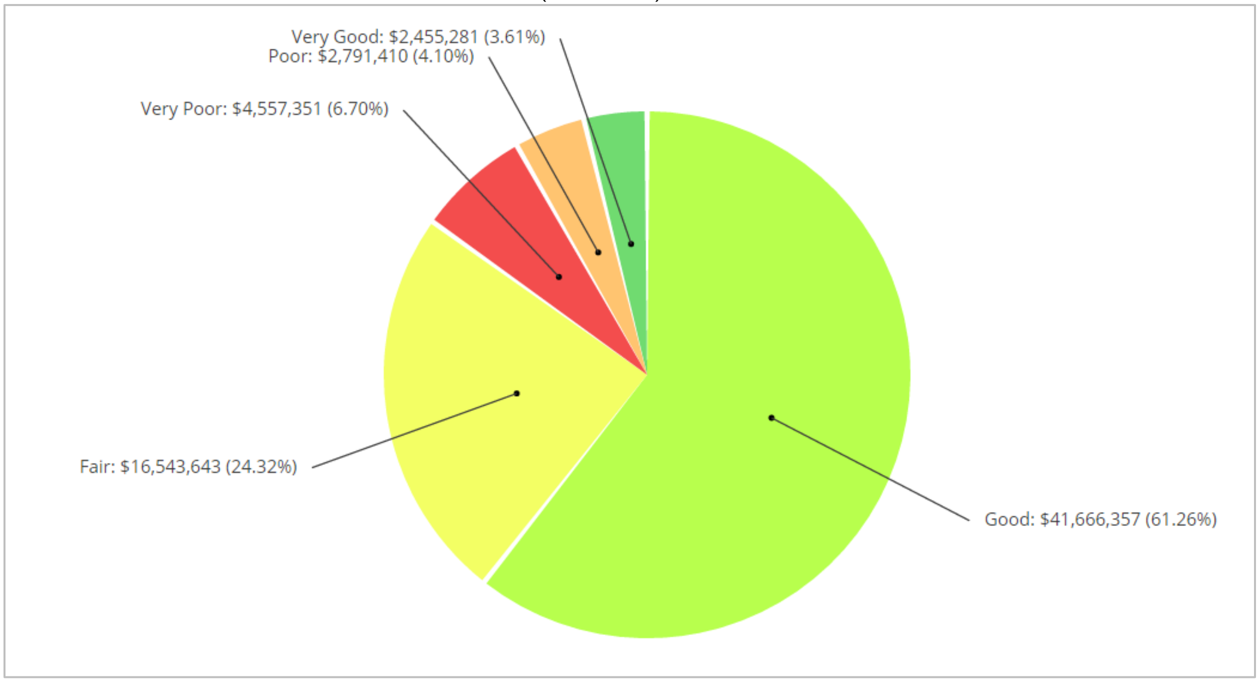


Nearly 90% of the municipality's waste water assets have at least 10 years of useful life remaining. However, more than 6% of assets, with a valuation of more $4 million, remain in service beyond their useful life.

4.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's waste water services. 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 25 ASSET CONDITION - WASTE WATER SERVICES (AGE-BASED)

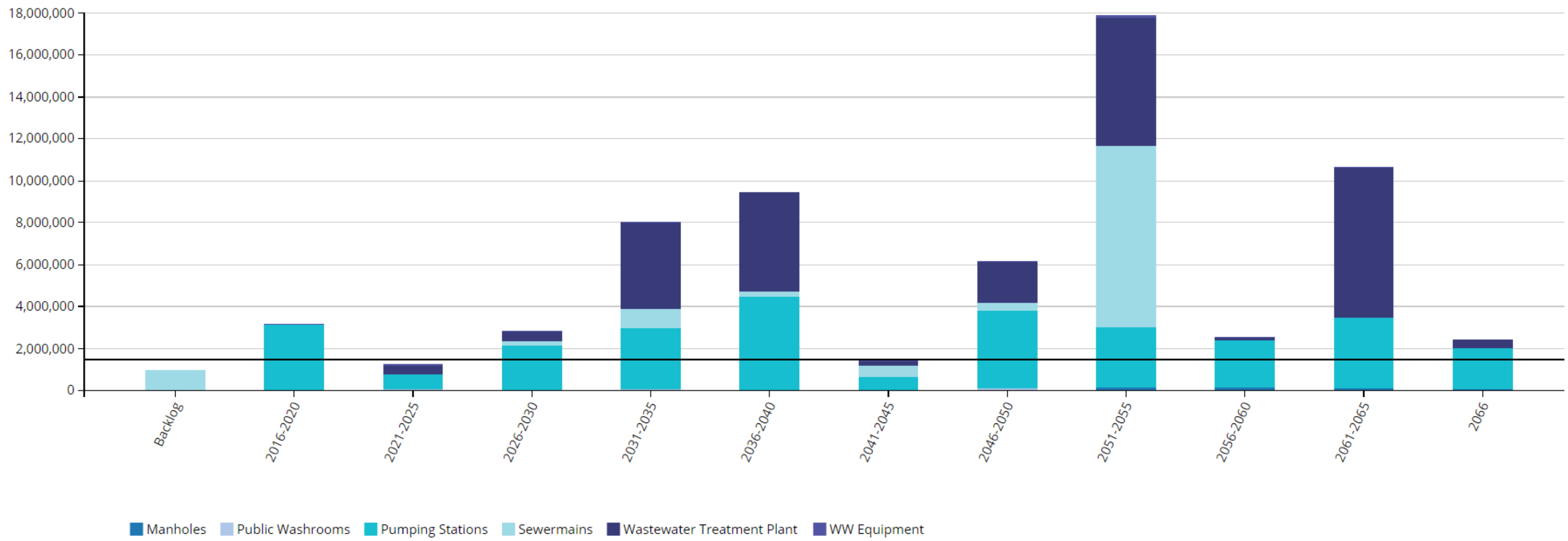


While the majority of waste water assets are in good to very good condition, more than 10% with a valuation of $7 million are in poor to very poor condition.

4.7 Forecasting Replacement Needs

In the following sections, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's waste water network. The backlog represents the immediate replacement needs that were deferred over previous years or decades.

FIGURE 26 FORECASTING REPLACEMENT NEEDS – WASTE WATER SERVICES



In addition to a backlog of $1million in mains replacement needs, the municipality's forecasted replacement expenditures will total more than $3 million in the next five years. An additional $1.2 million will be required between 2021-and 2025. These replacement needs will continue to rise until 2036-2040, when expenditures will total $9.5 million. The municipality's annual requirements (indicated by the black line) for its waste water assets total $1,529,000. At this level, funding is sustainable and replacement needs can be met as they arise without the need for deferring projects. The municipality is currently allocating $1,796,000, leaving an annual surplus of $267,000. 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.

4.8 Recommendations – Waste Water

- The majority of the municipality's waste water assets are in fair to very good condition. Further, the municipality has in place an inspection process in place for its facilities and sewer mains. The municipality should continue its comprehensive assessment program on a cyclical basis and dedicate a portion of its capital funding to this initiative. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- The municipality should establish a systematic lifecycle activity framework that reflects the consumption of its waste water assets. At the least, these activities should be designed to maintain existing levels of service, and should reflect the overarching priorities of the municipality. See Section 3, 'Lifecycle Analysis Framework' in the 'Asset Management Strategies' chapter.

- Waste water 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.

5. Storm

5.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 10 illustrates key asset attributes for the municipality's storm assets, 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 stormwater assets are valued at $7.4 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

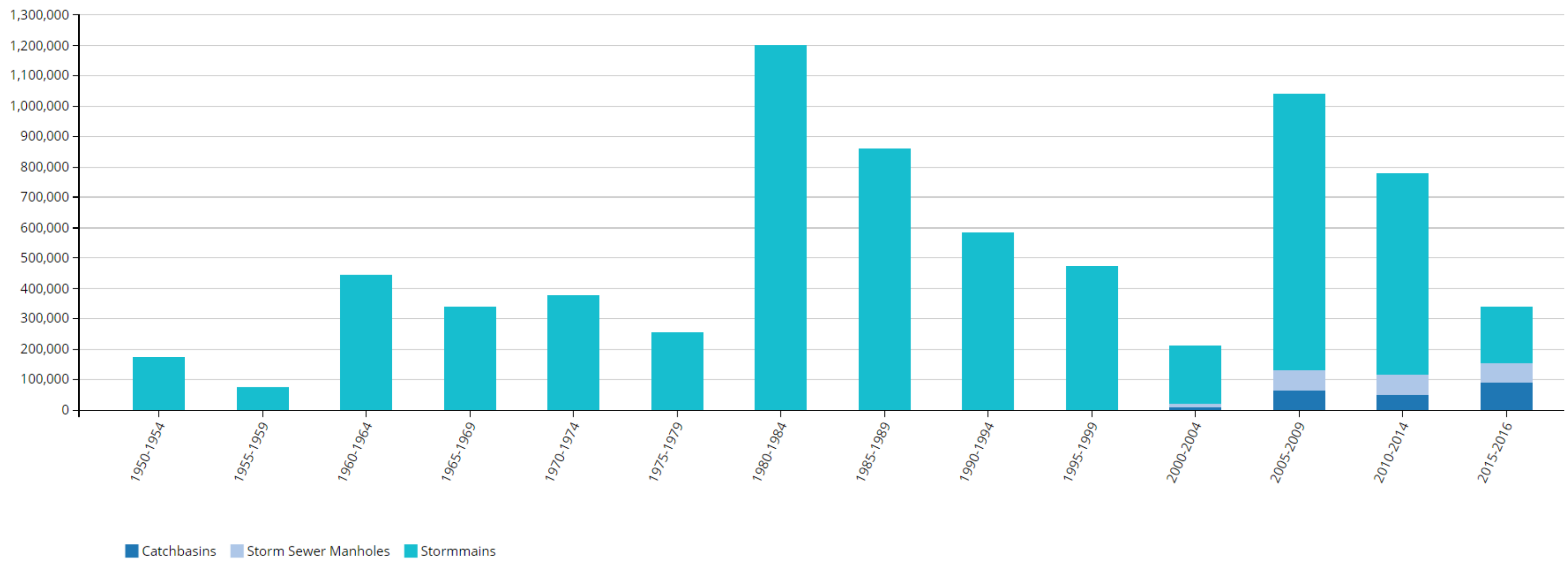
TABLE 10 ASSET INVENTORY - STORM

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Stormwater Services	Catchbasins	46 units	50	$4,765/unit	$219,190
	Stormmains - 1400 mm	253m	50/80	$285/m	$72,011
	Stormmains - 1350 mm	142m		$285/m	$40,333
	Stormmains - 1200 mm	378m		$285/m	$107,550
	Stormmains - 900 mm	438m		$285/m	$124,839
	Stormmains - 750 mm	1,339m		$285/m	$381,720
	Stormmains - 675 mm	272m		$285/m	$77,546
	Stormmains - 600 mm	3,142m		$285/m	$895,367
	Stormmains - 525 mm	806m		$285/m	$229,847
	Stormmains - 500 mm	14m		$285/m	$4,081
	Stormmains - 450 mm	3,972m		$285/m	$1,132,248
	Stormmains - 400 mm	1,388m		$285/m	$395,594
	Stormmains - 375 mm	3,352m		$285/m	$955,366
	Stormmains - 300 mm	6,673m		$285/m	$1,901,876
	Stormmains - 250 mm	444m		$285/m	$126,600
	Stormmains - 200 mm	144m		$285/m	$40,983
	Stormmains - 150 mm	41m		$285/m	$11,799
	Stormmains - Unknown	743m		$285/m	$211,860
	Stormmains - Unknown	5 units		NRBCPI (Toronto)	$218,530
	Storm Sewer Manholes	32 units	50	$6,380/unit	$204,160
				Total	$7,351,501

5.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of storm assets using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 27 HISTORICAL INVESTMENT - STORM

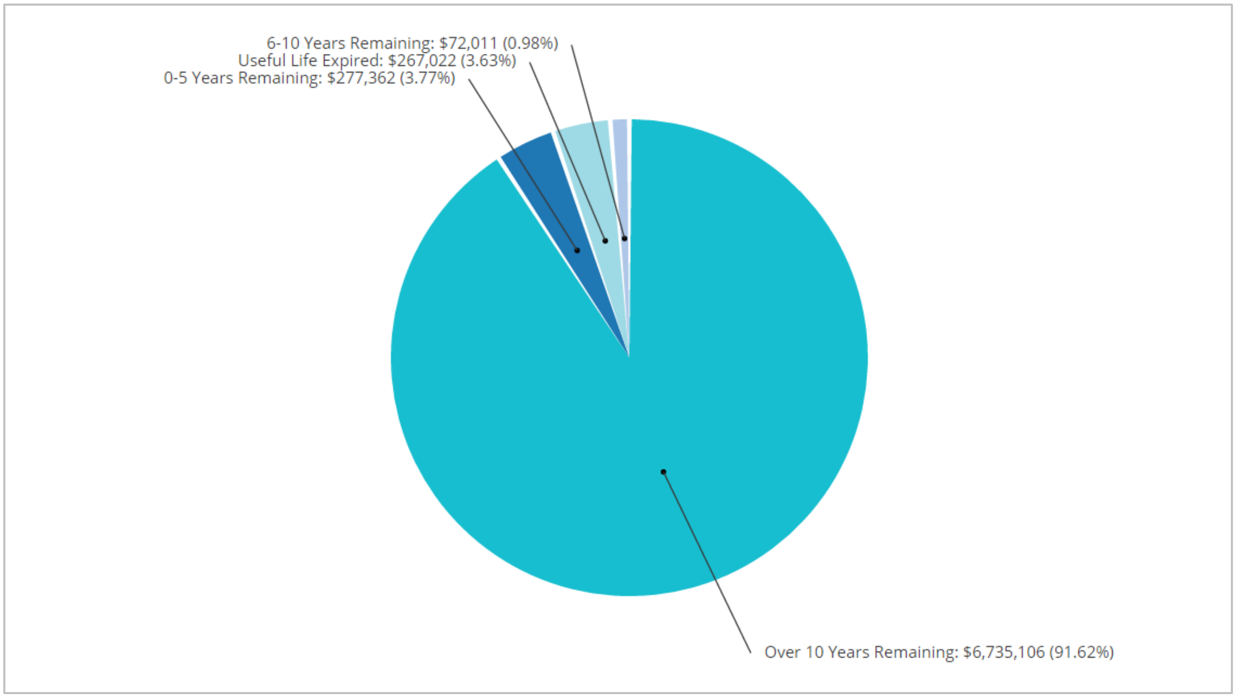


While investments were relatively stable between 1960 and 1979, the increased rapidly between 1980-1984, totaling $1.2 million. Expenditures declined steadily until the early 2000s. Between 2005-2009, expenditures increased again, totaling over $1 million. Since 2010, investments have totaled $1.1 million.

5.5 Useful Life Consumption

In this section, we detail the extent to which the asset class has consumed its useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 28 illustrates the useful life consumption levels for the municipality's storm assets.

FIGURE 28 USEFUL LIFE CONSUMPTION – STORM

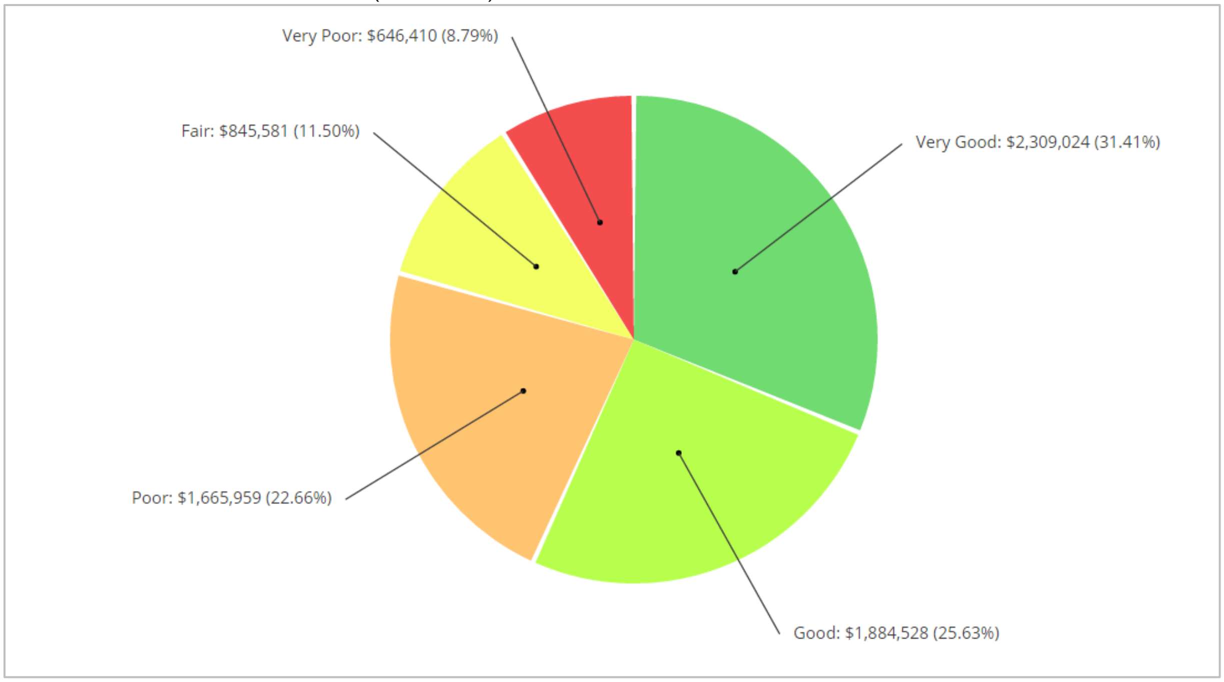


More than 90% of the municipality's storm assets have at least 10 years of useful life remaining.

