Addendum to Asset Management Plan

State of Local Infrastructure, Levels of Service, Lifecycle & Financial Management Strategy

TOWNSHIP OF MACHAR

Always in Season

Table of Contents

Revision #	Date	Notes
1	June 2025	○ Update asset listing. ○ Update asset conditions. ○ Update current replacement values. ○ Insert proposed levels of service. ○ Insert financing strategy.

Introduction

As required by O. Reg. 588/17 (the “Regulation”), municipalities are required to include all assets (core and non-core) in their Asset Management Plan (the “Plan”) by July 1, 2024. The Plan must include current levels of service, an assessment of inventory, and lifecycle activities required to maintain the current level of service. By July 1, 2025, the Plan must be updated to include the proposed levels of service the Township wishes to meet, as well as a Lifecycle Management and Financing Strategy. The purpose of this addendum to the Township of Machar’s 2017 Asset Management Plan is to meet the July 1, 2025 requirements of the Regulation.

The Addendum provides an update of the Township’s asset inventory as at December 31, 2024. Dollar amounts have been updated to reflect 2024 dollars. Other asset data, such as condition ratings, have been updated where possible to reflect more accurate information. This will provide the public with updated information on Township assets. It will also better inform Council and Township staff in the decision-making process and planning for the future.

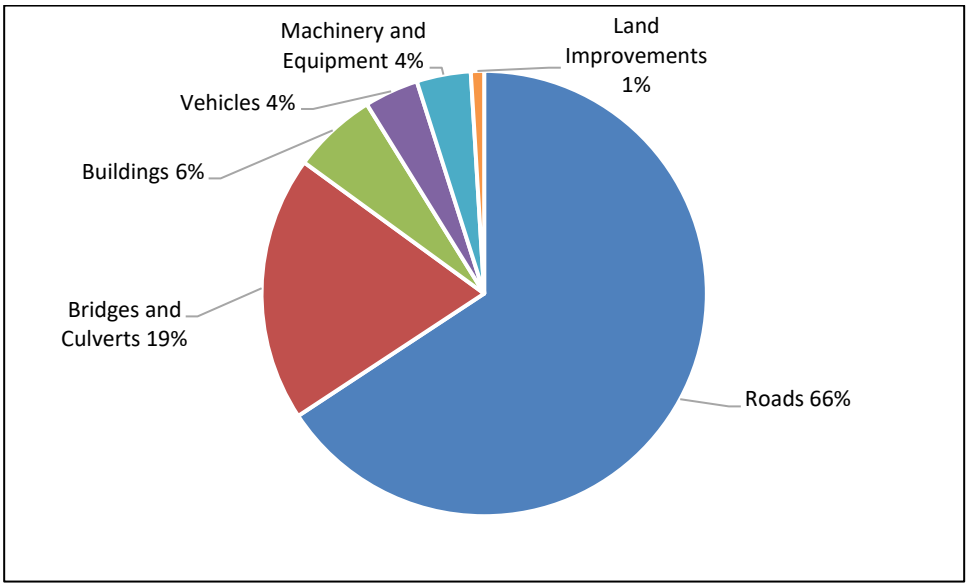
Overview

The addendum to the Plan includes the state of local infrastructure, current and proposed levels of service, and a lifecycle and financing strategy for six (6) asset classes, including: Roads, Bridges and Culverts, Buildings, Vehicles, Machinery and Equipment, and Land Improvements. The purpose of the information presented in this addendum is to assist in decision-making and planning for the future. Asset classes along with their current replacement values (CRVs) are shown in Table A1. A visual representation of the assets distributed by replacement value is set out in Figure A1. Following the presentation of each asset class is a brief discussion on the impacts of population and economic growth. A financing strategy follows.

Table A1: Asset Class CRVs

Asset Class	Current Replacement Value
Roads	$20,965,000
Bridges and Culverts	$6,150,000
Buildings	$1,960,200
Vehicles	$1,256,500
Machinery and Equipment	$1,253,000
Land Improvements	$307,700
Total	$31,892,400

Figure A1: CRV Distribution by Asset Class



Roads

State of Local Infrastructure

The Township of Machar's road network is its largest asset category in terms of size and value. The Township maintains roads with two types of surfaces, including 71.34 centreline km of gravel and 44.52 centreline km of low-class bituminous (LCB). The inventory of gravel roads includes both year-round and seasonally maintained roads, of which 9.8% of total roads are seasonally maintained. The distribution of roads by surface type is illustrated in Figure A2.

The average age of gravel road surfaces is 3.96 years, while the average age of paved roads surfaces is 6.3 years. Only gravel roads where date of last complete resurfacing is known have been included in this calculation. In many cases gravel may be applied to small sections of road as determined to be necessary, and not the entire road, so the true age of these roads is difficult to determine. Micro-surface treatment has been applied to multiple surface-treated Township roads, including Eagle Lake Road; however, its application has not been included in the calculation of road age. The intent of the micro-surfacing is to increase useful life and decrease operating costs of the already existing road surface.

The cost to replace the entire road network, in 2024 dollars, is $20,965,000. This figure excludes normal operating expenditures, such as road signs and street lights. A breakdown of the current replacement values for the Township's roads is shown in Table A2.

Figure A2: Road Classification by Surface Type

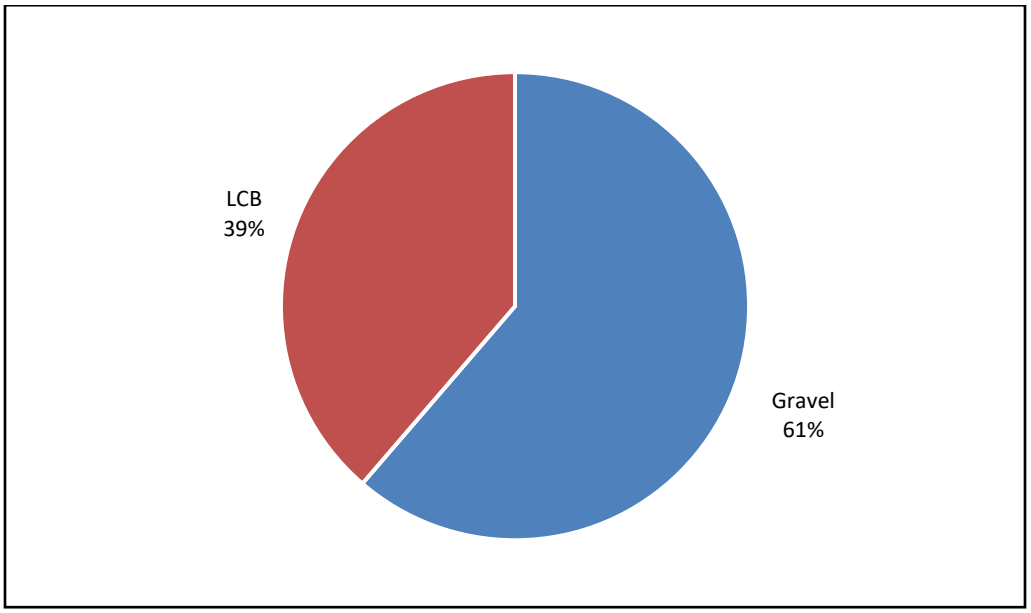


Table A2: Road Network CRVs

Surface Type	Length (KM)	Current Replacement Value
Gravel	71.34	$14,015,000
LCB	44.52	$6,950,000
Total	115.86	$20,965,000

Township staff assessed the condition of its gravel and paved roads. Gravel roads were assessed on a scale consisting of Good, Fair, and Poor. Paved roads were assessed using the Pavement Condition Index (PCI) which rates roads on a scale of 0 – 100, where 0 represents the road in failed condition and 100 in a new condition state.

The summary of condition states for gravel roads, derived from the MTO's *Manual for Condition Rating of Gravel Surface Roads*, can be found in Table A3. Table A4, derived from the MTO's *Manual for Condition Rating of Surface-Treated Pavements*, details condition states for paved roads and their corresponding values.

Table A3: Gravel Road Condition States

Condition State	Description
Good	Roadway surface well shaped with shoulder between roundings. Some distress manifestations in slight to moderate class such as loose gravel, dust, potholes, etc. There may be a few soft spots of frost heaving when evaluation is made in late spring. Good drainage for surface run-off on roadway and shoulder.
Fair	Mixture of properly shaped roadway surface and improperly shaped areas. Shoulder distress manifestations such as ponding and overgrowth evident between roundings in slight to moderate class. Various surface distress manifestations present such as washboarding, potholes, etc., in slight to moderate class. Localized breakup may be present.
Poor	Majority of roadway surface improperly shaped. Shoulder distress manifestations in moderate to severe class. Various roadway surface distress manifestations making travel unpleasant because of washboarding, dust, potholes, distortions, etc. Localized breakup areas.

Table A4: Paved Road Condition States

Pavement Condition Index Range	Condition State	Description
80 - 100	Excellent	Pavement is in excellent condition with just a few bumps or depressions from slight surface deformation. No surface defects such as streaking, potholes, or cracking distresses. Ride is very good.
60 - 79	Good	Pavement is in good condition with just a few bumps or depressions from slight to moderate surface deformation. Intermittent slight to moderate surface defects and/or cracking distresses. Ride is good.
40 - 59	Fair	Pavement is in fair condition with intermittent to frequent bumps or depressions from slight to moderate surface deformation. Intermittent to frequent moderate surface defects and/or cracking distresses. Ride is fair.
20 - 39	Poor	Pavement is in poor condition with frequent bumps or depressions from moderate surface deformation. Frequent moderate to severe surface defects and/or cracking distresses. Localized slight to moderate alligatoring crack may be present indicating pavement structural failure. Ride is poor.
0 - 19	Very Poor	Pavement is in very poor condition with extensive bumps or depressions from moderate to severe surface deformation. Extensive to severe surface defects and/or cracking distresses. Frequent slight to moderate alligatoring may be present, indicating pavement structural failures. Ride is very poor.

At the time of assessment, gravel roads in the Township of Machar received a weighted average condition rating of good (2.35 rated on a scale of 1-3). It should be noted that the condition of gravel roads can change quickly based on a variety of factors including traffic volume, weather, and grading frequency. Paved roads received a weighted average PCI rating of 75.33, indicating the Township's paved roads are in good condition. A breakdown of road conditions for gravel roads are displayed in Figure A3, while paved roads are shown in Figure A4. This information is summarized in Table A5 below.

Figure A3: Gravel Road Condition Ratings

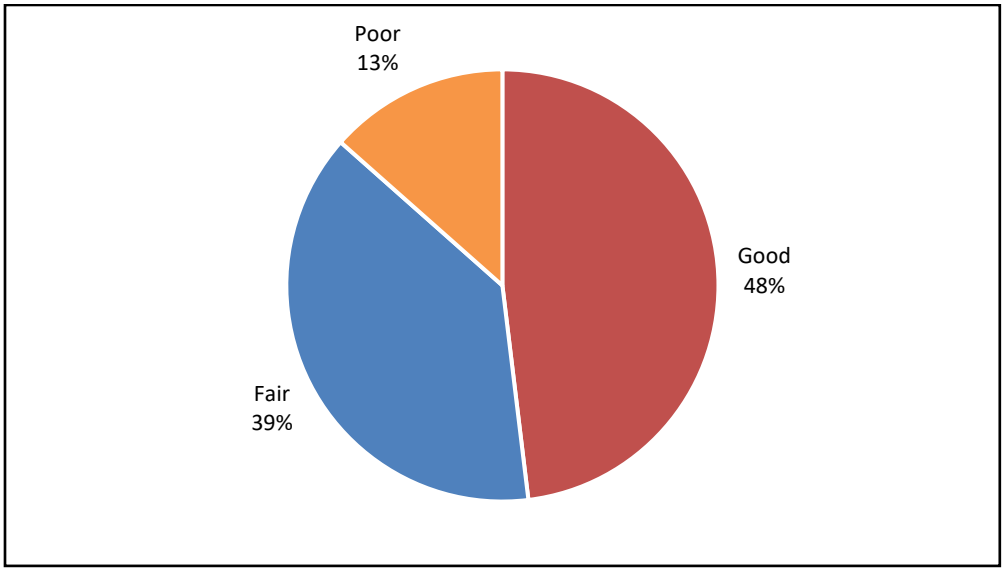


Figure A4: Paved Road Condition Ratings

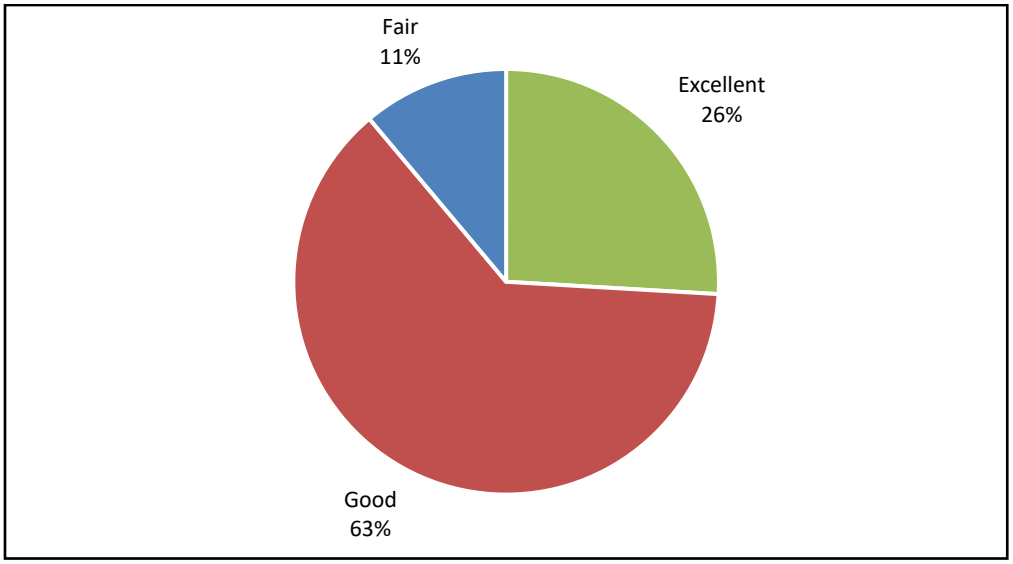


Table A5: Road Network Condition Ratings

Surface Type	Length (KM)	Condition Rating
Gravel	71.34	Fair (2.35)
LCB	44.52	75.33
Total	115.86	N/A

Moving forward, it will be important for the Township to regularly assess the condition of its roads to maintain accurate data and plan accordingly for the future. This may include assessment of the roads by Township staff, as well as studies completed by professional firms. Condition data will need to be updated at minimum every five years as required by O. Reg. 588/17.

Levels of Service

Table A6 below outlines the qualitative descriptions used to determine the community levels of service provided by the Township of Machar's road network.

Table A6: Community Levels of Service - Roads

Service Attribute	Qualitative Descriptions	Performance
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	The Township's road network contains 115.86km of gravel and paved roads which provide travel throughout the Township and access to neighbouring municipalities. Our most heavily trafficked road is Eagle Lake Road, the Township's main arterial road. The Township's road network allows numerous individuals to access areas which may include residential, commercial, and tourist locations, such as Mikisew Provincial Park.
Quality	Description or images that illustrate the different levels of road class pavement condition	Table A3 and Table A4 provide descriptions of road conditions.

Table A7 describes the technical levels of service which relate to the road network.

Table A7: Technical Levels of Service - Roads

Service Attribute	Performance Measure	2024 Performance	Proposed Performance
Scope	Number of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the Township	0.16km/km^2	Maintain Current
	Number of lane-kilometres of collector roads as a proportion of square kilometres of land area of the Township	N/A	Maintain Current
	Number of lane-kilometres of local roads as a proportion of square kilometres of land area of the Township	1.09km/km^2	Maintain Current
Quality	For paved roads in the municipality, the average pavement condition index value	75.33	Maintain Current
	For unpaved roads in the municipality, the average surface condition	2.35 (Good)	Maintain Current

The Township proposes to maintain their road network in its current condition state. The Township has no intention at this time to expand the road network. The decision to increase the number of roads it maintains, or increase the length and width of a road, will likely only be considered in the case of major population growth. This is not a concern at this time.

Lifecycle Management Strategy

Gravel Roads

The assessments for gravel roads are carried out by Township staff. The decision to regravel is often based on two factors: the current condition of the road and traffic levels. Determining a strategy for gravel roads can be challenging as the condition of these roads can change rapidly based on weather, level of traffic, and type of traffic.

To extend the life of gravel roads, preventative maintenance is carried out. These activities include grading, dust suppression, ditching, brushing, and spot/section replacement of gravel. Grading may occur 2-3 times per year on average, while calcium is often added once per year, dependent upon road traffic volumes. Ditching and brushing activities often occur in 10-year cycles.

While much of the lifecycle management strategy is based on the observations of various factors and difficult to predict, the Township can estimate when specific activities are likely needed to occur. The Township's most current Road Needs Study recommends gravel roads be resurfaced every 3-5 years. A generalized lifecycle model, with consideration taken from the Road Needs Study, can be found in Table A8. The average annual cost per centerline kilometer is $7,637. With 71.34km of gravel roads, the total average annual lifecycle capital cost is $544,824.

Table A8: Generalized Lifecycle Model - Gravel Roads

Activity	Cost per Centreline KM	Average Annual Cost per Centreline KM	Age
Regravelling	$38,187	$7,637	5

Surface Treated Roads

In a similar manner to gravel roads, Township staff generally decide to perform specific lifecycle activities on surface-treated roads based on their assessment of the road condition, as well as traffic levels. Preventative maintenance, which may include ditching, brushing, and patching are carried out as needed to extend the life of the road. Micro-surface treatment may also be applied to higher traffic roads to extend road life. When the road is no longer feasible to repair, resurfacing takes place as funds allow.

The Township creates 5- and 10-year capital roads plans which assists in the budgeting process. However, the plan is not static. Based on assessments of the roads, the decision may be made to amend the capital plan to meet the greatest needs first. A lifecycle model, found in Table A9, provides a general outline of which activities are typically considered when completing capital projects on road assets.

Table A9: Generalized Lifecycle Model - Surface Treated Roads

Activity	Cost per Centreline KM	Average Annual Cost per Centreline KM	Age
SST	$19,250	$2,750	5-7
Microsurface	$37,000	$5,286	5-7
Pulverize and DST/Full Reconstruction	$98,500	$4,925	14-20
Total	$154,750	$12,961	

Based on this lifecycle model, the average annual lifecycle capital cost is $577,024 for 44.52km of LCB roads. Table A10 outlines the total average annual lifecycle costs for roads.

Table A10: Average Annual Lifecycle Costs - Roads

Surface Type	Average Annual Lifecycle Cost
Gravel	$544,824
LCB	$577,024
Total	$1,121,848

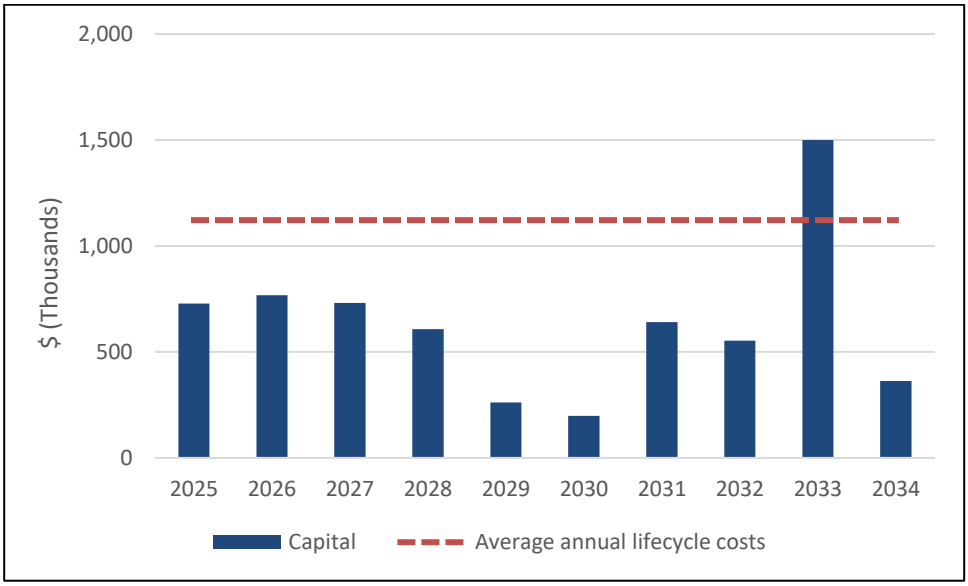
To meet the proposed levels of service for roads (maintain current overall rating of good), the Township will need to continue to perform the maintenance and lifecycle activities listed above. Annual investment in roads will need to increase to keep up with the replacement of roads coming due for rehabilitation or replacement.

There are always risks associated with the lifecycle activities which have been suggested above. It is important that the Township be prepared to mitigate any of these potential risks. Some of the risks may include: faster asset deterioration than anticipated, higher rehabilitation/replacement costs than anticipated, upgrades required to meet current design standards, and incorrect growth assumptions.

Figure A5 displays the 10-year forecast for the estimated annual capital funding requirements. Expenditures are not expected to be even and, therefore, plans should be made with this in mind. Strategies could include adjusting the timeline for which certain projects take place or contributing to reserves for known future projects. It should be noted that the figures may be imprecise to a degree because of the uncertainty of the last date of resurfacing for many gravel roads.

The large funding increase required in 2033 is related to Eagle Lake Road coming due for resurfacing. As the Township's main arterial road, it is a crucial part of the road network. Various funding options, such as grants, will be explored when it comes time to resurface the road.

Figure A5: 10-Year Capital Forecast – Roads



Bridges and Culverts

State of Local Infrastructure

The Township's inventory of bridges and culverts contains six structures. This includes four structural culverts and two bridges. Structural culverts are defined as spanning 3 metres or greater. The bridge and culvert assessments are based on the Ontario Structure Inspection Manual (OSIM) inspections completed in 2024.

It is estimated that the average useful life of the bridges and structural culverts is 75 years; however, this can vary depending on numerous factors. The average age of the Township's bridges is 35 years, while culverts have an average age of 40 years.

The cost to replace all bridges and structural culverts, in 2024 dollars, is $6,150,000. A breakdown of the current replacement values for these assets is shown in Table A11.

Table A11: Bridge & Culvert CRVs

Structure Type	Number of Assets	Current Replacement Value
Bridges	2	$3,200,000
Structural Culverts	4	$2,950,000
Total	6	$6,150,000

As legislated by the Province of Ontario, it is required that all bridge and culvert structures with a span greater than 3.0 meters be inspected under the direction of a Professional Engineer at no greater than two (2) year intervals. The inspection methodology and reporting must be done in accordance with the Ontario Structure Inspection Manual (OSIM). In compliance with this legislation, the Township of Machar completed its most recent OSIM inspection in 2024, where bridge conditions were assessed and recommendations for improvements provided in the report.

Bridges and culverts, similar to roads, can be rated on a scale called the Bridge Condition Index (BCI). Table A12, derived from the MTO's *Ontario Structure Inspection Manual – 2008* outlines the condition states of these assets. Table A13 outlines the weighted average bridge and culvert condition ratings derived from the 2024 OSIM inspection. It should be noted that BCI is not intended to rate or indicate a structure's safety, rather it is a planning tool developed by the Ontario ministry of Transportation to help schedule maintenance and rehabilitation work.

Table A12: Bridge & Culvert Condition States

BCI Range	Condition State	Description
70-100	Good	Not typically any maintenance required within the next five years.
60-69	Fair	Maintenance work needed within the next five years.
0-59	Poor	Maintenance work needed within one year. Structure may require a load restriction.

Table A13: Bridge & Culvert Condition Ratings

Structure Type	Number of Assets	Condition (Weighted Average)
Bridges	2	72
Structural Culverts	4	67
Total	6	70

Moving forward, it will be important for the Township to continue with inspections every two years so that maintenance, repairs, and replacement are planned and carried out at the time which is most cost effective, without compromising safety.

Levels of Service

Table A14 below outlines the qualitative descriptions used to determine the community levels of service provided by the Township of Machar's bridges and culverts.

Table A14: Community Levels of Service - Bridges & Culverts

Service Attribute	Qualitative Descriptions	Performance
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	The Township of Machar has two bridges and four structural culverts. Structural culverts are classified as spanning 3 metres or greater. None of the bridges have loading or dimensional restrictions. This allows various types of vehicles to cross over the bridges without restriction, including heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, and cyclists.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges	Table A12 provides descriptions of bridge and culvert conditions.
	Description or images of the condition of culverts and how this would affect use of the culverts	

Table A15 describes the technical levels of service which relate to the bridges and culverts.

Table A15: Technical Levels of Service - Bridges & Culverts

Service Attribute	Performance Measure	2024 Performance	Proposed Performance
Scope	Percentage of bridges with loading or dimensional restrictions	0%	Maintain Current
Quality	For bridges in the municipality, the average bridge condition index value	72	Maintain Current
	For structural culverts in the municipality, the average bridge condition index value	67	⬆

The Township intends to maintain its bridges so that none require load restrictions, and the bridge condition index value remains above 70. This will be achieved through ongoing maintenance, repair, and replacement of various bridge components.

The Township hopes to increase the BCI value for culverts through replacement and rehabilitation. The Township believes this proposed performance to be achievable within the next ten years through planned capital projects, including the replacement of the large Municipal Rd N Culvert scheduled for 2025, as well as the rehabilitation of the Black Creek Culvert on Eagle Lake Rd.

Lifecycle Management

The OSIM reports required every two (2) years are utilized as a short- and medium-term planning tool for bridge and structural culvert repair, rehabilitation, and replacement. The report provides recommended activities to occur on the assets within the following ten (10) years, with priority rankings provided. Township staff review maintenance and repair options to ensure activities occur at the best value for the lowest cost, so that the Township is maintaining its current inventory and striving to meet its proposed levels of service.

Bridges are generally described as having a 75-80-year expected useful life; however, maintenance, repairs, and rehabilitation activities may increase their life. Table A16 outlines a generalized lifecycle model for bridges.

Table A16: Generalized Capital Lifecycle Model – Bridges

Activity	Age
Minor Rehabilitation	25
Major Rehabilitation	50
Replacement	80

Steel culverts have an estimated 45-60-year useful life. Table A17 outlines a generalized lifecycle model for steel culverts. Table A18 outlines the general lifecycle model of concrete culverts, which have an estimated 100-year useful life. It should be noted that routine maintenance, as well as rehabilitation can extend the life of these assets.

Table A17: Generalized Capital Lifecycle Model – Steel Culverts

Activity	Age
Minor Rehabilitation	25
Major Rehabilitation	40
Replacement	60

Table A18: Generalized Capital Lifecycle Model – Concrete Culverts

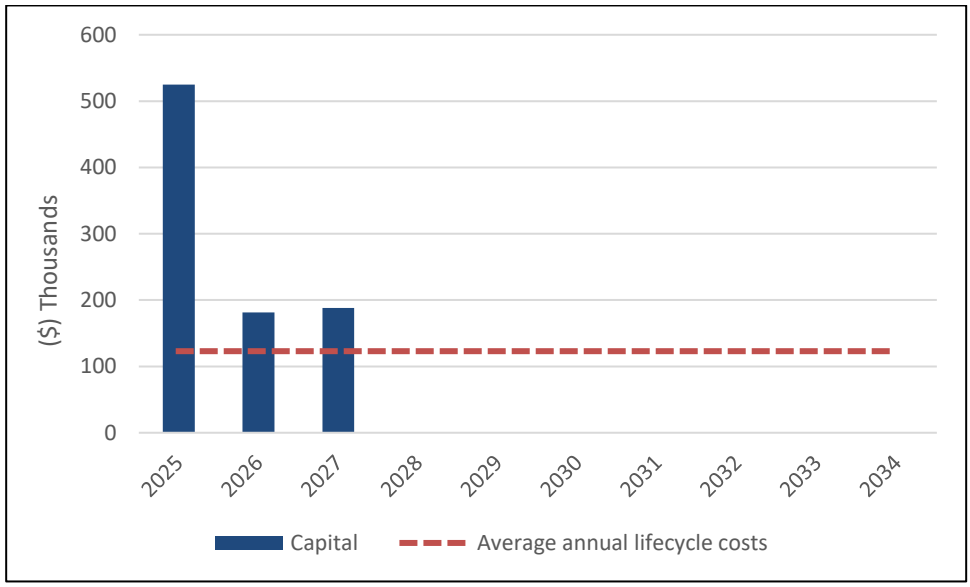
Activity	Age
Minor Rehabilitation	30
Major Rehabilitation	50
Replacement	100

The 2022 OSIM Report suggests budgeting approximately 2%, or $123,000, of the overall replacement value of the Township's entire structure inventory annually to maintain the current system. In addition to the $123,000 annual amount, the 2024 OSIM report recommended $745,000 in capital work be completed. Of the $745,000, $450,000 is estimated for the replacement of the large Municipal Rd N culvert which is scheduled to be completed Summer 2025. In addition to the recommended capital work in the 2024 OSIM Report, the Township performs preventative maintenance in an attempt to preserve the current condition of the assets and slow deterioration. Maintenance may include sweeping, replacing missing nuts/bolts, installing appropriate signage, removing debris, maintaining proper drainage, etc. It should be noted that repair and maintenance activities, although planned, can change based on a number of factors such as different than expected rate of deterioration, updated condition assessments, or varying growth patterns. The Township monitors changes in assets and updates plans accordingly.

Risks must be recognized and mitigated as greatly as possible in relation to the lifecycle activities mentioned above. Some of the risks of lifecycle activities include, but are not limited to: increasing regulatory requirements, weather patterns, incorrect useful life assumptions, premature asset failure, and higher maintenance and rehabilitation costs than expected.

The generalized lifecycle models for bridges and culverts, as well as recommendations and estimates from the 2024 OSIM Report, have been used to develop a 10-year forecast for lifecycle activities. Figure A6 shows the estimated annual capital funding requirements for the next ten (10) years. Since the expenditures are not estimated to be the same each year, planning ahead with the use of scheduling and reserves should be considered.

Figure A6: 10-Year Capital Forecast - Bridges & Culverts



Buildings

State of Local Infrastructure

The Township of Machar is responsible for operating five (5) buildings. These buildings are used for municipal and recreational use. They are a key part in carrying out the day-to-day operations of the Municipality and providing a high level of service to residents and visitors.

The average age of the buildings is 43 years (weighted by replacement value). The Township is working on updating its inventory going forward to calculate the average age by asset component; however, current data is not advanced enough at this time for that figure.

The cost to replace the Township's buildings, based on 2024 insurance estimates, is $1,960,200. A breakdown of these costs can be found in Table A18.

Table A18: Building CRVs

Department	Number of Buildings	Current Replacement Value
Administration	1	$486,200
Public Works - Roads	2	$1,127,500
Public Works - Landfill	1	$200,400
Parks	1	$146,100
Total	5	$1,960,200

Staff assessments have been carried out to determine the condition ratings of the Township's buildings. Buildings were assessed on a scale ranging from excellent to very poor. This scale along with corresponding descriptions can be found below in Table A19.

