THE MUNICIPALITY OF
LAMBTON SHORES

November 2019

The Asset Management Plan for the Municipality of Lambton Shores

PSD RESEARCH CONSULTING SOFTWARE

Key Statistics

$745 million Value of infrastructure as of 2018	**32%** Portion of total 2019 revenues spent on infrastructure
1.98% Target average annual infrastructure reinvestment rate	**0.81%** Actual average annual infrastructure reinvestment rate
41% Percentage of annual infrastructure funding needs currently being met	**53%** Maximum % of infrastructure backlog that can be eliminated by fully depleting reserves
5.3% Portion of total infrastructure funding that comes from the Gas Tax	**33%** Annual cost savings for roads through proactive lifecycle management
$893 Annual infrastructure deficit per capita	**15-20 years** Recommended timeframe for eliminating annual infrastructure deficit

Contents

Executive Summary

This asset management plan (AMP) provides data-driven guidance to the municipality of Lambton Shores on managing its capital asset portfolio, valued at $745 million. It is developed in accordance with Ontario Regulation 588/17 and addresses key reporting requirements, including outlining the state of the infrastructure, defining current levels of service (LOS), risk, and the associated lifecycle strategies.

Based on 2019 data, 92% of all assets analysed in this AMP are in fair or better condition. Field condition assessments were used to determine actual condition for only 27% of assets, based on replacement cost. For 73% of assets, assessment data was unavailable, and age was used to approximate condition, a data gap that persists in most municipalities. Generally, age can understate the true condition of assets, making assessments essential to accurate financial asset management planning, and a recurring recommendation in this AMP.

As required by O. Reg 588/17, Lambton Shores has established current levels of service for its core asset classes which include roads, bridges and culverts, water, wastewater, and storm. LOS for non-core assets are also included in this AMP. Based on 2018 data, the average surface condition for the municipality's road network was rated as 'good'. Similarly, for bridges, the average condition index is 73%, indicating that bridges are in good condition and maintenance is not required within the next five years. No boil-water advisories were issued in 2018; however, there were 16 watermain breaks in 2018, all repaired within the same day. There are no combined sewers in the municipality. The storm network is designed only to handle a 5-year storm event, making the community vulnerable to more extreme and unpredictable weather.

Central to asset management is selecting and applying the right combination of maintenance and rehabilitation options to minimize lifecycle costs and risks, extend the asset's useful life, and maximize value. When a proactive lifecycle strategy was applied to the municipality's road network, it reduced annual financial requirements by 33% and extended useful lives by as much as 25 years.

As staff further develop an asset management program and consolidate data, similar strategies can be identified and applied to other asset classes to reduce the financial burden on ratepayers. Currently, in addition to the $26 million infrastructure backlog, Lambton Shores has a total annual infrastructure funding shortfall of approximately $8.7 million. To eliminate the $4.5 million deficit for tax funded assets, we recommend increasing tax revenues by 1.5% per year for 20 years. For rate funded assets, a 15-year phase-in period is recommended, based on a 3.6% revenue increase for sanitary services, and 3.5% for water. Strategic reallocations of debt repayment reductions and OCIF funding is also recommended.

An Overview of Asset Management

The initial acquisition of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% comes from operations and maintenance. The intent of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio.

Total Cost of Ownership

Build
20%

Operate, Maintain, and Dispose
80%
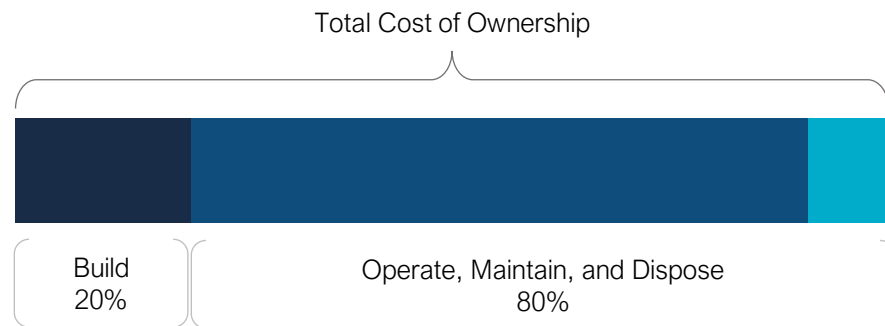
These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The diagram below depicts an industry-standard approach and sequence to developing a practical asset management program.