5.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's storm services. 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 29 ASSET CONDITION – STORM (AGE-BASED)

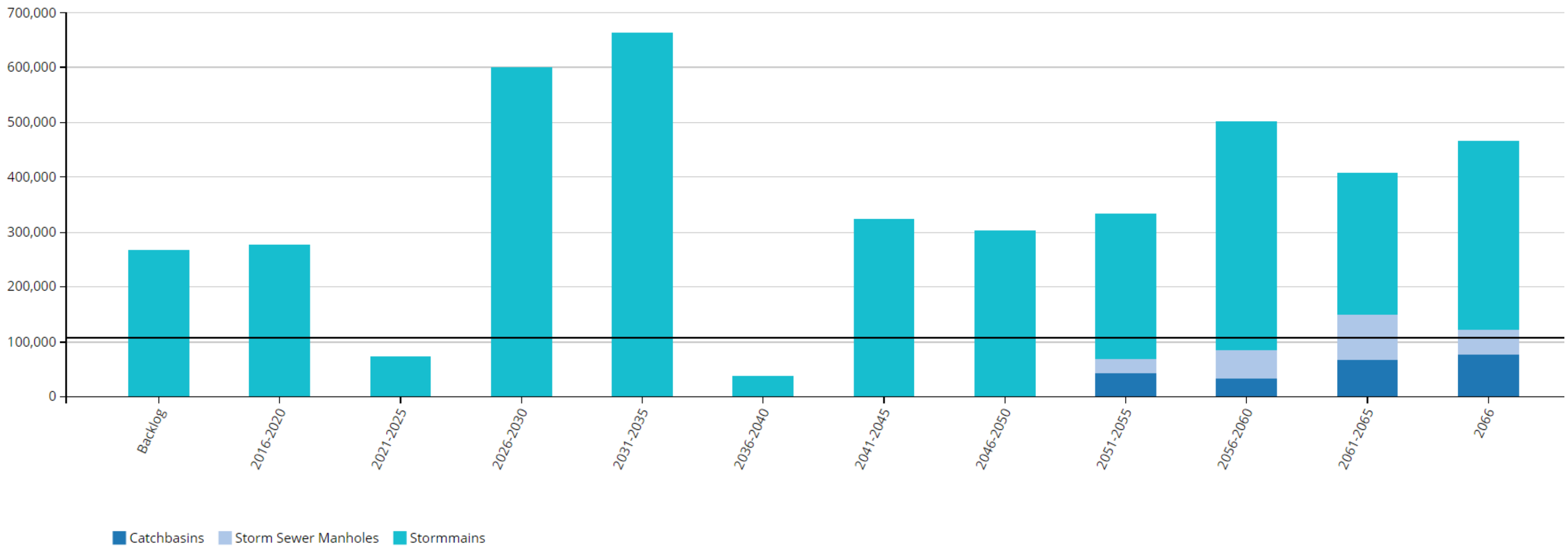


Based on age, while nearly 60% of the municipality's storm assets are in good to very good condition, more than 31%, with a valuation of $2.3 million are in poor to very poor condition.

5.7 Forecasting Replacement Needs

In the following sections, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's storm assets. The backlog represents the immediate replacement needs that were deferred over previous years or decades.

FIGURE 30 FORECASTING REPLACEMENT NEEDS – STORM



In addition to a backlog of $267,000, the municipality's replacement needs for its storm assets will total $277,000 between 2016 and 2020. An additional$72,000 will be required between 2021 and 2025. These needs will increase dramatically to $600,000 between 2026 and 2030. The municipality's annual requirements (indicated by the black line) for storm assets total $109,000. At this funding level, the municipality is 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 $0, leaving an annual deficit of $109,000. See the 'Financial Strategy' section for achieving 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.

5.8 Recommendations – Storm

- Condition data generated from the above initiative should be integrated with a risk management framework. Together, this data should be used to systematically prioritize short-, medium-, and long-term replacement needs for the municipality's waste water assets.

- The municipality should establish a systematic lifecycle activity framework that reflects the consumption of its storm assets. See Section 3, 'Lifecycle Framework' in the 'Asset Management Strategies' chapter.

- 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.

- This AMP and any LOS and KPIs established should be updated annually to gauge the performance of the municipality against quantified targets.

6. Buildings

6.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

The municipality's buildings portfolio contains fire stations, municipal offices, a library, recreational facilities and other assets as outlined in Tables 11 and 12.

TABLE 11 KEY ASSET ATTRIBUTES – BUILDINGS: QUANTITY, VALUATION METHOD, AND REPLACEMENT COST

Asset Type	Asset Class	Facility Name	Quantity	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Buildings	Community Buildings	Bobby Orr Community Centre	1 structure (10 components)	NRBCPI (Toronto)	$9,999,954
		Big Sound Marina	1 structure (3 components)	NRBCPI (Toronto)	$510,772
		Stockey Centre	1 structure (4 components)	NRBCPI (Toronto)	$15,861,210
		CP Station	2 structures (6 components)	NRBCPI (Toronto)	$12,244
		Kinsmen Park Facility	1 structure (4 components)	NRBCPI (Toronto)	$1,163,088
		Kinsmen Park Maintenance Shed	1 structure (2 components)	NRBCPI (Toronto)	$73,303
		Tower Hill	1 structure	NRBCPI (Toronto)	$197,197
		Town Docks Bandshell	1 structure (2 components)	NRBCPI (Toronto)	$16,282
		Town Docks Facility	1 structure (2 components)	NRBCPI (Toronto)	$292,748
		Waubuno Beach Pavilion	1 structure (2 components)	NRBCPI (Toronto)	$189,520
		Waubuno Beach Storage Shed	1 structure (1 component)	NRBCPI (Toronto)	$4,302
		Old Fire Hall	1 structure (4 components)	NRBCPI (Toronto)	$396,418
		Smelter Wharf	1 structure	NRBCPI (Toronto)	$221,129
	Municipal Building	Municipal Office	1 structure (5 components)	NRBCPI (Toronto)	$4,980,849
	Operational Buildings	Waste Transfer Station	1 structure (7 components)	NRBCPI (Toronto)	$394,745
		PW Cold Mix Storage Shed	1 structure	NRBCPI (Toronto)	$32,342
		Operations Garage and Office	1 structure (12 components)	NRBCPI (Toronto)	$967,762
		PW Storage Shed	1 structure (2 components)	NRBCPI (Toronto)	$362,887
	Emergency Buildings	Dog Impound	1 structure (2 components)	NRBCPI (Toronto)	$235,448
		Fire Station	1 structure (4 components)	NRBCPI (Toronto)	$2,064,893
		Powassan Ambulance Base	1 structure	NRBCPI (Toronto)	$103,779
	Other Town Property	Boatramp	1 structure	NRBCPI (Toronto)	$31,590
		Hillcrest Cemetery Chapel/Mausoleum	1 structure (8 components)	NRBCPI (Toronto)	$428,026
		Hillcrest Cemetery Columbarium	1 structure	NRBCPI (Toronto)	$26,416
		Hillcrest Cemetery Maintenance Garage	1 structure (2 components)	NRBCPI (Toronto)	$133,848
		Hillcrest Cemetery Storage Shed	2 structures (3 components)	NRBCPI (Toronto)	$57,177
		Sylvan Acres Cemetery Storage Shed	1 structure (2 components)	NRBCPI (Toronto)	$706,917
				Total	$39,464,846

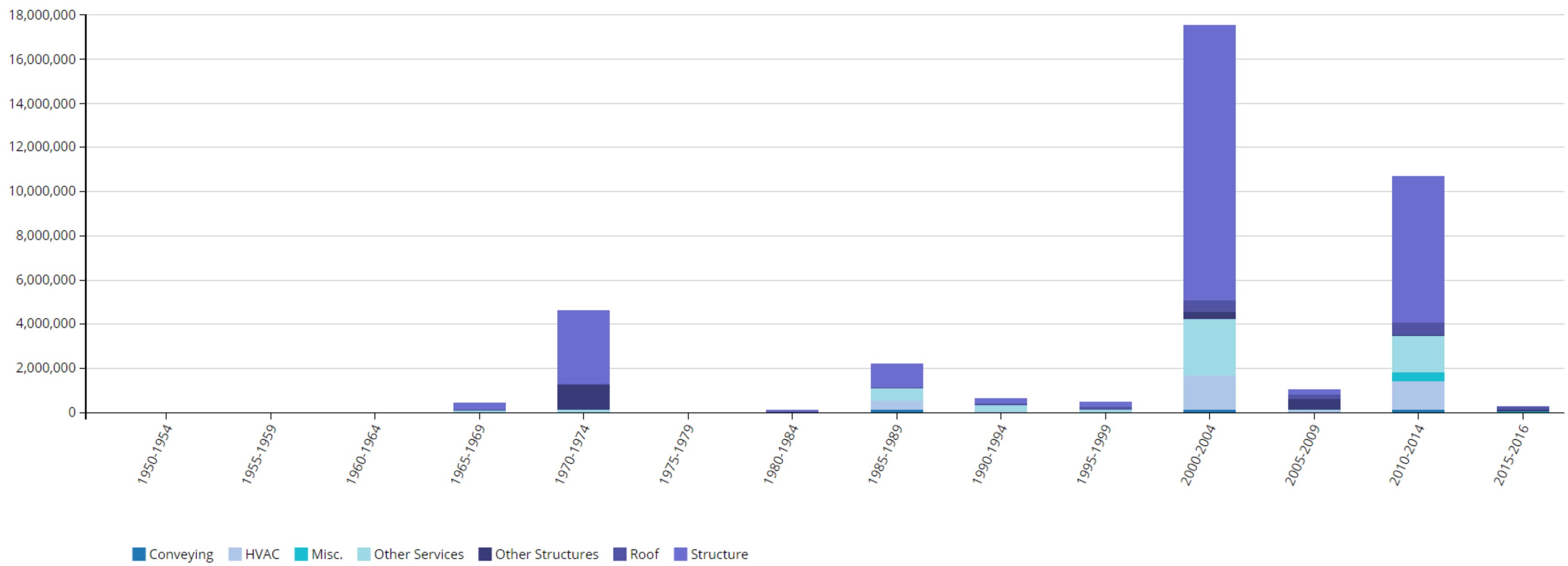
TABLE 12 KEY ASSET ATTRIBUTES – USEFUL LIFE

Asset Type	Facility Name	Useful Life in Years
Buildings	Structure	75
	Other Structures*	25/40/50/60/75/99
	Roof	15
	HVAC	25
	Conveying	25
	Other Services	25
	Special Construction	25
	Misc. Components**	20/25/30

6.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of buildings using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 31 HISTORICAL INVESTMENT - BUILDINGS

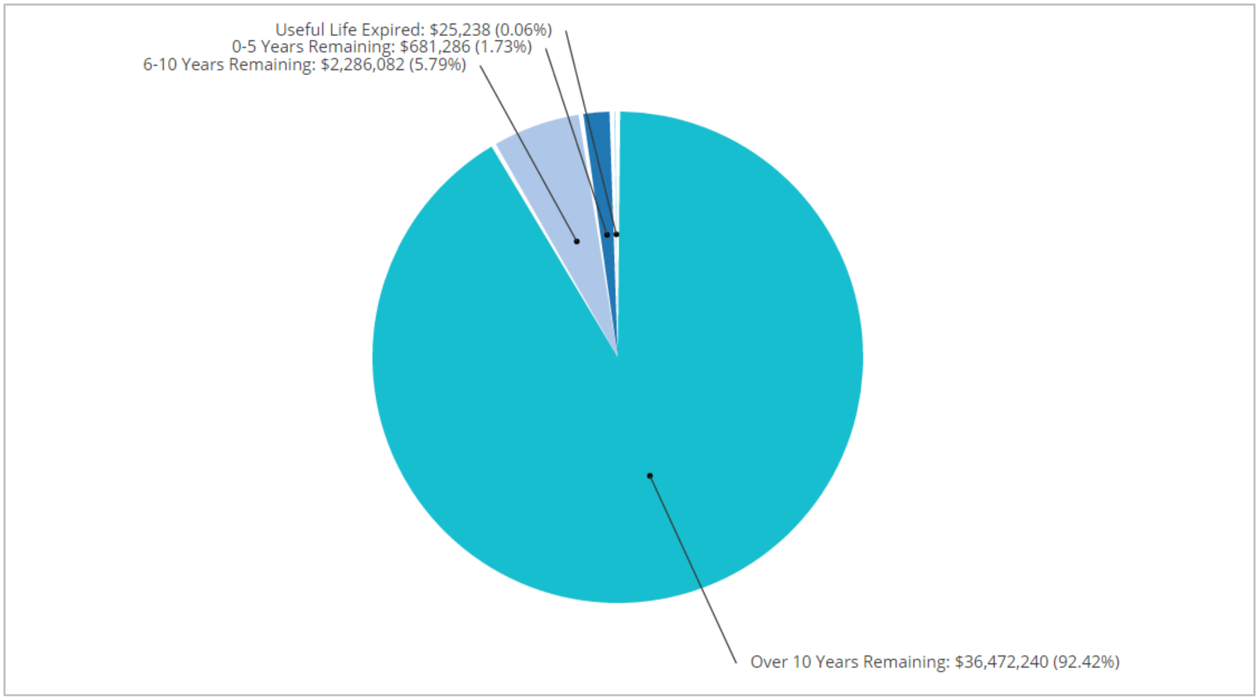


The largest investments in the municipality's buildings assets occurred between 2000 and 2004, in which expenditures totaled nearly $18 million. Since 2010, investments have totaled $11 million.

6.5 Useful Life Consumption

In this section, we detail the extent to which the asset class has consumed its useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 32 illustrates the useful life consumption levels for the municipality's buildings assets.

FIGURE 32 USEFUL LIFE CONSUMPTION – BUILDINGS

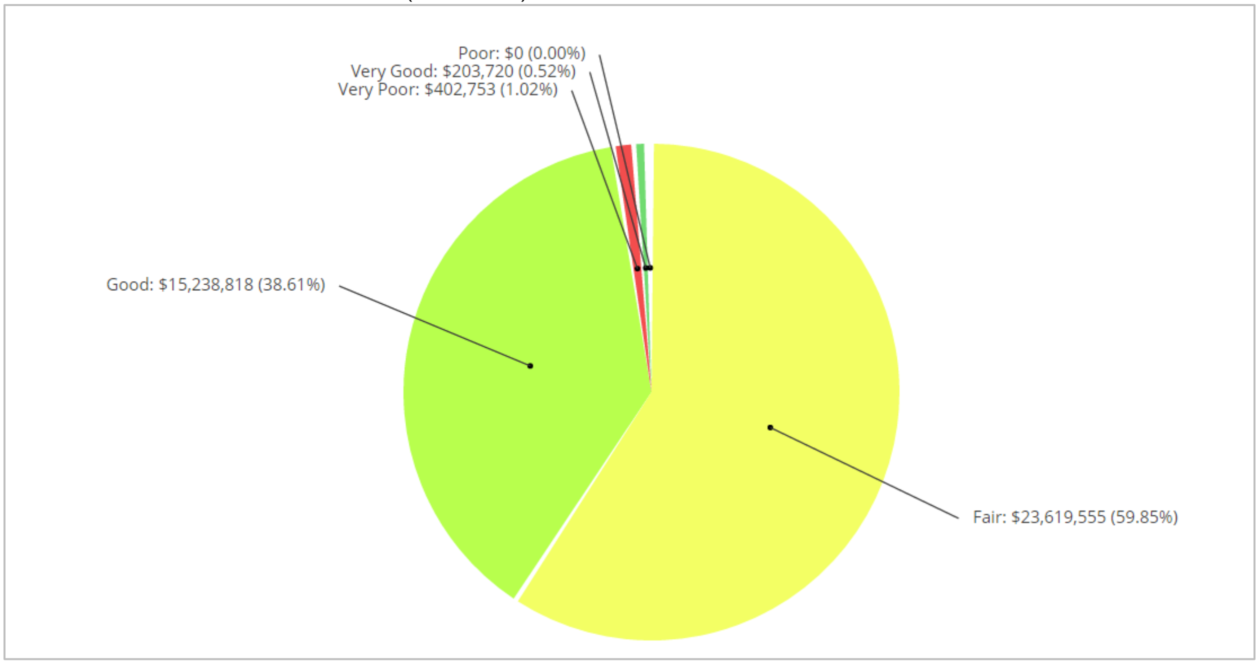


More than 90% of the municipality's buildings assets have at least 10 years of useful life remaining. Less than two percent will reach the end of their useful life in the next five years.