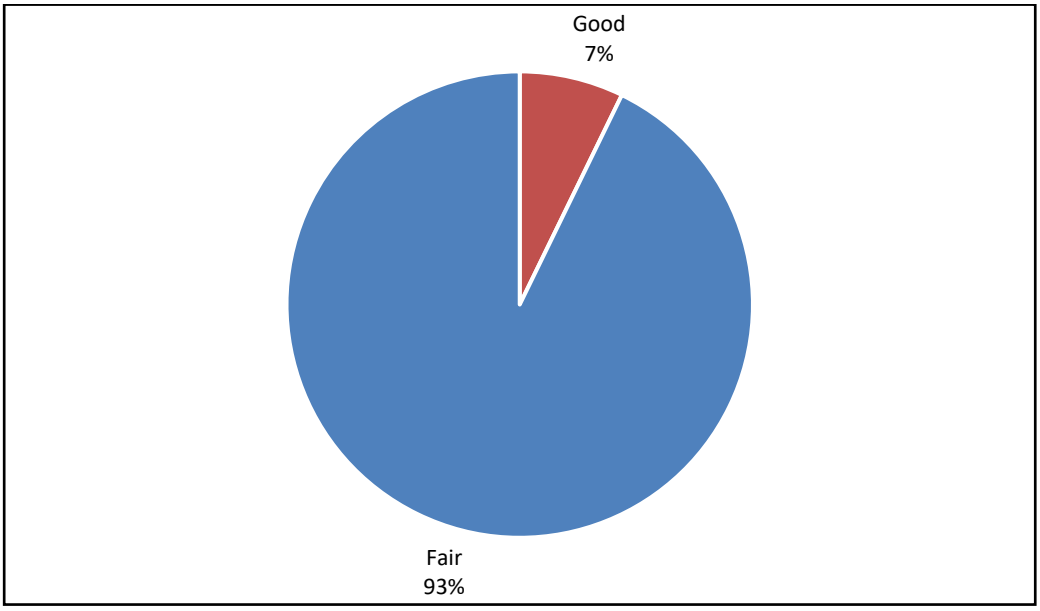
Table A19: Building Condition States

Condition State	Description
Excellent	Like new condition. No defects.
Good	Minor defects noticeable. Minimal repairs needed.
Fair	Some defects/deterioration in occurrence. Use of the asset not greatly affected. Some repairs needed.
Poor	Major defects/deterioration. Function of asset severely affected. Major rehabilitation or replacement is needed.
Very Poor	Asset is no longer functional. Replacement is needed.

The most recent assessment of buildings shows that the average condition rating is fair, based on the weighted replacement value. This indicates that buildings in the Township may need some repairs; however, the use of the buildings is not generally affected by these needs and

service can continue to be provided. Condition ratings distributed by current replacement value can be viewed in Figure A7.

Figure A7: Building Condition Ratings



Moving forward, it is important that regular inspections be carried out to identify maintenance and repair needs so that use of the buildings is uninterrupted.

Levels of Service

Table A20 outlines the qualitative descriptions used to determine the community levels of service provided by the Township of Machar's buildings.

Table A20: Community Levels of Service – Buildings

Service Attribute	Performance
Quality	The Township maintains its buildings to a level that provides good user experiences.

Table A21 describes the technical levels of service which relate to the Township's buildings.

Table A21: Technical Levels of Service – Buildings

Service Attribute	Performance Measure	Performance	Proposed Performance
Quality	The average condition rating of all buildings in the Municipality	Fair	Rating ≥ Fair
	Number of inspections carried out annually	Not Currently Available	N/A

The Township proposes to maintain the condition ratings of buildings at a minimum of fair through ongoing maintenance and repairs, as well as planning for the replacement of its existing buildings as necessary. As the buildings continue to age, it is important to monitor their conditions. The buildings need to be able to facilitate the administration of Council's policies. The physical structures of the buildings must be adequate to serve the public and carry out necessary tasks, they must be accessible, and they must have the necessary capacity to facilitate staff and the public.

The proposed level of service for buildings is possible in the long-term through planning and the use of reserves. It is important for regular maintenance and repairs to occur to keep current buildings in good condition. Due to the high costs anticipated for building upgrades or replacement, it will be important for the Township to transfer money to reserves to pay for these activities as they come due so that large tax rate increases do not occur at the time in which these activities occur.

The Township hopes to implement detailed tracking of building inspections carried out so that deficiencies and improvements are accurately followed. This will allow Council and staff to make informed decisions regarding the buildings.

Lifecycle Management

The current lifecycle management strategy for buildings relies upon accounting useful life estimates, as well as condition assessments. Buildings are currently amortized in accounting records over 50 years. This is the estimated useful life used in this Plan. However, it should be noted that the life of buildings may be extended well beyond 50 years through preventative and normal maintenance, minor and major rehabilitation, and component replacement. These activities may include component replacement, regular cleaning, groundskeeping, and inspections. Failure of building assets can pose great risks to the Township due to their critical role in operations, as well as the costliness and complexity to replace. Some risks related to the

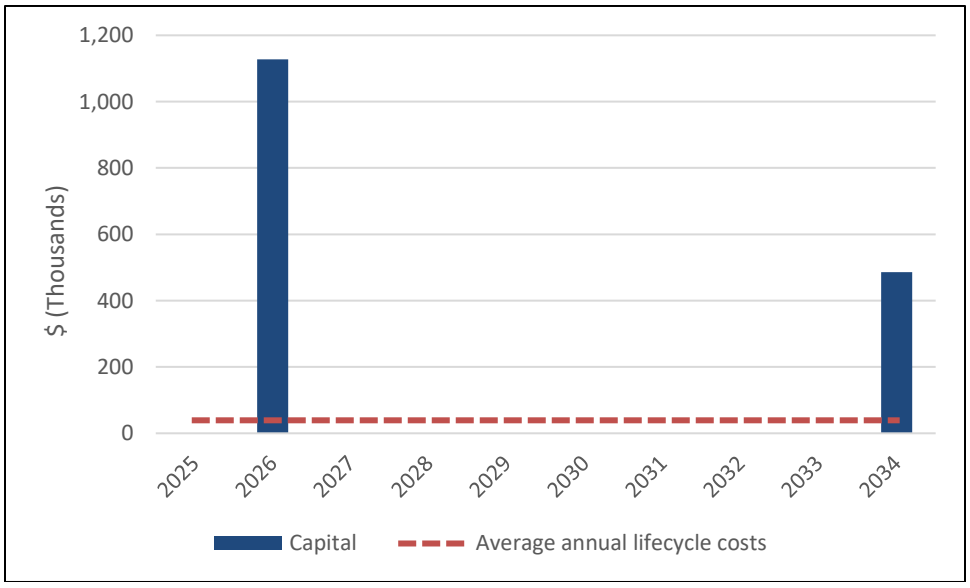
lifecycle activities of buildings include: cost and incorrect timing of component replacement and complexity of planning/zoning/building regulations.

As age of components for each building are not known in entirety, the lifecycle strategy includes only replacement of the buildings at 50 years old. With the maintenance, repairs, and component replacement carried out by the Township, it is anticipated that buildings will last longer than the accounting useful life. The average annual lifecycle costs have been estimated and are shown in Table A22. Figure A8 shows the estimated annual capital funding needs for the next 10 years. It should be noted that this graph is based on replacement of each building every 50 years. In practice, it is more likely that costs will be smoother as building components are replaced when needed. As data is gathered and buildings are tracked based on component, a lifecycle and financing strategy will become increasingly accurate.

Table A22: Average Annual Lifecycle Costs – Buildings

Asset Class	Average Annual Lifecycle Cost
Buildings	$39,204

Figure A8: 10-Year Capital Forecast – Buildings



Vehicles

State of Local Infrastructure

The Township of Machar's vehicle fleet makes up a crucial component of its entire asset inventory. Five (5) vehicles, including two (2) pick up trucks and three (3) plow trucks, make up this category. These vehicles belonging to the Public Works Department are used in daily operations to carry out the monitoring, maintenance, and improvement of the Township road network. Activities such as patrolling, snowplowing, pothole repair, and gravelling roads are done with the use of these vehicles.

The pick-up trucks were purchased new in 2014 and 2018, while plow trucks were purchased new in 2008, 2013, and 2020. As of 2024, the average age of vehicles, weighted by replacement value, is 10 years.

The cost to replace the entire vehicle fleet, in 2024 dollars, is $1,256,500. A summary of the replacement values is found in Table A23 below.

Table A23: Vehicle CRVs

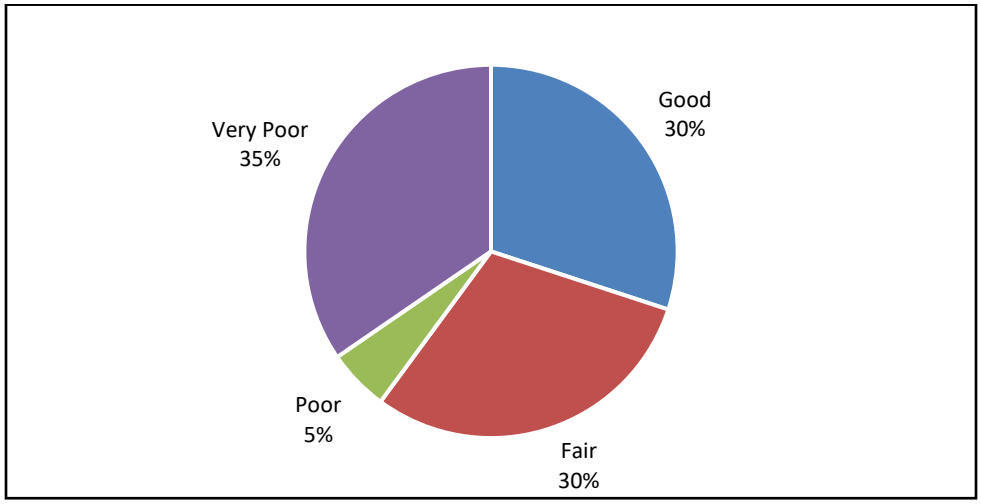
Vehicle	Number of Assets	Current Replacement Value
Pick-Up Truck	2	$124,000
Plow Truck	3	$1,132,500
Total	5	$1,256,500

Condition assessments for vehicle assets are age-based. Condition states are summarized in Table A24. The average condition rating (weighted average) for the assets in this class is fair. Condition ratings by current replacement value can be viewed in Figure A9.

Table A24: Useful Life Condition States

Useful Life %	Condition State	Description
0% - 9%	Excellent	Only normal maintenance required.
10% - 49%	Good	Normal and preventative maintenance required.
50% - 74%	Fair	Some signs of deterioration. Minor repairs expected.
75% - 100%	Poor	Significant signs of deterioration. Major rehabilitation or replacement expected soon.
>100%	Very Poor	Asset beyond useful life. Replacement is required.

Figure A9: Vehicle Condition Ratings



The Township carries out many preventative maintenance and normal maintenance activities on its vehicles. This allows for the use of vehicles beyond their expected useful life, which is not reflected in the condition ratings. It is hopeful for future updates that the Township will be able conduct condition assessments on their vehicles to produce a more accurate condition rating.

Levels of Service

Table A25 below outlines the qualitative descriptions used to determine the community levels of service provided by the Township of Machar's vehicles.

Table A25: Community Levels of Service - Vehicles

Service Attribute	Qualitative Descriptions
Reliability	The Township maintains their vehicles so they are reliable in performing the tasks required.

Table A26 describes the technical levels of service which relate to the Township's vehicles.

Table A26: Technical Levels of Service – Vehicles

Service Attribute	Performance Measure	2024 Performance	Proposed Performance
Reliability	Average reliability of vehicles (rated by staff)	Not Currently Available	N/A
	Average condition rating	Fair	Rating ≥ Fair
	Number of vehicle assets with a condition rating of poor or worse	3	⬇

The Township of Machar proposes to reduce the number of vehicles with a condition of poor or worse, and by doing this increase the average condition rating. Condition assessments carried out on vehicles would provide a more accurate reading of their state, and may change the current condition ratings based on age.

Township staff currently ensure to perform normal and preventative maintenance, as well as repairs, on vehicles. Some of these activities may include component replacement, greasing, oil changes, and regular inspections. The continuation of these activities assists in meeting the levels of service. The replacement of vehicles will also aid the Township in meeting the proposed service levels for vehicles. The Township's oldest plow truck is being replaced in 2025 which will improve the average condition rating. It may be challenging for the Township to continue to meet the proposed performance on a continual basis as it is expensive to repair and replace vehicles. There appears to be a trend of vehicle lifespans becoming shorter, and repair costs increasing, creating financial challenge to the Municipality.

Lifecycle Management

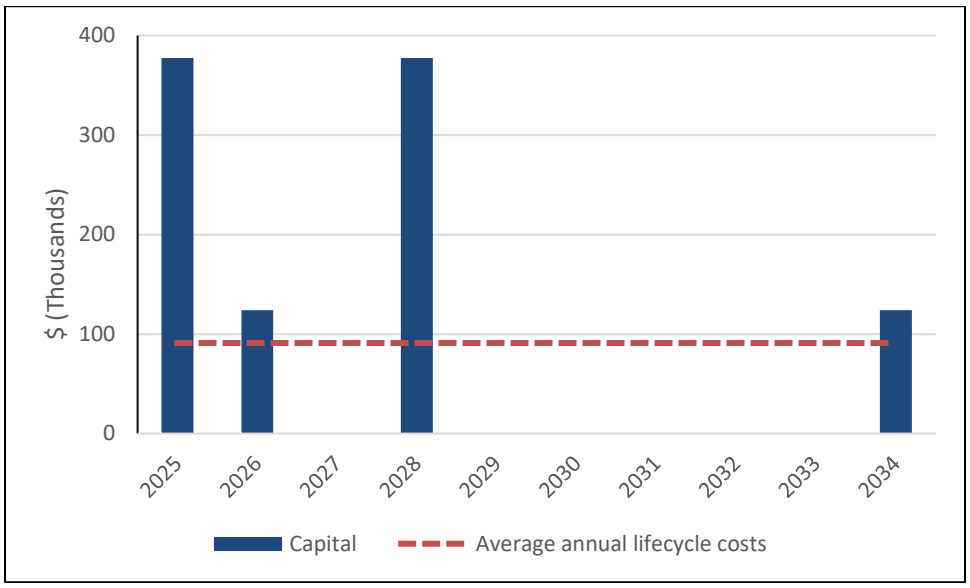
The lifecycle management strategy for vehicles relies heavily upon age-based estimates and accounting useful life figures. Staff and Council will identify the need to replace vehicle assets through a review of the age and condition of vehicles, as well as current maintenance and repair costs. The decision will be made while attempting to achieve the best value for the lowest cost to taxpayers.

The average annual lifecycle costs for vehicles have been estimated by dividing replacement cost by the estimated useful life. These costs are found in Table A27. Figure A10 shows the estimated annual capital funding needs for the next 10 years.

Table A27: Average Annual Lifecycle Costs – Vehicles

Asset Class	Average Annual Lifecycle Cost
Vehicles	$91,000

Figure A10: 10-Year Capital Forecast – Vehicles



Machinery and Equipment

State of Local Infrastructure

The Township of Machar's fleet of machinery and equipment is composed of items from the Administration, Roads, and Landfill Departments. The machinery and equipment are used in daily operations to complete administrative duties, maintain roads, and operate the Landfill.

The average age of machinery and equipment assets, weighted by replacement value, is 8 years. The cost to replace the entire asset class is $1,253,000. A summary of the replacement values, categorized by department, is found in Table A28.

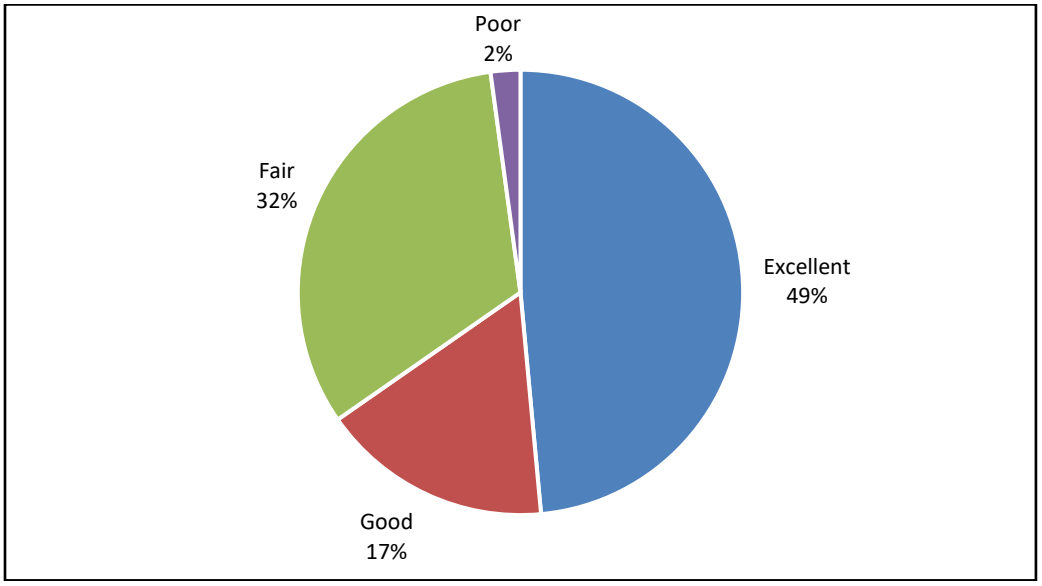
Table A28: Machinery & Equipment CRVs

Department	Number of Assets	Current Replacement Value
Administration	2	$27,000
Public Works - Roads	6	$902,500
Public Works - Landfill	2	$323,500
Total	10	$1,253,000

Condition assessments for machinery and equipment are age-based. Condition states are the same as presented for vehicles, summarized in Table A24. The average condition rating (weighted by replacement value) for the assets in this class is good. Condition ratings distributed by replacement value can be viewed in Figure A11.

The Township carries out preventative and regular maintenance on its machinery and equipment, with the intent of extending the life of the assets. With the maintenance activities performed, there is possibility that some of the condition ratings of the assets based on age are not truly reflective of the asset's condition. In the future, the Township hopes to conduct condition assessments of its assets on an individual basis, producing more accurate ratings and estimations of remaining useful life.

Figure A11: Machinery & Equipment Condition Ratings



Levels of Service

Table A29 below outlines the qualitative descriptions used to determine the community levels of service provided by the Township of Machar's machinery and equipment.

Table A29: Community Levels of Service - Machinery & Equipment

Service Attribute	Qualitative Descriptions
Reliability	The Township maintains their machinery and equipment so they are reliable in performing their required tasks.

Table A30 describes the technical levels of service which relate to machinery and equipment.

Table A30: Technical Levels of Service - Machinery & Equipment

Service Attribute	Performance Measure	2024 Performance	Proposed Performance
Reliability	Percentage of regularly scheduled maintenance performed	Not Currently Available	N/A
	Average condition rating	Good	Maintain Current
	Number of machinery and equipment assets with a condition rating of poor or worse	2	Maintain Current

The Township proposes to maintain its machinery and equipment at the levels which they are operating at now. However, they would like to work towards providing assessment-based, rather than age-based, condition ratings to gain a more accurate representation of these assets.

Like other assets, the Township performs regular maintenance and repairs on machinery and equipment assets, such as oil changes, greasing parts, and component replacement. By continuing with the current activities, the Township can meet its proposed performance for these assets. There is concern, however, regarding the ability to afford replacement of the larger assets (e.g. tractor, loader, compactor, backhoe) as they come due, which pose a risk to smooth operations. Careful planning and use of reserves will be essential to ensuring replacement occurs as needed.

Lifecycle Management

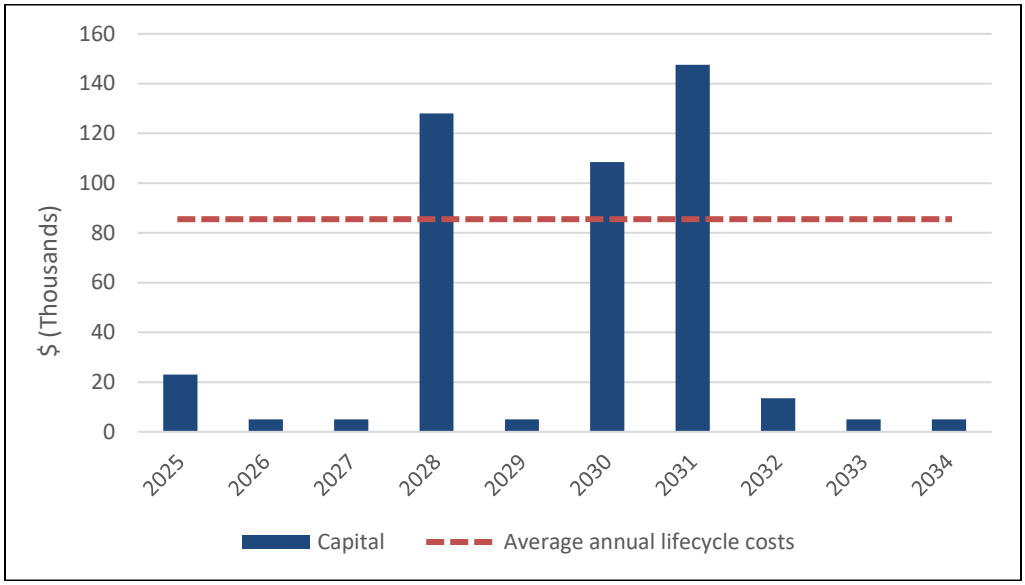
As with vehicles, the machinery and equipment strategy formation has heavily relied upon age-based data and accounting useful life estimates. Township staff will identify machinery and equipment assets which have reached the end of their useful life based on the reliability and effectiveness of the asset along with a cost analysis. The decision for major rehabilitation or replacement will be made by Council, taking into consideration various factors such as cost, funds available, risk, and asset priority.

The average annual lifecycle costs for machinery and equipment have been estimated by dividing the replacement cost by estimated useful life. Table A31 displays the average annual lifecycle costs estimated to be $85,483. Figure A12 presents the estimated annual capital funding needs for the next 10 years.

Table A31: Average Annual Lifecycle Costs - Machinery & Equipment

Asset Class	Average Annual Lifecycle Cost
Machinery and Equipment	$85,483

Figure A12: 10-Year Capital Forecast - Machinery & Equipment



Land Improvements

State of Local Infrastructure

Land improvements include a variety of assets located at multiple spots within the Township. These assets aim to provide an improved level of service to residents and visitors. Land improvement assets include the office parking lot, speed signs, gates, fencing, lighting, water wells for testing, playground equipment, boat launch, and dock.

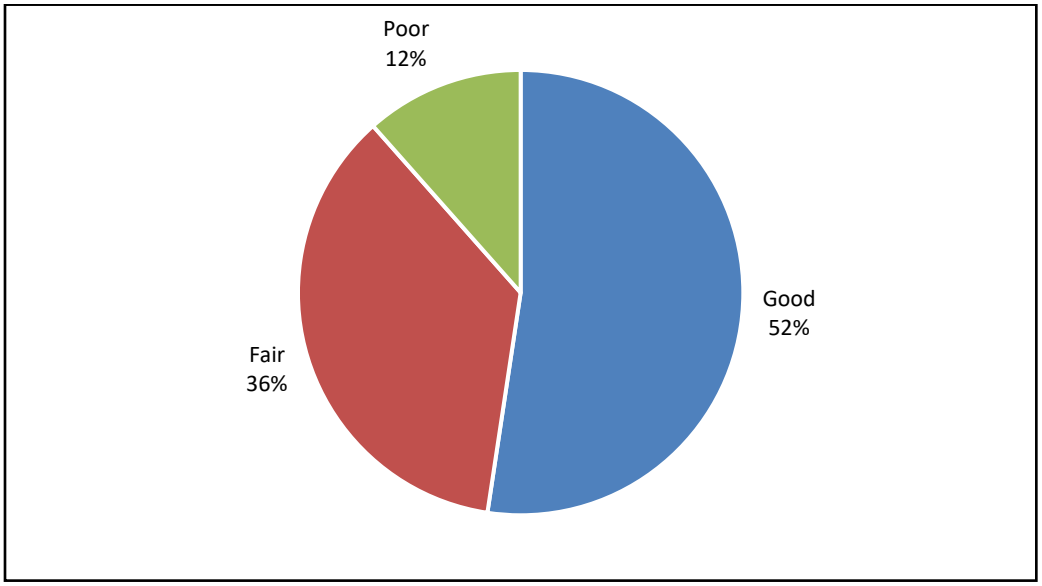
The average age of these assets (weighted by replacement value) is 10 years. The cost to replace the land improvement assets is $307,700. A further breakdown can be found in Table A32 below.

Table A32: Land Improvement CRVs

Department	Number of Assets	Current Replacement Value
Administration	1	$33,000
Public Works - Roads	1	$9,200
Public Works - Landfill	3	$84,000
Parks	4	$181,500
Total	9	$307,700

Condition assessments for land improvement assets are age-based. Condition states are the same as summarized under the *Vehicles* section in Table A24. The average condition rating (weighted) for the assets in this class is good. A breakdown of condition ratings can be viewed in Figure A13. It should be noted that condition based on age does not factor in some maintenance activities that have been performed to extend useful life. Condition assessments of each individual asset would provide the most precise rating. In the future, the Township hopes to conduct condition assessments on these assets to provide a more accurate rating.

Figure A13: Land Improvement Condition Ratings



Levels of Service

Table A33 below outlines the qualitative descriptions used to determine the community levels of service provided by the Township of Machar's land improvements.

Table A33: Community Levels of Service - Land Improvements

Service Attribute	Qualitative Descriptions
Reliability	The Township aims to maintain land improvements so they perform as intended

Table A34 describes the technical levels of service which relate to the land improvements.

Table A34: Technical Levels of Service - Land Improvements

Service Attribute	Performance Measure	2024 Performance	Proposed Performance
Reliability	Average condition rating of land improvement assets	Good	Maintain Current
	Number of land improvement assets with a condition rating of poor or worse	2	⬇

The Township of Machar intends to maintain an average condition rating of good for land improvement assets, while decreasing the number of assets in poor or worse condition. As conditions are age-based for this asset class, it is difficult to determine whether the two assets listed as poor or worse are physically in that condition state. The Township hopes to conduct condition assessments to gain more accurate information.

Lifecycle Management

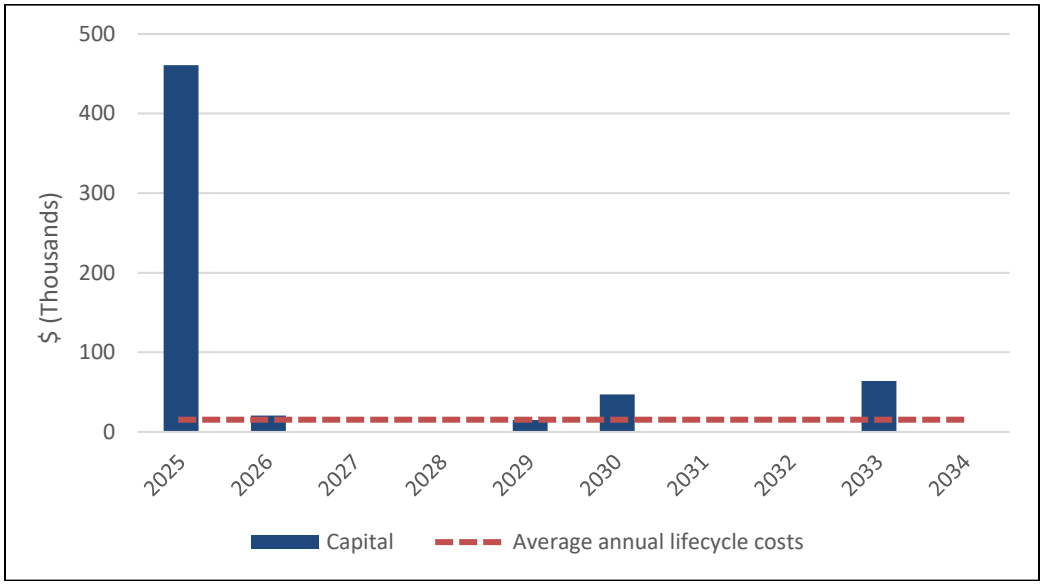
The lifecycle management strategy for land improvements is also age-based. The useful life estimates are based on accounting useful life, and costs are inflated historical amounts. As assets are used and their life is diminished, Township staff will identify the need to replace the assets. Decisions on which assets will be replaced first will be based on the funds available, as well as risk and asset use. Specific lifecycle activities can vary based on the large variety of assets within this asset category. Generally, they may include routine inspections to detect deficiencies, regular maintenance, repairs, and component replacement.

The average annual lifecycle costs have been estimated by dividing replacement cost by the estimated useful life. These costs are found in Table A35. Figure A14 shows the estimated annual capital funding needs for the next 10 years.

Table A35: Average Annual Lifecycle Costs - Land Improvements

Asset Class	Average Annual Lifecycle Cost
Land Improvements	$15,385

Figure A14: 10-Year Capital Forecast - Land Improvements



Population and Economic Growth

The 2021 Census recorded a population of 969, which is a 9.9% increase over the 2016 population count of 882. The annual growth rate is approximately 1.98% per year. The Township is expecting to see more growth and development as individuals continue to move further north as a result of seeking a quieter lifestyle or choosing to retire in the Municipality.

A continued increase in population may necessitate the expansion of the current inventory, and possibly the services provided; however, this would be far into the future. Because growth related expansion is likely very far in the future, it did not impact the lifecycle management or financial strategy within the 10-year timeframe outlined in the Plan. Another factor to be considered would be the need for increased human capital, or skilled employees, to deliver these services. Moving ahead it will be important to consider the effects of growth in relation to various plans, including the Asset Management Plan. The Township will need to consider which services are most crucial and how to fund those services while meeting its proposed levels of service.

Financing Strategy

The financing strategy examines how the assets listed within the Plan can be funded to meet the proposed levels of service outlined for each asset category. The financing strategy will need to be re-evaluated on a regular basis as changes may occur.

If the Municipality proposed to meet levels of service whereby all assets were replaced at the end of their useful life, they would need to spend $1,431,470 annually on capital items, as shown in Table A36.

Table A36: Total Average Annual Lifecycle Costs - Capital

Asset Class	Average Annual Lifecycle Costs
Roads	$1,121,848
Bridges & Culverts	$80,500
Buildings	$39,204
Vehicles	$91,000
Machinery and Equipment	$83,533
Land Improvements	$15,385
Total	$1,431,470

The Township of Machar spent $402,000, $377,000, and $1,628,000 on capital items in 2022, 2023, and 2024, respectively. In 2024, the large increase in capital spending was only possible with the use of reserves. It is not financially feasible for the Township to spend $1,431,470 on capital projects each year, so they have proposed levels of service where assets are extended to meet a life greater than expected, sometimes falling below a condition threshold of good.

The proposed annual capital expenditures for 2025-2034 are shown in Figure A15 below. The expenditure forecast is based on the capital expenditures planned in the 2025 budget, as well as the lifecycle activities identified in the previous sections of this document. The figures included in the expenditure forecast have been inflated at a rate of 3.8% annually, aligning with the 60-year historical average.

Figure A15: Annual Capital Expenditures – Inflated

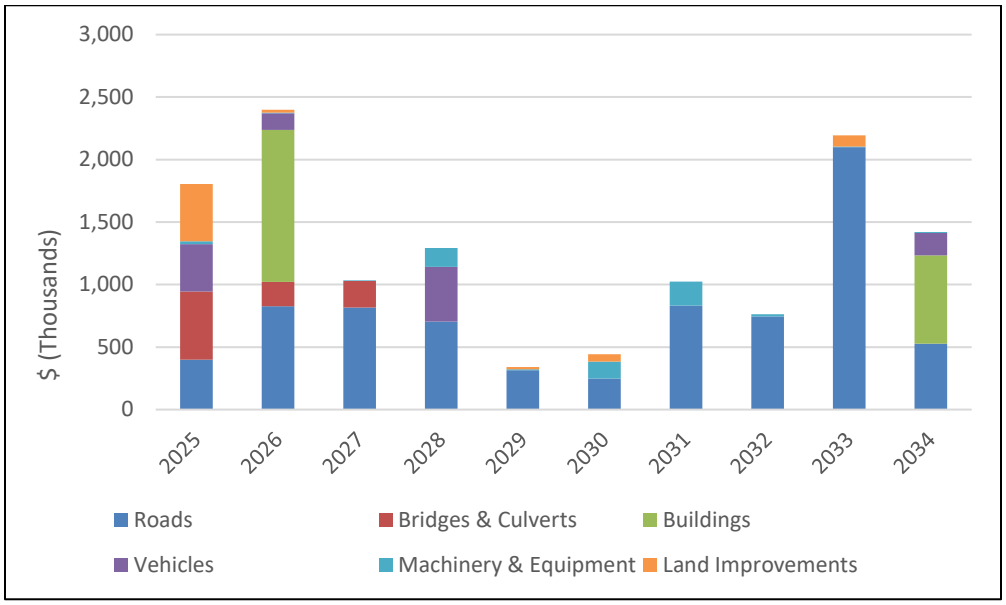


Figure A16 displays a breakdown of total expected capital expenditures with their corresponding operating costs. Operating costs have been based on historical average and inflated based on a rate of 3.8%. Please note the operating expenses do not include expenses not related to a capital asset. It will be important for the Municipality to make use of transfers to and from reserves when planning for the future to smooth tax rate increases year-over-year, eliminating sharp increases and decreases in the required tax levy.