Strategic Plan → Asset Management Policy → Asset Management Strategy → Asset Management Plan
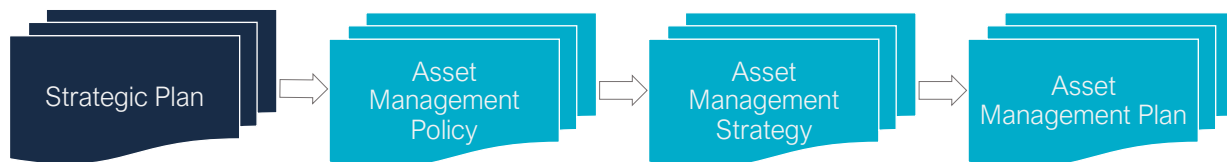
The diagram, adopted from the Institute of Asset Management (IAM), illustrates the concept of 'line of sight', or alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting—making it integral.

The municipality has not completed a documented asset management strategy. The strategy is an asset management best practice and is **not required** under any provincial or federal regulation.

Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. We apply these concepts throughout this asset management plan.

Lifecycle Management Strategies

Developing a lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest cost. There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation and replacement. The following table provides a description of each type of activity and the general difference in cost:

Event Type	Description	Example for roads	Cost
Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	$
Rehabilitation	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Resurface	$$
Replacement	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	$$$

Risk Management Strategies

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

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

Levels of Service

A level of service (LOS) is a measure of what the municipality is providing to the community and the nature and quality of that service. Within each asset class in this AMP, technical metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

These measures include a combination of those that have been outlined in O. Reg. 588/17 in addition to performance measures identified by the municipality as worth measuring and evaluating. The municipality measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

Community Levels of Service

Community levels of service provide a simple, plain language description or measure of how the community receives or experiences the services that the municipality provides. For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP. For non-core asset categories, the municipality has determined the qualitative descriptions that will be used to determine the community level of service provided. These descriptions can be found in the Levels of Service subsection within each asset category.

Technical Levels of Service

Technical levels of service provide a quantitative measure of key technical attributes of the service being provided to the community. These include mostly quantitative measures. For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP. For non-core asset categories, the municipality has determined the technical metrics that will be used to determine the technical level of service provided. These metrics can be found in the Levels of Service subsection within each asset category.

Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the municipality plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17. Proposed levels of service should be realistic and achievable within the timeframe outlined by the municipality. They should also be determined with consideration of a variety of community expectations, fiscal capacity, regulatory requirements, corporate goals and long-term sustainability. Once proposed levels of service have been established, and prior to July 2024, the municipality must identify a lifecycle management and financial strategy which allows these targets to be achieved.

Ontario Regulation 588/17

As part of the *Infrastructure for Jobs and Prosperity Act, 2015*, the Ontario government introduced Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (O. Reg 588/17. Along with creating better performing organizations, more liveable and sustainable communities, the regulation is a key, mandated driver of asset management planning and reporting. It places substantial emphasis on current and proposed levels of service and the lifecycle costs incurred in delivering them. The diagram below outlines key reporting requirements under O. Reg 588/17 and the associated timelines.

AMP: All Assets

Same requirements as 2021, but to include core and non-core assets

Asset Management Policy

Asset Management Policy Update

| 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |

THIS AMP

AMP: Core Assets

1. Current levels of service
2. Inventory analysis
3. Lifecycle activities to sustain LOS
4. Cost of lifecycle activities
5. Population and employment forecasts
6. Discussion of growth impacts

AMP: All Assets

1. Proposed levels of service for next 10 years
2. Updated inventory analysis
3. Lifecycle management strategy
4. Financial strategy and addressing shortfalls
5. Discussion of how growth assumptions impacted lifecycle and financial strategy

Scope and Methodology

Assets classes included in this AMP

This asset management plan for the municipality of Lambton Shores is produced in compliance with Ontario Regulation 588/17. The July 2021 deadline under the regulation—the first of three AMPs—requires analysis of only core assets. However, Lambton Shores is taking a more strategic and complete approach to this asset management plan by integrating all asset classes, not just core.

It summarizes the state of the infrastructure for the municipality's asset portfolio, establishes current levels of service and the associated technical and customer oriented key performance indicators (KPIs), outlines lifecycle strategies for optimal asset management and performance, and provides financial strategies to reach sustainability for the nine asset classes listed below.

Asset Class	Source of Funding
Roads	Tax Levy
Bridges & Culverts	
Storm Sewer Network	
Buildings and Facilities	
Land Improvements	
Rolling Stock	
Equipment	
Water	User Rates
Wastewater	

Deriving Replacement Costs

There are a range of methods to determine the replacement cost of an asset, and some are more accurate and reliable than others. This AMP relies on two methodologies:

- **User-Defined Cost**: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience
- **Cost Inflation**: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the municipality incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method. The municipality should aim to continuously improve the accuracy and reliability of replacement cost data based on the best available costing.