6.6 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.

FIGURE 33 ASSET CONDITION – BUILDINGS (AGE-BASED)

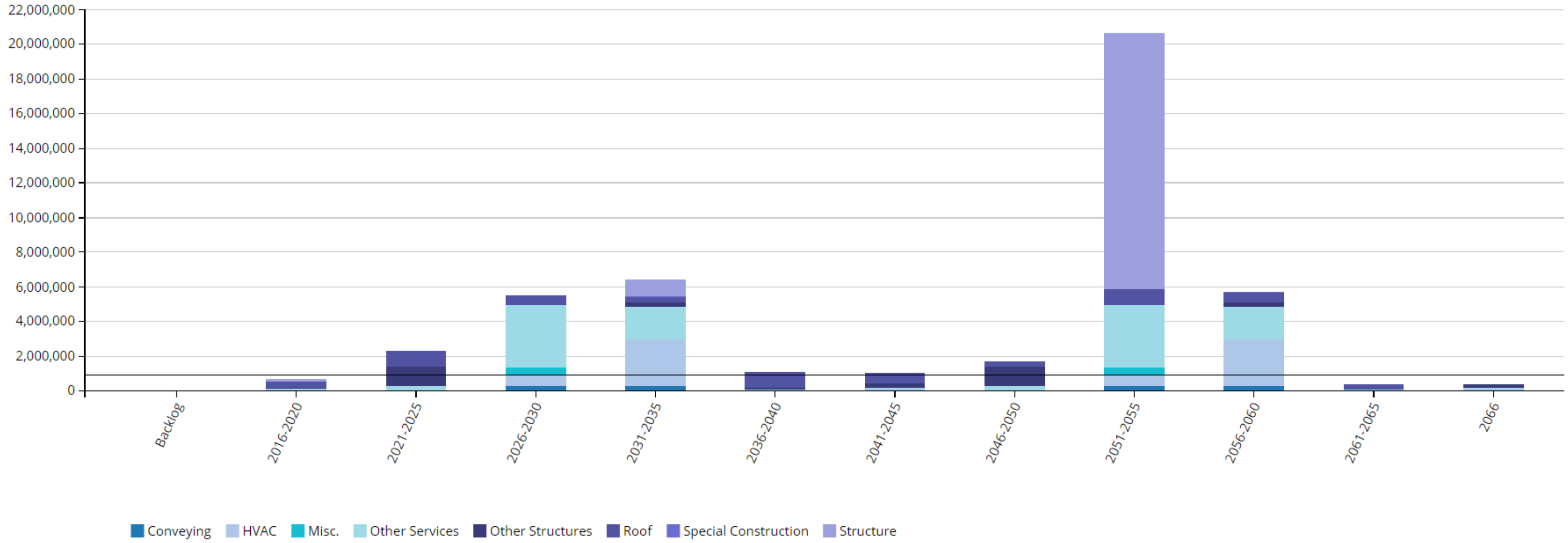


Nearly 40% of building assets are in good to very good condition with the remaining in fair condition; approximately 1%, with a valuation of $400,000 are in very poor condition.

6.7 Forecasting Replacement Needs

In the following sections, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for buildings assets. The backlog represents the immediate replacement needs that were deferred over previous years or decades.

FIGURE 34 FORECASTING REPLACEMENT NEEDS – BUILDINGS



While there is no backlog, assessed condition shows that the municipality's replacement needs will begin to rise over the next 20 years as assets reach the end of their useful life. Replacement needs total approximately $7 million between 2016 and 2025. An additional $5.5 million and $6.4 million will be required between 2026-2030, and 2031-2035, respectively. The municipality's annual requirements (indicated by the black line) for its buildings total $939,000. At this funding level, the municipality is 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 $25,000, leaving an annual deficit of $914,000. See the 'Financial Strategy' section for achieving 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.

6.8 Recommendations – Buildings

- If not in place already the municipality should implement a component based condition inspection program for its facilities. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- While the municipality's confidence in its data is high, there is no formal data verification policy in place. To maintain a high degree of data confidence over time and minimize deficiencies, the municipality should establish a systematic data verification policy.

- 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.

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

7. Machinery & Equipment

7.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 13 illustrates key asset attributes for the municipality's machinery and equipment assets, 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 $6.3 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

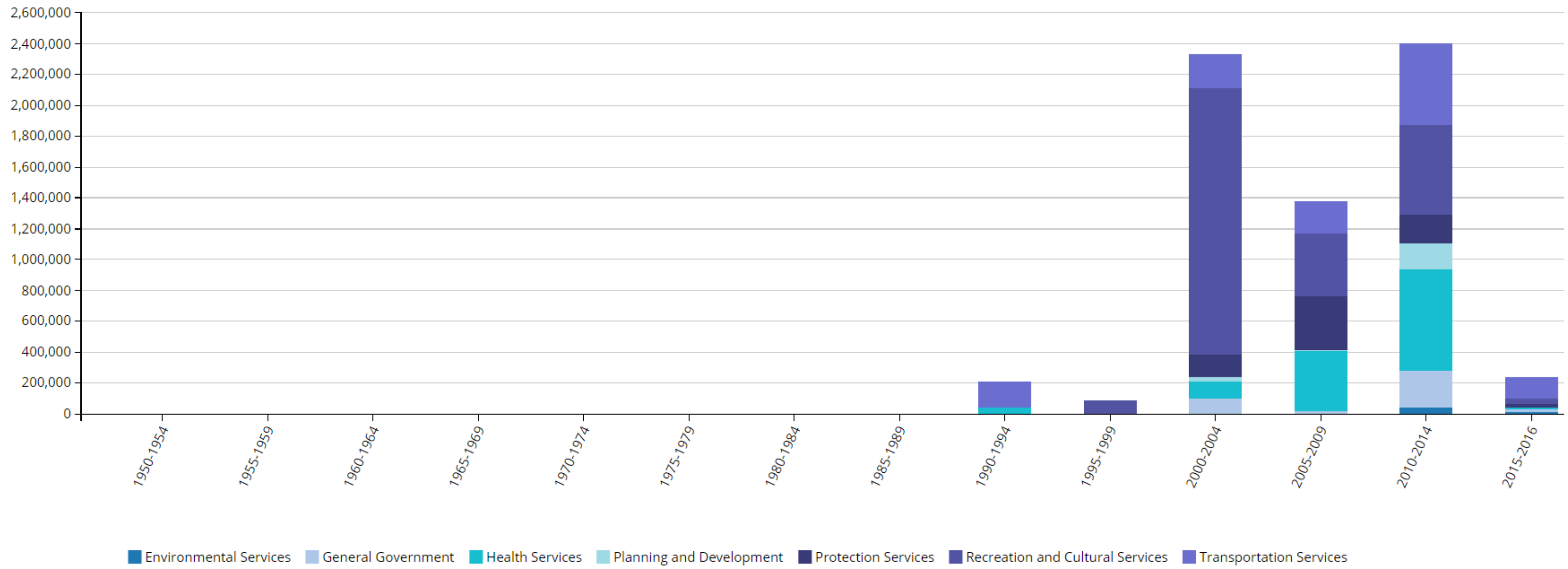
TABLE 13 ASSET INVENTORY – MACHINERY & EQUIPMENT

Asset Type	Service Area	Components	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Machinery & Equipment	Transportation	Public Works Equipment	Pooled	15/20/30	CPI (Ontario)	$124,434
		Public Works Machinery	Pooled	5/6.5/10/12/15/20/25	CPI (Ontario)	$1,039,803
		Parking Meters	Pooled	10/50	CPI (Ontario)	$287,592
	General Government	Computer Hardware	Pooled	3/5	CPI (Ontario)	$43,632
		Computer Software	Pooled	10	CPI (Ontario)	$148,949
		IT Servers	Pooled	5	CPI (Ontario)	$26,018
		Office Equipment	Pooled	10/15	CPI (Ontario)	$18,139
		Office Furniture	Pooled	10/20	CPI (Ontario)	$32,754
		Small Electronics	Pooled	3/4	CPI (Ontario)	$14,852
		Telephone System	Pooled	15	CPI (Ontario)	$29,894
	Land Ambulance	Land Ambulance Equipment	Pooled	5/7/10/15	CPI (Ontario)	$983,836
	Planning & Development	Signs	Pooled	20	CPI (Ontario)	$173,393
		GIS	Pooled	10	CPI (Ontario)	$33,408
	Protection	Courtroom Equipment	Pooled	5/10	CPI (Ontario)	$38,696
		Fire Hall Equipment	Pooled	5/20	CPI (Ontario)	$60,516
		Firefighter Gears	Pooled	10	CPI (Ontario)	$438,944
	Recreational & Cultural	Community Centre Equipment	Pooled	10/15/20/25	CPI (Ontario)	$1,016,225
		Park Equipment	Pooled	10/12/15/20	CPI (Ontario)	$553,468
		Performance Hall Equipment	Pooled	10/5/25/30	CPI (Ontario)	$1,054,534
		Stockey Centre Equipment	Pooled	5/10/15/20	CPI (Ontario)	$220,916
					Total	$6,340,003

7.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of machinery & equipment using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 35 HISTORICAL INVESTMENT – MACHINERY & EQUIPMENT

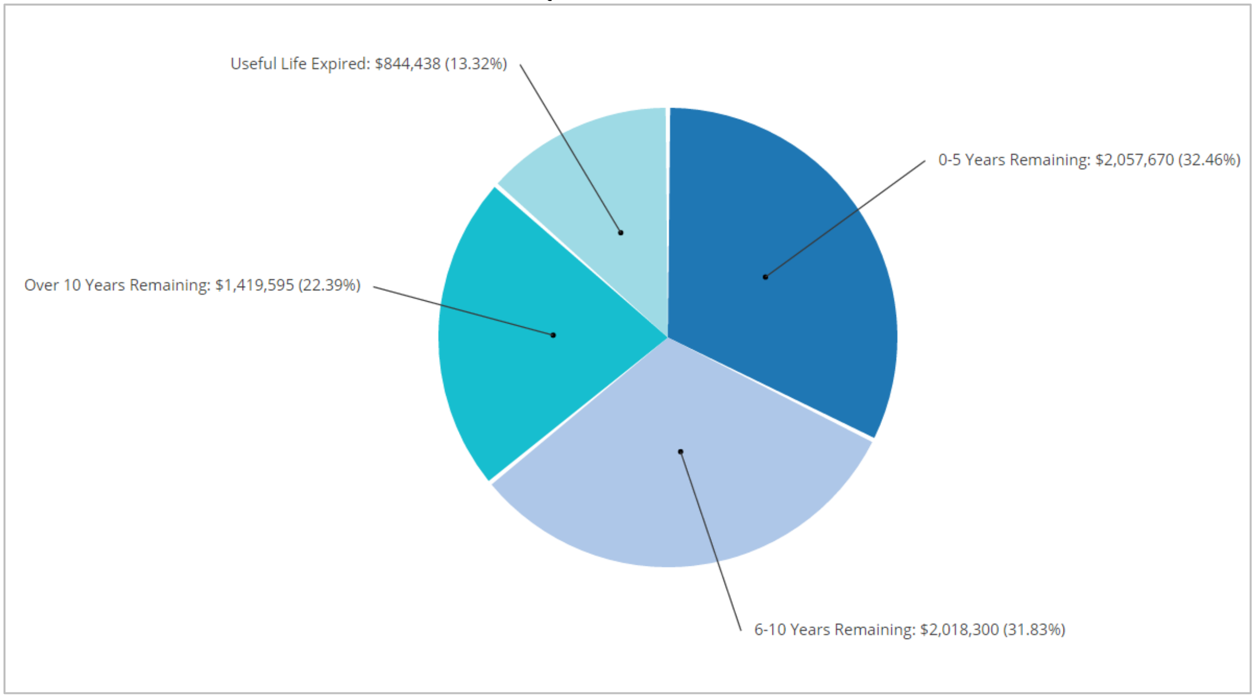


Investments in machinery & equipment rose significantly in the early 2000s, with expenditures totaling $2.3 million, the majority of which was allocated to recreation services. Since 2010, expenditures have totaled $2.8 million.

7.5 Useful Life Consumption

In this section, we detail the extent to which the asset class has consumed its useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 36 illustrates the useful life consumption levels for the municipality's machinery & equipment assets.

FIGURE 36 USEFUL LIFE CONSUMPTION – MACHINERY & EQUIPMENT

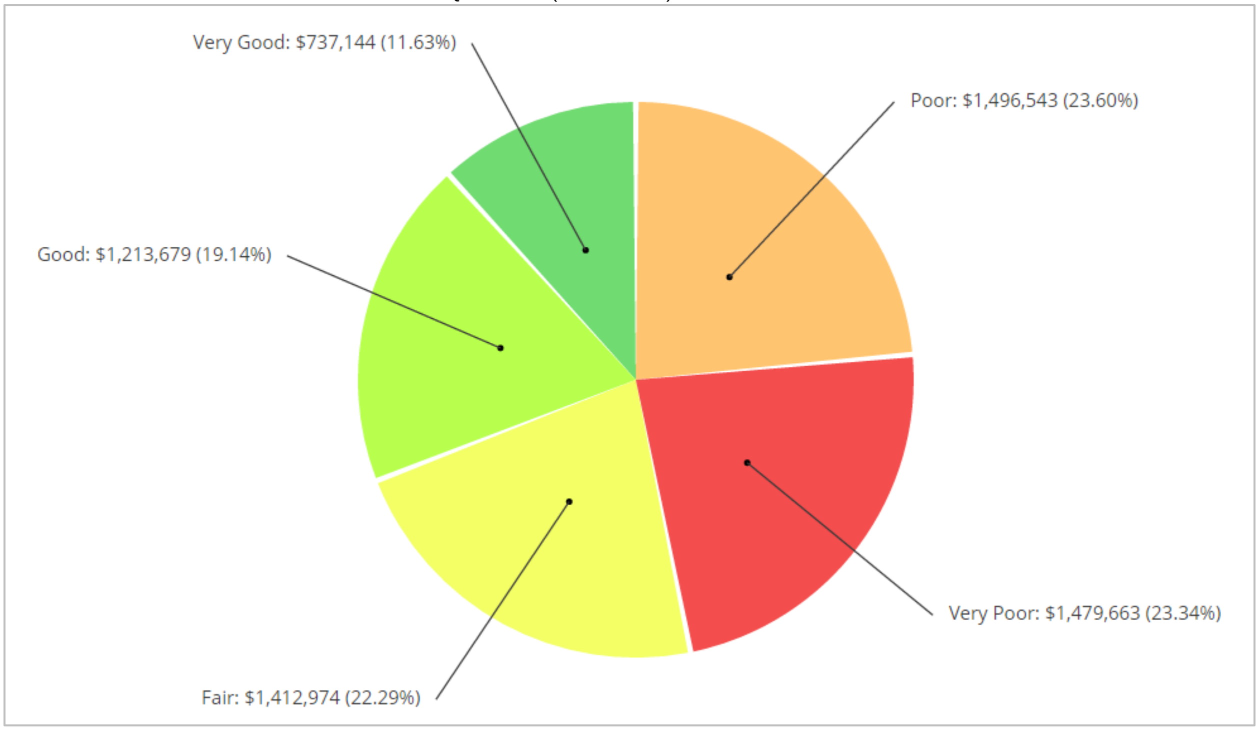


While less than 25% of equipment assets have at least 10 years of useful life remaining, more than 13% of the assets, with a valuation of $844,000, remain in operation beyond their established useful life. Further, nearly 33% will reach the end of their useful life within the next five years.

7.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's machinery & equipment 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.