Figure A16: Annual Capital & Operating Expenditures – Inflated

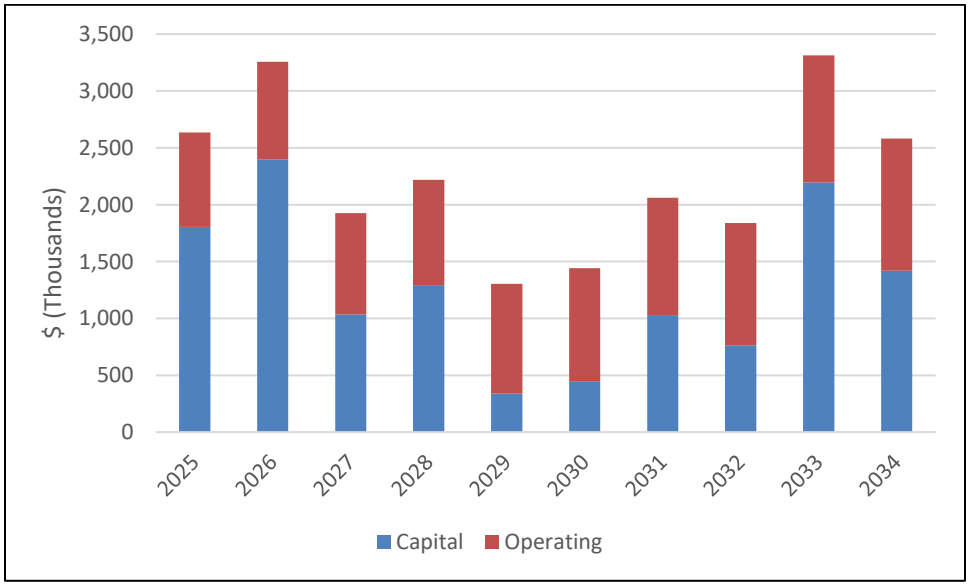
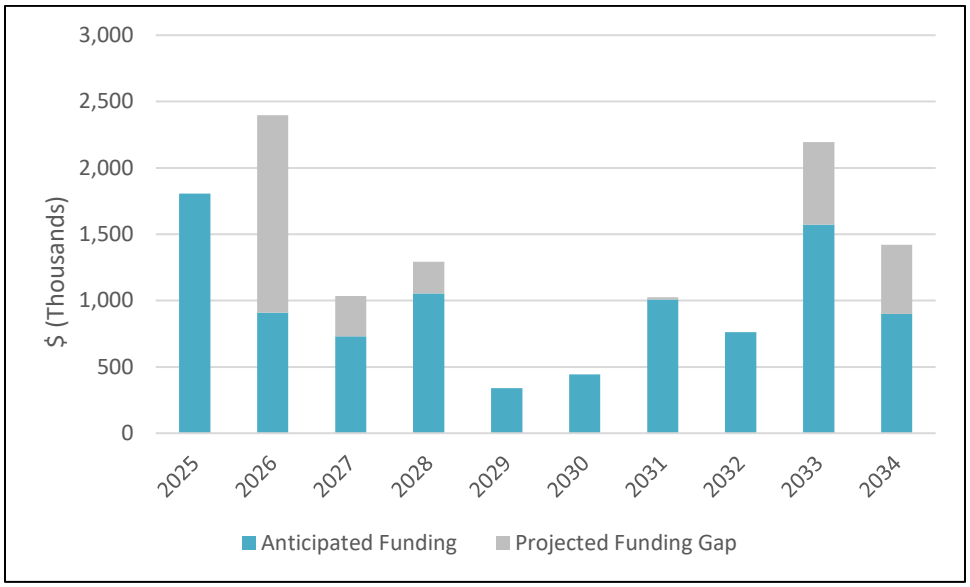


Figure A17 displays the annual funding projected to be available for the Township to carry out capital lifecycle activities and the expected funding gap.

Figure A17: Projected Funding Available – Inflated



It should be noted that the projected funding and funding gap is based on a number of assumptions, and therefore can change when put into practice. The proposed capital projects, specifically for gravel roads, do not include every lifecycle activity at the ideal date. For example, the regravelling of gravel roads should typically occur every 3-5 years; however, the proposed regravelling projects for many roads in this Plan are stretched beyond 5 years to create greater financial feasibility. It is also assumed that there will be a budget increase of 3.8% each year to account for inflation (based on historical inflation rates). This does not include growth related increases or increased responsibilities handed down from higher levels of government. Figure A17 above assumes that for 2026-2034 approximately 10% of the overall Township budget will be set aside for capital projects, other than in years where lower amounts of funding are expected to be required. At the time of this Plan update, the 2025 budget has already been adopted by Council and expected funding and expenses are known or estimated.

The anticipated funding amounts include grants, municipal funds (taxation), and reserve use. Grant funding for 2025 includes the Canada Community Building Fund (CCBF), Ontario Community Infrastructure Fund (OCIF), the Northern Ontario Resource Development Support Fund (Municipal Rd N Culvert replacement), and the Northern Ontario Heritage Fund Corporation (Retaining Wall). Grant funding for 2026-2034 is only expected from the CCBF and OCIF. Funding amounts for the expected continuing grants are based on 2025 funding

allotments. The Township will continue to search and apply for grants to cover the costs of capital projects which have an associated funding gap.

Reserve use will play a key role in the Township's capital plan. Historically the Township has avoided sharp tax levy increases by borrowing from and repaying reserves. It is crucial to ensure reserves are continually being funded so that this trend can continue and the Township remains in good financial standing.

Figure A17 above shows a funding gap in many of the years included. If funding has not been found through other methods such as revenues, grants, or reserves, the Township will have to explore other options such as financing or delaying lifecycle activities. Deferral of lifecycle activities may include, but is not limited to, extending the timeframe in which road resurfacing is completed, component rather than entire asset replacement, or letting assets drop below the desired condition. Decisions to defer lifecycle activities will be made on a case-by-case basis but generally will consider consequences of asset failure, probability of asset failure, and level of usage.

AMP2017

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The 2017 Asset Management Plan for the

Township of Machar

SUBMITTED BY THE PUBLIC SECTOR DIGEST INC. (PSD)
WWW.PUBLICSECTORDIGEST.COM
MAY 2018

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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 Township of Machar's infrastructure portfolio comprises the following asset classes: road network, bridges & culverts, buildings, machinery & equipment, land improvements and vehicles. The asset classes analyzed in this asset management plan for the township had a total 2016 valuation of $11.3 million, of which roads comprised 50%.

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

In addition to observed field conditions, historical capital expenditures can assist the township in identifying impending infrastructure needs, and guide its medium- and long-term capital programs. The township has invested into its infrastructure sporadically over the decades. Investments have fluctuated during since the 1970s to 2016 and they peaked in the early 2000s. During this time, $6.8 million was invested with $3.7 million put into the road network. Since 2015, $190,000 has been invested with a focus on machinery & equipment.

Based on 2016 replacement cost, and age-based condition data, over 22% of assets, with a valuation of $2.6 million, are in good to very good condition; 72% are in poor to very poor condition. The township has provided condition information for 57% of assets based on 2016 replacement cost. Nearly 45% of the assets analyzed in this AMP have at least 10 years of useful life remaining. However, 8%, with a valuation of $851,000, remain in operation beyond their established useful life. An additional 44% will reach the end of their useful life within the next five years.

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

The average annual investment requirement for the above categories is $832,000. Annual revenue currently allocated to these assets for capital purposes is $380,000 leaving an annual deficit of $452,000. To put it another way, these infrastructure categories are currently funded at 46% of their long-term requirements. In 2017, Machar has annual tax revenues of $1,735,000. Our strategy includes full funding being achieved over 20 years by:

- Increasing tax revenues by 1.3% each year for the next 20 years solely for the purposes of phasing in full funding to the asset categories covered in this section of the AMP.
- allocating the current gas tax and OCIF revenue and scheduled increases to the infrastructure deficit as they occur.
- Reallocating appropriate revenue from categories in a surplus position to those in a deficit position.

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

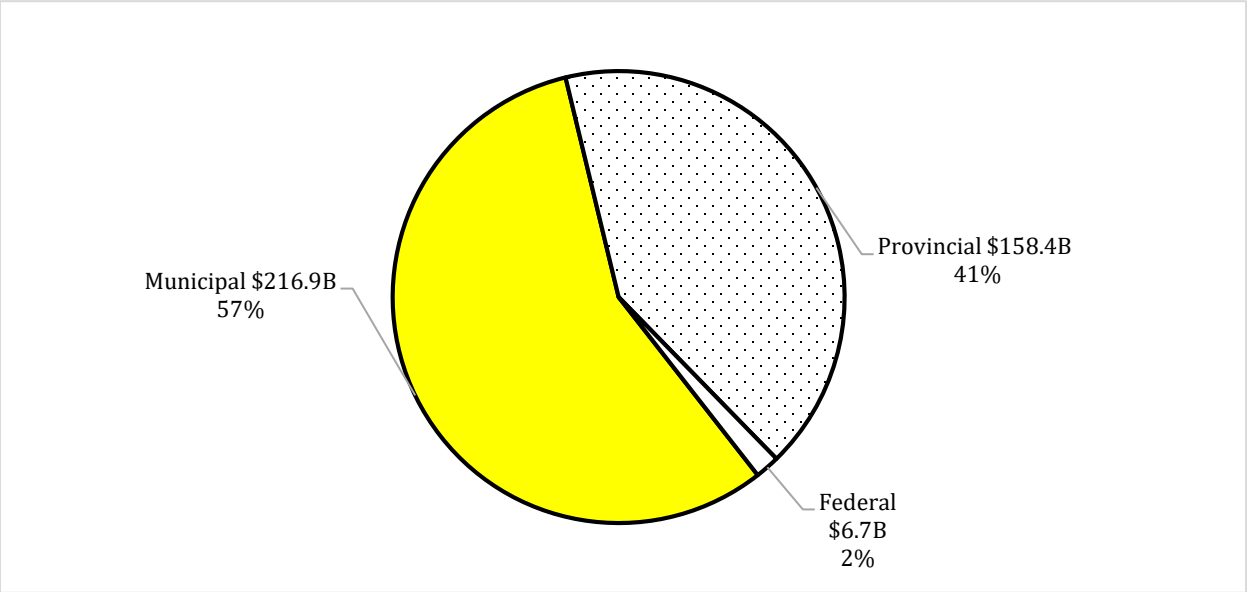
Although our financial strategies allow the township to meet its long-term funding requirements and reach fiscal sustainability, injection of additional revenues will be required to mitigate existing infrastructure backlogs.

A critical aspect of this asset management plan is the level of confidence the township has in the data used to develop the state of the infrastructure and form the appropriate financial strategies. The township has indicated a 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 Township of Machar's capital assets portfolio, as analyzed in this asset management plan (AMP) is valued at $11.3 million using 2016 replacement costs. The township 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 township manage these assets optimally in order to produce the highest total value for taxpayers. This asset management plan, (AMP) will assist the township in the pursuit of judicious asset management for its capital assets.

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

II. Asset Management

Asset management can be best defined as an integrated business approach within an organization with the aim to minimize the lifecycle costs of owning, operating, and maintaining assets, at an acceptable level of risk, while continuously delivering established levels of service for present and future customers. It includes the planning, design, construction, operation and maintenance of infrastructure used to provide services. By implementing asset management processes, infrastructure needs can be prioritized over time, while ensuring timely investments to minimize repair and rehabilitation costs and maintain municipal assets.

Table 1 Objectives of Asset Management

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

1. Overarching Principles

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

Table 2 Principles of Asset Management

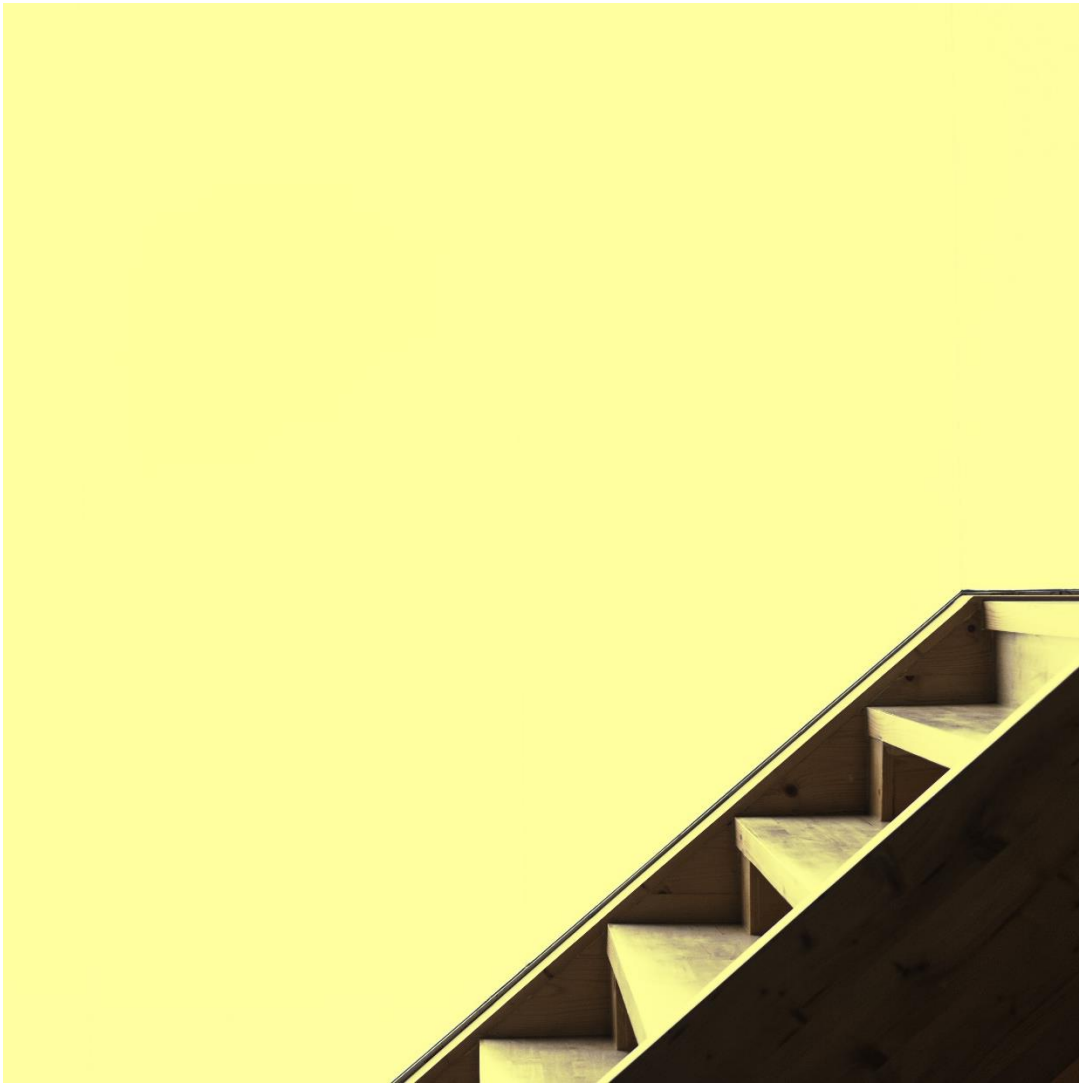
Holistic	Asset management must be cross-disciplinary, total value focused.
Systematic	Rigorously applied in a structured management system.
Systemic	Looking at assets in their systems context, again for net, total value.
Risk-based	Incorporating risk appropriately into all decision-making.
Optimal	Seeking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

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

III. AMP Objectives and Content

This AMP is one component of Machar's overarching corporate strategy. It was developed to support the township's vision for its asset management practice and programs. It provides key asset attribute data, including current composition of the township's infrastructure portfolio, inventory, replacement costs, useful life etc., summarizes the physical health of the capital assets, enumerates the township'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 township's asset management plan in 2013, this AMP is developed in accordance with provincial standards and guidelines, and new requirements under the Federal Gas Tax Fund (GTF) stipulating the inclusion of all eligible asset classes. The following asset classes are analysed in this document: road network; bridges & culverts; buildings; machinery & equipment; land improvements; and vehicles.



IV. Data and Methodology

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

1. Condition Data

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 prior to aggregation and reporting; therefore, many imprecisions that may be highlighted at the individual asset level are attenuated at the class level.

As available, actual field condition data was used to make recommendations more meaningful and representative of the township's state of infrastructure. The value of condition data cannot be overstated as they provide a more accurate representation of the state of infrastructure. The type of condition data used for each class is indicated in Chapter V, Section 2.

2. Financial Data

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

To determine current funding capacity, all existing sources of funding are identified and combined to enumerate the total available funding; funding for the previous three years is analyzed as data is available. These figures are then assessed against the average annual requirements, and are used to calculate the annual funding shortfall (surplus) and for forming the financial strategies.

In addition to the annual shortfall, the majority of 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 township can rely on with a high degree of certainty. Government grants and other ad-hoc injections of capital are not included in this asset management plan given their unpredictability. As senior governments make greater, more predictable and permanent commitments to funding municipal infrastructure programs, e.g., the Federal Gas Tax Fund, future iterations of this asset management plan will account for such funding sources.

3. Infrastructure Report Card

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

Table 3 Infrastructure Report Card Description

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

4. Limitations and Assumptions

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

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

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

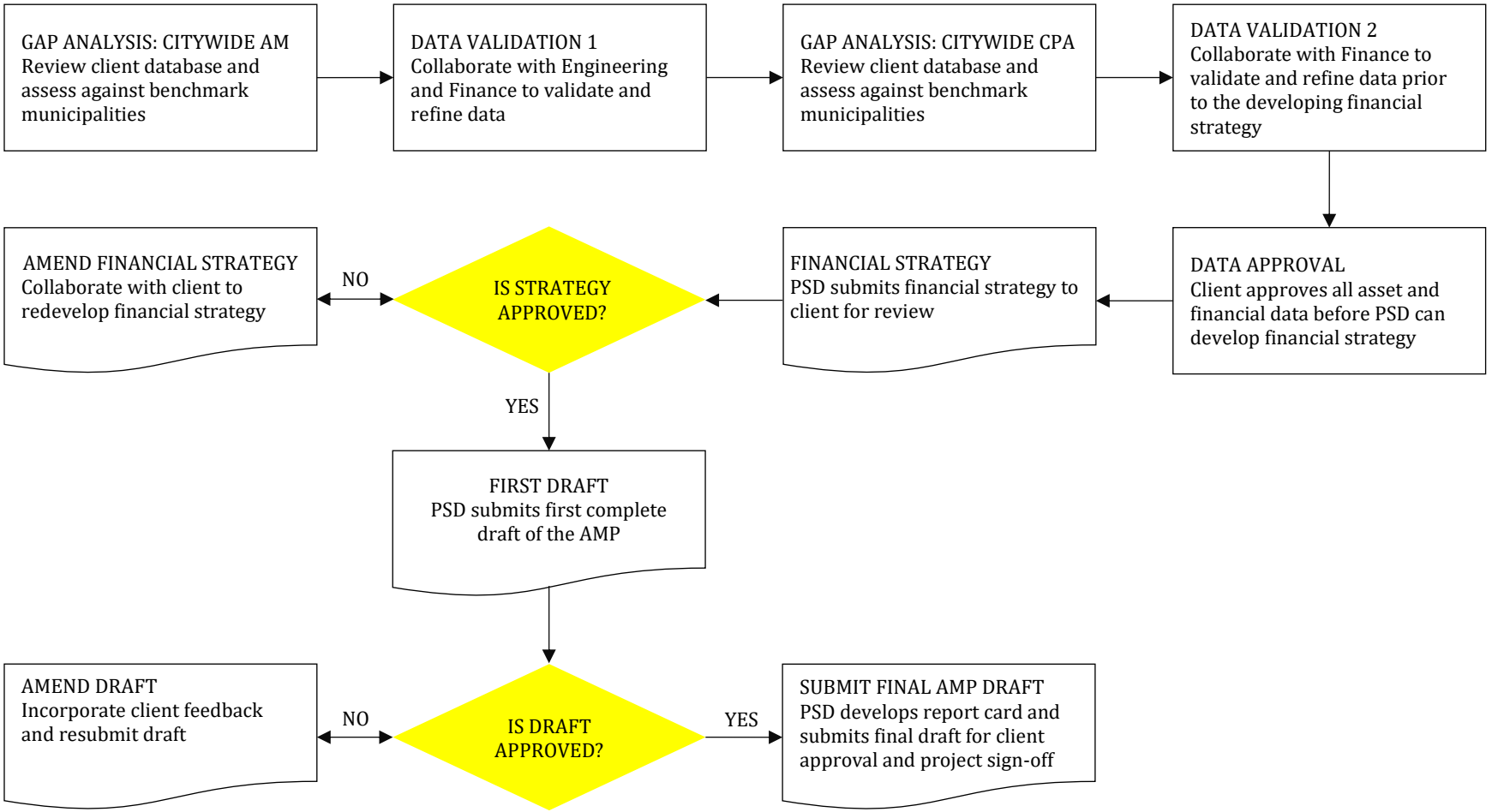
- Our calculations and recommendations will reflect the best available data at the time this AMP was developed.

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

5. Process

High data quality is the foundation of intelligent decision-making. Generally, there are two primary causes of poor decisions: inaccurate or incomplete data, and the misinterpretation of data used. The figure below illustrates an abbreviated version of our work order/work flow process between PSD and township 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 township 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. Township 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 township'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 township's self-assessed score in each factor is then used to calculate data confidence in each asset class using Equation 1 below.

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

V. Summary Statistics

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

1. Asset Valuation

The asset classes analyzed in this asset management plan for the township had a total 2016 valuation of $11.3 million, of which roads comprised 50%, followed by bridges & culverts at 24%. The ownership per household (Figure 4) totaled $12,788 based on 882 households for all asset categories.

Figure 3 Asset Valuation by Class

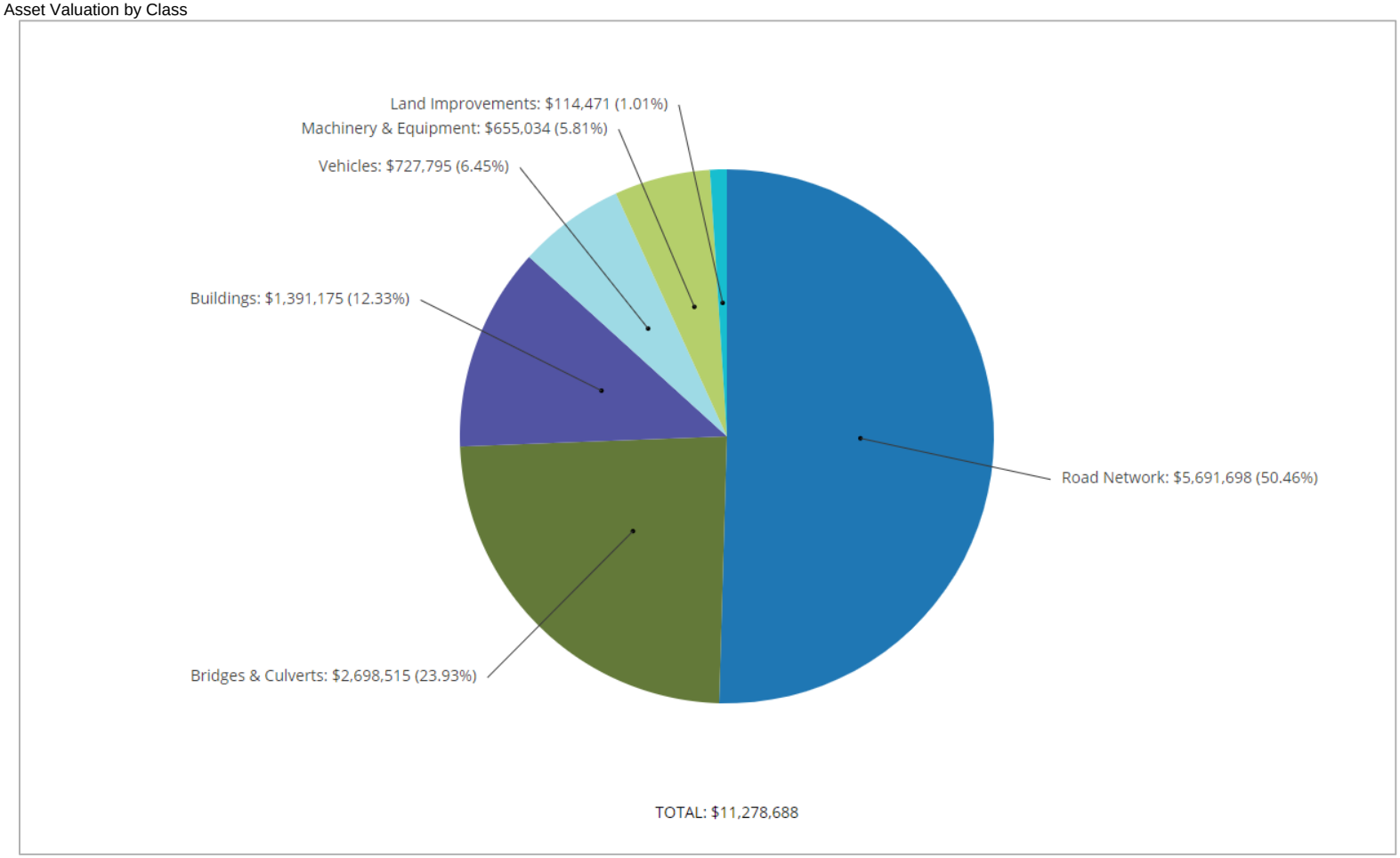
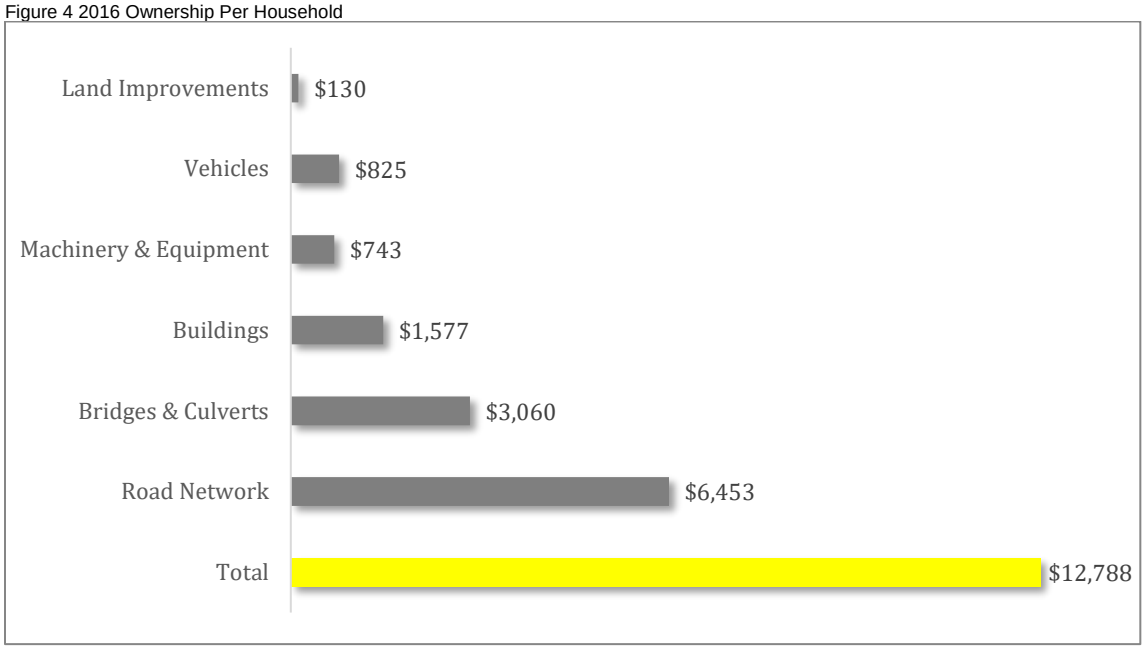


Figure 4 2016 Ownership Per Household



2. Source of Condition Data by Asset Class

Observed data will provide the most precise indication of an asset's physical health. In the absence of such information, the age of capital assets can be used as a meaningful approximation of the asset's condition. Table 4 indicates the source of condition data used for the various asset classes in this AMP. The township has condition data for 44% of all assets based on 2016 replacement cost.