Deriving Asset Condition

Asset condition is defined as a measure of the physical state of an asset. An incomplete or limited understanding of asset condition can mislead long-term planning and decision-making. Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the municipality's asset portfolio. The table below outlines the condition rating system to determine asset condition. When field condition data is not available, service life remaining is used to approximate asset condition.

Condition	Description	Criteria	Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated	80-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	60-80
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies	40-60
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-40
Very Poor	Unfit for sustained service	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable	0-20

The analysis in this AMP is based on assessed condition data only as available. The value of assessed condition data cannot be overstated as it provides a more accurate representation of the state of infrastructure than does an age-based indicator. Age-based condition tends to understate asset condition, leading to premature treatments.

The municipality employs a combination of both formal and informal condition assessment programs for municipal assets. The road network was assessed by an external consultant in 2017 as part of a Road Needs Study completed by B.M. Ross, and all bridges & structural culverts are assessed every two years as per provincial regulations (Ontario Structure Inspection Manual).

This AMP relies on assessed condition data for only 27% of assets; for the remaining portfolio, age is used as an approximation of condition. The table below outlines how condition ratings were assigned to assets.

Asset Class	Asset Segment	Type of Condition Data	Source of Condition Data
Road Network	Paved	88% Assessed	2017 Road Needs Study (BM Ross)
	Tar & Chip	96% Assessed	2017 Road Needs Study (BM Ross)
Bridges & Culverts	Bridges	100% Assessed	2017 OSIM Inspection (BM Ross)
	Culverts	51% Assessed	2017 OSIM Inspection (BM Ross)
Storm Sewer Network	All	Age-based	In-Service Date and EUL
Water Network	All	Age-based	In-Service Date and EUL
Wastewater	All	Age-based	In-Service Date and EUL
Buildings	All	72% Assessed	2018 Assessments (Coin/Coulter)
Machinery & Equipment	All	2% Assessed	2018 Assessments (Coin/Coulter)
Land Improvements	All	58% Assessed	2018 Assessments (Coin/Coulter) & Staff Assessments
Rolling Stock	All	Age-based	In-Service Date and EUL

Estimated Useful Life and Service Life Remaining

The estimated useful life (EUL) of an asset is the period over which the municipality expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this AMP was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

By using an asset's in-service data and its EUL, the municipality can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the municipality can more accurately forecast when it will require replacement. The SLR is calculated as follows:

$$Service\ Life\ Remaining\ (SLR) = In\ Service\ Date + Estimated\ Useful\ Life\ (EUL) - Current\ Year$$

Reinvestment Rate

The reinvestment rate is a measurement of how much funding is available annually to individual asset classes relative to their current replacement cost.

Portfolio Overview

In this section, we provide a high-level summary of all asset classes before analysing each asset class individually.

Current Value of Asset Portfolio

The asset categories analysed in this AMP have a total 2018 replacement cost of $745 million. This total was determined based on a combination of user-defined costs and cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.
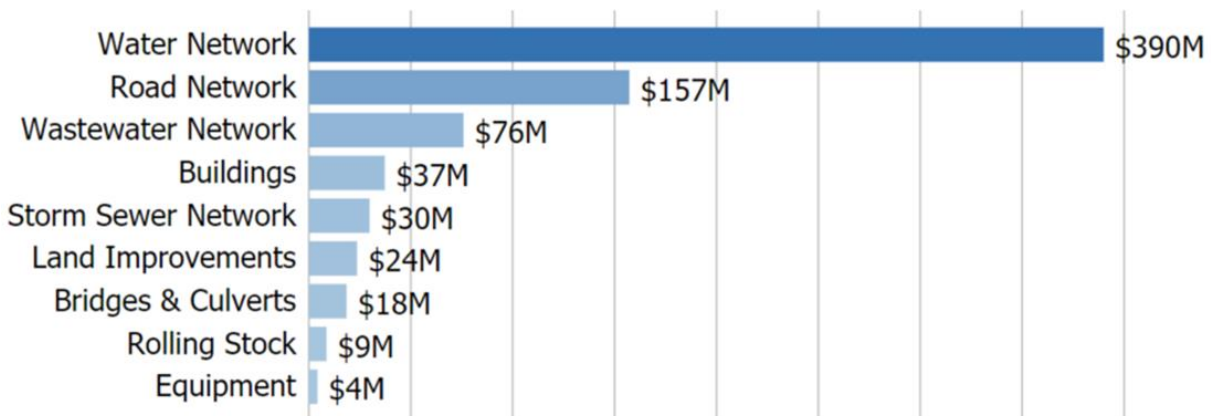
Historical Investments in Infrastructure