FIGURE 37 ASSET CONDITION – MACHINERY & EQUIPMENT (AGE-BASED)

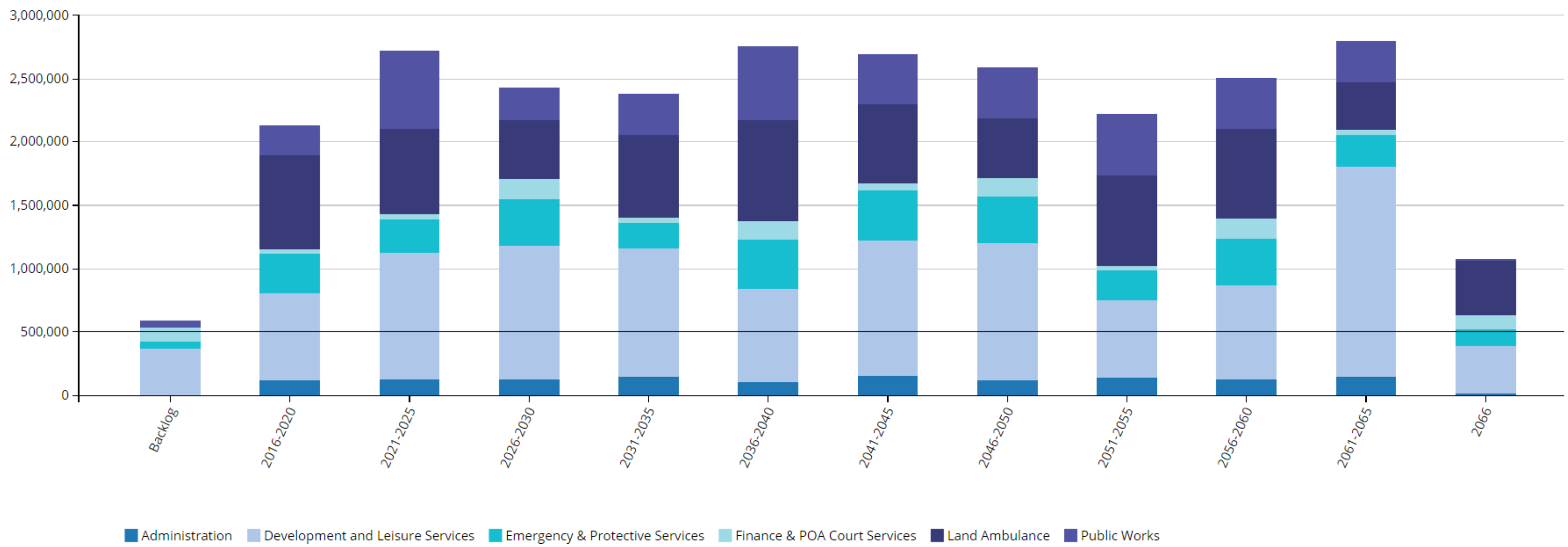


Approximately 50% of machinery & equipment at the municipality, with a valuation of nearly $3 million, are in poor to very poor condition; 30% are in good to very good condition.

7.7 Forecasting Replacement Needs

In the following sections, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's machinery & equipment assets. The backlog represents the immediate replacement needs that were deferred over previous years or decades.

FIGURE 38 FORECASTING REPLACEMENT NEEDS – MACHINERY & EQUIPMENT



In addition to a backlog of $585,000, the municipality's replacement needs total approximately $2.1 million in the next five years. An additional $2.8 million will be required between 2021-2025. The municipality's annual requirements (indicated by the black line) for its machinery & equipment total $511,000. At this funding level, the municipality is 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 $178,000, leaving an annual deficit of $333,000. See the 'Financial Strategy' section for achieving 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.

7.8 Recommendations – Machinery & Equipment

- Age-based data indicates a backlog of $585,000. Further, 50% of assets are in poor to very poor condition. Condition assessment data and utilization data (e.g., mileage analysis, hours consumed), once gathered, should be used to provide better estimate of this pent-up demand, and to guide the prioritization of capital projects required to eliminate the backlog. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- While the municipality's confidence in its data is high, there is no formal data verification policy in place. To maintain a high degree of data confidence over time and minimize deficiencies, the municipality should establish a systematic data verification policy.

- The municipality should continue to audit its capital assets data and update old data with more current information.

- 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.

8. Land improvements

8.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 14 illustrates key asset attributes for the municipality's land improvement assets, 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 $9.3 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

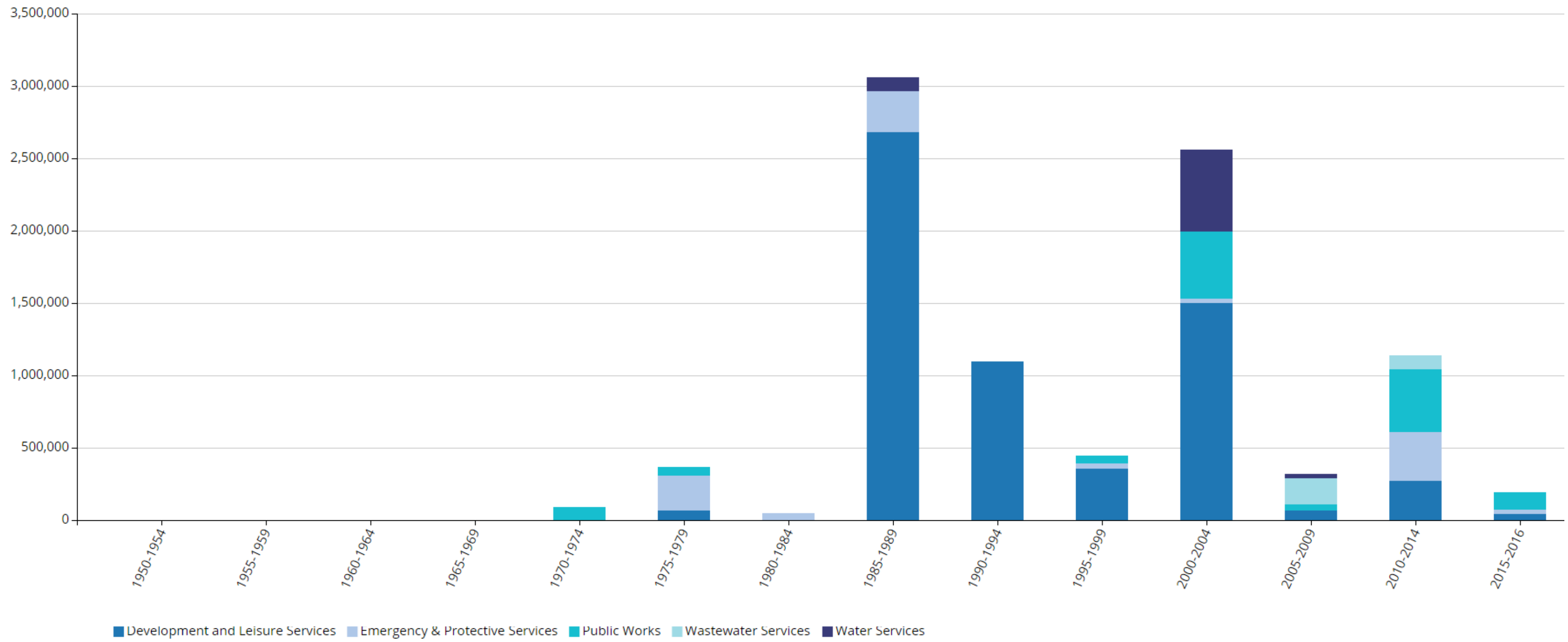
TABLE 14 ASSET INVENTORY - LAND IMPROVEMENTS

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Land Improvements	Access Road/Driveways/Paved Assets	46 units	9/10/25/40	CPI (Ontario)	$3,882,802
	Bleachers	1 unit	20	CPI (Ontario)	$9,365
	Boat Slips/Docks	6 units	20/30/35/40	CPI (Ontario)	$1,136,014
	Breakwater	1 unit	40	CPI (Ontario)	$31,905
	Concrete Wall/Ramp	3 units	25/50	CPI (Ontario)	$130,211
	Deck	1 unit	25	CPI (Ontario)	$17,671
	Fencing	11 units	25/30	CPI (Ontario)	$455,900
	Gabion Wall	2 units	40	CPI (Ontario)	$66,436
	Irrigation System	1 unit	25	CPI (Ontario)	$35,507
	Landscaping	6 units	40	CPI (Ontario)	$631,197
	Lighting	8 units	20/25/30	CPI (Ontario)	$822,747
	Monument	1 unit	50	CPI (Ontario)	$20,470
	Power Tower	1 unit (1 component)	20	CPI (Ontario)	$167,936
	Retaining Wall	16 units	20/40	CPI (Ontario)	$1,008,713
	Trail Construction	1 unit	40	CPI (Ontario)	$673,443
	Walkways	3 units	30/40	CPI (Ontario)	$198,360
				Total	$9,288,677

8.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of land improvement assets using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 39 HISTORICAL INVESTMENT - LAND IMPROVEMENTS

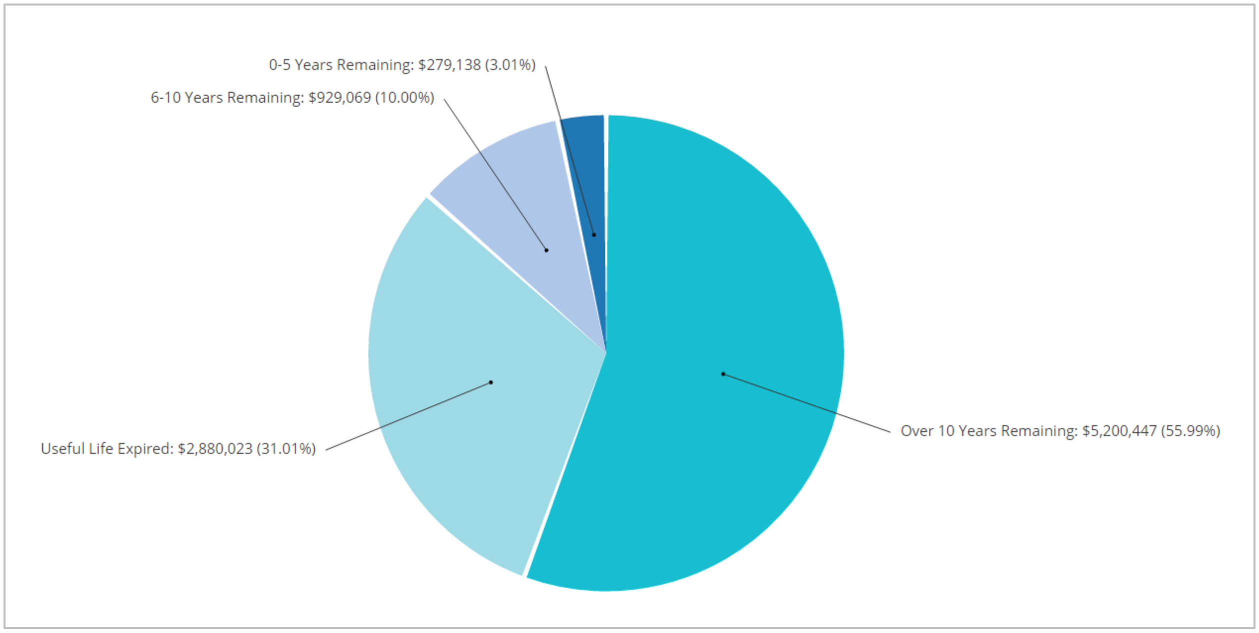


The municipality's investments in land improvements rose rapidly in the mid-1980s, totaling $3 million, nearly $2.7 million of which was allocated to Development and Leisure Services. Investments increased again between 2000-2004, totaling $2.6. Since 2010, investments have totaled $1.3 million

8.5 Useful Life Consumption

In this section, we detail the extent to which the asset class has consumed its useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 40 illustrates the useful life consumption levels for the municipality's land improvement assets.

FIGURE 40 USEFUL LIFE CONSUMPTION - LAND IMPROVEMENTS

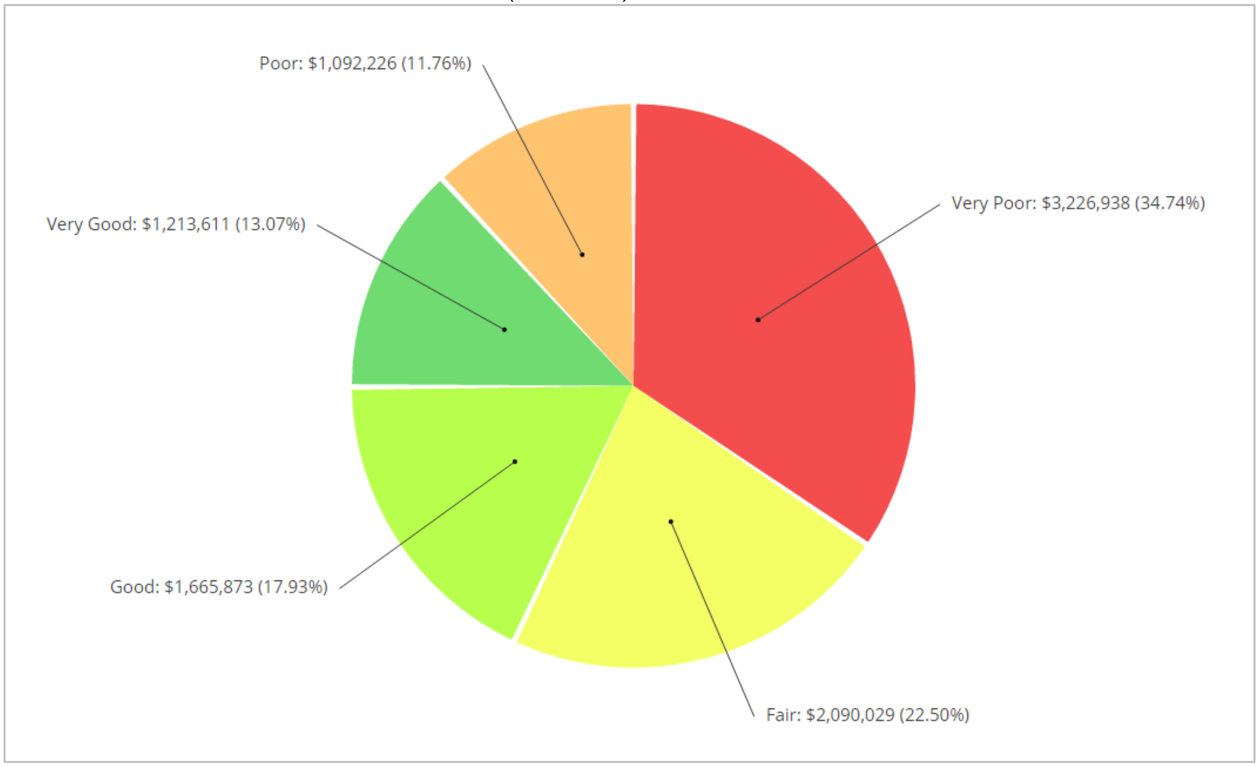


While 60% of the municipality's land improvement assets, with a valuation of $5.2 million, have at least 10 years of useful life remaining, more than 30% remain in operation beyond their useful life.

8.6 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.

FIGURE 41 ASSET CONDITION - LAND IMPROVEMENTS (AGE-BASED)

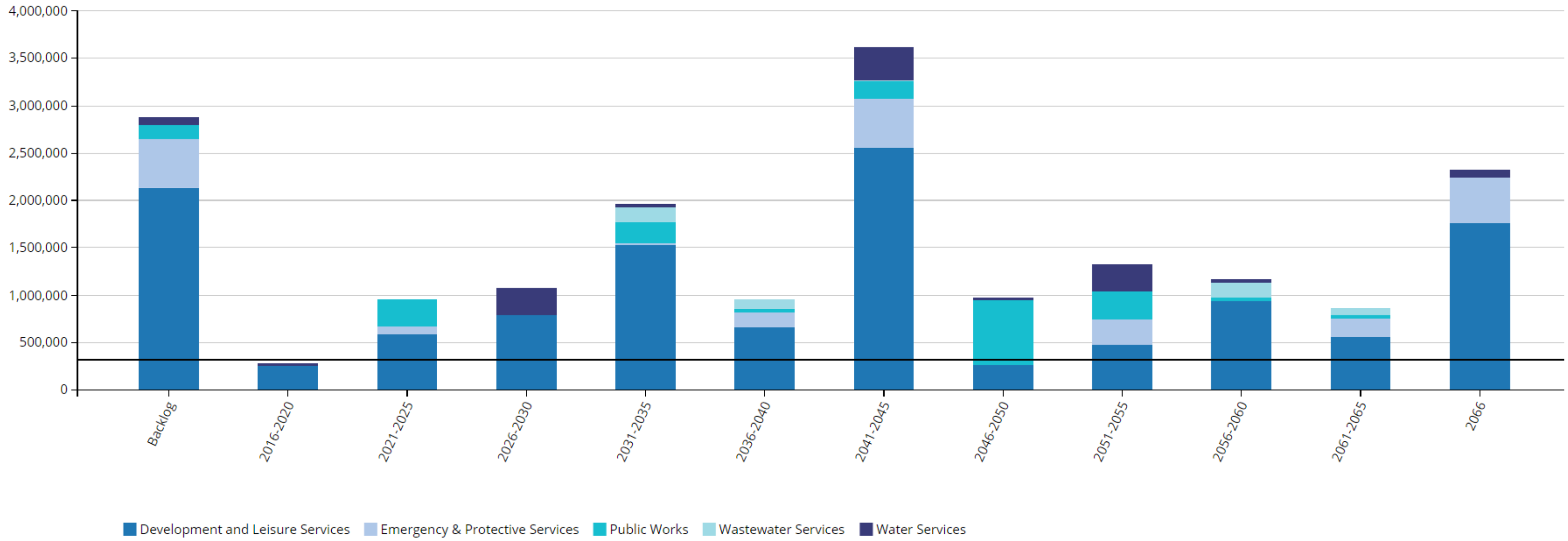


Nearly 50% of the municipality's land improvement assets, with a valuation of $4.2 million, are in poor to very poor condition; approximately 30% are in good to very good condition.