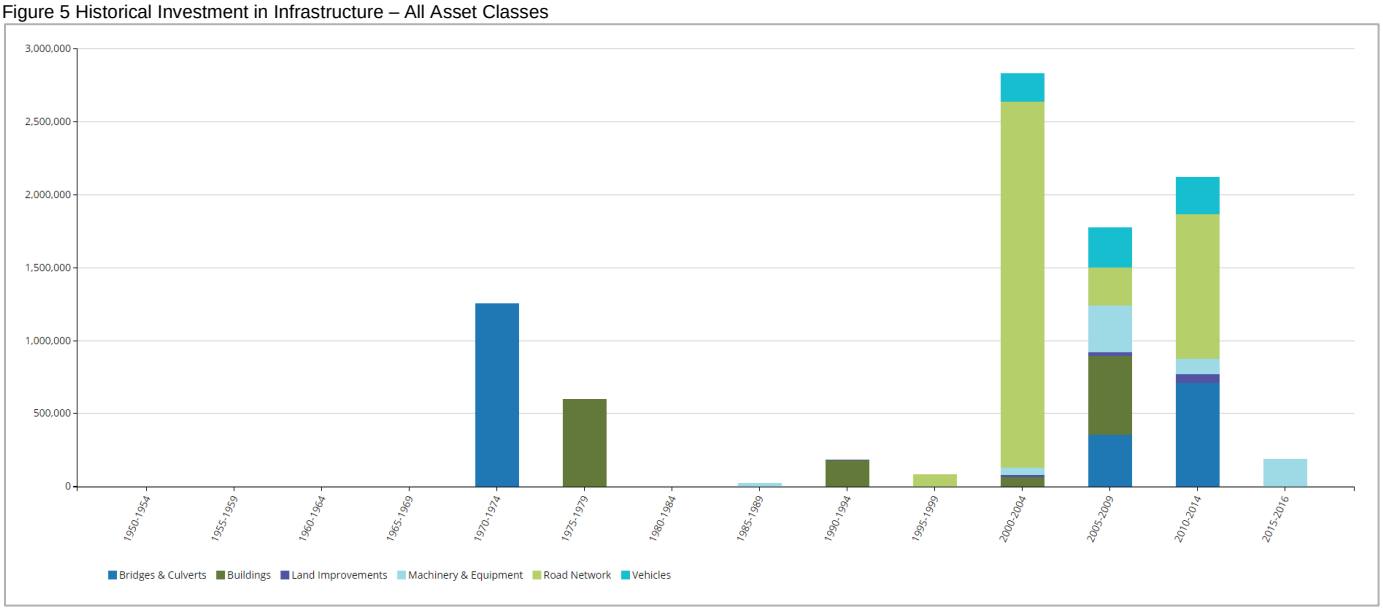
Table 4 Source of Condition Data by Asset Class

Asset class	Component	Source of Condition Data
Roads Network	Paved Surface	49% Assessed – 2013
	Gravel Surface	39% Assessed – 2013
	Remaining segments	Age-based
Bridges & Culverts	Bridges	Age-based
	Culverts	Age-based
Buildings	All	Age-based
Machinery & Equipment	All	Age-based
Land Improvements	All	Age-based
Vehicles	All	Age-based

3. Historical Investment in Infrastructure – All Asset Classes

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

Figure 5 Historical Investment in Infrastructure – All Asset Classes

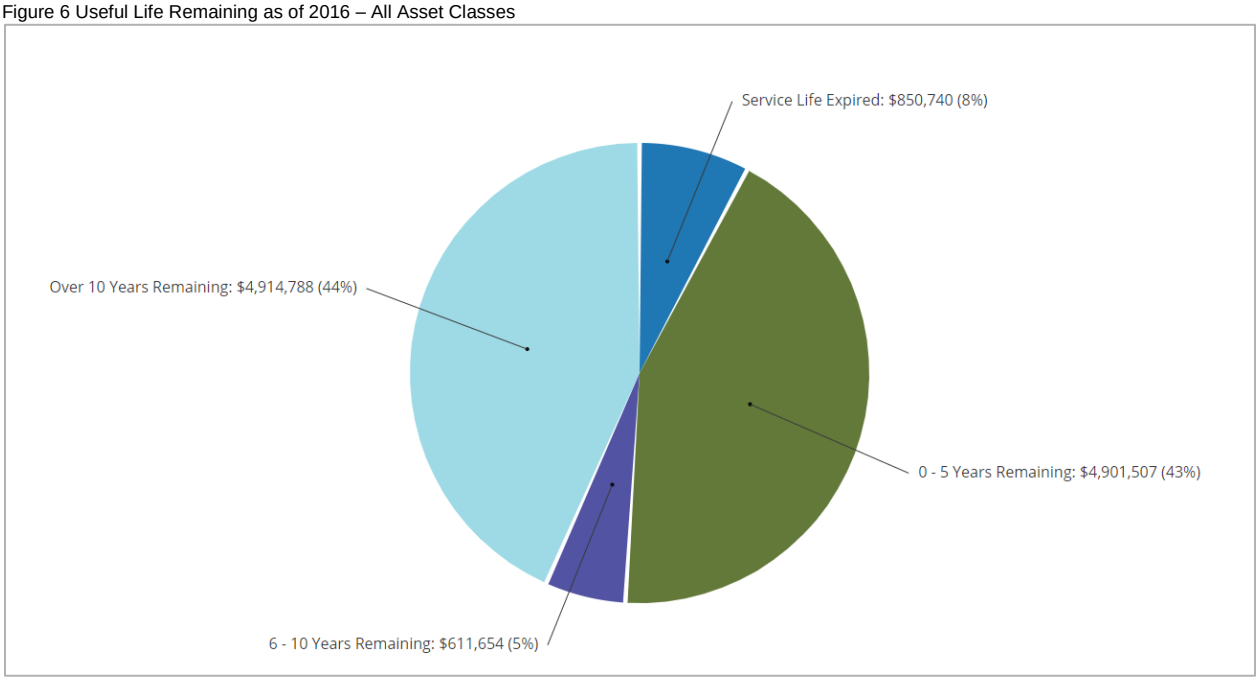


The township began to invest into its infrastructure in 1970 with large investments towards bridges & culverts and buildings. Investments fluctuated between 1980 and late 1990s and peaked in the early 2000s. During this time, $2.8 million was invested with $2.5 million put into the road network. Since early 2000, $6.9 million has been invested with a focus on roads, bridges & culverts and vehicles.

4. Useful Life Consumption – All Asset Classes

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

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

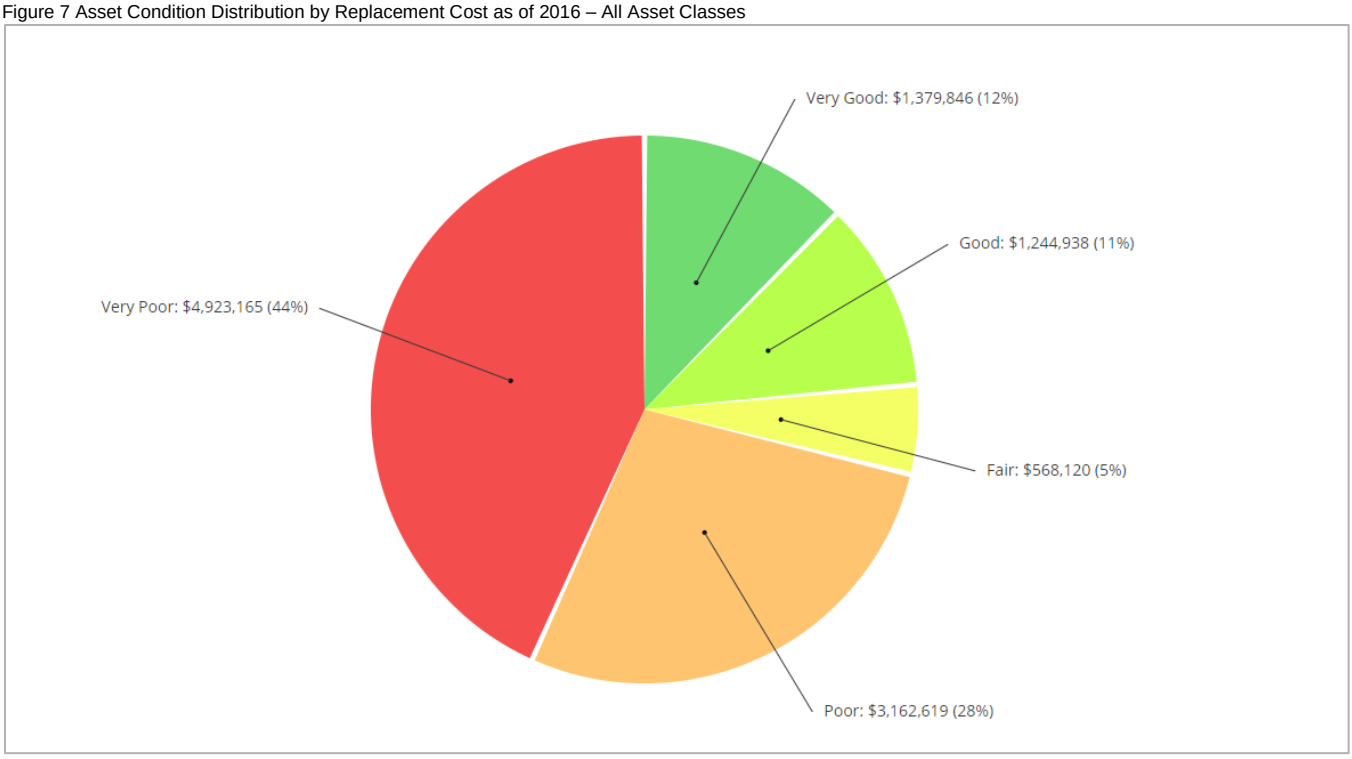


About 44% of the assets analyzed in this AMP have at least 10 years of useful life remaining. However, 8%, with a valuation of $850,000, remain in operation beyond their established useful life. An additional 43% will reach the end of their useful life within the next five years.

5. Overall Condition – All Asset Classes

Based on 2016 replacement cost, and primarily age-based condition data, over 20% of assets, with a valuation of $2.6 million, are in good to very good condition; 72% are in poor to very poor condition.

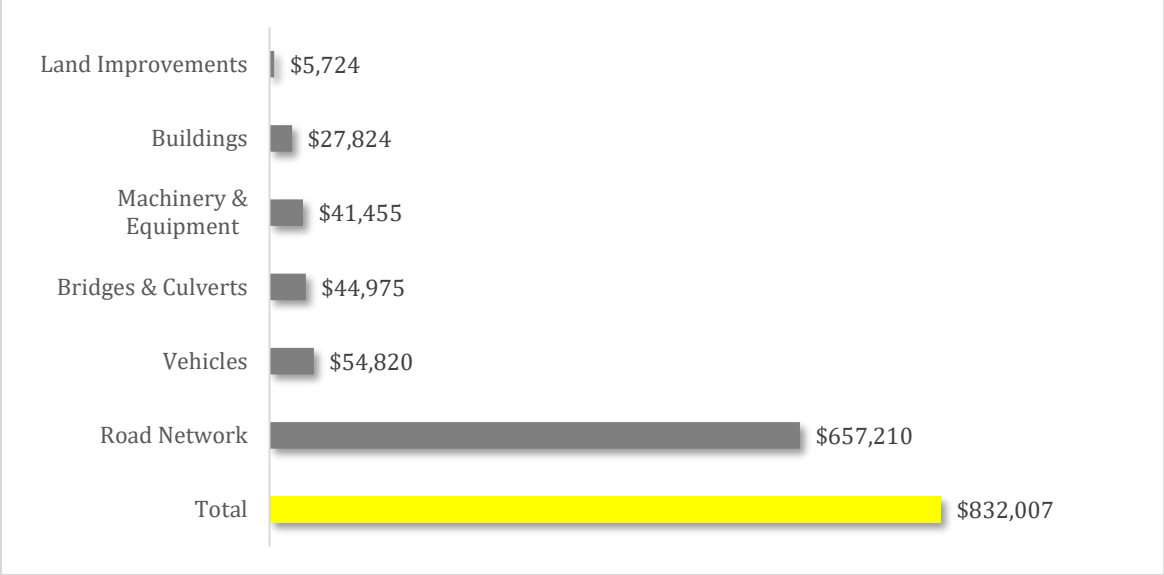
Figure 7 Asset Condition Distribution by Replacement Cost as of 2016 – All Asset Classes



6. Financial Profile

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

Figure 8 Annual Requirements by Asset Class



The annual requirements represent the amount the township should allocate annually to each of its asset classes to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the township must allocate $832,000 annually for the assets covered in this AMP.

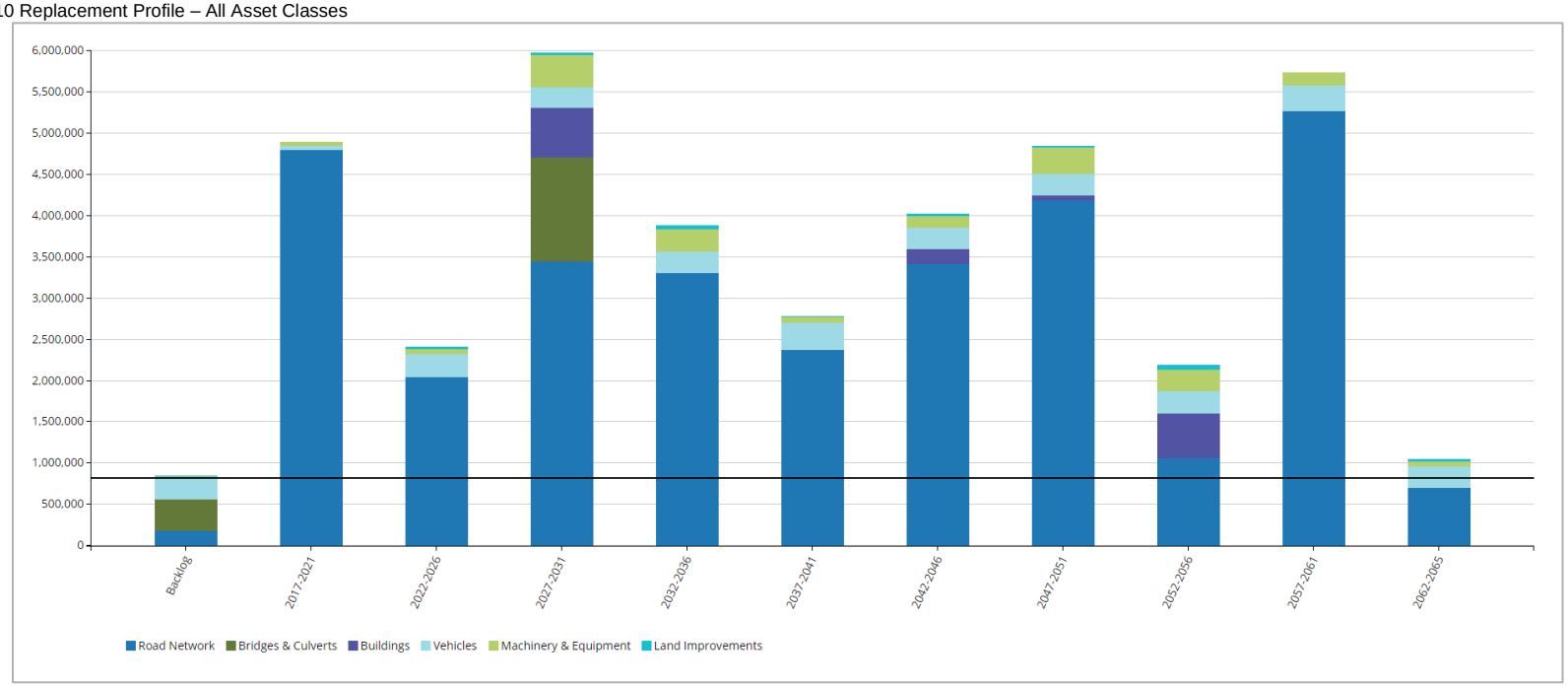
Figure 9 Infrastructure Backlog – All Asset Classes

The township has a combined infrastructure backlog of $638,000, with bridges & culverts comprising 59%. The backlog represents the investment needed today to meet previously deferred replacement needs. In the absence of assessed data, the backlog represents the value of assets still in operation beyond their established useful life.

7. Replacement Profile – All Asset Classes

In this section, we illustrate the aggregate short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's asset classes. The backlog is the total investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 10 Replacement Profile – All Asset Classes



Based primarily on age-based condition data, the township has a combined backlog of $638,000, of which bridges & culverts comprises $375,000. Aggregate replacement needs will total $4.8 million over the next five years. An additional $2.4 million will be required between 2022 and 2026. The township's aggregate annual requirements (indicated by the black line) total $832,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet the replacement needs for its various asset classes as they arise without the need for deferring projects and accruing annual infrastructure deficits. Currently, the township is funding 46% of the annual requirements for tax-funded assets. See the 'Financial Strategy' chapter for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the township to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

8. Data Confidence

The township has a high degree of confidence in the data used to develop this AMP, receiving a weighted confidence rating of 95%. This is indicative of significant effort in collecting and refining its data set.

Table 5 Data Confidence Ratings

Asset Class	The data is up-to-date.	The data is complete and uniform.	The data comes from an authoritative source.	The data is error free.	The data is verified by an authoritative source.	Average Confidence Rating
Road Network	100%	100%	100%	90%	90%	96%
Bridges & Culverts	100%	100%	100%	90%	90%	96%
Buildings	90%	90%	100%	90%	90%	92%
Machinery & Equipment	100%	100%	90%	90%	90%	94%
Land Improvements	100%	100%	90%	90%	90%	94%
Fleet	85%	85%	90%	90%	90%	88%
					Overall Average Data Confidence Rating	93%

VI. State of Local Infrastructure

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

1. Road Network

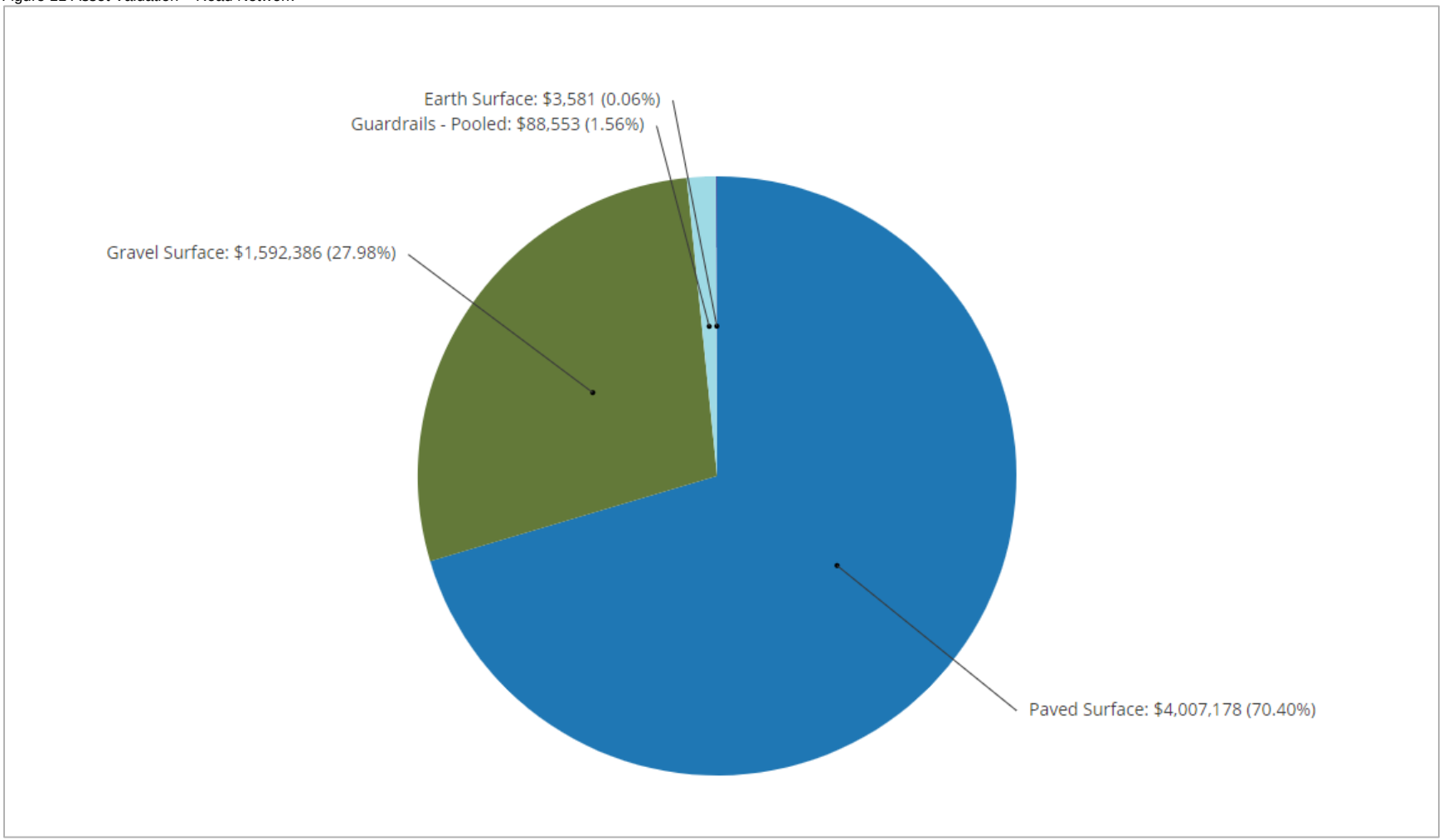
1.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 6 illustrates key asset attributes for the township's road network, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the township's roads assets are valued at $5.7 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the township.

Table 6 Key Asset Attributes – Road Network

Asset Type	Asset Component	Quantity	Useful Life (Years)	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Road Network	Guardrails - Pooled	1	20	NRBCPI (Toronto)	$88,553.00
	Paved Base	45.07km	75	Not Planned for Replacement	-
	Paved Surface	51.22km	8	NRBCPI (Toronto), User-Defined Cost	$4,007,178.00
	Road Base	69.84km	75	Not Planned for Replacement	-
	Earth Surface	.21km	75	NRBCPI (Toronto)	$3,580.50
	Gravel Surface	67.35km	10	NRBCPI (Toronto)	$1,592,386.00
				Total	**$5,691,697.50**

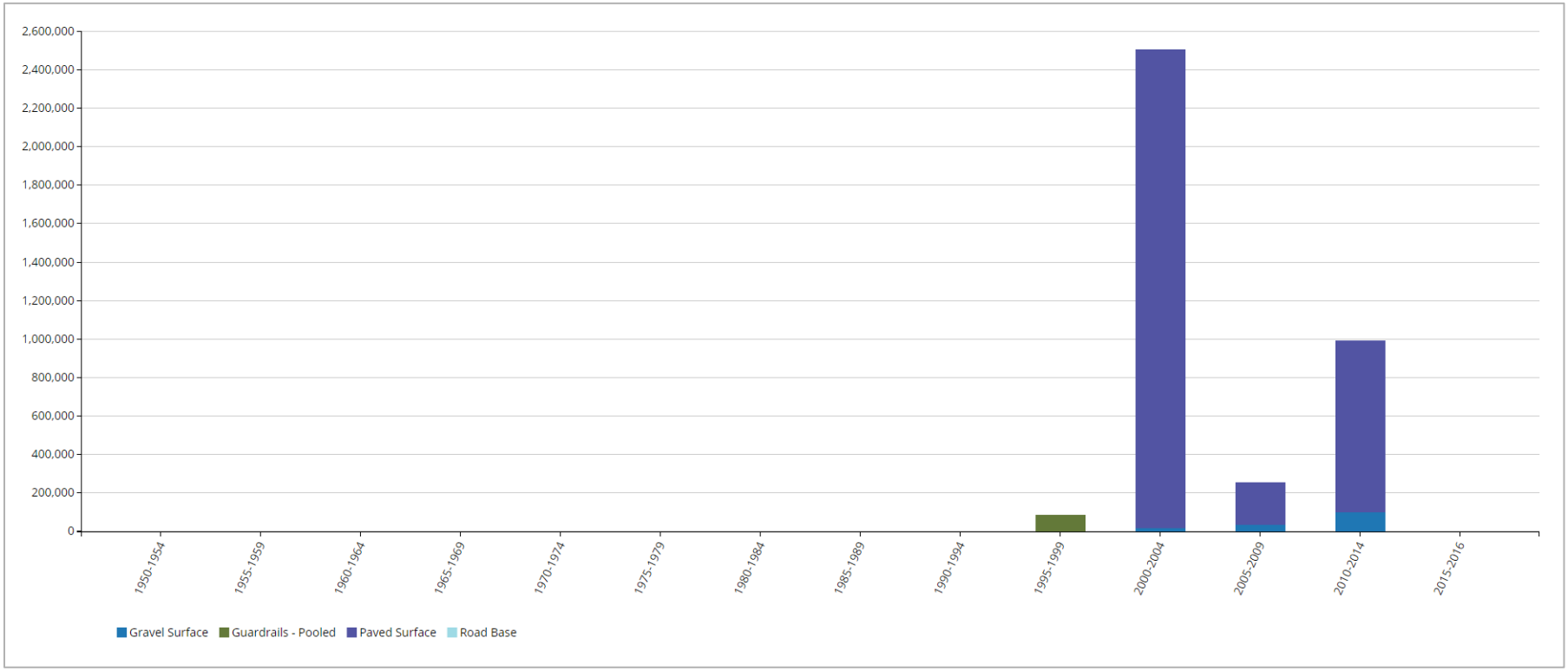
Figure 11 Asset Valuation – Road Network



1.2 Historical Investment in Infrastructure

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

Figure 12 Historical Investment – Road Network

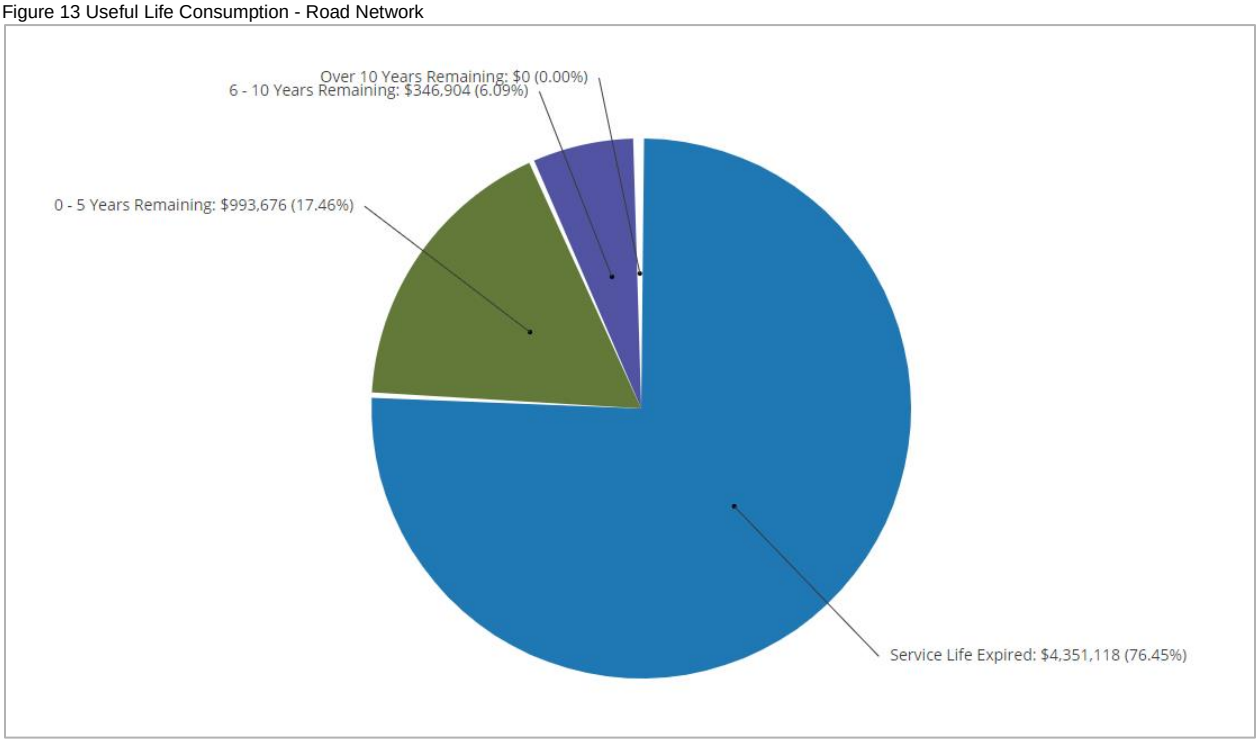


Investments in the township's road network began in the mid 1990s with a large increase in the early 2000s. In the early 2000s, the period of largest investment, $2.5 million was invested with over $2.4 million put into paved roads.

1.3 Useful Life Consumption

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

Figure 13 Useful Life Consumption - Road Network

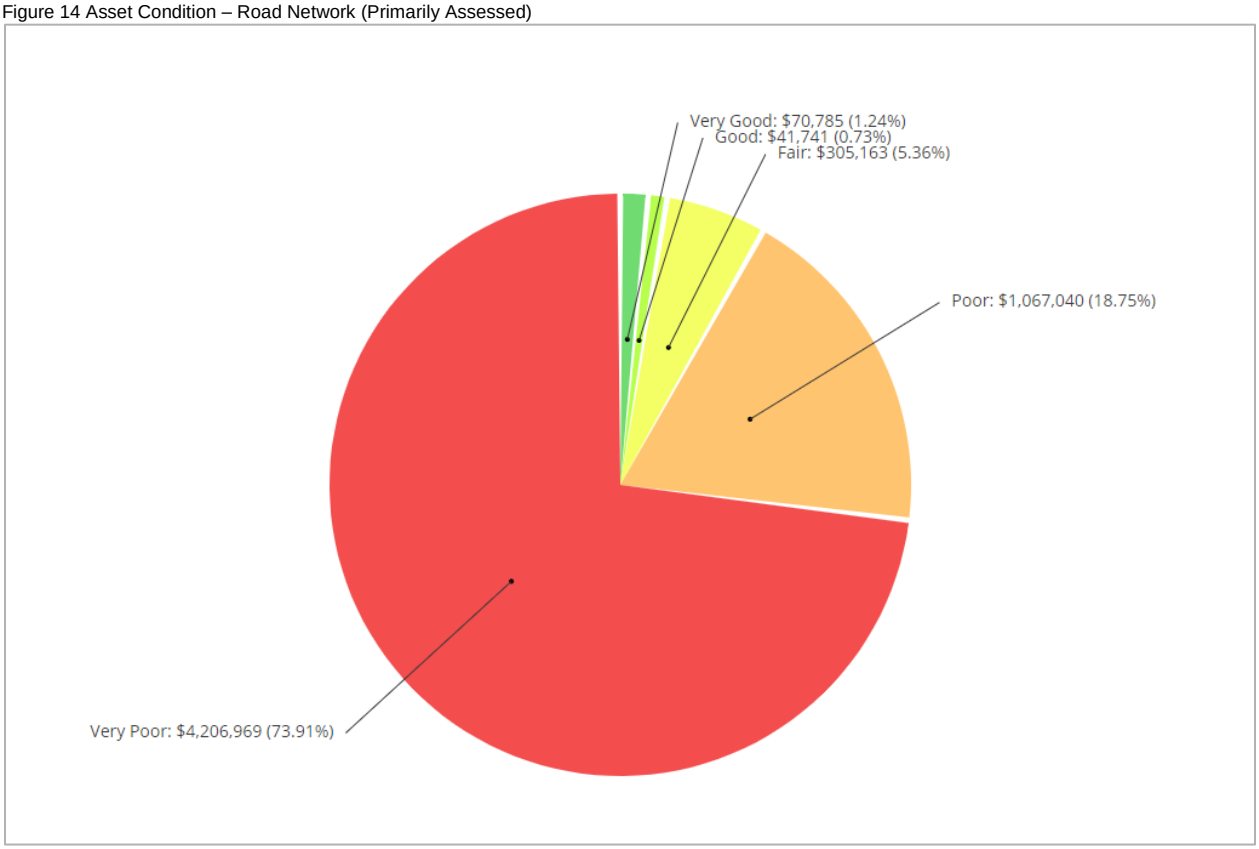


While 6% of the township's road network has 6 to 10 years of useful life remaining, 76%, with a valuation of $4.3 million, remain in operation beyond their useful life. An additional 17% will reach the end of their useful life within the next five years.

1.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the township's road network as of 2016. By default, we rely on observed field data as provided by the township. In the absence of such information, age-based data is used as a proxy. The township has provided condition data for 49% of paved surface roads, and 39% for gravel roads.

Figure 14 Asset Condition – Road Network (Primarily Assessed)

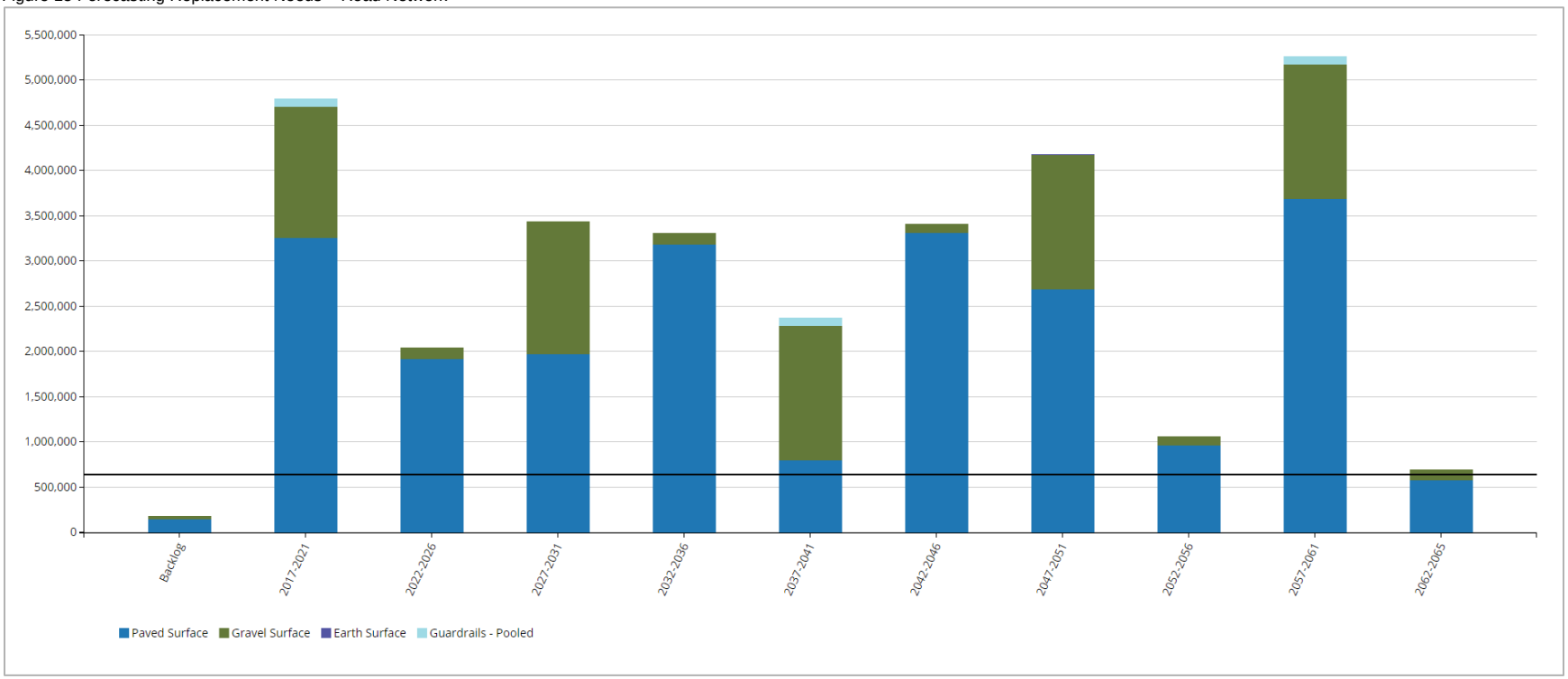


Based primarily on assessed condition data, 2% of assets, with a valuation of $ 113,000 are in good to very good condition; 93% are in poor to very poor condition.