8.7 Forecasting Replacement Needs

In the following sections, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's land improvements. The backlog represents the immediate replacement needs that were deferred over previous years or decades.

FIGURE 42 FORECASTING REPLACEMENT NEEDS - LAND IMPROVEMENTS



In addition to a backlog of $2.9 million, the municipality's replacement needs will begin to increase from $279,000 for 2016-2020, to $2 million between 2031-2035. The municipality's annual requirements (indicated by the black line) for its land improvements total $327,000. At this funding level, the municipality is 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 $5,000, leaving an annual deficit of $322,000. See the 'Financial Strategy' section for achieving 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.

8.8 Recommendations – Land improvements

- A condition assessment program should be established to aid in prioritizing overall needs for rehabilitation and replacement and to assist with optimizing the long and short term budgets. Further detail is outlined within Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- While the municipality's confidence in its data is high, there is no formal data verification policy in place. To maintain a high degree of data confidence over time a data verification policy should be established.

- 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.

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

9. Vehicles

9.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 15 illustrates key asset attributes for the municipality's vehicles assets, 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 $5.5 million based on 2016 replacement costs. The useful life indicated for the asset types below was assigned by the municipality and obtained from the municipality's accounting data as maintained in the CityWide® Tangible Asset module.

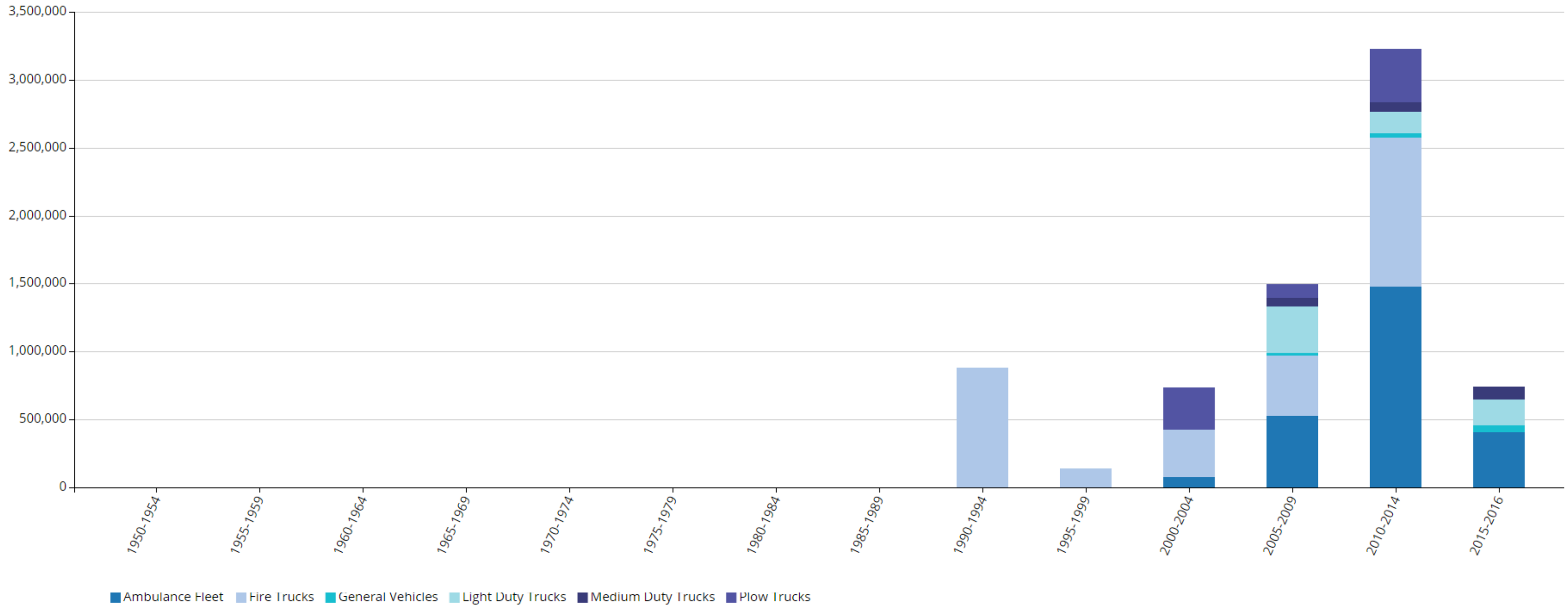
TABLE 15 ASSET INVENTORY - VEHICLES

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Overall Replacement Cost
Land Improvements	Ambulance Fleet	16 units	6/7/8	CPI (Ontario)	$1,857,996
	Fire Trucks	6 units	7/20	CPI (Ontario)	$2,037,291
	General Vehicles	4 units	5/7	CPI (Ontario)	$107,951
	Medium Duty Trucks	3 units	7	CPI (Ontario)	$170,966
	Light Duty Trucks	15 units	5/7	CPI (Ontario)	$507,102
	Plow Trucks	5 units (1 component)	15	CPI (Ontario)	$808,280
				Total	$5,489,586

9.4 Historical Investment in Infrastructure

In the next two sections, we provide the installation profile and useful life consumption levels of vehicles using in-service data obtained from CityWide® Tangible Assets. 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, these graphs illustrate historical infrastructure investment trends and can assist in forecasting short-, medium- and long-term replacement needs.

FIGURE 43 HISTORICAL INVESTMENT – VEHICLES

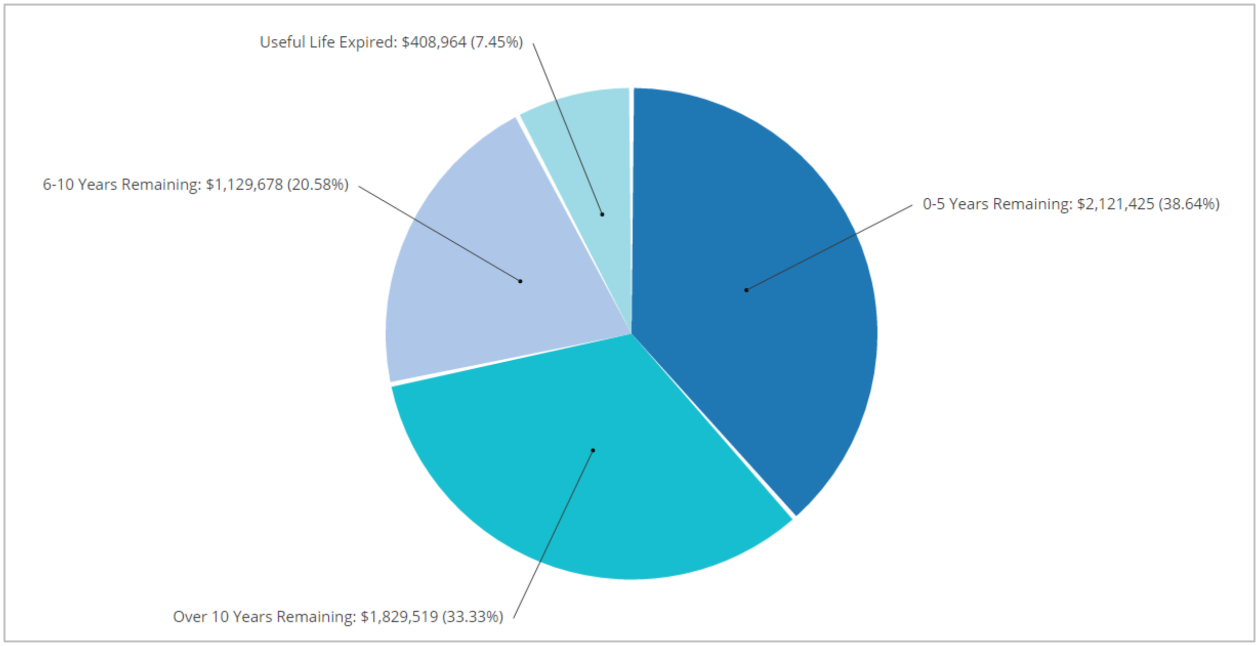


The vast majority of the municipality's investments in vehicles have occurred in the last 15 years. Investments peaked between 2010-2014 totaling $3.2 million. Expenditures have totaled $743,000 since 2015.

9.5 Useful Life Consumption

In this section, we detail the extent to which the asset class has consumed its useful life based on the above, established useful life standards. In conjunction with asset condition data, understanding the consumption rate of assets based on industry established useful life measures provides a more complete profile of the state of a community's infrastructure. Figure 44 illustrates the useful life consumption levels for the municipality's vehicles.

FIGURE 44 USEFUL LIFE CONSUMPTION – VEHICLES

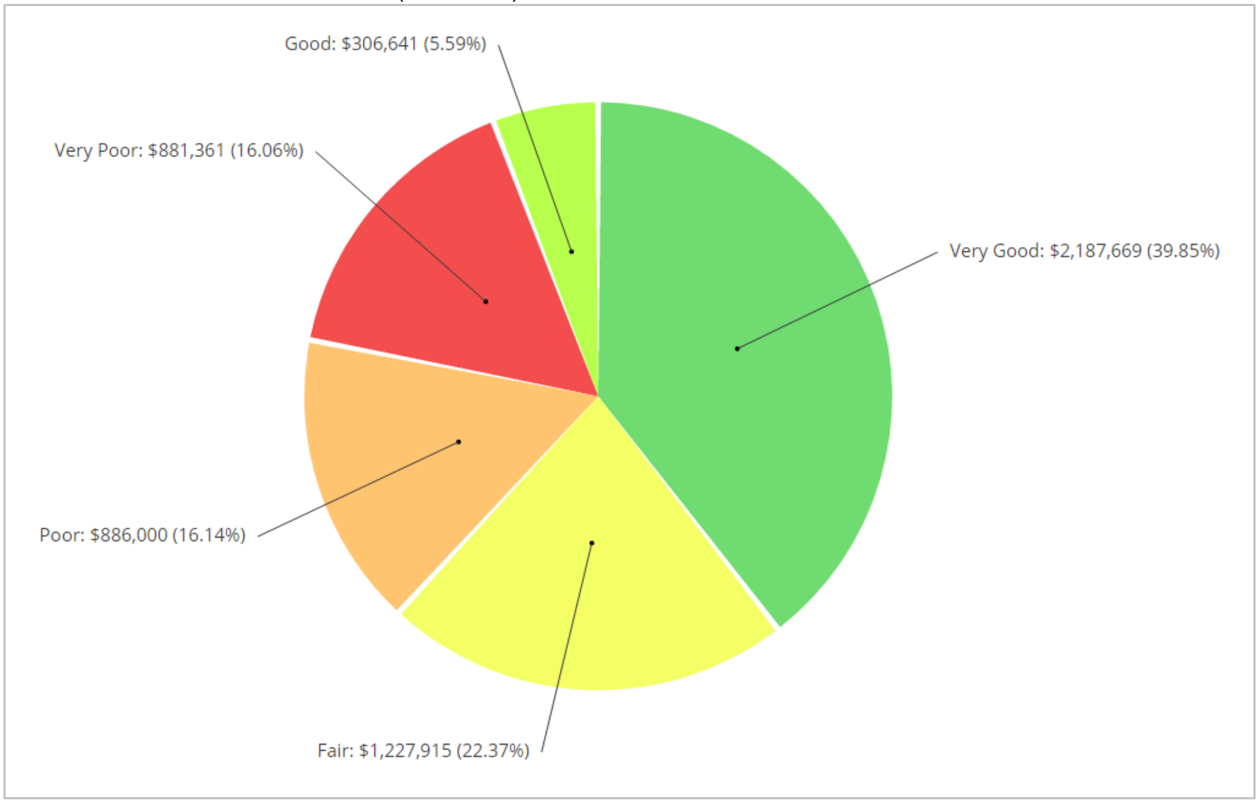


While 33% of the vehicles assets have at least 10 years of useful life remaining, nearly 40% , with a valuation of $2.1 million will reach the end of their useful life in the next five years. Further, 7%, with a valuation of $409,000 remain in operation beyond their useful life.

9.6 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the municipality's vehicles 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.

FIGURE 45 ASSET CONDITION – VEHICLES (AGE-BASED)

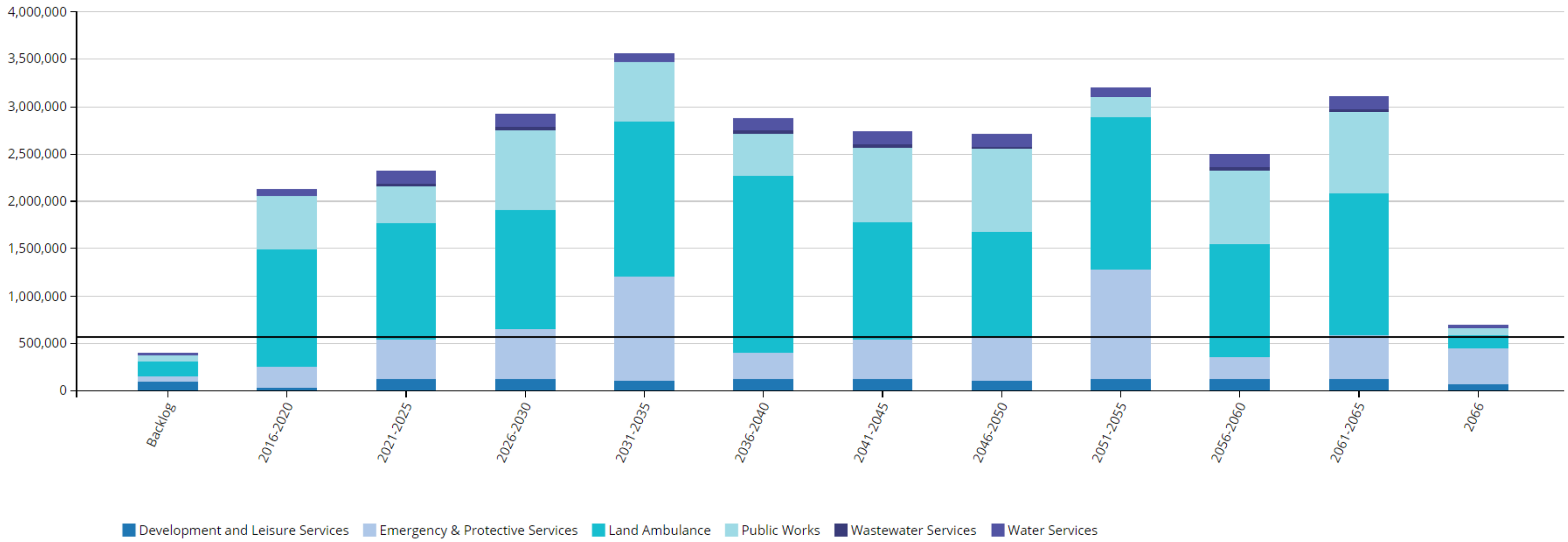


Less than 50% of the municipality's assets are in good to very good condition. Nearly 33%, with a valuation of $1.8 million are in poor to very poor condition.

9.7 Forecasting Replacement Needs

In the following sections, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the municipality's vehicles assets. The backlog represents the immediate replacement needs that were deferred over previous years or decades.

FIGURE 46 FORECASTING REPLACEMENT NEEDS - VEHICLES



In addition a backlog of $409,000, replacement needs will total $2.1 million over the next five years; an additional $2.3 million will be required between 2021-2025. Ambulance fleet accounts for the majority of the replacement needs. The municipality's annual requirements (indicated by the black line) for its vehicles total $582,000. At this funding level, the municipality is 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 $452,000, leaving an annual deficit of $130,000. See the 'Financial Strategy' section for achieving 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.

9.8 Recommendations – Vehicles

- A preventative maintenance and life cycle assessment program should be established for the fleet class to gain a better understanding of current condition and performance. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

- While the municipality's confidence in its data is high, there is no formal data verification policy in place. To maintain a high degree of data confidence over time and minimize deficiencies, the municipality should establish a systematic data verification policy.

- 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.

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

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, municipalities face a choice: overpromise and underdeliver; underpromise 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, municipalities 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 levels of service 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*.

- **Available**: 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
- **Reliable**: Services are predictable and continuous
- **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.

While the above categories provide broad strategic direction to council and staff, specific and measurable KPIs related to each LOS category are needed to ensure the municipality remains steadfast in its pursuit of delivering the highest value for money to various internal and external stakeholders.

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 right-of-way)
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 km 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 • Percentage of signage that pass reflectivity test. The remaining should be replaced
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 km • 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 buildings and 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 • Overall facility condition index as a percentage of desired condition index • Annual adjustment in condition indexes • Annual percentage of new facilities (square metre) • Percent of facilities rated poor or critical • Percentage of facilities replacement value spent on operations and maintenance Increase facility utilization rate by [x] percent by 2020. • $Utilization\ Rate = \frac{Occupied\ Space}{Facility\ Usable\ Area}$
Operational Indicators	• [x] sq.ft. of facilities per full-time employee (or equivalent), i.e., maintenance staff • Percentage of facilities inspected within the last five years • Number/type of service requests • Percentage of customer requests responded to within 24 hours

TABLE 18 KEY PERFORMANCE INDICATORS – FLEET AND VEHICLES

Level	KPI (Reported Annually)
Strategic	• Percentage of total reinvestment compared to asset replacement value • Completion of strategic plan objectives
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	• Percentage of all vehicles replaced • Average age of fleet vehicles • Percent of vehicles rated poor or critical • Percentage of fleet replacement value spent on operations and maintenance
Operational Indicators	• Average downtime per fleet category • Average utilization per fleet 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 responded to within 24 hours

TABLE 19 KEY PERFORMANCE INDICATORS – WATER, WASTE WATER AND STORM NETWORKS

Level	KPI (Reported Annually)
Strategic	• Percentage of total reinvestment compared to asset replacement value • Completion of strategic plan objectives (related water / waste water / 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 • Lost revenue from system outages
Tactical	• Percentage of water / waste water / storm network rehabilitated / reconstructed • Overall water / waste water / storm network condition index as a percentage of desired condition index • Annual adjustment in condition indexes • Annual percentage of growth in water / waste water / storm network • Percentage of mains where the condition is rated poor or critical for each network • Percentage of water / waste water / storm network replacement value spent on operations and maintenance
Operational Indicators	• Percentage of water / waste water / 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 / waste water / storm networks • Percentage of customer requests responded to within 24 hours per water / waste water / storm network

3. Future Performance

In addition to the financial capacity, and legislative requirements, e.g., *Safe Drinking Water Act*, the Minimum Maintenance Standards for municipal highways, building codes and the *Accessibility for Ontarians with Disability Act*, many factors, internal and external, can influence the establishment of LOS and their associated KPIs, both target and actual, including the municipality's overarching mission as an organization, the current state of its infrastructure, and the municipality's financial capacity.

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 service 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 opinions and insights regarding the levels of service a particular asset 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 facilitate any planned growth in infrastructure services.

Demographic Changes
The type of residents that dominate a municipality can also serve as infrastructure demand drivers, 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 will develop an implementation process that can be applied to the needs identification and prioritization of renewal, rehabilitation, and maintenance activities. This will assist in the production of a 10-year 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 life cycle interventions required; and prioritization techniques, including risk, to determine which priority projects should move forward into the budget first.

1. Non-Infrastructure Solutions and 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 clearer path of what is required to achieve sustainable infrastructure programs.

2. Condition Assessment Programs

The foundation of good asset management practice is based on having comprehensive and reliable information on the current condition of the infrastructure. Municipalities need to have a clear understanding regarding 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 about an asset may lead to its premature 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 of an entire asset class, the cursory approach (metrics such as good, fair, poor, very poor) is used. This will be a less expensive approach when applied to thousands of assets, yet 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.

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 municipalities 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. The CityWide Works software has a road patrol component built in that could capture this type of inspection data during road patrols in the field, enabling later analysis of rehabilitation and replacement needs for budget development.

It is recommended that the municipality establish a strategic 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 metres 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 would be to have the structural engineer who performs the inspections to develop a maintenance requirements report, and rehabilitation and replacement requirements report as part of the overall assignment. In addition to refining 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 will be developed for the municipality's bridges.

2.3 Facilities & Buildings

The most popular and practical type of buildings and facility 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, mathematical modeling, or a combination of both. But the most accurate way of determining the condition requires a walk-through to collect baseline data.

The following five asset classifications are typically inspected:

- Site Components – property around the facility and includes the 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 type of 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 waste water assets, and establish supplementary condition assessment protocols for other buildings and facilities. It is also recommended that a portion of capital funding is dedicated to this.

2.4 Fleet

The typical approach to optimizing the maintenance expenditures of a corporate fleet of vehicles is through routine vehicle inspections, routine vehicle servicing, and an established routine preventative maintenance program. Most, if not all, makes and models of vehicles 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 good vehicle 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 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 further and 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 fleet vehicles and that a software application is utilized for the overall management of the program.

2.4 Water

Unlike sewer mains, it is very difficult to inspect water mains from the inside due to the high pressure flow of water constantly underway within the water network. Physical inspections require a disruption of service to residents, can be an expensive exercise, and are time consuming to set up. It is recommended practice that physical inspection of water mains typically only occurs 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 are:

- Remote eddy field current (RFEC)
- Ultrasonic and acoustic techniques
- Impact echo (IE)
- 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 could be used, along with weighting factors, to determine an overall condition score are listed below.

- Age
- Material Type
- Breaks
- Hydrant Flow Inspections
- Soil Condition

It is recommended that the municipality develop a rating system for the mains within the distribution network based on the availability of key data, and that funds are budgeted for this development.

2.4 Sewer network inspection (Waste Water and Storm)

The most popular and practical type of waste water and storm sewer assessment is the use of Closed Circuit Television Video (CCTV). The municipality currently performs video inspections for its storm and waste water mains. 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 travels 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 a very good 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 but in it's a 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 establish a sewer condition assessment program and that a portion of capital funding is dedicated to this.

2.5 Parks and open spaces

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 park inspection will involve qualified groups of trained industry professionals (operational staff or landscape architects) performing an analysis of the condition of a group of Parks 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.

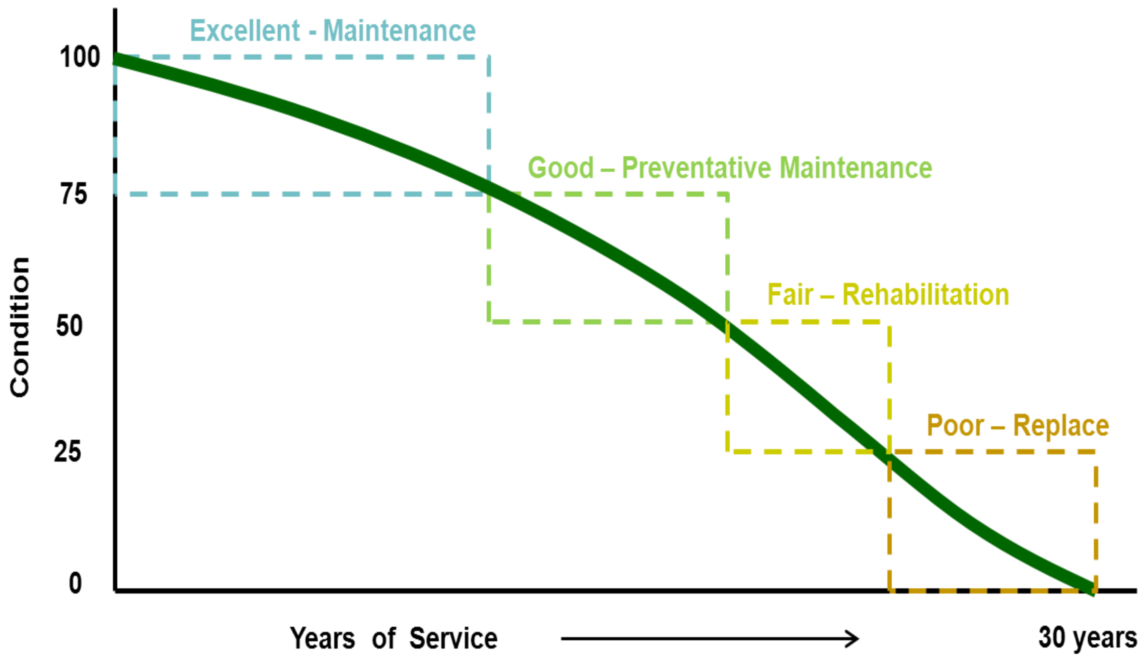
3. Life Cycle Analysis Framework

An industry review was conducted to determine which life cycle 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 could 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 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 road with a 30-year life.

FIGURE 47 PAVED ROAD GENERAL DETERIORATION PROFILE



As shown above, during the road's life cycle 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 20 ASSET CONDITION AND RELATED WORK ACTIVITY - PAVED ROADS

Condition	Condition Range	Work Activity
Excellent condition (Maintenance only phase)	100-76	• maintenance only
Good Condition (Preventative maintenance phase)	75 - 51	• crack sealing • emulsions
Fair Condition (Rehabilitation phase)	50 -26	• resurface - mill & pave • resurface - asphalt overlay • single & double surface treatment (for rural roads)
Poor Condition (Reconstruction phase)	25 - 1	• reconstruct - pulverize and pave • reconstruct - full surface and base reconstruction
Critical Condition (Reconstruction phase)	0	• 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 threshold and condition ranges can be easily 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 life cycle 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 would be to have 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 Facilities & Buildings

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. Of course, if the inspection data is housed or uploaded into the CityWide software, then these reports can be produced automatically from the system.

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 / legislative requirements, energy conservation programs and upgrades, customer complaints and health and safety concerns, and also 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 Fleet and Vehicles

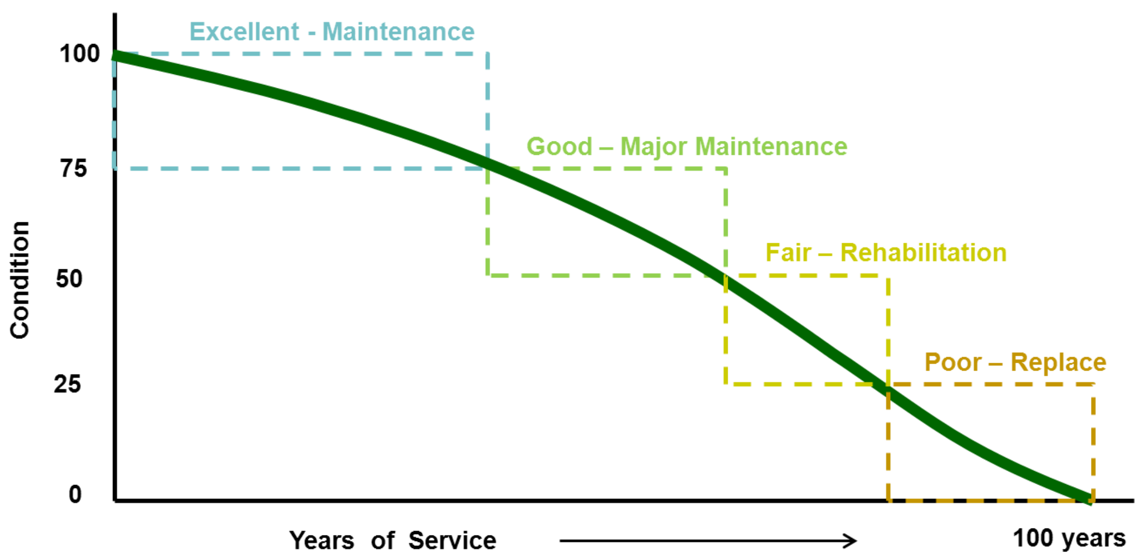
The best approach to develop a 10-year needs list for the municipality's fleet and vehicle portfolio would first be through a defined preventative maintenance program, and secondly, through an optimized life cycle vehicle replacement schedule. The preventative maintenance program would serve to determine budget requirements for operating and minor capital expenditures for part renewal and major refurbishments and rehabilitations. An optimized vehicle replacement program will ensure a vehicle 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 fleet industry in regards to vehicle life cycles 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 fleet management that should also be examined in further detail as part of the long-term management plan, such as fleet utilization and incorporating green fleet, etc. It is recommended that the municipality establish a prioritization framework for the fleet asset class that incorporates the key components outlined above.

3.5 Waste Water and Storm Sewers

The following analysis has been conducted at a fairly high level, using industry standard activities and costs for waste water 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 municipality activities used for sewer mains and the associated local costs for those work activities. All of 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 48 SEWER MAIN GENERAL DETERIORATION



As shown above, during the sewer main's life cycle 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 21 ASSET CONDITION AND RELATED WORK ACTIVITY FOR SEWER MAINS

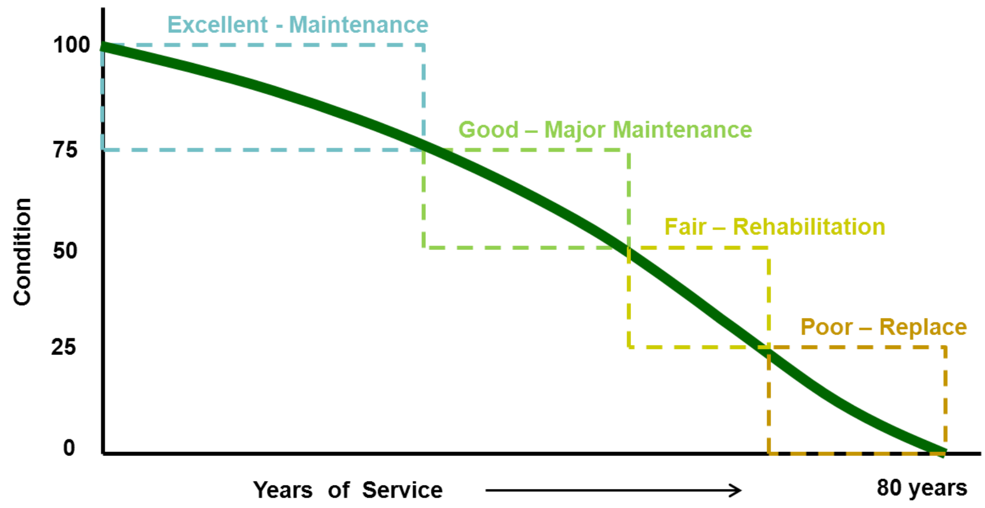
Condition	Condition Range	Work Activity
Excellent condition (Maintenance only phase)	100-76	• maintenance only (cleaning & flushing etc.)
Good Condition (Preventative maintenance phase)	75 - 51	• mahhole repairs • small pipe section repairs
Fair Condition (Rehabilitation phase)	50 -26	• structural relining
Poor Condition (Reconstruction phase)	25 - 1	• pipe replacement
Critical Condition (Reconstruction phase)	0	• 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 threshold and condition ranges can be easily updated with the CityWide software suite and an updated 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.

3.6 Water

As with roads and sewers above, the following analysis has been conducted at a fairly 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 49 WATER MAIN GENERAL DETERIORATION



As shown above, during the water main's life cycle 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 22 ASSET CONDITION AND RELATED WORK ACTIVITY FOR WATER MAINS

Condition	Condition Range	Work Activity
excellent condition (Maintenance only phase)	100-76	• maintenance only (cleaning & flushing etc.)
good Condition (Preventative maintenance phase)	75 - 51	• water main break repairs • small pipe section repairs
fair Condition (Rehabilitation phase)	50 -26	• structural water main relining
poor Condition (Reconstruction phase)	25 - 1	• pipe replacement
critical Condition (Reconstruction phase)	0	• 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. According to the 2011 census data, the municipality's population is 6,191, a change of 6% from 2006.

In conjunction with raw population growth, the type of shift in demographics can also dictate how municipalities allocate their infrastructure investments. As the demographics change and the municipality assumes responsibility of new infrastructure, the level of strain on various critical and supplementary infrastructure services will shift to reflect the needs of the residents. Some services, e.g., open spaces, are particularly vulnerable to the dual stress of overuse and underfunding.

5. Project Prioritization and Risk Management

Generally, infrastructure needs exceed municipal capacity. As such, municipalities 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 piece 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

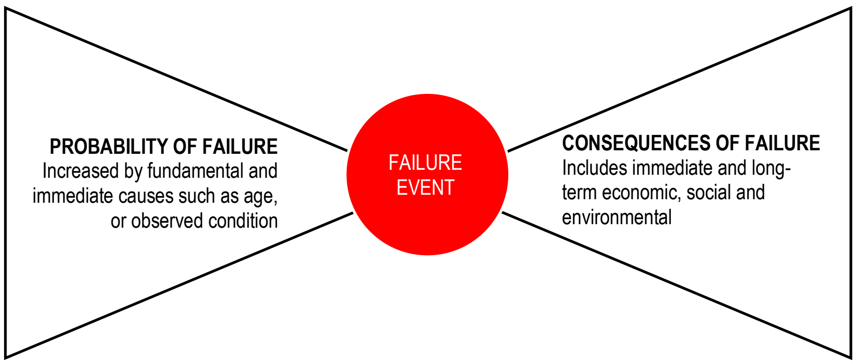
- The impact that actions (or inaction) on one asset will have on other related assets

- 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 below. 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. The following diagram (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 50 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 23 PROBABILITIY 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 their material types, classifications (or other attributes). Asset classes for which replacement cost is used include: bridges & culverts, buildings, 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 higher risk scoring.