1.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's road network assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 15 Forecasting Replacement Needs – Road Network



In addition to a backlog of $170,000, replacement needs are forecasted to be $4.8 million in the next five years; an additional $2 million is forecasted in replacement needs between 2022-2026. The township's annual requirements (indicated by the black line) for its road network total $657,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the township is currently allocating $140,000, leaving an annual deficit of $517,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the township to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

1.6 Recommendations – Road Network

- Primarily assessed condition data indicates a backlog of $170,000 and significant 10-year replacement needs of $5.1 million. The township should continue its condition assessments of road surfaces (Gravel and LCB), and expand the program to incorporate all assets in order to more precisely estimate its actual financial requirements and field needs. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

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

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

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

- The township is funding 21% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable funding levels.

2. Bridges & Culverts

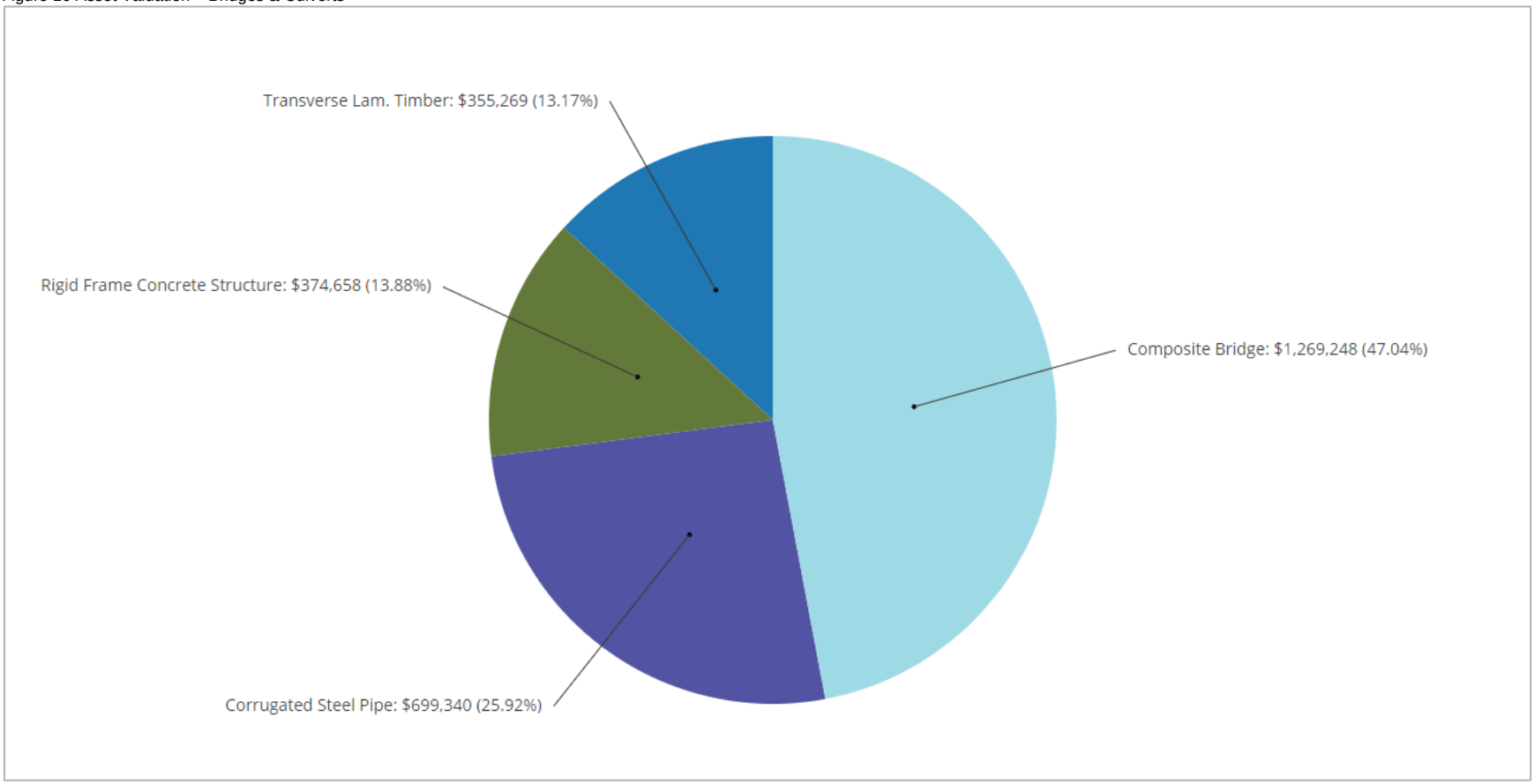
2.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 7 illustrates key asset attributes for the township'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 township's bridges & culverts assets are valued at $2.7 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the township.

Table 7 Key Asset Attributes – Bridges & Culverts

Asset Type	Asset Component	Quantity	Useful Life (Years)	2016 Unit Replacement Cost	2016 Overall Replacement Cost
Bridges & Culverts	Composite Bridge	16.7m	60	NRBCPI (Toronto)	$1,269,248.00
	Corrugated Steel Pipe	43.8m	60	NRBCPI (Toronto)	$699,340.00
	Rigid Frame Concrete Structure	10.8m	60	NRBCPI (Toronto)	$374,658.00
	Transverse Lam. Timber	17m	60	NRBCPI (Toronto)	$355,269.00
				Total	**$2,698,515.00**

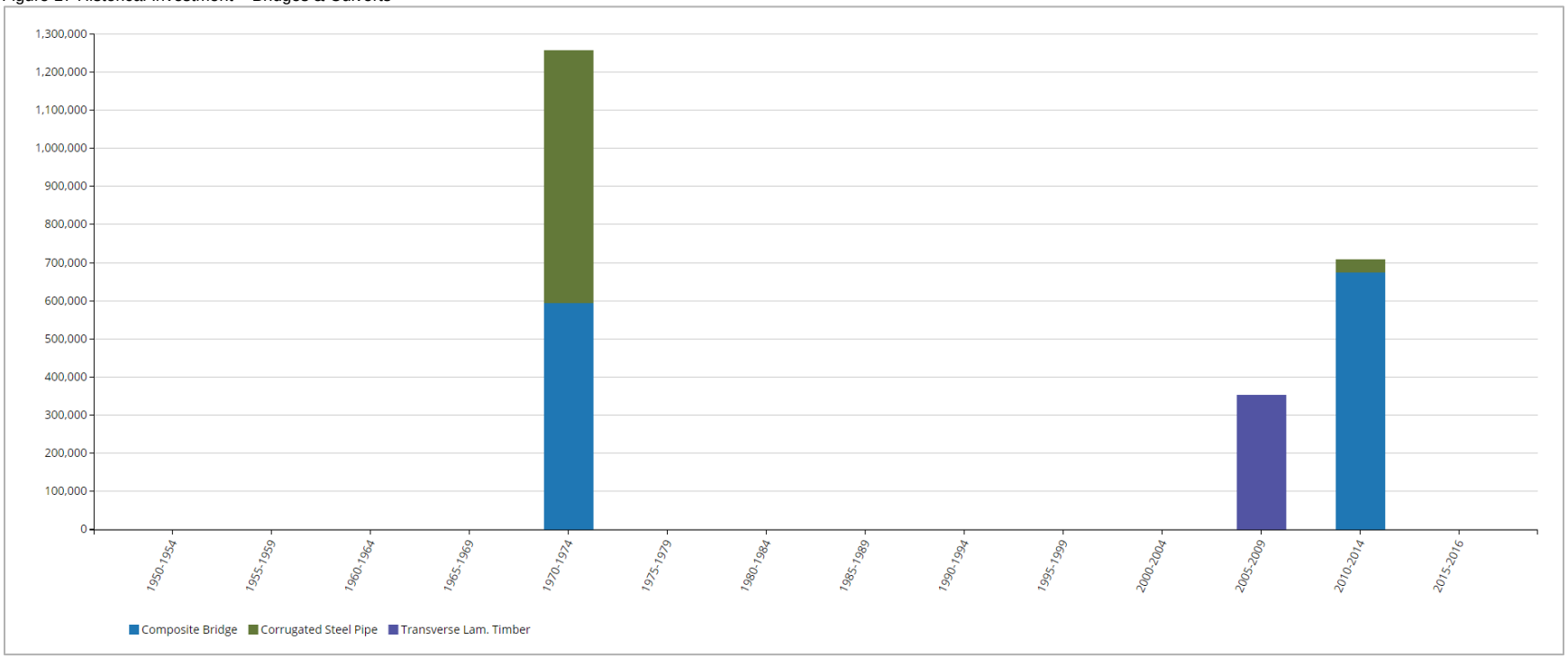
Figure 16 Asset Valuation – Bridges & Culverts



2.2 Historical Investment in Infrastructure

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

Figure 17 Historical Investment – Bridges & Culverts

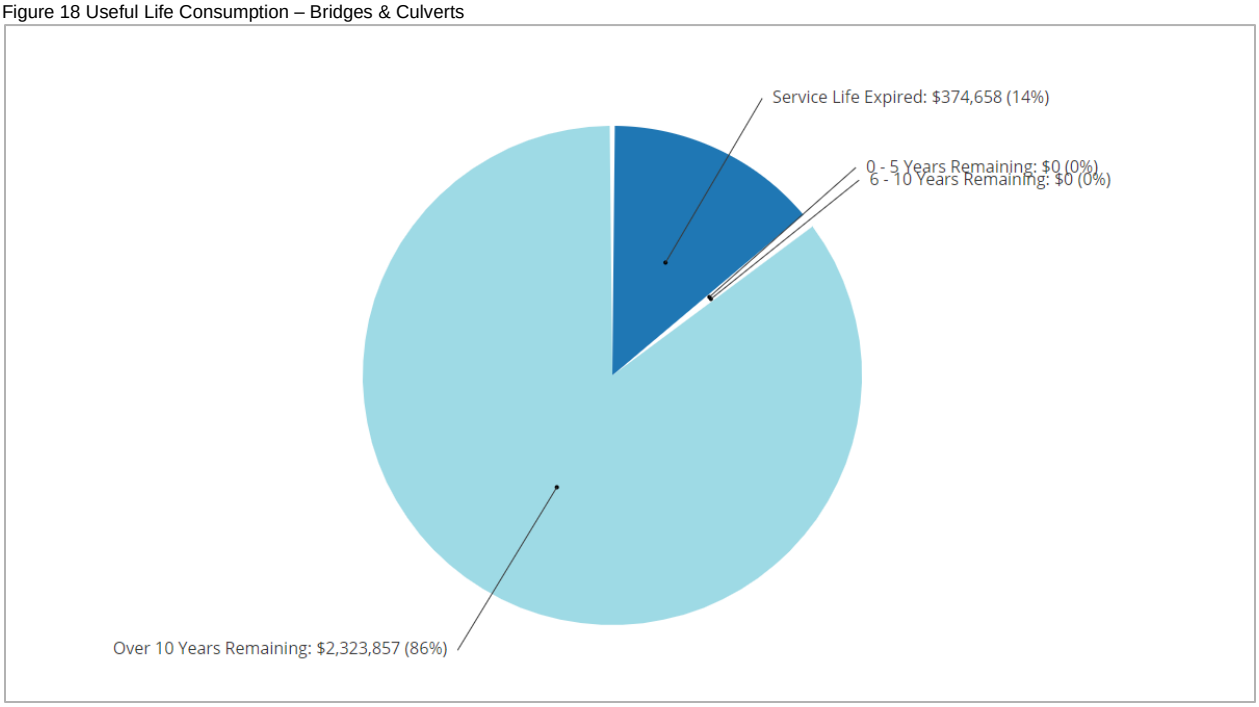


The township has invested sporadically in its bridges and culverts since 1970. In the early 1970s, the period of largest investment, $1.26 million was invested with $664,000 put into corrugated steel pipe and $595,000 put into composite bridges.

2.3 Useful Life Consumption

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

Figure 18 Useful Life Consumption – Bridges & Culverts

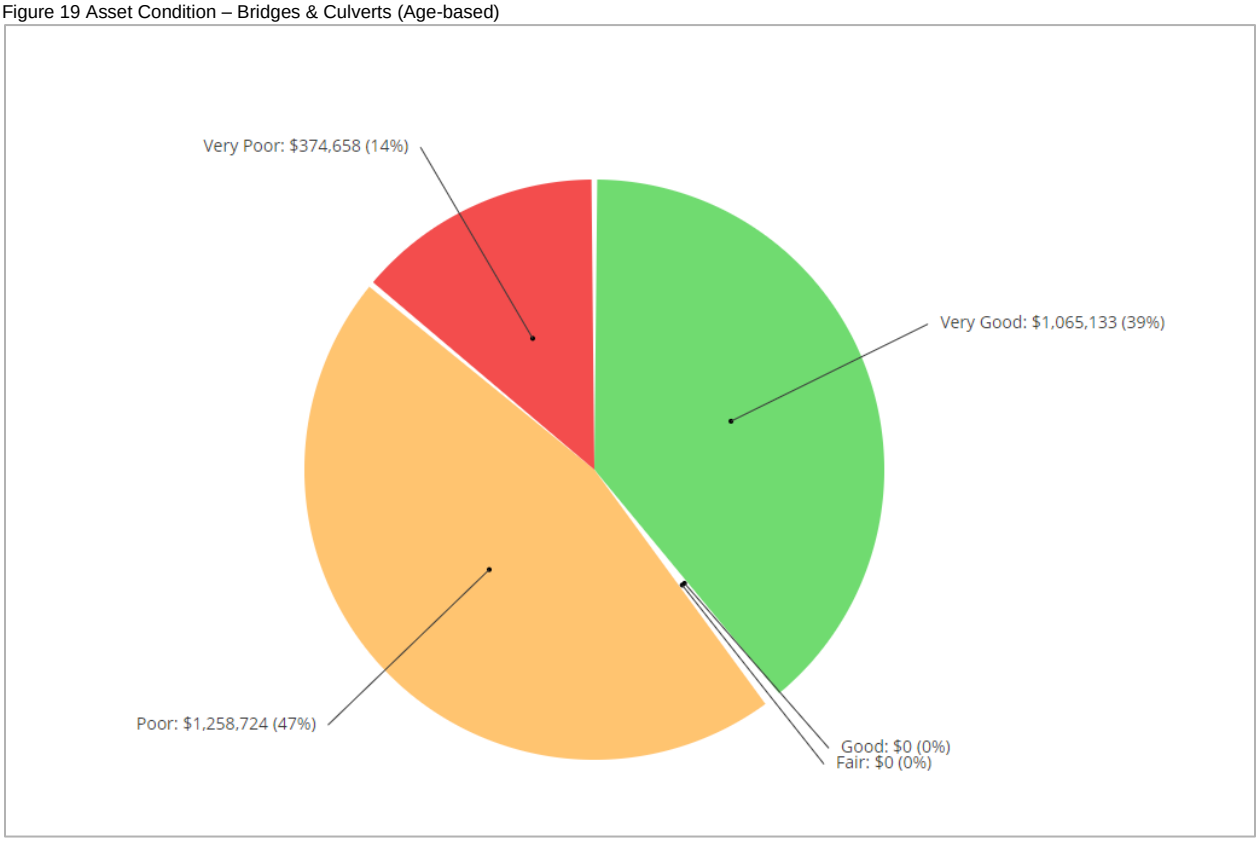


86% of the assets have at least 10 years of useful life remaining while 14%, with a valuation of $375,000, remain in operation beyond their useful life.

2.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the township's bridges & culverts as of 2016. By default, we rely on observed field data adapted from Ontario Structure Inspection Manual (OSIM) inspections as provided by the township. In the absence of such information, age-based data is used as a proxy. All assets are based on age-based data.

Figure 19 Asset Condition – Bridges & Culverts (Age-based)

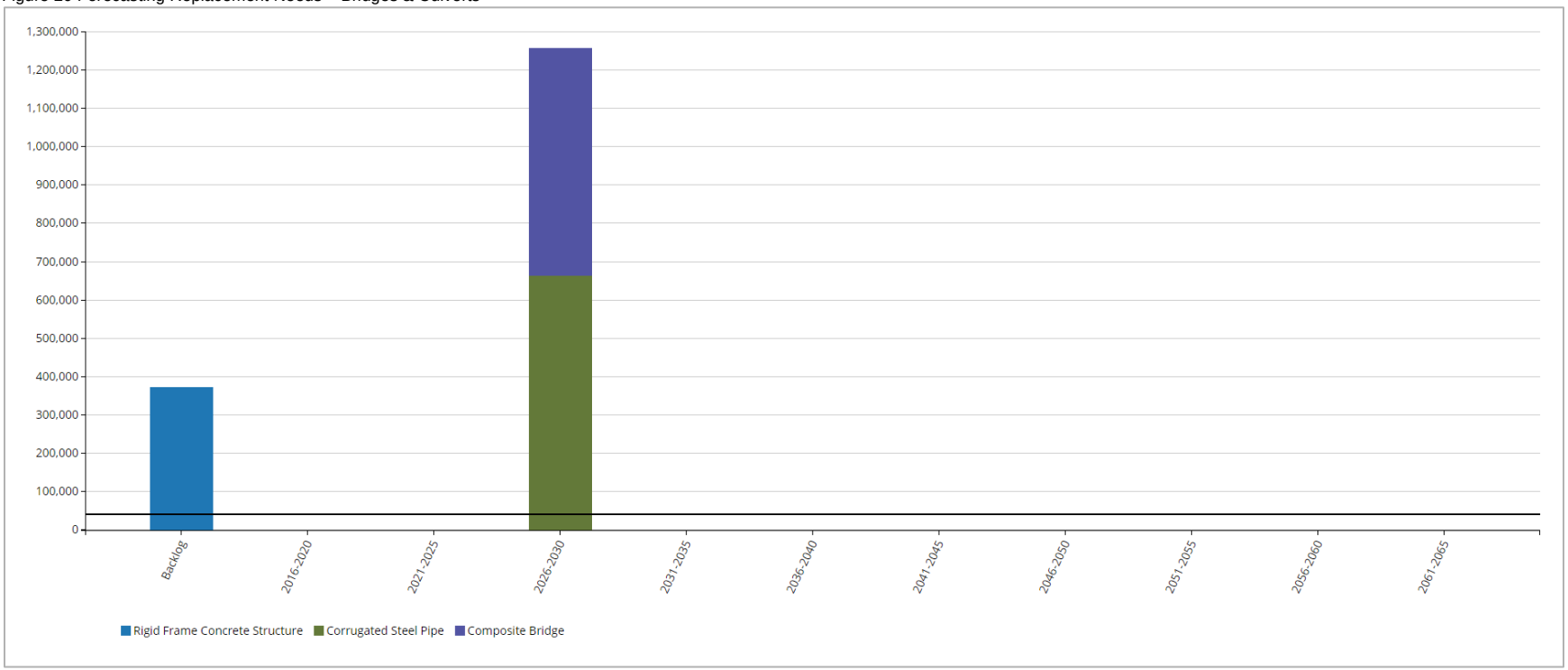


Age-based data indicates that while 39% of the township's bridges & culverts are in good to very good condition, 61%, with a valuation of $1.2 million, are in poor to very poor condition.

2.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's bridges & culverts. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 20 Forecasting Replacement Needs – Bridges & Culverts



In addition to a backlog of $375,000, replacement needs will total $1.25 million in the next fifteen years. The township's annual requirements (indicated by the black line) for its bridges & culverts total $45,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. The township is currently allocating $14,000, leaving an annual deficit of $31,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the township to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

2.6 Recommendations – Bridges & Culverts

- Age-based data indicates a significant backlog of $375,000 and 15-year replacement needs of $1.25 million. The results and recommendations from the Ontario Structure Inspection Manual (OSIM) inspections should be incorporated into the AMP analysis and used to generate the short-and long-term capital and maintenance budgets for the bridge and large culvert structures. See Section VIII, 'Asset Management Strategies'.

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

- The township is funding 31% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

3. Buildings

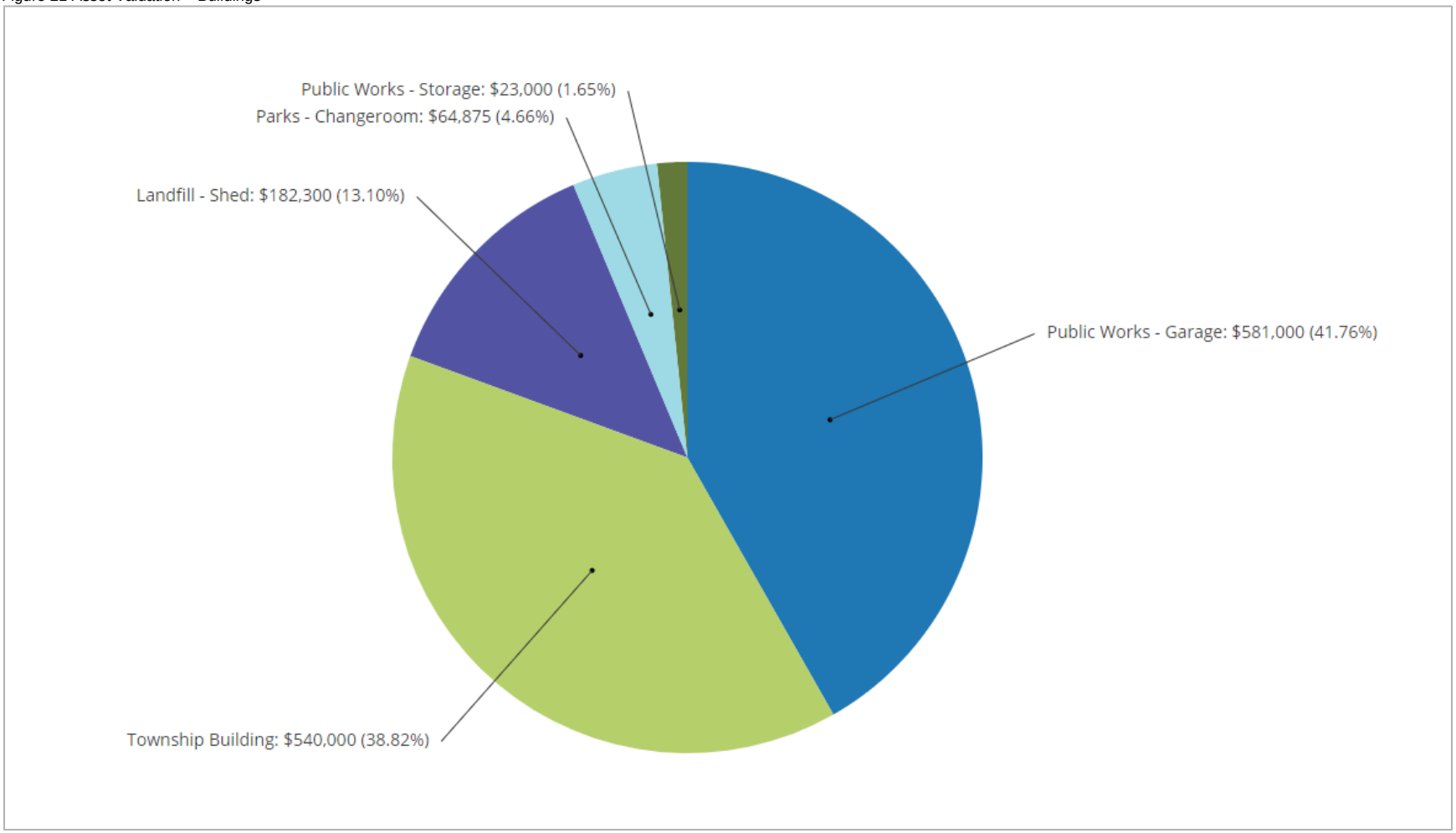
3.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 8 illustrates key asset attributes for the township's buildings & facilities, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the township's buildings assets are valued at $1.39 million based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the township.

Table 8 Key Asset Attributes – Buildings

Asset Type	Asset Component	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Buildings	Landfill - Shed	1600 sq ft	50	User Defined	$182,300.00
	Parks - Changeroom	720 sq ft	50	NRBCPI (Toronto)	$64,875.00
	Public Works - Garage	3100 sq ft	50	User Defined	$581,000.00
	Public Works - Storage	800 sq ft	50	User Defined	$23,000.00
	Township Building	2080 sq ft	50	User Defined	$540,000.00
				Total	$1,391,175.00

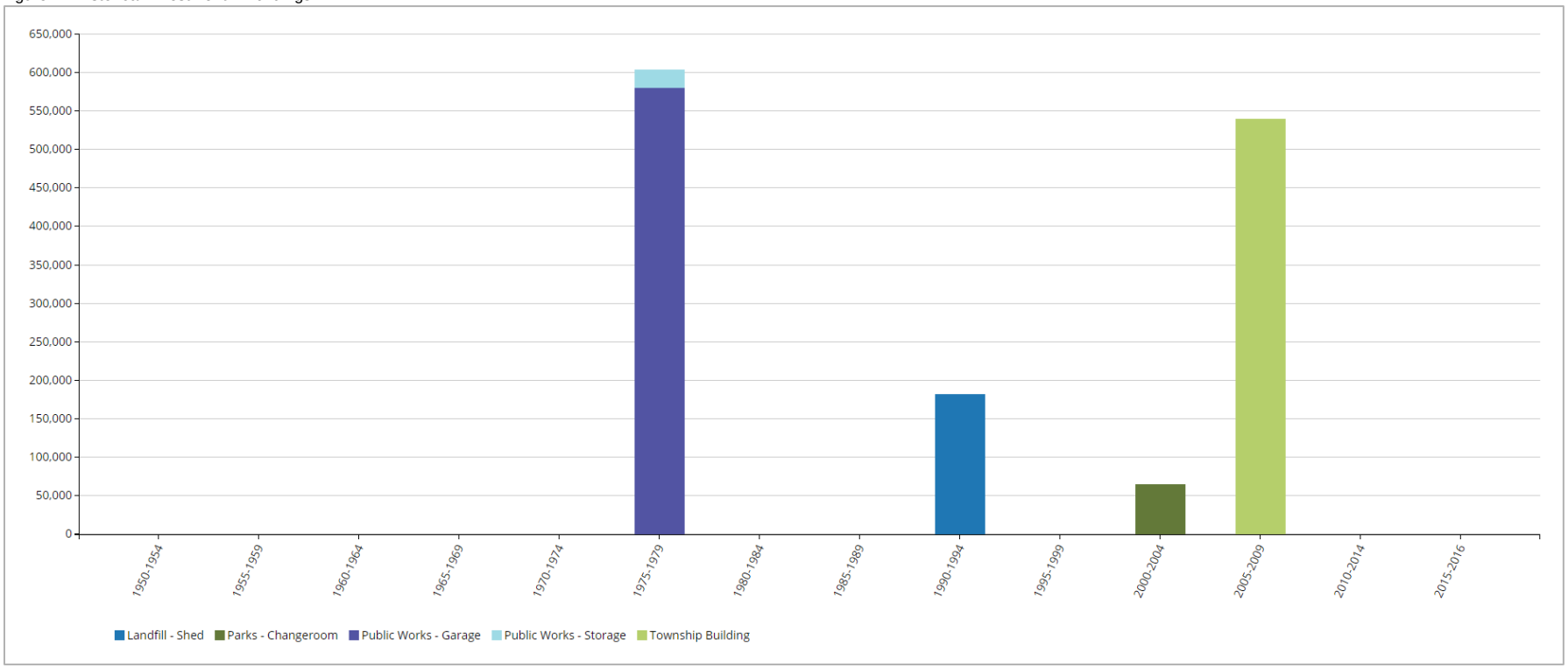
Figure 21 Asset Valuation – Buildings



3.2 Historical Investment in Infrastructure

Figure 22 shows the township's historical investments in its buildings since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 6.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 22 Historical Investment – Buildings

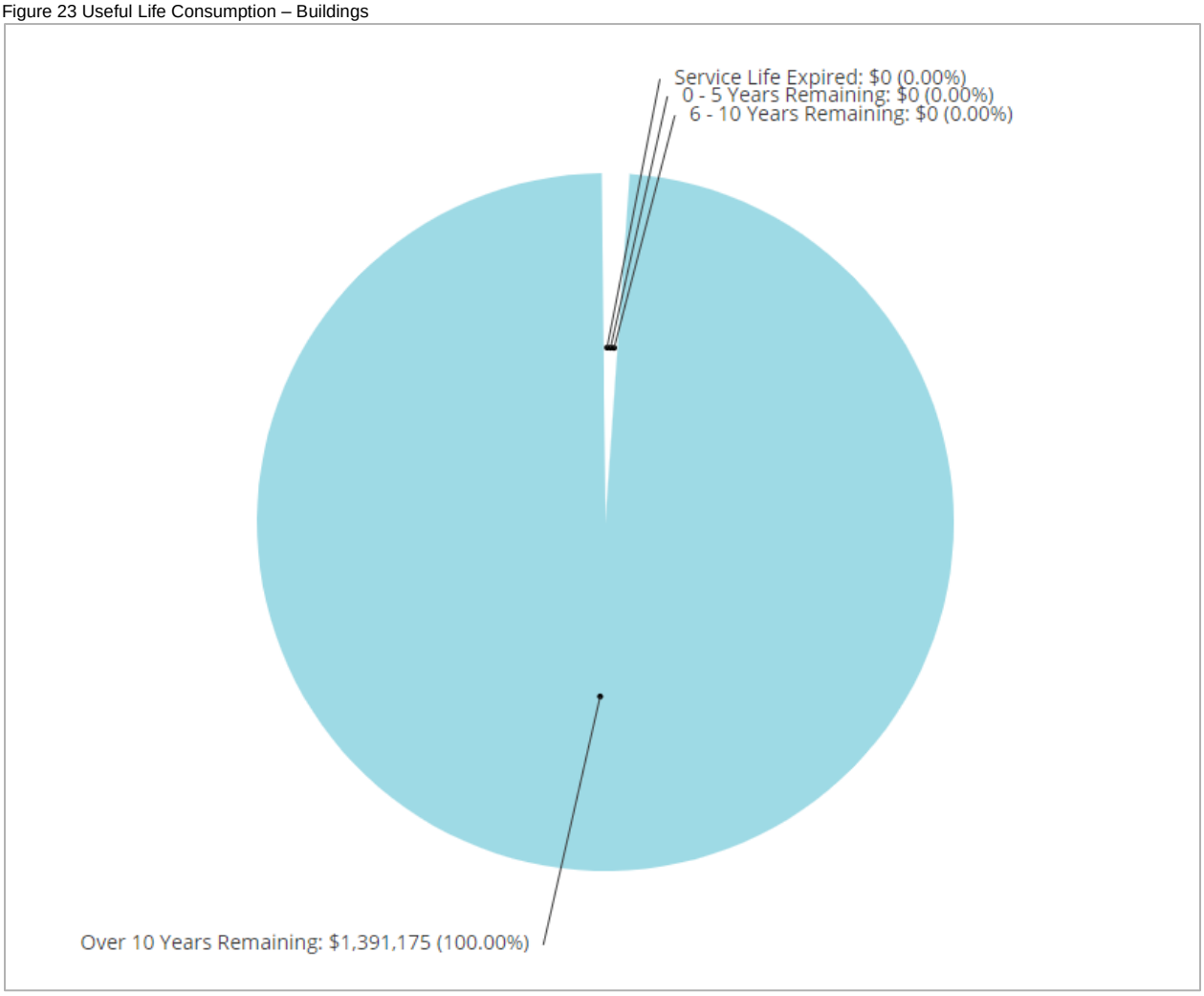


The township's investments into its building assets have been sporadic starting in 1970 until 2010. Between 1975 and 1980, the period of largest investment, $1.86 million was invested into the building assets with a focus on public works structures. The township also invested $7.2 million in it's landfill, parks and township buildings from 1985 to 2016. Although not shown, the town has also invested amounts in 2014 for accessibility renovations to its building assets.