Assets for which other attributes are used include: water, wastewater, storm, roads, and rate facilities. For linear infrastructure, pipe diameter is used to estimate a suitable consequence of failure score. Scoring for roads and rate-based facilities is based on classification or asset type.

TABLE 24 CONSEQUENCE OF FAILURE – BRIDGES & CULVERTS

Replacement Value	Consequence of failure
Less than $500k	Score of 1
$500k to $800k	Score of 2
$801k to $999k	Score of 3
$1m to $5m	Score of 4
$5m and over	Score of 5

TABLE 25 CONSEQUENCE OF FAILURE - BUILDINGS

Replacement Value	Consequence of failure
Less than $150k	Score of 1
$150k to $400k	Score of 2
$401 to $999k	Score of 3
$1m to $5m	Score of 4
$5m and over	Score of 5

TABLE 26 CONSEQUENCE OF FAILURE – LAND IMPROVEMENTS

Replacement Value	Consequence of failure
Less than $100k	Score of 1
$100k to $150K	Score of 2
$151k to $200K	Score of 3
$201k to $300k	Score of 4
$301k and over	Score of 5

TABLE 27 CONSEQUENCE OF FAILURE – ROLLING STOCK

Replacement Value	Consequence of failure
Less than $50k	Score of 1
$51k to $120k	Score of 2
$121k to $150k	Score of 3
$151k to $500k	Score of 4
$501k and over	Score of 5

TABLE 28 CONSEQUENCE OF FAILURE - EQUIPMENT

Consequence of Failure: Equipment	
Replacement Value	Consequence of failure
Less than $50k	Score of 1
$51k to $80K	Score of 2
$80k to $140K	Score of 3
$141k to $200k	Score of 4
$201k and over	Score of 5

TABLE 29 CONSEQUENCE OF FAILURE - ROADS

Road Classification	Consequence of failure
Gravel	Score of 1
LCB(Rural)	Score of 2
LCB (Urban)	Score of 3
HCB (Rural)	Score of 4
HCB (Urban)	Score of 5

TABLE 30 CONSEQUENCE OF FAILURE – SANITARY SEWERS

Pipe Diameter	Consequence of failure
Less than 100mm	Score of 1
200mm or less	Score of 2
300mm or less	Score of 3
400mm or less	Score of 4
401mm and over	Score of 5

TABLE 31 CONSEQUENCE OF FAILURE – WATER MAINS

Pipe Diameter	Consequence of Failure
Less than 75m	Score of 1
100mm or less	Score of 2
200mm or less	Score of 3
350mm or less	Score of 4
351mm and over	Score of 5

TABLE 32 CONSEQUENCE OF FAILURE – STORM SEWERS

Pipe Diameter	Consequence of failure
Less than 200m	Score of 1
400mm or less	Score of 2
500mm or less	Score of 3
1000mm or less	Score of 4
1001mm and over	Score of 5

TABLE 33 CONSEQUENCE OF FAILURE - FACILITIES

Type	Consequence of failure
-	Score of 1
Public Washrooms	Score of 2
Booster Station	Score of 3
Water Tower	Score of 4
WW Treatment Plant & Equipment/Water Plant & Equipment/Pumping Station	Score of 5

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

FIGURE 51 DISTRIBUTION OF ASSETS BASED ON RISK - ALL ASSET CLASSES

8 Assets 74.00 unit(s), m $1,318,875.00	60 Assets 2,359.89 m, unit(s) $36,677,867.65	15 Assets 308.00 unit(s), m $16,325,349.00	15 Assets 88.00 unit(s), m $4,643,478.00	14 Assets 473.67 unit(s), m $1,397,528.95
44 Assets 4,830.33 unit(s), m $2,795,416.05	108 Assets 14,071.03 unit(s), m $20,227,086.55	79 Assets 11,533.18 unit(s), m $17,527,622.30	53 Assets 7,225.14 unit(s), m $5,275,266.90	193 Assets 35,707.93 unit(s), m $15,418,694.05
39 Assets 4,932.45 m, unit(s) $4,302,449.25	187 Assets 25,750.19 unit(s), m $21,997,415.15	61 Assets 9,952.37 unit(s), m $8,856,506.45	49 Assets 5,282.03 unit(s), m $4,284,884.55	30 Assets 2,610.08 unit(s), m $3,575,721.80
103 Assets 8,587.16 unit(s), m $5,616,215.60	214 Assets 27,801.37 unit(s), m $23,880,956.45	146 Assets 21,227.01 unit(s), m $21,019,283.85	88 Assets 9,785.27 unit(s), m $8,614,879.95	71 Assets 6,064.96 unit(s), m $9,284,289.60
178 Assets 3,670.36 unit(s), m $4,947,136.60	294 Assets 5,278.11 unit(s), m $14,111,286.35	223 Assets 3,778.00 unit(s), m $11,002,985.00	198 Assets 9,153.00 unit(s), m $12,687,553.00	292 Assets 10,553.00 unit(s), m $18,831,185.00

FIGURE 52 DISTRIBUTION OF ASSETS BASED ON RISK – ROAD NETWORK

0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00
18 Assets 2,122.00 m, unit(s) $1,067,727.00	32 Assets 5,127.00 m $2,173,848.00	49 Assets 8,601.00 m $4,827,487.00	26 Assets 4,637.00 m $1,966,088.00	183 Assets 35,201.00 m $14,925,224.00
3 Assets 878.00 m $892,926.00	7 Assets 1,828.00 m, unit(s) $2,285,693.00	8 Assets 4,208.00 m $4,279,536.00	1 Assets 552.00 m $561,384.00	1 Assets 1.00 unit(s) $514,114.00
7 Assets 759.00 m, unit(s) $908,917.00	26 Assets 3,891.00 m, unit(s) $5,446,339.00	27 Assets 6,911.00 m, unit(s) $7,533,711.00	15 Assets 3,791.00 m, unit(s) $4,254,182.00	7 Assets 2,025.00 m, unit(s) $3,339,839.00
21 Assets 1,996.00 m, unit(s) $1,746,283.00	62 Assets 3,874.00 unit(s), m $4,742,858.00	64 Assets 3,297.00 unit(s), m $5,345,911.00	82 Assets 7,986.00 unit(s), m $9,412,170.00	137 Assets 10,167.00 unit(s), m $14,616,692.00

FIGURE 53 DISTRIBUTION OF ASSETS BASED ON RISK – BRIDGES & CULVERTS

0 Assets - $0.00	1 Assets 60.00 m $6,640,145.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00
0 Assets - $0.00	1 Assets 55.00 m $1,513,080.00	1 Assets 100.00 m $2,930,707.00	0 Assets - $0.00	0 Assets - $0.00
1 Assets 21.00 m $826,280.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00
1 Assets 55.00 m $640,939.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	1 Assets 23.00 m $651,247.00
3 Assets 15.00 unit(s) $25,837.00	2 Assets 74.00 m $548,697.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00

FIGURE 54 DISTRIBUTION OF ASSETS BASED ON RISK – WATER

4 Assets 4.00 unit(s) $191,410.00	19 Assets 268.00 m, unit(s) $10,006,015.00	7 Assets 7.00 unit(s) $3,335,223.00	6 Assets 20.00 m, unit(s) $2,805,334.00	3 Assets 3.00 unit(s) $24,188.00
6 Assets 1,591.00 m $970,510.00	29 Assets 6,349.00 m, unit(s) $6,913,266.00	13 Assets 2,152.00 m, unit(s) $3,754,855.00	6 Assets 955.00 m $582,550.00	0 Assets - $0.00
16 Assets 2,826.00 m $1,723,860.00	127 Assets 20,362.00 m, unit(s) $12,978,337.00	24 Assets 3,476.00 m, unit(s) $2,123,389.00	18 Assets 2,640.00 m $1,610,400.00	14 Assets 2,261.00 m $1,379,210.00
2 Assets 980.00 m $597,800.00	6 Assets 1,005.00 m $613,050.00	8 Assets 915.00 m $558,150.00	8 Assets 1,110.00 m $677,100.00	6 Assets 721.00 m $439,810.00
25 Assets 752.00 unit(s), m $655,020.00	69 Assets 570.00 unit(s), m $750,990.00	43 Assets 227.00 unit(s), m $374,390.00	48 Assets 498.00 unit(s), m $592,740.00	54 Assets 54.00 unit(s) $395,820.00

FIGURE 55 DISTRIBUTION OF ASSETS BASED ON RISK – WASTEWATER

3 Assets 69.00 m, unit(s) $76,888.00	37 Assets 1,713.00 m, unit(s) $19,940,824.00	6 Assets 299.00 m, unit(s) $1,190,637.00	5 Assets 64.00 m, unit(s) $567,807.00	3 Assets 3.00 unit(s) $20,790.00
0 Assets - $0.00	4 Assets 403.00 m $253,890.00	0 Assets - $0.00	1 Assets 55.00 m $34,650.00	0 Assets - $0.00
6 Assets 835.00 m $526,050.00	21 Assets 2,510.00 m $1,581,300.00	8 Assets 1,167.00 m $735,210.00	2 Assets 405.00 m $255,150.00	1 Assets 261.00 m $164,430.00
16 Assets 2,904.00 m, unit(s) $1,840,120.00	117 Assets 20,041.00 unit(s), m $14,968,114.00	82 Assets 12,260.00 unit(s), m $9,992,729.00	27 Assets 1,988.00 unit(s), m $2,116,209.00	21 Assets 2,027.00 unit(s), m $2,822,486.00
24 Assets 32.00 m, unit(s) $350,711.00	66 Assets 467.00 unit(s), m $5,405,622.00	37 Assets 37.00 unit(s) $2,753,981.00	7 Assets 575.00 unit(s), m $847,776.00	16 Assets 16.00 unit(s) $1,568,668.00

FIGURE 56 DISTRIBUTION OF ASSETS BASED ON RISK – STORM

0 Assets - $0.00	3 Assets 318.89 m $90,883.65	0 Assets - $0.00	0 Assets - $0.00	4 Assets 452.67 m $129,010.95
18 Assets 1,115.33 m $317,869.05	34 Assets 2,129.03 m $606,773.55	11 Assets 675.18 m $192,426.30	15 Assets 1,573.14 m $448,344.90	8 Assets 504.93 m $143,905.05
11 Assets 370.45 m $105,578.25	21 Assets 1,039.19 m $296,169.15	14 Assets 822.37 m $234,375.45	21 Assets 1,678.03 m $478,238.55	4 Assets 77.08 m $21,967.80
73 Assets 3,885.16 unit(s), m $1,111,750.60	53 Assets 2,849.37 m $812,070.45	15 Assets 1,127.01 m $321,197.85	31 Assets 2,874.27 m $819,166.95	18 Assets 1,224.96 m $349,113.60
59 Assets 820.36 unit(s), m $757,975.60	17 Assets 83.11 unit(s), m $94,481.35	0 Assets - $0.00	0 Assets - $0.00	1 Assets - m $20,202.00

FIGURE 57 DISTRIBUTION OF ASSETS BASED ON RISK – BUILDINGS

0 Assets - $0.00	0 Assets - $0.00	1 Assets 1.00 unit(s) $11,492,044.00	0 Assets - $0.00	0 Assets - $0.00
0 Assets - $0.00	3 Assets 3.00 unit(s) $7,569,503.00	2 Assets 2.00 unit(s) $5,110,763.00	1 Assets 1.00 unit(s) $1,126,437.00	0 Assets - $0.00
0 Assets - $0.00	6 Assets 6.00 unit(s) $4,254,503.00	2 Assets 2.00 unit(s) $925,807.00	1 Assets 1.00 unit(s) $504,304.00	0 Assets - $0.00
1 Assets 1.00 unit(s) $197,197.00	8 Assets 8.00 unit(s) $1,733,934.00	8 Assets 8.00 unit(s) $2,033,064.00	1 Assets 1.00 unit(s) $181,878.00	1 Assets 1.00 unit(s) $181,496.00
11 Assets 13.00 unit(s) $332,787.00	28 Assets 28.00 unit(s) $1,354,614.00	33 Assets 33.00 unit(s) $1,392,556.00	19 Assets 19.00 unit(s) $852,702.00	5 Assets 5.00 unit(s) $221,257.00

FIGURE 58 DISTRIBUTION OF ASSETS BASED ON RISK – LAND IMPROVEMENTS

0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	3 Assets 3.00 unit(s) $1,023,924.00	2 Assets 2.00 unit(s) $714,846.00
1 Assets 1.00 unit(s) $243,910.00	3 Assets 3.00 unit(s) $819,225.00	0 Assets - $0.00	2 Assets 2.00 unit(s) $583,651.00	1 Assets 1.00 unit(s) $209,152.00
0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	2 Assets 2.00 unit(s) $364,740.00	6 Assets 6.00 unit(s) $1,014,803.00
2 Assets 2.00 unit(s) $223,491.00	1 Assets 1.00 unit(s) $117,459.00	2 Assets 2.00 unit(s) $228,868.00	1 Assets 1.00 unit(s) $105,098.00	4 Assets 4.00 unit(s) $501,519.00
18 Assets 18.00 unit(s) $656,966.00	18 Assets 18.00 unit(s) $680,250.00	13 Assets 13.00 unit(s) $602,321.00	7 Assets 7.00 unit(s) $202,684.00	26 Assets 26.00 unit(s) $995,770.00

FIGURE 59 DISTRIBUTION OF ASSETS BASED ON RISK – MACHINERY & EQUIPMENT

0 Assets - $0.00	0 Assets - $0.00	1 Assets 1.00 unit(s) $307,445.00	1 Assets 1.00 unit(s) $246,413.00	2 Assets 13.00 unit(s) $508,694.00
0 Assets - $0.00	1 Assets 1.00 unit(s) $178,405.00	2 Assets 2.00 unit(s) $326,938.00	1 Assets 1.00 unit(s) $179,401.00	1 Assets 1.00 unit(s) $140,413.00
2 Assets 2.00 unit(s) $227,755.00	2 Assets 2.00 unit(s) $197,757.00	3 Assets 275.00 unit(s) $314,409.00	1 Assets 1.00 unit(s) $133,079.00	2 Assets 2.00 unit(s) $211,121.00
0 Assets - $0.00	2 Assets 5.00 unit(s) $136,645.00	2 Assets 2.00 unit(s) $121,018.00	2 Assets 17.00 unit(s) $120,761.00	7 Assets 33.00 unit(s) $468,503.00
11 Assets 18.00 unit(s) $201,350.00	30 Assets 162.00 unit(s), m $508,718.00	29 Assets 167.00 unit(s) $446,599.00	31 Assets 62.00 unit(s) $624,182.00	42 Assets 273.00 unit(s) $740,397.00

FIGURE 60 DISTRIBUTION OF ASSETS BASED ON RISK – VEHICLES

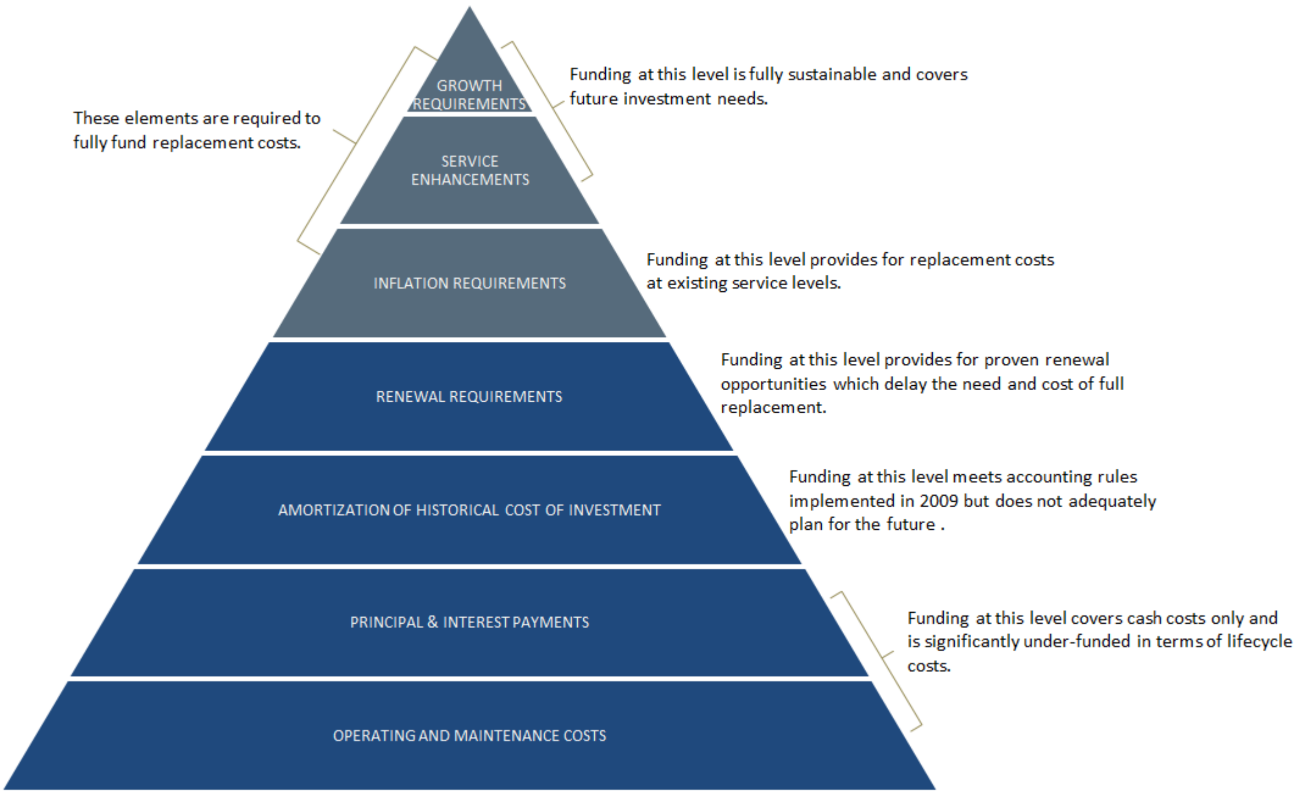
1 Assets 1.00 unit(s) $1,050,577.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00	0 Assets - $0.00
1 Assets 1.00 unit(s) $195,400.00	1 Assets 1.00 unit(s) $199,096.00	1 Assets 1.00 unit(s) $384,446.00	1 Assets 1.00 unit(s) $354,145.00	0 Assets - $0.00
0 Assets - $0.00	3 Assets 3.00 unit(s) $403,656.00	2 Assets 2.00 unit(s) $243,780.00	3 Assets 3.00 unit(s) $377,589.00	2 Assets 2.00 unit(s) $270,076.00
1 Assets 1.00 unit(s) $96,001.00	1 Assets 1.00 unit(s) $53,345.00	2 Assets 2.00 unit(s) $230,546.00	3 Assets 3.00 unit(s) $340,485.00	6 Assets 6.00 unit(s) $530,276.00
6 Assets 6.00 unit(s) $220,207.00	2 Assets 2.00 unit(s) $25,056.00	4 Assets 4.00 unit(s) $87,227.00	4 Assets 6.00 unit(s) $155,299.00	11 Assets 12.00 unit(s) $272,379.00

IX. Financial Strategy

1. General overview of financial plan requirements

In order for an AMP to be effectively put into action, 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 following pyramid depicts the various cost elements and resulting funding levels that should be incorporated into AMPs that are based on best practices.

FIGURE 61 COST ELEMENTS



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

1. the financial requirements (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)
    - requirements of anticipated growth (none identified for this plan)

2. use of traditional sources of municipal funds:
    - tax levies
    - user fees
    - reserves
    - debt
    - development charges

3. use of non-traditional sources of municipal funds:
    - reallocated budgets
    - partnerships
    - procurement methods

4. use of senior government funds:
    - gas tax
    - grants (not included in this plan due to Provincial requirements for firm commitments)

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:

1. in order to reduce financial requirements, consideration has been given to revising service levels downward
2. all asset management and financial strategies have been considered. For example:
    - 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.

This AMP includes recommendations that avoid long-term funding deficits.

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: roads; bridges & culverts; storm sewers; buildings; machinery & equipment; vehicles; and yard improvement. For each scenario developed we have included strategies, where applicable, regarding the use of tax revenues, user fees, reserves and debt.

2.2 Current funding position

Table 34 and Table 35 outline, by asset category, 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 34 SUMMARY OF INFRASTRUCTURE REQUIREMENTS AND CURRENT FUNDING AVAILABLE

Summary of Infrastructure Requirements & Current Funding Available for Tax Funded Assets							
		2016 Funding Available					
Asset Category	Average Annual Investment Required	Taxes	Gas Tax	OCIF	Taxes to Reserves	Total Funding Available	Annual Deficit
Bridges & Culverts	278,000	46,000	0	0	0	46,000	232,000
Facilities	939,000	25,000	0	0	0	25,000	914,000
Land Improvements	327,000	5,000	0	0	0	5,000	322,000
Machinery & Equipment	511,000	58,000	0	0	120,000	178,000	333,000
Road Network	3,167,000	0	376,000	205,000	0	581,000	2,586,000
Storm Sewer Network	109,000	0	0	0	0	0	109,000
Vehicles	582,000	0	0	0	452,000	452,000	130,000
Total	5,913,000	134,000	376,000	205,000	572,000	1,287,000	4,626,000

2.3 Recommendations for full funding

The average annual investment requirement for the above categories is $5,913,000. Annual revenue currently allocated to these assets for capital purposes is $1,287,000 leaving an annual deficit of $4,626,000. To put it another way, these infrastructure categories are currently funded at 22% of their long-term requirements. In 2016, the municipality has annual tax revenues of $11,972,000. As illustrated in Table 35, without consideration of any other sources of revenue, full funding would require the following tax change over time:

TABLE 35 TAX CHANGE REQUIRED FOR FULL FUNDING

Asset Category	Tax Increase Required for Full Funding
Road Network	21.6%
Bridges & Culverts	1.9%
Storm Sewer Network	0.9%
Equipment	2.8%
Facilities	7.6%
Land Improvements	2.7%
Vehicles	1.1%
Total	**38.6%**

As illustrated in the table below, Parry Sound's debt payments for these asset categories will be decreasing by $84,000 between 2016 and 2021. Although not shown in the table, debt payment decreases will be $140,000 over 10 years, $350,000 over 15 years, and $328,000 over 20 years. Our recommendations include capturing those decreases in cost and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents a number of options:

TABLE 36 EFFECT OF REALLOCATING DECREASES IN DEBT COSTS

	Without Reallocation of Decreasing Debt Costs				With Reallocation of Decreasing Debt Costs			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit as Outlined in Table 39	4,626,000	4,626,000	4,626,000	4,626,000	4,626,000	4,626,000	4,626,000	4,626,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-84,000	-140,000	-350,000	-382,000
Resulting Infrastructure Deficit	4,626,000	4,626,000	4,626,000	4,626,000	4,542,000	4,486,000	4,276,000	4,244,000
Resulting Tax Increase Required:								
Total Over Time	38.6%	38.6%	38.6%	38.6%	37.9%	37.5%	35.7%	35.4%
Annually	7.7%	3.9%	2.6%	1.9%	7.6%	3.8%	2.4%	1.8%

Considering all of the above information, we recommend the 20 year option in Table 36 that includes the reallocations. This involves full funding being achieved over 20 years by:

- when realized, reallocating the debt cost reductions of $382,000 to the infrastructure deficit as outlined above.
- increasing tax revenues by 1.8% 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 gas tax and OCIF revenue as outlined in Table 34.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:
1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. 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.

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

Although this option achieves full funding on an annual basis in 20 years and provides financial sustainability over the period modeled (to 2050), the recommendations do require prioritizing capital projects to fit the resulting annual funding available. As of the end of 2015, age based data shows a pent up investment demand of $651,000 for bridges & culverts, $25,000 for facilities, $2,880,000 for land improvements, $585,000 for machinery & equipment, $23,106,000 for the road network, $267,000 for the storm sewer network and $409,000 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 waste water. 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

Tables 37 and Table 38 outline, by asset category, 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 37 SUMMARY OF INFRASTRUCTURE REQUIREMENTS AND CURRENT FUNDING AVAILABLE

Asset Category	Average Annual Investment Required	2014 Annual Funding Available				Annual Deficit
		Rates	To Operations	Other	Total	
Waste water services	1,529,000	2,835,000	-1,039,000	0	1,796,000	267,000
Water services	1,138,000	2,389,000	-1,516,000	0	873,000	265,000
Total	2,667,000	5,224,000	-2,555,000	0	2,669,000	2,000

3.3 Recommendations for full funding

The average annual investment requirement for the above categories is $2,667,000. Annual revenue currently allocated to these assets for capital purposes is $2,669,000, leaving an annual surplus of $2,000. To put it another way, these infrastructure categories are currently funded at 100.1% of their long-term requirements. In 2016, Parry Sound has annual waste water revenues of $2,835,000 and annual water revenues of $2,389,000. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following increases over time:

TABLE 38 RATE CHANGE REQUIRED FOR FULL FUNDING

Asset Category	Rate Increase Required for Full Funding
Waste water	-9.4%
Water	11.1%

As illustrated in the tables below, Parry Sound's debt payments for sanitary services will be decreasing by $25,000 from 2016 to 2021 (5 years) and, though not illustrated in the table, by $71,000 from 2016 to 2026 (10 years). Since sanitary services are over funded, the option of capturing these reductions is not needed. For water services, the amounts are $347,000 and $379,000 respectively. Our recommendations include capturing those decreases in cost and allocating them to the applicable infrastructure deficit.

TABLE 39 WITHOUT CHANGE IN DEBT COSTS

	Sanitary Sewer Network		Water Network	
	5 Years	10 Years	5 Years	10 Years
Infrastructure Deficit (Surplus) as Outlined in Table 26	-267,000	-267,000	265,000	265,000
Change in Debt Costs	N/a	n/a	N/A	n/a
Resulting Infrastructure Deficit (Surplus)	-267,000	-267,000	265,000	265,000
Resulting Rate Increase Required:				
Total Over Time	-9.4%	-9.4%	11.1%	11.1%
Annually	-1.9%	-0.9%	2.2%	1.1%

TABLE 40 WITH CHANGE IN DEBT COSTS

	Sanitary Sewer Network		Water Network	
	5 Years	10 Years	5 Years	10 Years
Infrastructure Deficit (Surplus) as Outlined in Table 26	n/a	n/a	265,000	265,000
Change in Debt Costs			-347,000	-379,000
Resulting Infrastructure Deficit (Surplus)			-82,000	-114,000
Resulting Rate Increase Required:				
Total Over Time			-3.4%	-4.8%
Annually			-0.7%	-0.5%

Considering all of the above information, we recommend the following to achieve full funding within five years:

- consider reducing sanitary sewer rates by 9.4% during the next year's budget deliberations.
- when realized within the next five years, reallocating the first $265,000 in water service debt cost reductions to its infrastructure deficit. This will negate the need for any increase in water rates for capital purposes.
- when debt cost reductions are realized (other than in above), consider those reductions in the formation of the applicable year's operating budget.
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the above recommendations.

Notes:
1. 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.

2. Any change in rates required for operations would be in addition to the above recommendations.

Although this option achieves full funding on an annual basis in five years and provides financial sustainability over the period modeled (to 2050), the recommendations do require prioritizing capital projects to fit the resulting annual funding available. As of the end of 2015, age based data shows a pent up investment demand of $166,000 for sanitary services and $2,024,000 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 41 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.

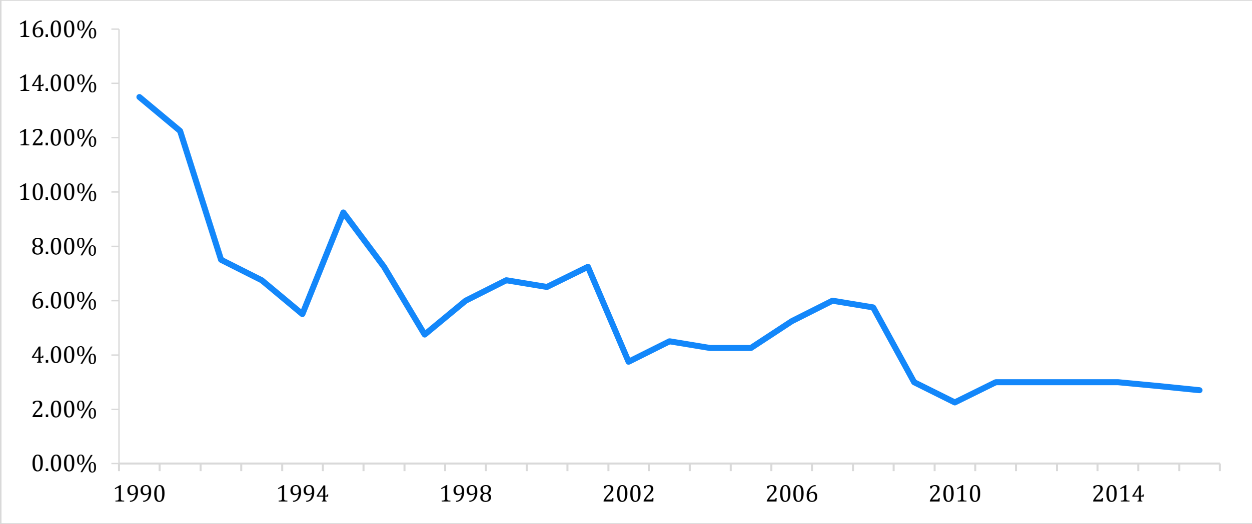
TABLE 41 TOTAL INTEREST PAID AS A % OF PROJECT COSTS

	Number of Years Financed					
Interest Rate	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 3.2%.

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 62 HISTORICAL PRIME BUSINESS INTEREST RATES



As illustrated in Table 41, 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.

Tables 42 and 43 outline how Parry Sound has historically used debt for investing in the asset categories as listed. There is currently $13,040,000 of debt outstanding for the assets covered by this AMP with corresponding debt payments of $1,555,000. These principal and interest payments are well within its provincially prescribed annual maximum of $5,043,000.

TABLE 42 OVERVIEW OF USE OF DEBT

Asset Category	Debt at Dec 31st, 2015	Use of Debt in Last Five Years				
		2011	2012	2013	2014	2015
Road Network	455,000	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Storm Sewer Network	0	0	0	0	0	0
Equipment	0	0	0	0	0	0
Facilities	5,120,000	0	0	0	0	0
Land Improvements	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Total Tax Funded	5,575,000	0	0	0	0	0
Waste water services	5,134,000	0	0	0	0	0
Water services	2,331,000	0	0	0	0	0
Total rate funded	7,465,000	0	0	0	0	0

TABLE 43 OVERVIEW OF DEBT COSTS

	Principal & Interest Payments in Next Ten Years					
Asset Category	2016	2017	2018	2019	2020	2021
Road Network	68,000	74,000	72,000	70,000	67,000	65,000
Bridges & Culverts	0	0	0	0	0	0
Storm Sewer Network	8,000	16,000	16,000	16,000	16,000	15,000
Equipment	0	0	0	0	0	
Facilities	453,000	754,000	392,000	383,000	375,000	365,000
Land Improvements	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Total tax funded	529,000	844,000	480,000	469,000	458,000	445,000
Waste water services	467,000	486,000	476,000	466,000	457,000	442,000
Water services	559,000	581,000	573,000	566,000	559,000	212,000
Total rate funded	1,026,000	1,067,000	1,049,000	1,032,000	1,016,000	654,000

The revenue options outlined in this plan allow Parry Sound 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
- normalizing infrastructure funding requirements

By infrastructure category, Table 44 outlines the details of the reserves currently available to Parry Sound.

TABLE 44 SUMMARY OF RESERVES AVAILABLE

Asset Category	Balance at December 31, 2015
Road Network	512,000
Bridges & Culverts	55,000
Storm Sewer Network	0
Equipment	427,000
Facilities	844,000
Land Improvements	595,000
Vehicles	1,063,000
Total Tax Funded	3,496,000
Water Network	1,878,000
Waste water Sewer Network	3,684,000
Total Rate Funded	5,562,000

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
- internal reserve and debt policies.

The reserves in Table 44 are available for use by applicable asset categories during the phase-in period to full funding. This, coupled with Parry Sound’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 Parry Sound updates its AMP and expands it to include other asset categories, we recommend that future planning should include determining what its long-term reserve balance requirements are and a plan to achieve such balances.

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 45 2016 INFRASTRUCTURE REPORT CARD

Asset Category	Asset Health Grade	Funding Percentage	Financial Capacity Grade	Average Asset Category Grade	Comments
Roads	D	18%	F	F	Based on 2016 replacement cost, and a blend of age-based and observed data, while approximately 50% of the municipality's total asset portfolio as analysed in this AMP is in very good or good condition, more than 25% of the assets, with a valuation of $78 million, is in poor to very poor condition. The municipality is funding 22% of its long-term replacement needs for its tax funded assets; however, it is fully-funding its rate funded assets.
Bridges & Culverts	C	17%	F	F	
Water	C	77%	B	C	
Sanitary	C	117%	A	B	
Storm	C	0%	F	F	
Facilities	C	3%	F	F	
Vehicles	C	78%	B	C	
Land Improvements	D	2%	F	F	
Machinery & Equipment	C	35%	B	C	
		Average Asset Health Grade	C		
		Average Financial Capacity Grade	F		
		Overall Grade	D		

XI. Appendices: Grading and Conversion Scales

Appendix 1: Grading and Conversion Scales

TABLE 46 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 47 FINANCIAL CAPACITY SCALE

How well is the municipality funding its long-term infrastructure requirements? Short Term: Less than 5 years Medium Term: 5 to 20 years Long Term: Greater than 20 years				
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 underpreparing 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.