3.3 Useful Life Consumption

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

Figure 23 Useful Life Consumption – Buildings

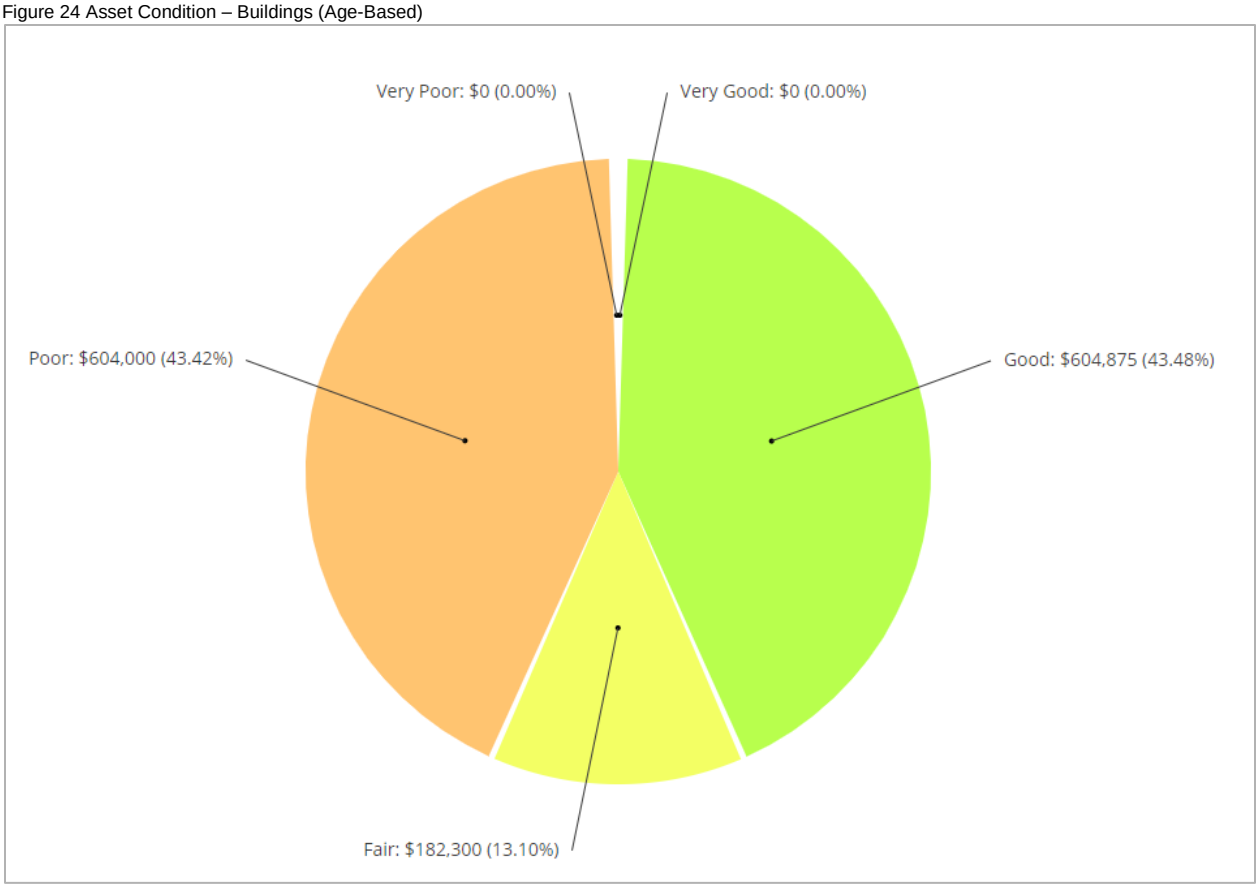


100% of buildings assets have at least 10 years of useful life remaining.

3.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the township's buildings assets. By default, we rely on observed field data as provided by the township. In the absence of such information, age-based data is used as a proxy. All assets are based on age-based data.

Figure 24 Asset Condition – Buildings (Age-Based)

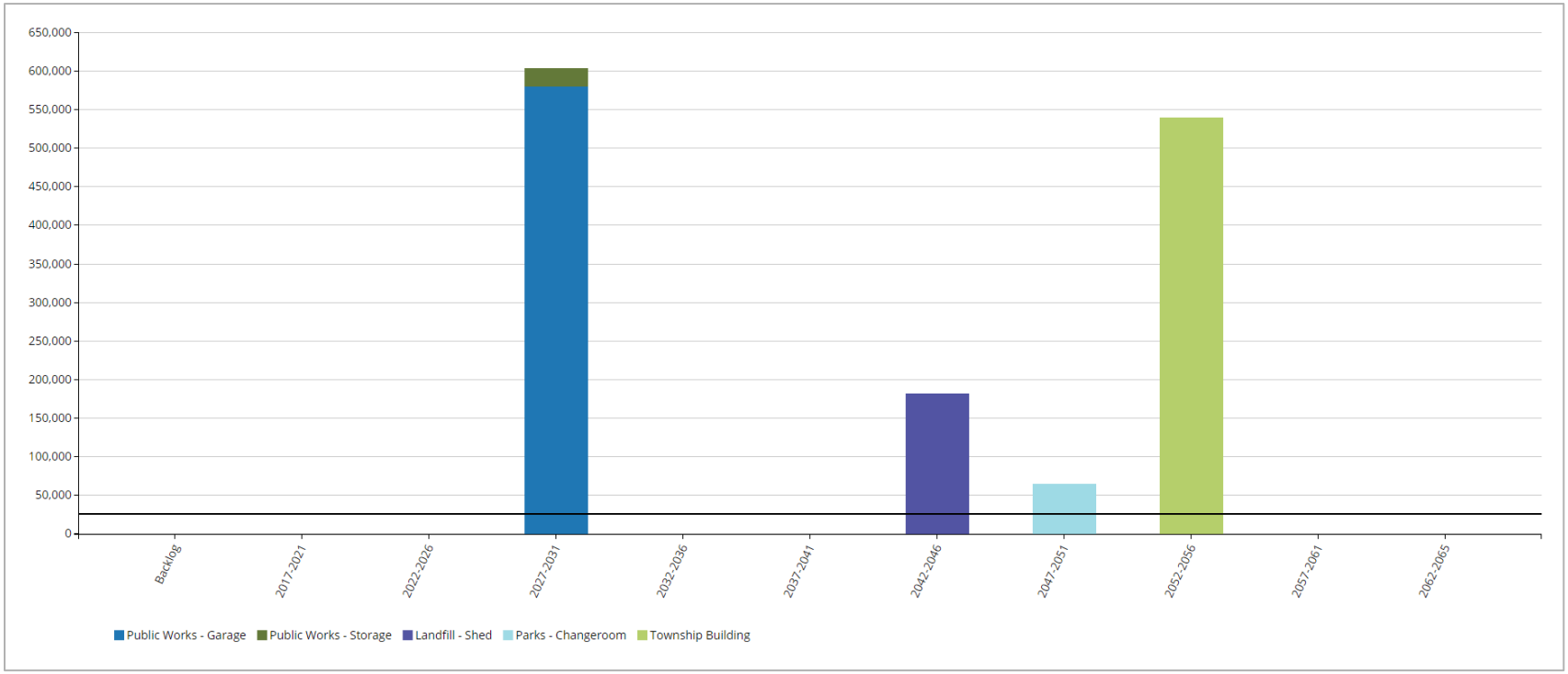


Nearly 44% of buildings assets, with a valuation of $605,000, are in good to very good condition; 43% are in poor to very poor condition.

3.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's buildings assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 25 Forecasting Replacement Needs – Buildings



The age-based condition data indicates zero backlog with fifteen-year replacement needs of $600,000. The township's annual requirements (indicated by the black line) for its buildings total $28,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. The township is currently allocating approximately $5,000, leaving an annual deficit of $23,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level.

3.6 Recommendations – Buildings & Facilities

- The township should implement a condition inspection program for all building assets to better define financial requirements for its buildings. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

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

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

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

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

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

- The township is funding 18% of its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to achieve more sustainable and optimal funding levels.

4. Machinery & Equipment

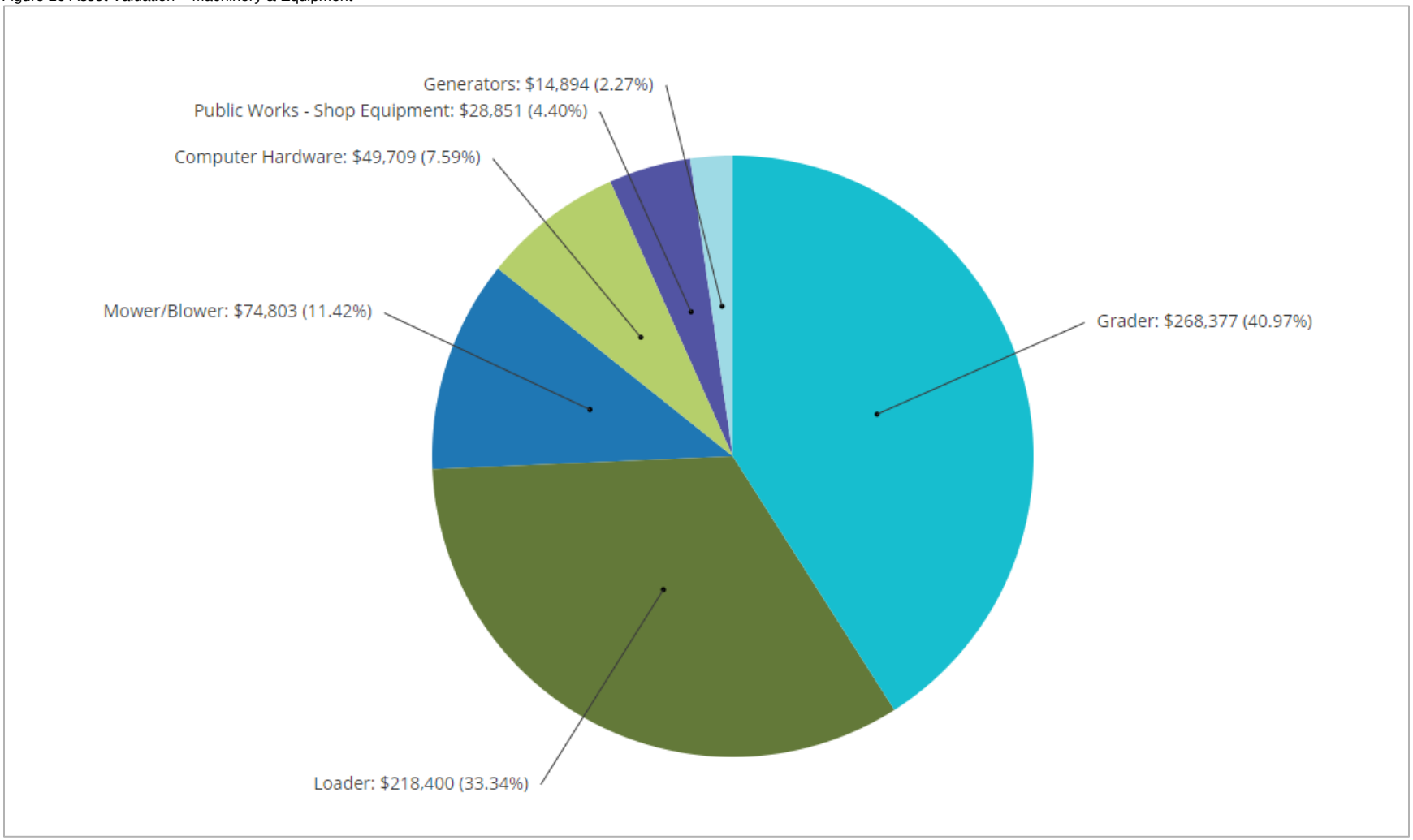
4.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 9 illustrates key asset attributes for the township's machinery & equipment, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the township's machinery & equipment assets are valued at $655,000 based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the township.

Table 9 Asset Inventory – Machinery & Equipment

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Machinery & Equipment	Generators	2	20	CPI (Ontario)	$14,894.00
	Grader	1	20	CPI (Ontario)	$268,377.00
	Loader	2	20	CPI (Ontario)	$218,400.00
	Mower/Blower	1	15	CPI (Ontario)	$74,803.00
	Public Works - Shop Equipment	1	20	CPI (Ontario)	$28,851.00
	Computer Hardware - Pooled	1	5	CPI (Ontario)	$49,709.00
				Total	$655,034.00

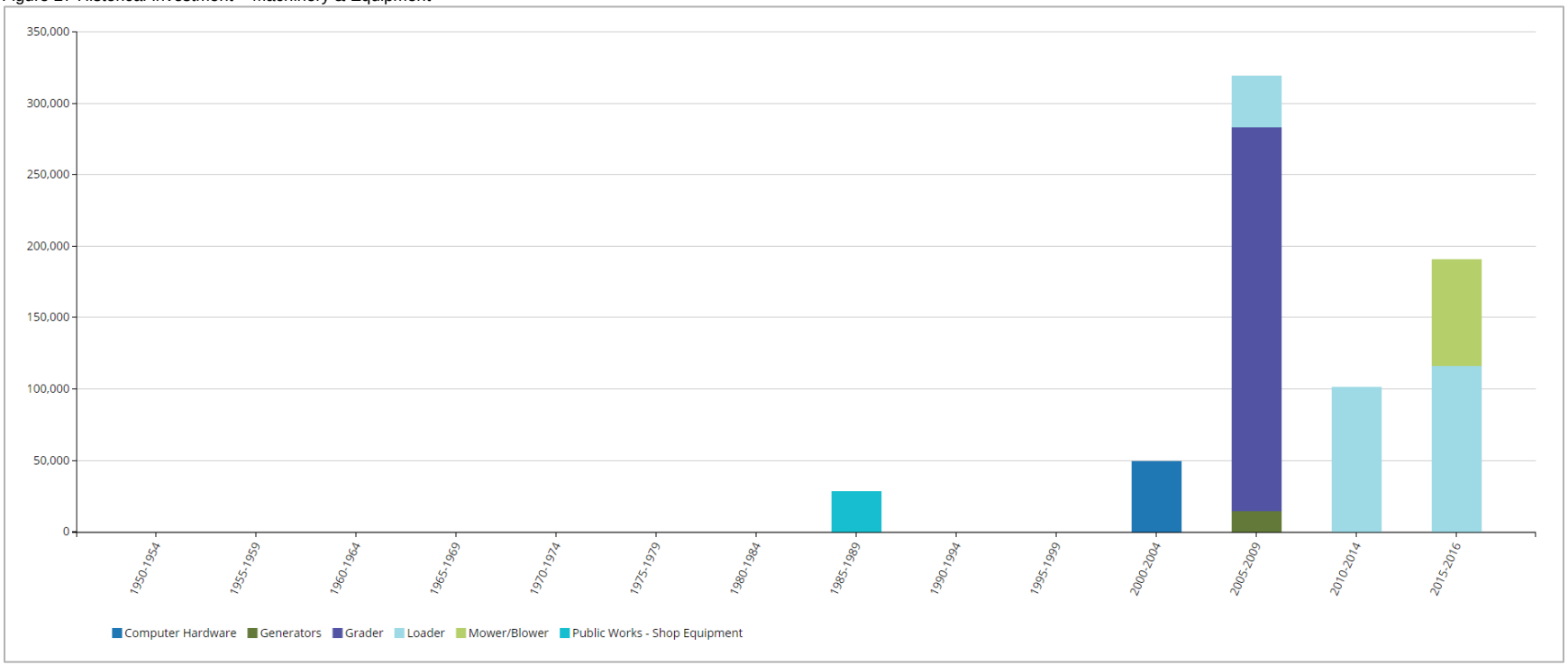
Figure 26 Asset Valuation – Machinery & Equipment



4.2 Historical Investment in Machinery & Equipment

Figure 27 shows the township's historical investments in its machinery & equipment since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 7.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 27 Historical Investment – Machinery & Equipment

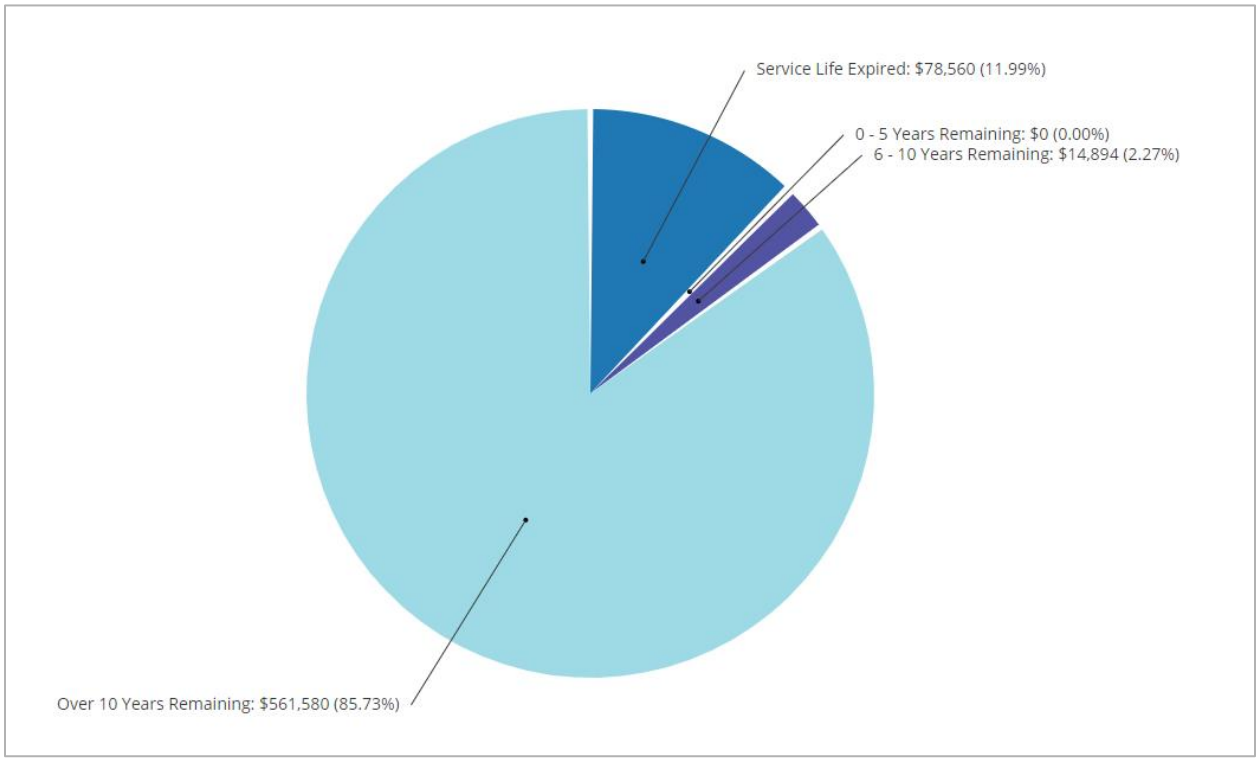


The township rapidly expanded its machinery & equipment portfolio beginning in the early 2000s. Between 2005 and 2010, the period of largest investment, $320,000 was invested in the machinery and equipment category.

4.3 Useful Life Consumption

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

Figure 28 Useful Life Consumption – Machinery & Equipment

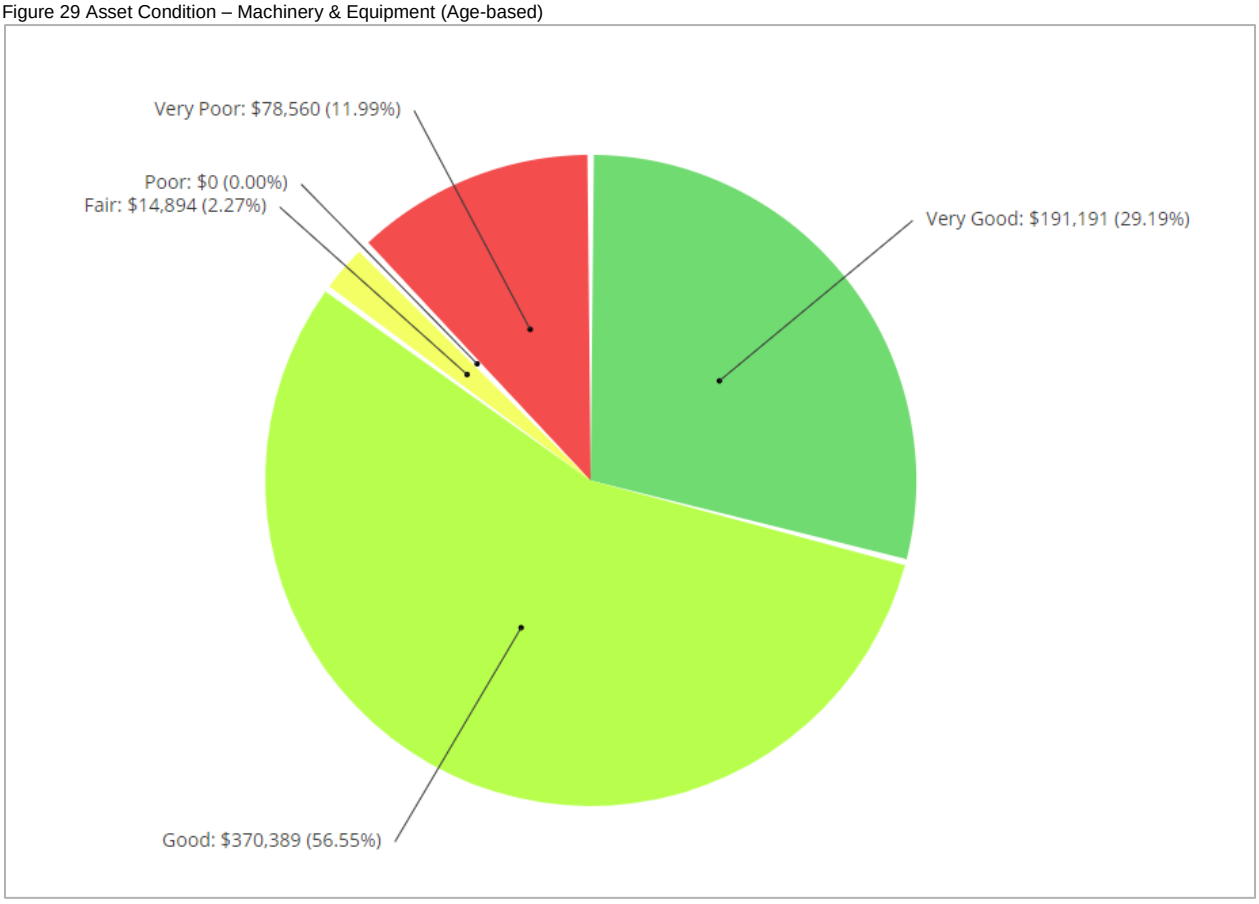


While 86% of assets have at least 10 years of useful life remaining, 12%, with a valuation of $78,500, remain in operation beyond their useful life.

4.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the township's machinery & equipment assets as of 2016. By default, we rely on observed field data as provided by the township. In the absence of such information, age-based data is used as a proxy. All assets are based on age-based data.

Figure 29 Asset Condition – Machinery & Equipment (Age-based)

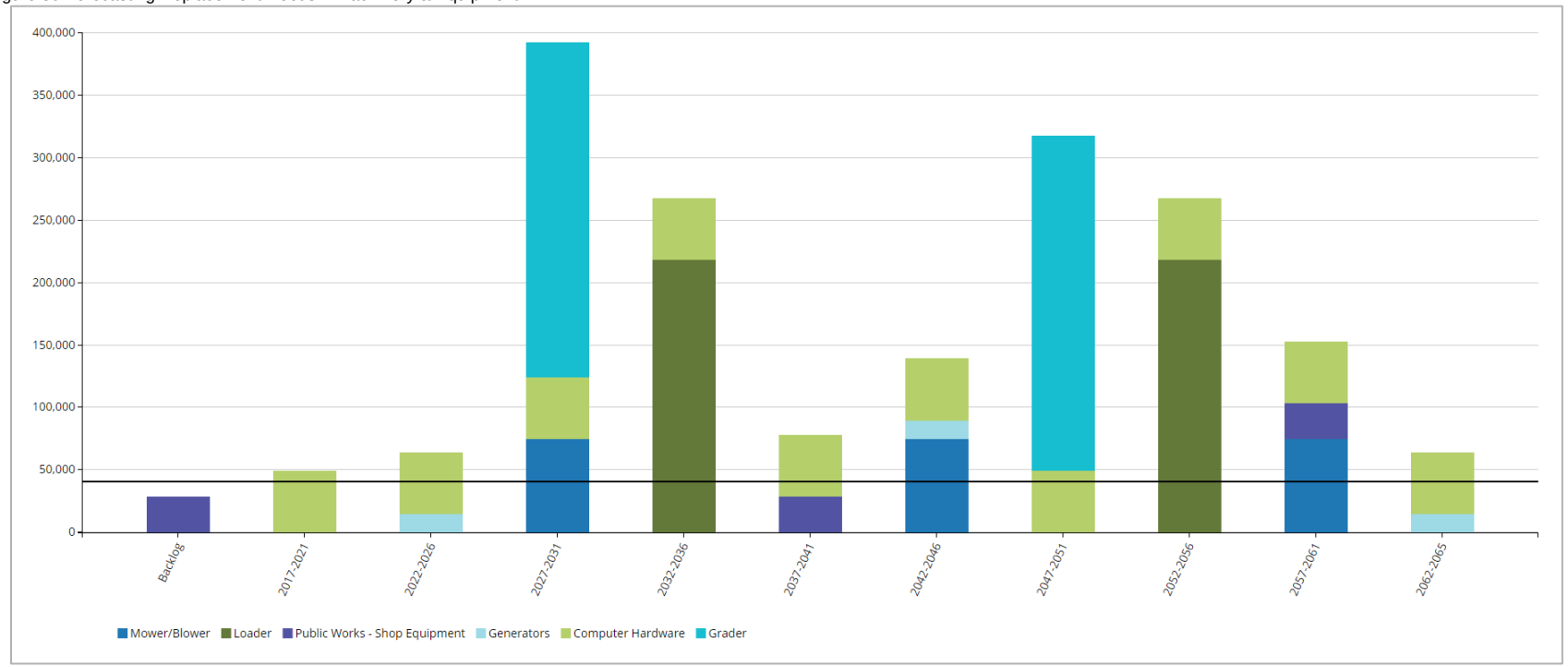


Based on age-based condition data, 12% of assets, with a valuation of $78,50, are in poor to very poor condition; 86% are in good to very good condition.

4.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's machinery & equipment assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 30 Forecasting Replacement Needs – Machinery & Equipment



In addition to a backlog of $29,000, the township's replacement needs total $50,000 in the next five years. An additional $457,000 will be required between 2022-2031. The township's annual requirements (indicated by the black line) for its machinery & equipment total $41,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the township is currently allocating $47,000, leaving an annual surplus of $6,000. See the 'Financial Strategy' section for maintaining a sustainable funding level. Further, while fulfilling the annual requirements will position the township to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

4.6 Recommendations – Machinery & Equipment

- The township should implement a component based condition inspection program for all machinery & equipment assets to better define financial requirements for its machinery and equipment. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

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

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

- The township is fully funding its long-term requirements on an annual basis. See the 'Financial Strategy' section on how to maintain sustainable and optimal funding levels.

5. Land Improvements

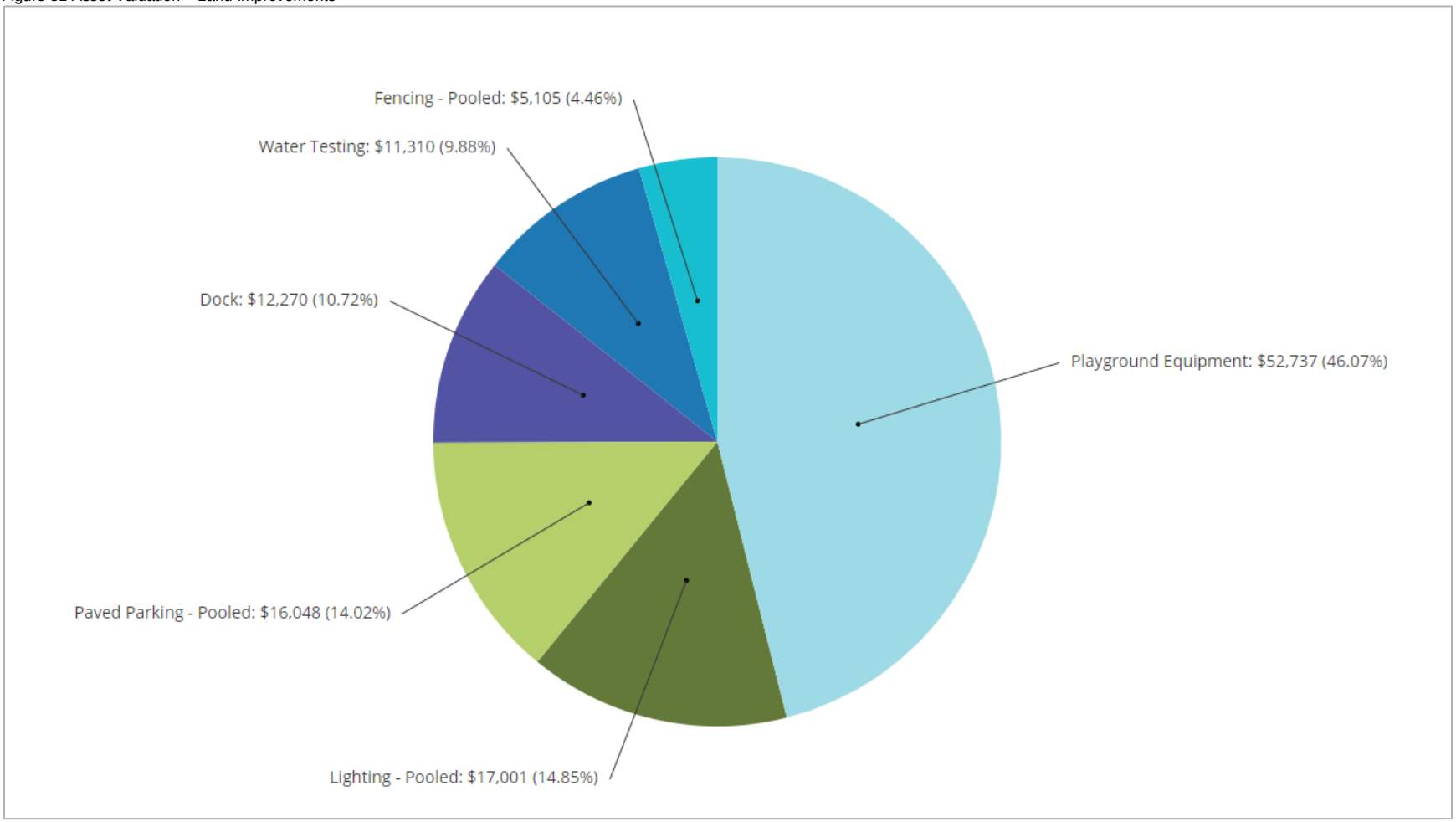
5.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 10 illustrates key asset attributes for the township's land improvements, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the township's land improvements assets are valued at $114,000 based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the township.

Table 10 Asset Inventory – Land Improvements

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Land Improvements	Dock	1	20	CPI (Ontario)	$12,270.00
	Fencing - Pooled	1	20	CPI (Ontario)	$5,105.00
	Lighting - Pooled	1	20	CPI (Ontario)	$17,001.00
	Paved Parking - Pooled	1	20	CPI (Ontario)	$16,048.00
	Playground Equipment	1	20	CPI (Ontario)	$52,737.00
	Water Testing	1	20	CPI (Ontario)	$11,310.00
				Total	**$114,471.00**

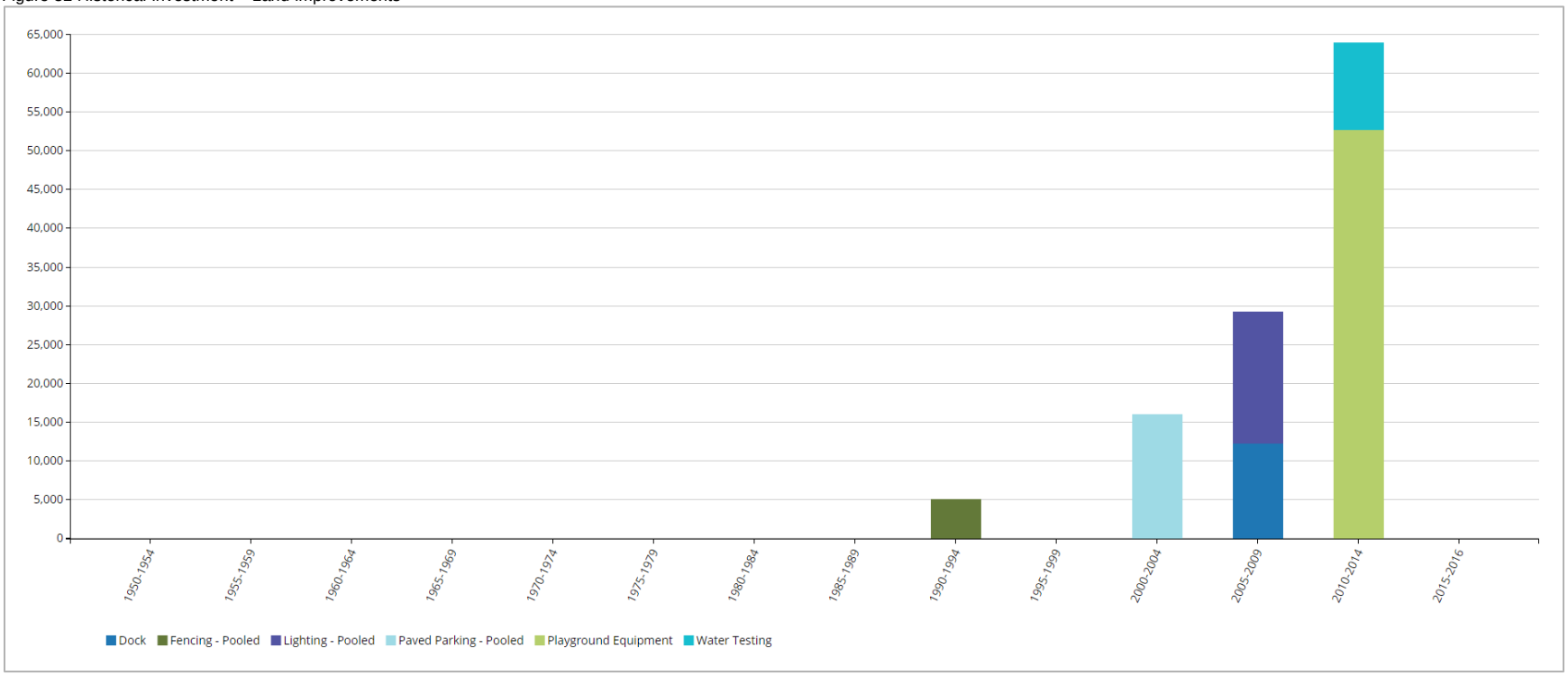
Figure 31 Asset Valuation – Land Improvements



5.2 Historical Investment in Infrastructure

Figure 32 shows the township's historical investments in its land improvements since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 8.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 32 Historical Investment – Land Improvements

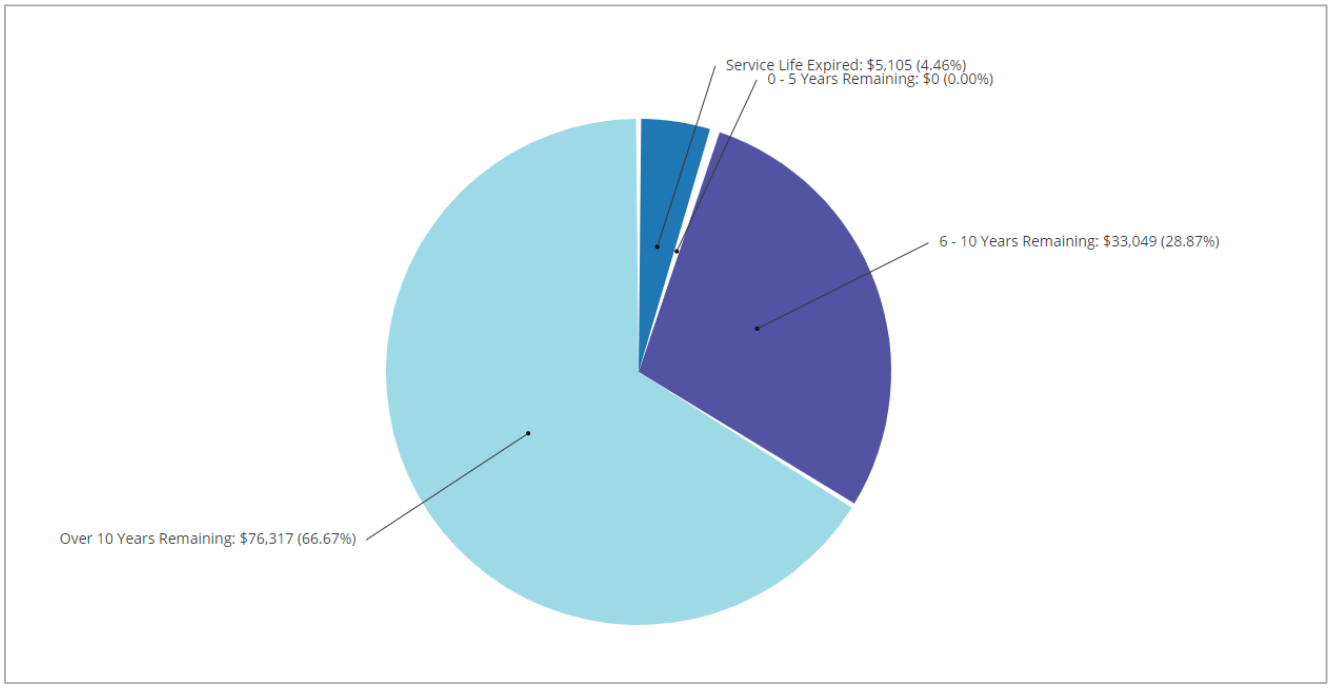


Expenditures in land improvements have gradually increase since 1990. Between 2010 and 2015, the period of largest investment, $64,000 was invested with a focus on playground equipment.

5.3 Useful Life Consumption

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

Figure 33 Useful Life Consumption – Land Improvements

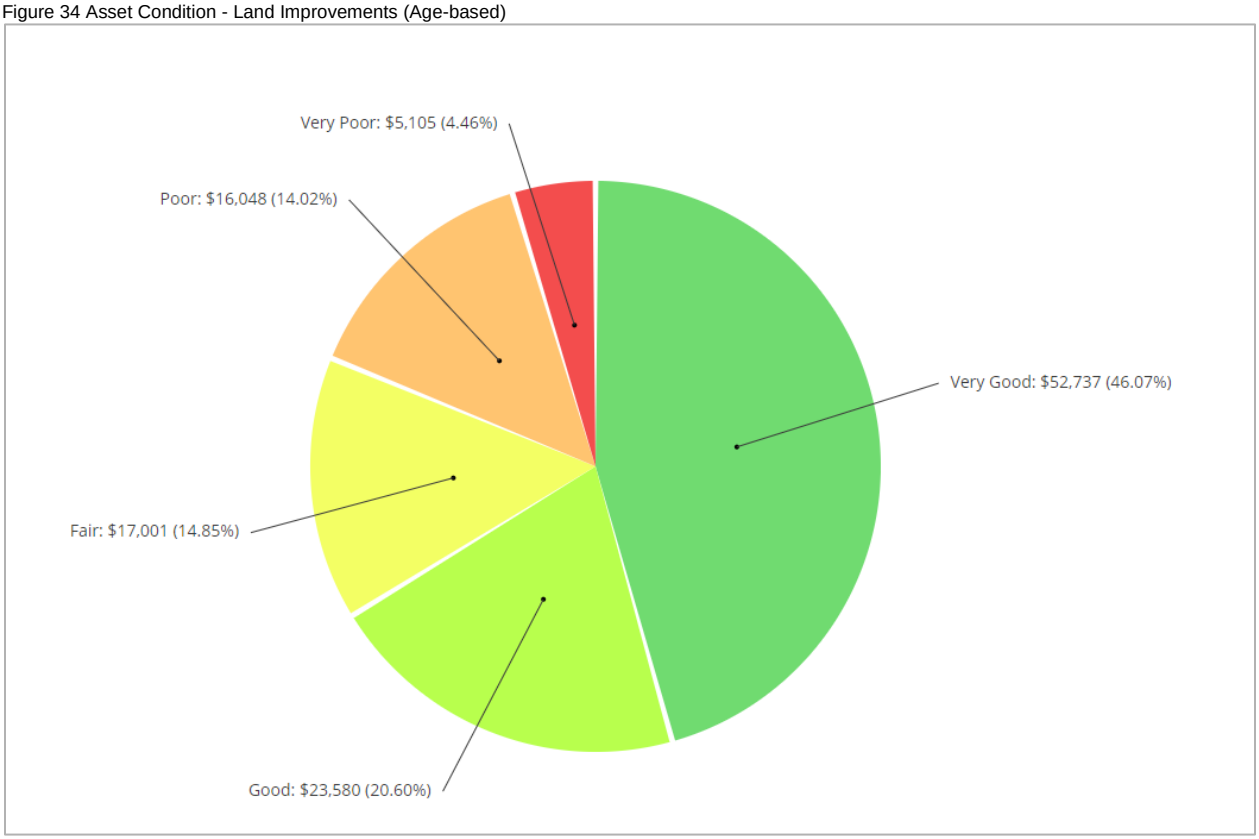


67% of the township's land improvement assets, with a valuation of $76,000, have at least 10 years of useful life remaining. An additional 4% will reach the end of their useful life within the next five years.

5.4 Current Asset Condition

Using replacement cost, in this section we summarize the condition of the township's land improvement assets. By default, we rely on observed field data as provided by the township. In the absence of such information, age-based data is used as a proxy. All assets are based on age-based data.

Figure 34 Asset Condition - Land Improvements (Age-based)

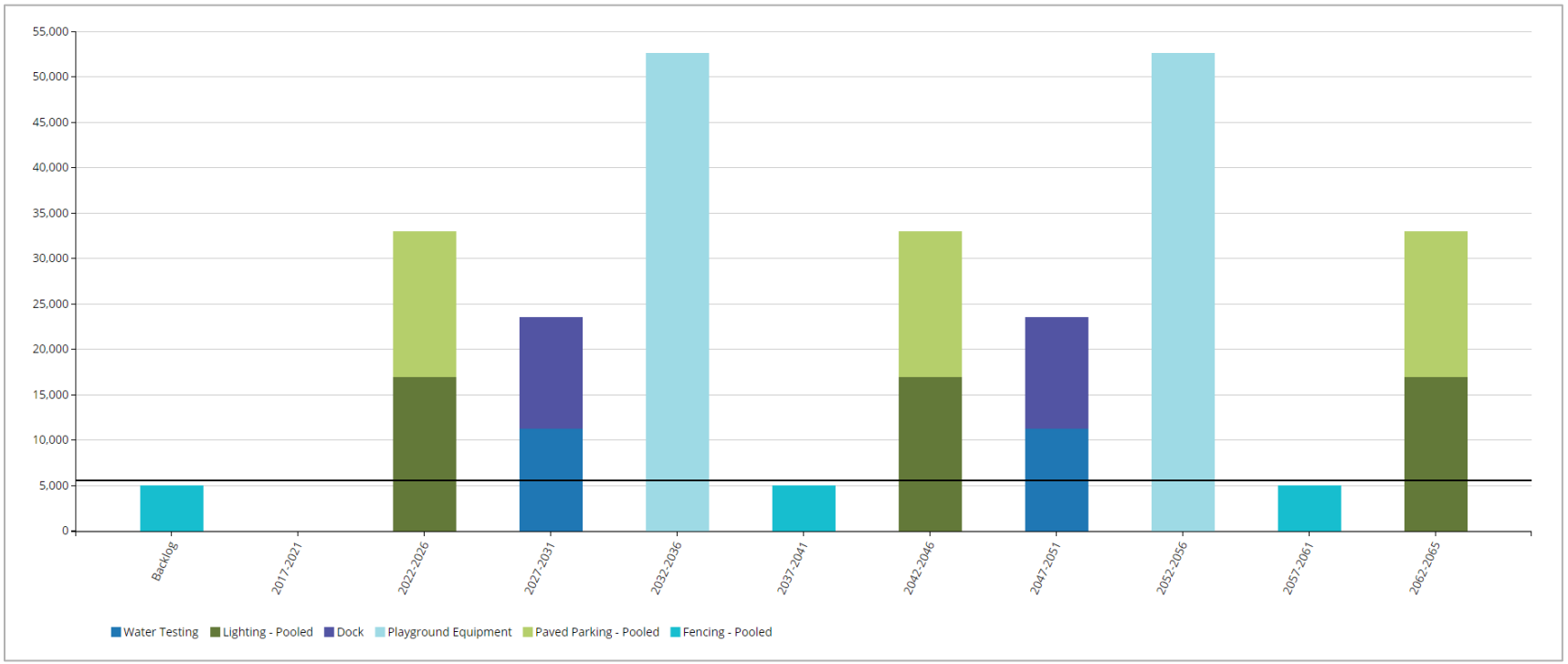


Based on age-based condition data, 67% of the township's land improvement assets, with a valuation of $76,000, are in good to very good condition; 18% are in poor to very poor condition.

5.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's land improvements assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 35 Forecasting Replacement Needs – Land Improvements



Age-based data shows a backlog of $5000 with replacement needs totaling $33,000 in the next ten years. However, replacement needs will total $76,000 between 2027-2036. The township's annual requirements (indicated by the black line) for its land improvements total $6,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the township is currently allocating $97,000, leaving an annual surplus of $91,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the township to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

5.6 Recommendations – Land Improvements

- The township should implement a condition assessment program for its land improvement assets to precisely estimate financial needs. See Section 2, 'Condition Assessment Programs' in the 'Asset Management Strategies' chapter.

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

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

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

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

6. Vehicles

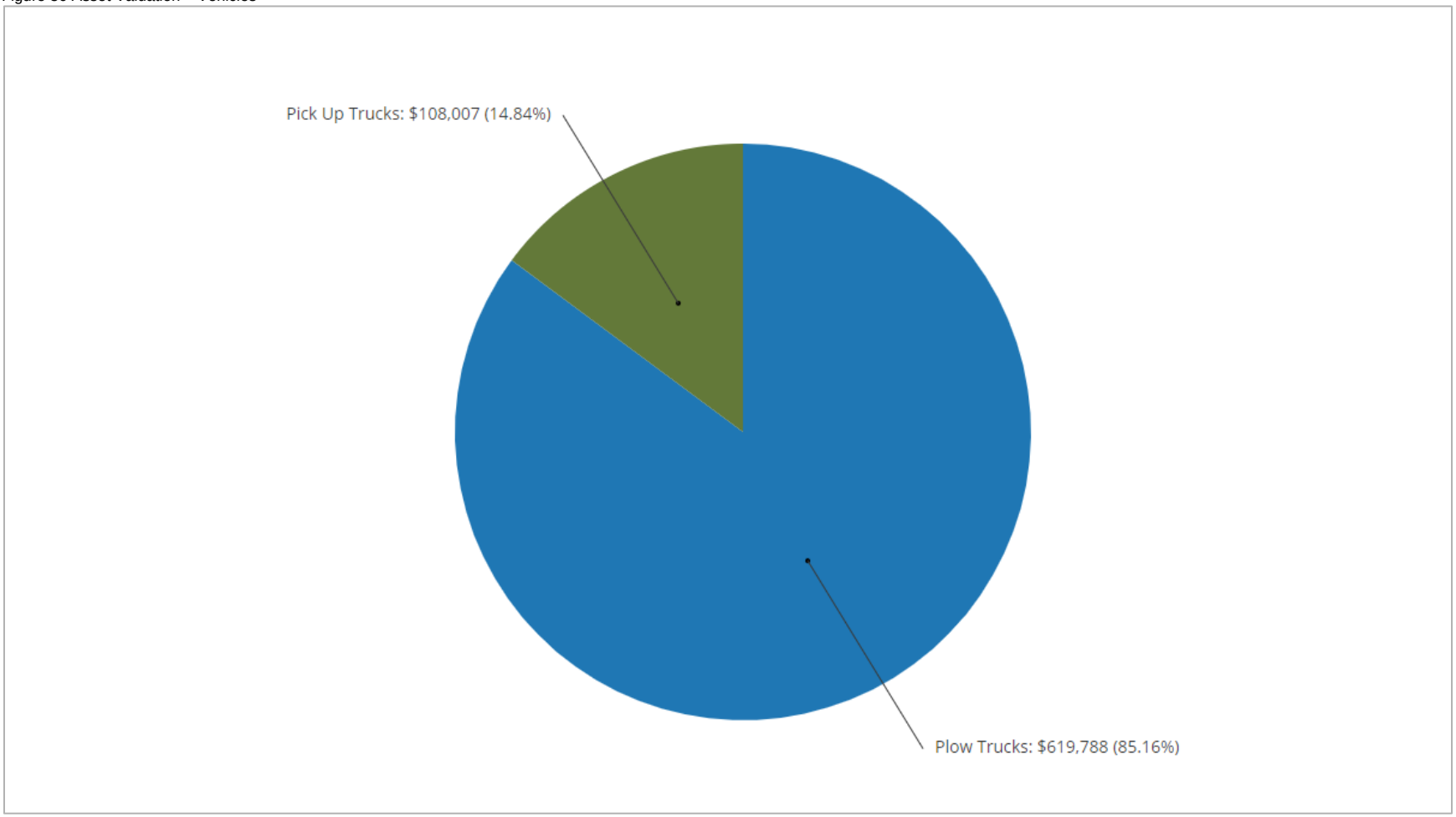
6.1 Asset Portfolio: Quantity, Useful Life and Replacement Cost

Table 11 illustrates key asset attributes for the township's vehicles portfolio, including quantities of various assets, their useful life, their replacement cost, and the valuation method by which the replacement costs were derived. In total, the township's vehicles assets are valued at $728,000 based on 2016 replacement costs. The useful life indicated for each asset type below was assigned by the township.

Table 11 Asset Inventory – Vehicles

Asset Type	Components	Quantity	Useful Life in Years	Valuation Method	2016 Replacement Cost
Vehicles	Plow Trucks	3	15	CPI (Ontario)	$619,788.00
	Pick Up Trucks	2	8	CPI (Ontario)	$108,007.00
				Total	$727,795.00

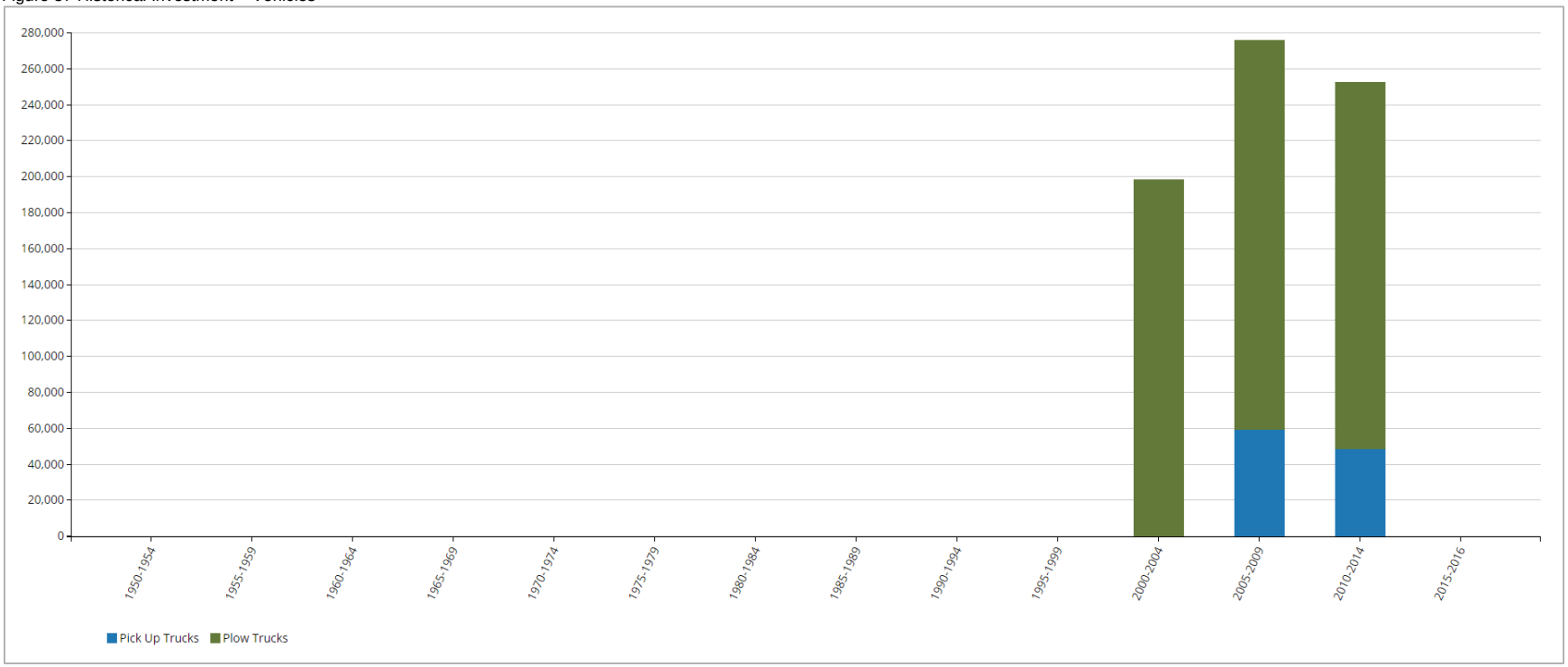
Figure 36 Asset Valuation – Vehicles



6.2 Historical Investment in Infrastructure

Figure 37 shows the township's historical investments in its vehicles portfolio since 1950. While observed condition data will provide superior accuracy in estimating replacement needs and should be incorporated into strategic plans, in the absence of such information, understanding past expenditure patterns and current useful life consumption levels (Section 9.3) can inform the forecasting and planning of infrastructure needs and in the development of a capital program. Note that this graph only includes the active asset inventory as of December 31, 2016.

Figure 37 Historical Investment – Vehicles



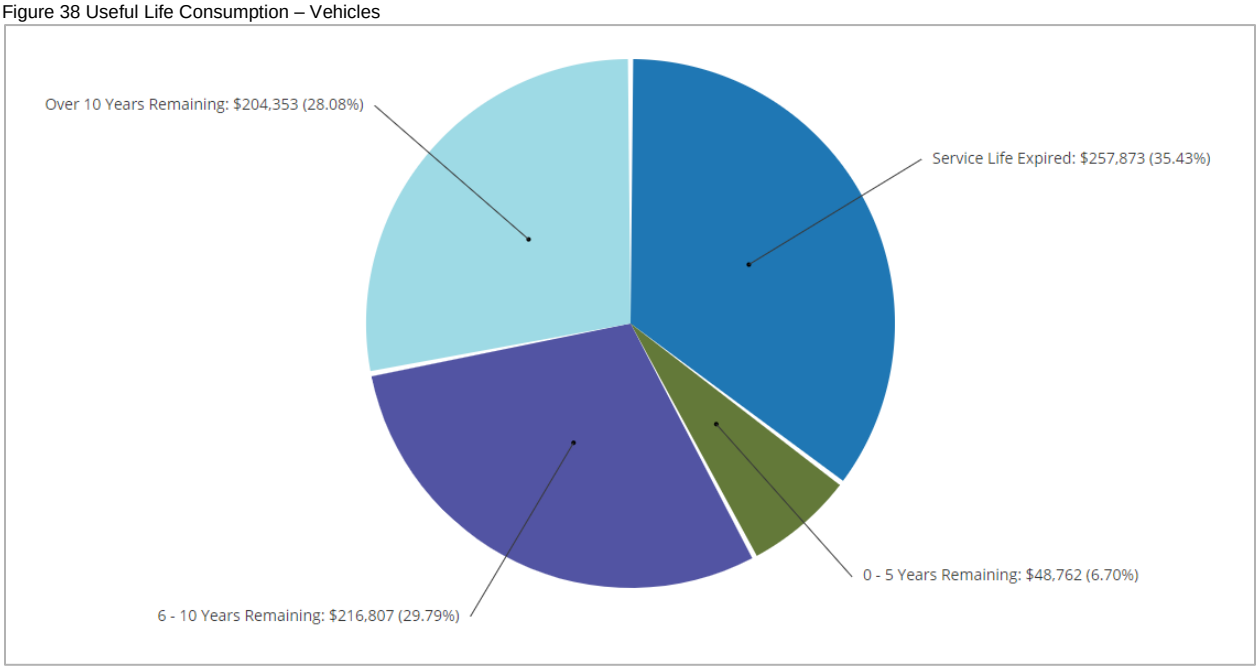
Investments in vehicles quickly increased starting in the 2000s. In 2000-2015, the period of largest investment, $728,000 was invested with $620,000 put into plow trucks.

Note: Investments into vehicle assets are only shown for assets currently in-service.

6.3 Useful Life Consumption

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

Figure 38 Useful Life Consumption – Vehicles

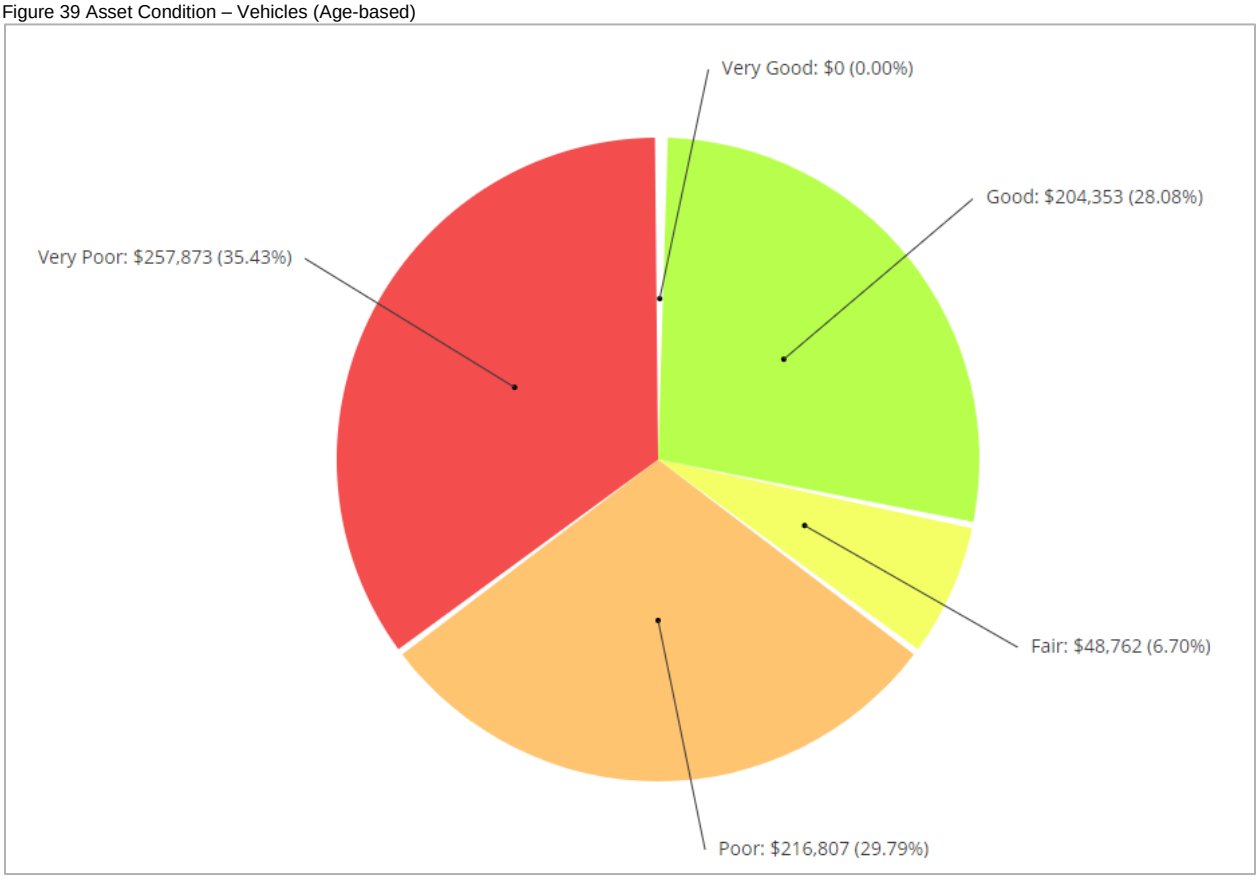


28% of assets have at least 10 years of useful life remaining; 35%, with a valuation of $258,000 remain in operation beyond their useful life. An additional 7% will reach the end of their useful life within the next five years.

6.4 Current Asset Condition

Using replacement cost, in this section, we summarize the condition of the township's vehicles assets as of 2015. By default, we rely on observed field data as provided by the township. In the absence of such information, age-based data is used as a proxy. All assets are based on age-based data.

Figure 39 Asset Condition – Vehicles (Age-based)

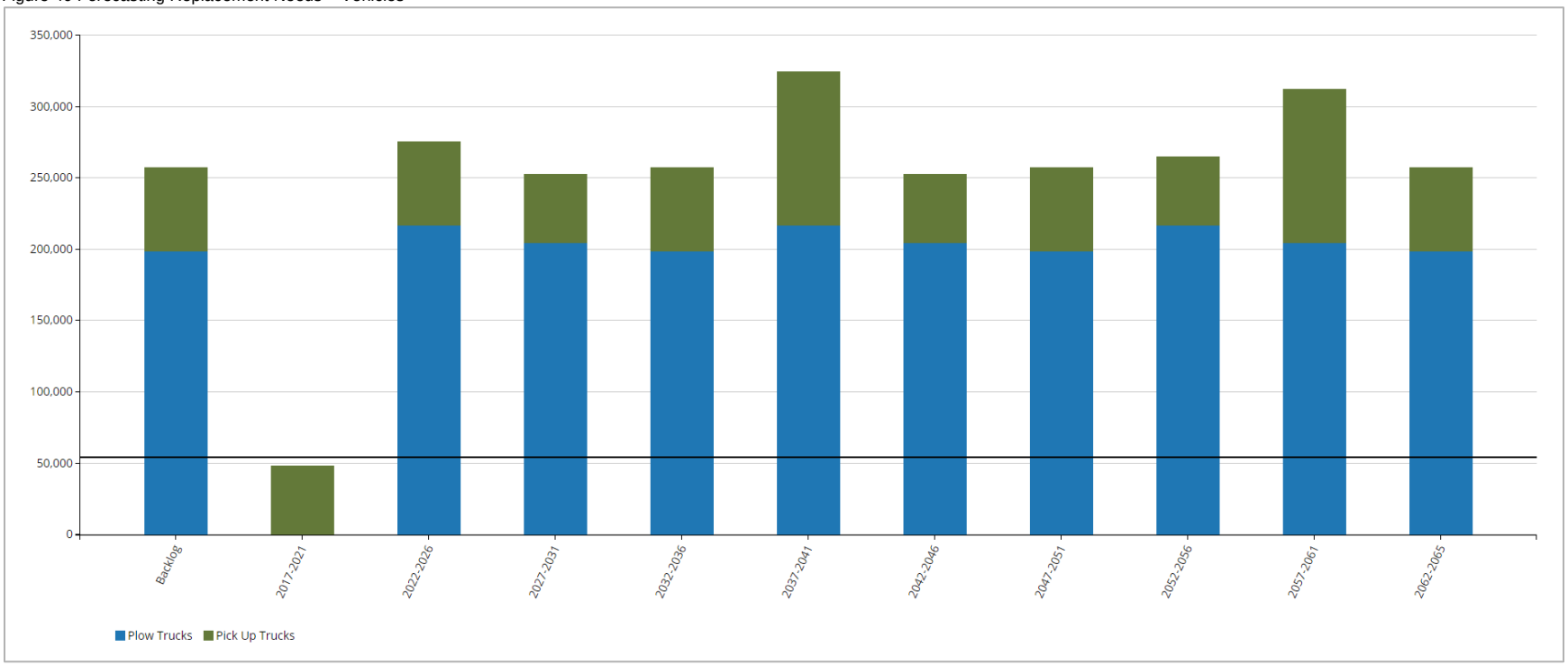


Age-based data shows that 65% of the township's vehicle assets are in poor to very poor condition; 28%, with a valuation of $204,000 are in good to very good condition.

6.5 Forecasting Replacement Needs

In this section, we illustrate the short-, medium- and long-term infrastructure spending requirements (replacement only) for the township's vehicles assets. The backlog is the aggregate investment in infrastructure that was deferred over previous years or decades. In the absence of observed data, the backlog represents the value of assets that remain in operation beyond their useful life.

Figure 40 Forecasting Replacement Needs – Vehicles



In addition to a backlog of $258,000, replacement needs will total over $49,000 over the next five years; an additional $276,000 will be required between 2022-2026. The township's annual requirements (indicated by the black line) for its vehicles total $55,000. At this funding level, the township would be allocating sufficient funds on an annual basis to meet replacement needs as they arise without the need for deferring projects and accruing annual infrastructure deficits. However, the township is currently allocating $77,000, leaving an annual surplus of $22,000. See the 'Financial Strategy' section for achieving a more optimal and sustainable funding level. Further, while fulfilling the annual requirements will position the township to meet its future replacement needs, injection of additional revenues will be needed to mitigate existing infrastructure backlogs.

6.6 Recommendations – Vehicles

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

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

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

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

VII. Levels of Service

The two primary risks to a township'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; under promise and overdeliver; or promise only that which can be delivered efficiently without placing inequitable burden on taxpayers. In general, there is often a trade-off between political expedience and judicious, long-term fiscal stewardship.

Developing realistic LOS using meaningful key performance indicators (KPIs) can be instrumental in managing citizen expectations, identifying areas requiring higher investments, driving organizational performance and securing the highest value for money from public assets. However, 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 township.

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

Table 12 LOS Categories

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

2. Key Performance Indicators and Targets

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

Table 13 Key Performance Indicators – Road Network and Bridges & Culverts

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

Table 14 Key Performance Indicators – Buildings

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

Table 15 Key Performance Indicators – Vehicles

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

Table 16 Key Performance Indicators – Machinery & Equipment

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

Table 17 Key Performance Indicators – Land Improvements

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

3. Future Performance

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

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

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

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

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

Demographic Changes
The composition of residents in a municipality can also serve as an infrastructure demand driver, and as a result, can change how a municipality allocates its resources (e.g., an aging population may require diversion of resources from parks and sports facilities to additional wellbeing centers). Population growth is also a significant demand driver for existing assets (lowering LOS), and may require the township 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 township should collect data on its current performance against the KPIs listed and establish targets that reflect the current fiscal capacity of the township, 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 township should be tracked annually.

VIII. Asset Management Strategies

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

1. Non-Infrastructure Solutions & Requirements

The township 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 township should develop and implement holistic condition assessment programs for all asset classes. This will advance the understanding of infrastructure needs, improve budget prioritization methodologies and provide a clearer path of what is required to achieve sustainable infrastructure programs.

2. Condition Assessment Programs

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

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

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

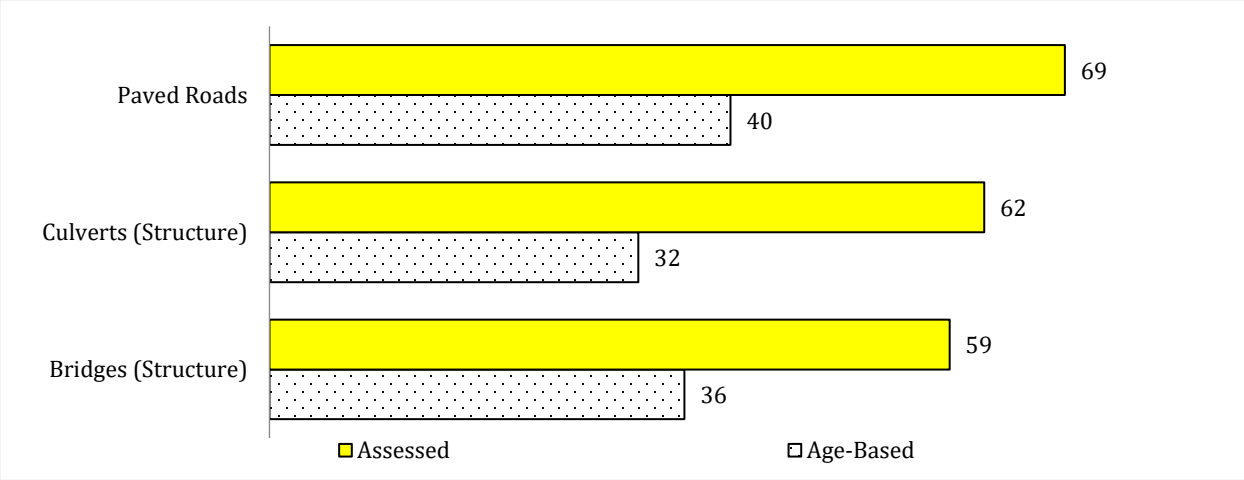
Condition assessment can involve different forms of analysis such as subjective opinion, mathematical models, or variations thereof, and can be completed through a very detailed or very cursory approach. When establishing the condition assessment for an entire asset class, a cursory approach (metrics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

The Impact of Condition Assessments

In 2015, PSD published a study in partnership with the Association of Municipalities of Ontario (AMO). The report, *The State of Ontario's Roads and Bridges: An Analysis of 93 Municipalities*, enumerated the infrastructure deficits, annual investment gaps, and the physical state of roads, bridges and culverts with a 2013 replacement value of $28 billion.

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

Figure 41 Comparing Age-based and Assessed Condition Data



2.1 Pavement Network

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

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

Another option for a cursory level of condition assessment is for municipal road crews to perform simple windshield surveys as part of their regular patrol. Many 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.

It is recommended that the township continue its pavement condition assessment program and that a portion of capital funding is dedicated to this. We also recommend expansion of this program to incorporate additional components.

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

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

Through the Ontario Structure Inspection Manual (OSIM) recommendations and additional detailed investigations, a 10-year needs list can be developed for the township's bridges.

2.3 Buildings & Facilities

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

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

Once collected, this information can be uploaded into the CityWide®, the township'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 township conduct inspections of structures and expand its condition assessment program for all buildings. It is also recommended that a portion of capital funding is dedicated to this.

2.4 Vehicles and Machinery & Equipment

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

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

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

The ideal preventative maintenance program would move progressively further away from reactive repairs and instead towards the prevention of all equipment failure before it occurs.

It is recommended that a preventative maintenance routine is defined and established for all vehicles and machinery & equipment assets, and that a software application is utilized for the overall management of the program.

2.5 Parks and Land Improvements

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

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

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

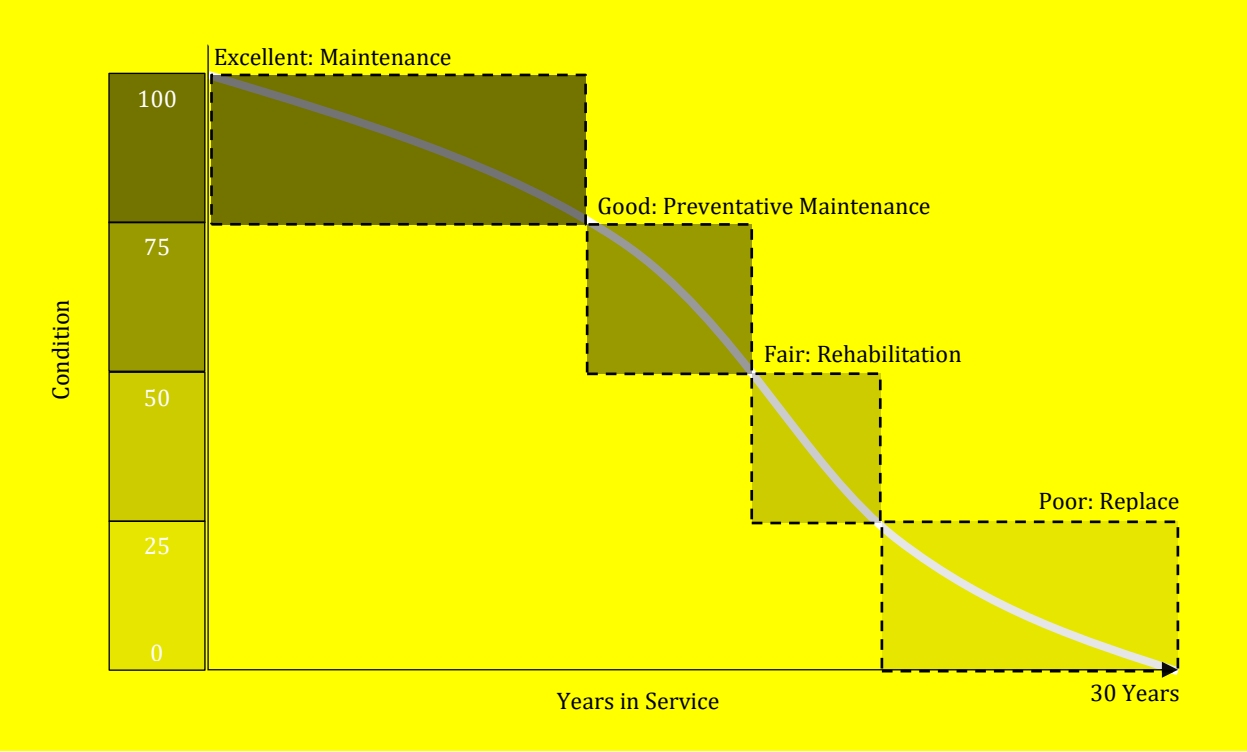
3. Lifecycle Analysis Framework

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

3.1 Paved Roads

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

Figure 42 Paved Road General Deterioration Profile



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

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

Table 18 Asset Condition and Related Work Activity for Paved Roads

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

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

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

3.2 Bridges & Culverts

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

3.3 Buildings & Facilities

The best approach to develop a 10-year needs list for the township's facilities portfolio would be to have the engineers, operational staff or architects who perform the facility inspections to also develop a complete portfolio maintenance requirements report and rehabilitation and replacement requirements report, and also identify additional detailed inspections and follow up studies as

required. This may be performed as a separate assignment once all individual facility audits/inspections are complete.

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

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

3.4 Vehicles and Machinery & Equipment

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

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

4. Growth and Demand

Growth is a critical infrastructure demand driver for most infrastructure services. As such, the township 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. Based on the 2016 census, the population for Machar has decreased 4.4% since 2011 to reach 882. Population changes will require the township to determine the impact to expected levels of service and if any changes to the existing asset inventory may be required.

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 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 township'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.

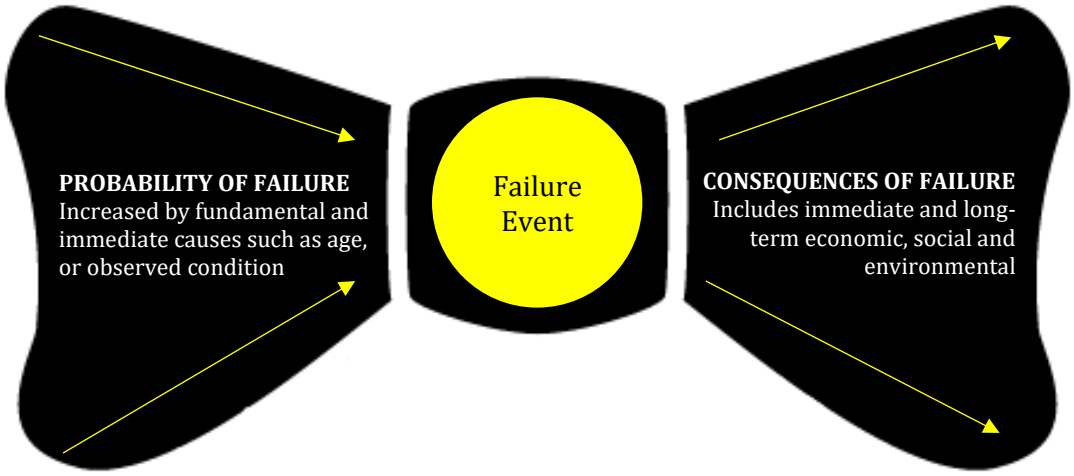
Risk mitigation is traditionally thought of in terms of safety and liability factors. In asset management, the definition of risk should heavily emphasize these factors but should be expanded to consider the risks to the township's ability to deliver targeted levels of service

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

5.2 Risk Matrices

Using the logic above, a risk matrix will illustrate each asset's overall risk, determined by multiplying the probability of failure (PoF) scores with the consequence of failure (CoF) score, as illustrated in the table that follow. This can be completed as a holistic exercise against any data set by determining which factors (or attributes) are available and will contribute to the PoF or CoF of an asset. Figure 43 (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 43 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 19 Probability of Failure – All Assets

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

Consequence of Failure

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

Assets for which other attributes are used include: roads. Attributes are selected based on their impact on service delivery. Scoring for roads, the risk is based on classification as it reflects the traffic volumes and number of people affected.

Table 20 Consequence of Failure – Roads

Road Classification	Consequence of failure
Gravel	Score of 1
LCB	Score of 3

Table 21 Consequence of Failure – Bridges & Culverts

Replacement Value	Consequence of failure
Up to $200k	Score of 1
$201 to $300k	Score of 2
$301 to $400k	Score of 3
$401 to $500k	Score of 4
$501k and over	Score of 5

Table 22 Consequence of Failure – Buildings & Facilities

Replacement Value	Consequence of failure
Up to $50k	Score of 1
$51k to $150k	Score of 2
$151k to $500k	Score of 3
$501k to $1 million	Score of 4
Over $1 million	Score of 5

Table 23 Consequence of Failure – Machinery & Equipment

Replacement Value	Consequence of failure
Up to $10k	Score of 1
$11k to $50k	Score of 2
$51k to $100k	Score of 3
$101k to $150k	Score of 4
Over $150k	Score of 5

Table 24 Consequence of Failure – Land Improvements

Replacement Value	Consequence of failure
Up to $10k	Score of 1
$11k to $30k	Score of 2
$31k to $50k	Score of 3
$51k to $80k	Score of 4
Over $80k	Score of 5

Table 25 Consequence of Failure – Vehicles

Replacement Value	Consequence of failure
Up to $50k	Score of 1
$51k to $100k	Score of 2
$101k to $150k	Score of 3
$151k to $200k	Score of 4
Over $200k	Score of 5

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

Figure 44 Distribution of Assets Based on Risk – All Asset Classes

Figure 45 Distribution of Assets Based on Risk – Road Network

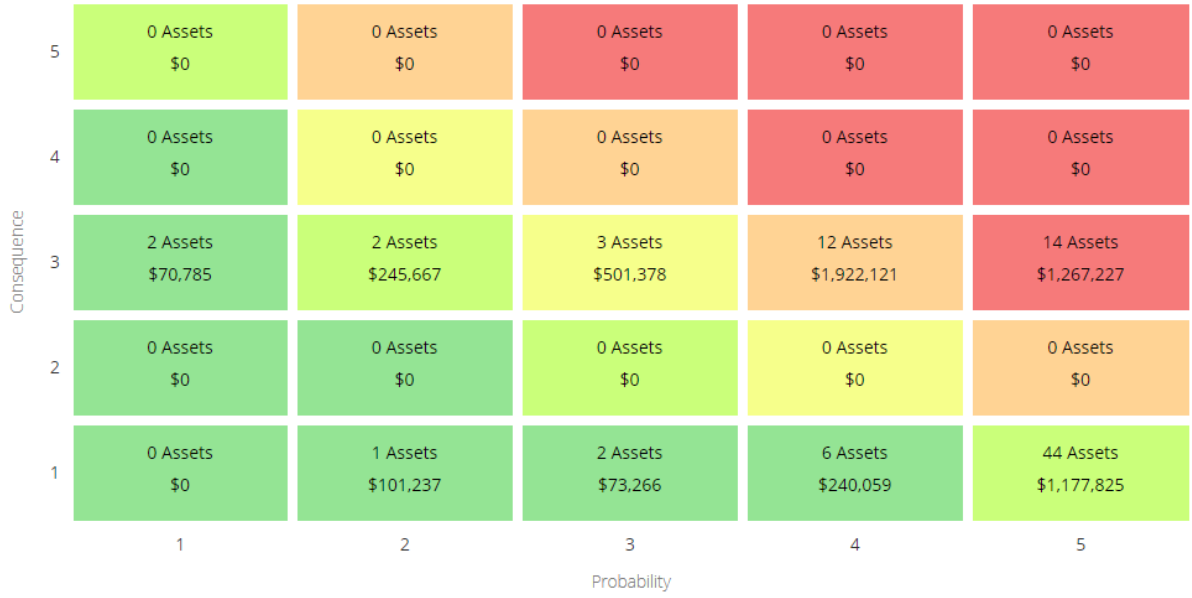


Figure 46 Distribution of Assets Based on Risk – Bridges & Culverts

Figure 47 Distribution of Assets Based on Risk – Buildings & Facilities

Figure 48 Distribution of Assets Based on Risk – Machinery & Equipment

Figure 49 Distribution of Assets Based on Risk – Land Improvements

Figure 50 Distribution of Assets Based on Risk – Vehicles

IX. Financial Strategy

1. General Overview

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

Figure 51 Cost Elements

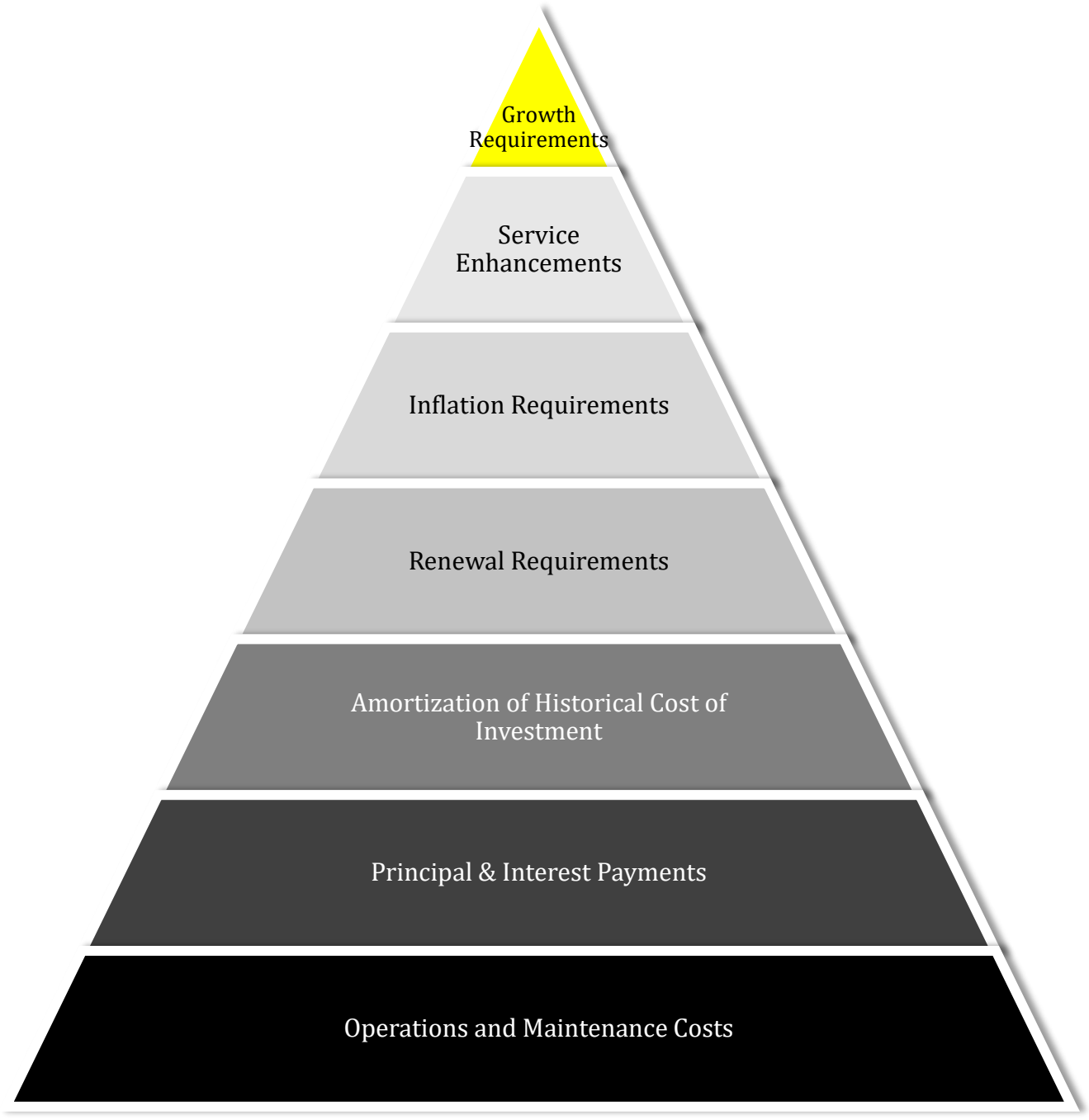


Figure 51 depicts the various cost elements and resulting funding levels that should be incorporated into AMPs that are based on best practices. Municipalities meeting their operational and maintenance needs, and debt obligations are funding only their cash cost. Funding at this level is severely deficient in terms of lifecycle costs.

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

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

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

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

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

2. Financial Profile: Tax Funded Assets

2.1 Funding Objective

We have developed scenarios that would enable the township to achieve full funding within 5 to 20 years for the following assets: Road Network; Bridges & Culverts; Machinery & Equipment; Buildings; Land Improvements; Vehicles. 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 26 and Table 27 outline, by asset category, Machar's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Table 26 Infrastructure Requirements and Current Funding Available: Tax Funded Assets

Asset class	Average Annual Investment Required	Total Funding Available in 2016					Annual Deficit/Surplus
		Taxes	Gas Tax	OCIF	Taxes to Reserves	Total Funding Available	
Road Network	657,000	34,000	56,000	50,000	0	140,000	517,000
Bridges & Culverts	45,000	14,000	0	0	0	14,000	31,000
Machinery & Equipment	41,000	26,000	0	0	21,000	47,000	6,000
Buildings	28,000	5,000	0	0	0	5,000	23,000
Land Improvements	6,000	97,000	0	0	0	97,000	91,000
Vehicles	55,000	56,000	0	0	21,000	77,000	22,000
Total	832,000	232,000	56,000	50,000	42,000	380,000	452,000

2.3 Recommendations for Full Funding

The average annual investment requirement for tax funded categories is $832,000. Annual revenue currently allocated to these assets for capital purposes is $380,000, leaving an annual deficit of $452,000. To put it another way, these infrastructure categories are currently funded at 46% of their long-term requirements.

In 2017, Machar had annual tax revenues of $1,735,000. As illustrated in Table 27, without consideration of any other sources of revenue, full funding would require the following tax change over time:

Table 27 Tax Change Required for Full Funding

Asset class	Tax Change Required for Full Funding
Road Network	29.8%
Bridges & Culverts	1.8%
Machinery & Equipment	-0.3%
Facilities	1.3%
Land Improvements	-5.2%
Vehicles	-1.3%
Total	26.1%

Table 28 Effect of Changes in OCIF Funding and Reallocating Decreases in Debt Costs

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	452,000	452,000	452,000	452,000	452,000	452,000	452,000	452,000
Change in OCIF Grant	N/A	N/A	N/A	N/A	0	0	0	0
Changes in Debt Costs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Resulting Infrastructure Deficit	452,000	452,000	452,000	452,000	452,000	452,000	452,000	452,000
Resulting Tax Increase Required:								
Total Over Time	**26.1%**	**26.1%**	**26.1%**	**26.1%**	**26.1%**	**26.1%**	**26.1%**	**26.1%**
Annually	5.2%	2.6%	1.7%	1.3%	5.2%	2.6%	1.7%	1.3%

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

- Increasing tax revenues by 1.3% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
- allocating the current gas tax and OCIF revenue as outlined in Table 26.
- Reallocating appropriate revenue from categories in a surplus position to those in a deficit position
- increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

- As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula based funding, if applicable, since this funding is a multi-year commitment.
- We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $184,000 for paved roads, $375,000 for bridges & culverts, $29,000 for machinery & equipment, $0 for buildings, $5,000 for land improvements and $258,000 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. Use of Debt

For reference purposes, Table 23 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.

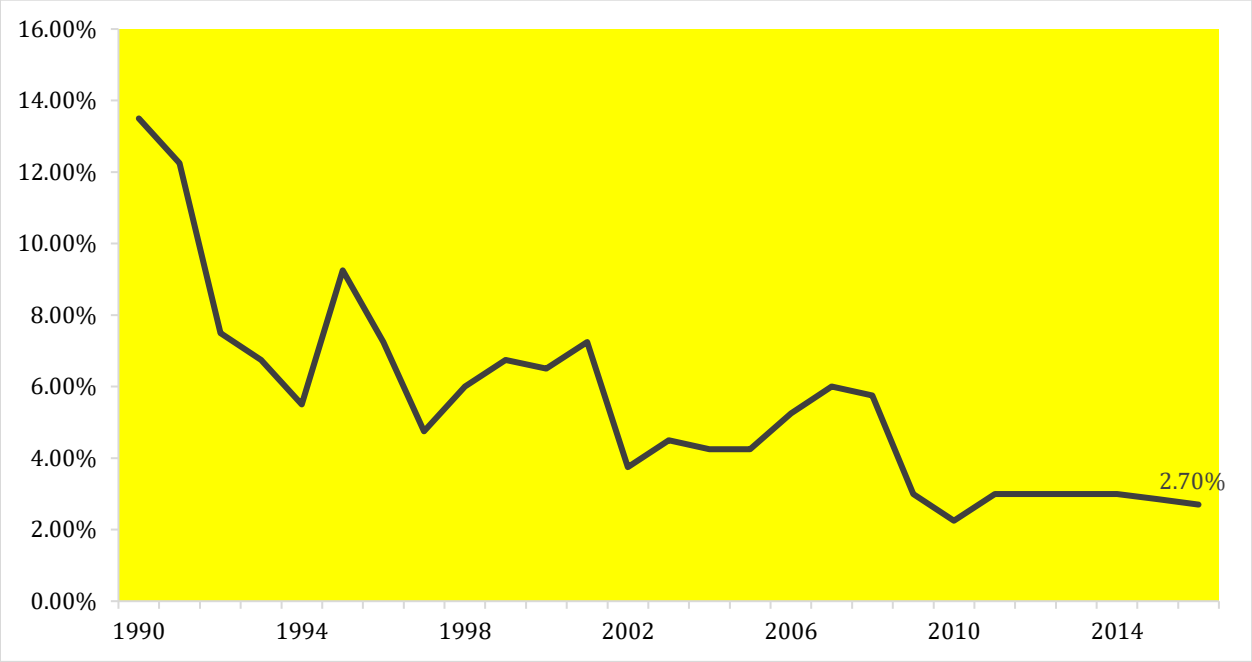
Table 23 Total Interest Paid as a Percentage of Project Costs

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

[3] Current municipal Infrastructure Ontario rates for 15 year money is 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 52 Historical Prime Business Interest Rates



As illustrated in Table 23, a change in 15 year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

Table 30 and Table 31 outline how Machar has historically not used debt for investing in the asset categories as listed. There is currently $0 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $0.

Table 30 Overview of Use of Debt

Asset class	Debt at December 31st, 2016	Use of Debt in Last Five Years				
		2011	2012	2013	2014	2015
Road Network	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0
Buildings	0	0	0	0	0	0
Land Improvements	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0
Total Tax Funded	0	0	0	0	0	0

Table 31 Overview of Debt Costs

Asset class	Principal & Interest Payments in Next Ten Years						
	2017	2018	2019	2020	2021	2022	2027
Road Network	0	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Machinery & Equipment	0	0	0	0	0	0	0
Buildings	0	0	0	0	0	0	0
Land Improvements	0	0	0	0	0	0	0
Vehicles	0	0	0	0	0	0	0
Total Tax Funded	0	0	0	0	0	0	0

The revenue options outlined in this plan allows Machar to fully fund its long-term infrastructure requirements without further use of debt. However, as explained in section 7.3.2, the recommended condition rating analysis may require otherwise.

4. Use of Reserves

4.1 Available Reserves

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

Table 32 Summary of Reserves Available

Asset class	Balance at December 31st, 2016
Road Network	0
Bridges & Culverts	0
Machinery & Equipment	202,000
Buildings	0
Land Improvements	0
Vehicles	202,000
Total Tax Funded	404,000

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 32 are available for use by applicable asset categories during the phase-in period to full funding. This, coupled with Machar'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.

4.2 Recommendation

As Machar 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 township'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 33 2016 Infrastructure Report Card

Asset class	Asset Health Grade	Funding Percentage	Financial Capacity Grade	Average Asset Class Grade	Comments
Roads	F	21%	F	F	Based on 2016 replacement cost, and primarily condition data, over 23% of assets, with a valuation of $2.6 million, are in good to very good condition; 72% are in poor to very poor condition. The township is underfunding its assets. Tax-funded categories are funded at 46%.
Bridges & Culverts	C	31%	F	D	
Buildings	C	18%	F	F	
Machinery & Equipment	C	115%	A	B	
Land Improvements	C	1617%	A	B	
Vehicles	D	140%	A	C	
		Average Asset Health Grade	D		
		Average Financial Capacity Grade	F		
		Overall Grade for the Township	F		

XI. Appendix: Grading and Conversion Scales

Table 34 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 35 Financial Capacity Scale

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

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