In addition to current replacement costs, a better understanding of historical infrastructure spending can help identify previous investment gaps and potential short- and medium-term spikes. The figure below illustrates historical investments Lambton Shores has made since 1960 in the asset classes analysed in this AMP.
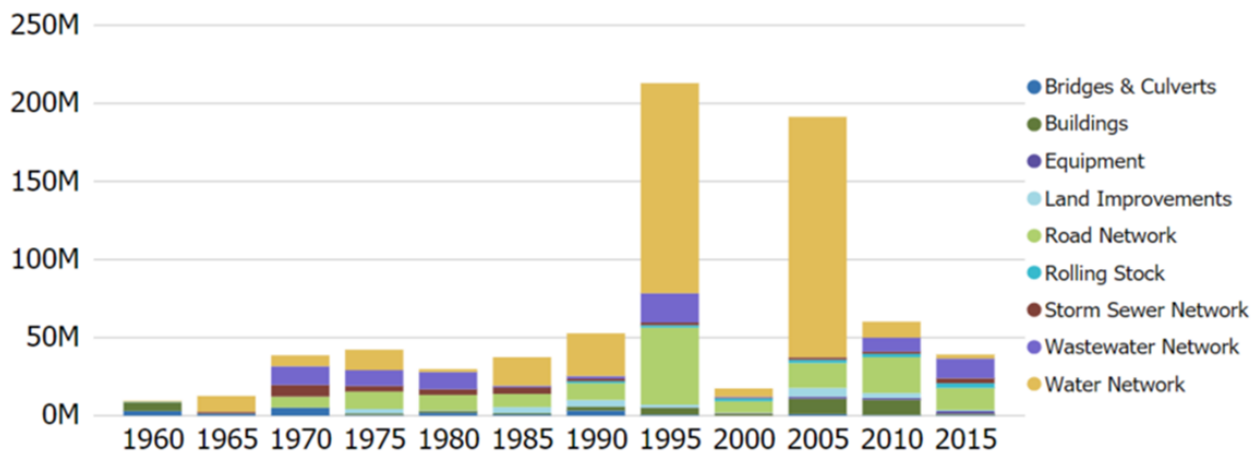
Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs of its $745 million asset portfolio, the municipality should be allocating approximately $14.8 million annually, for a target reinvestment rate of 1.98%. Actual annual spending on infrastructure totals approximately $6 million, for an actual reinvestment rate of 0.81%.
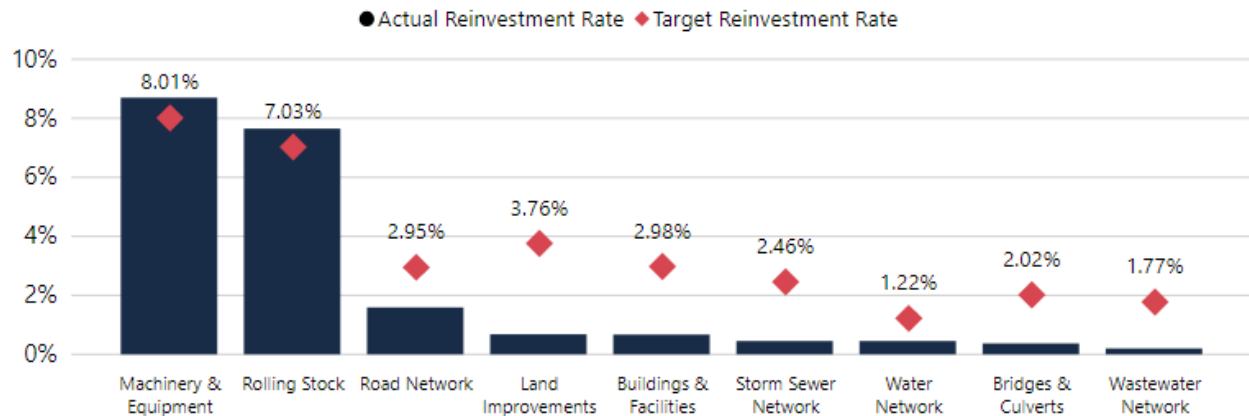
Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 92% of assets in Lambton Shores are in fair or better condition. This estimate relies on both age-based and field condition data.
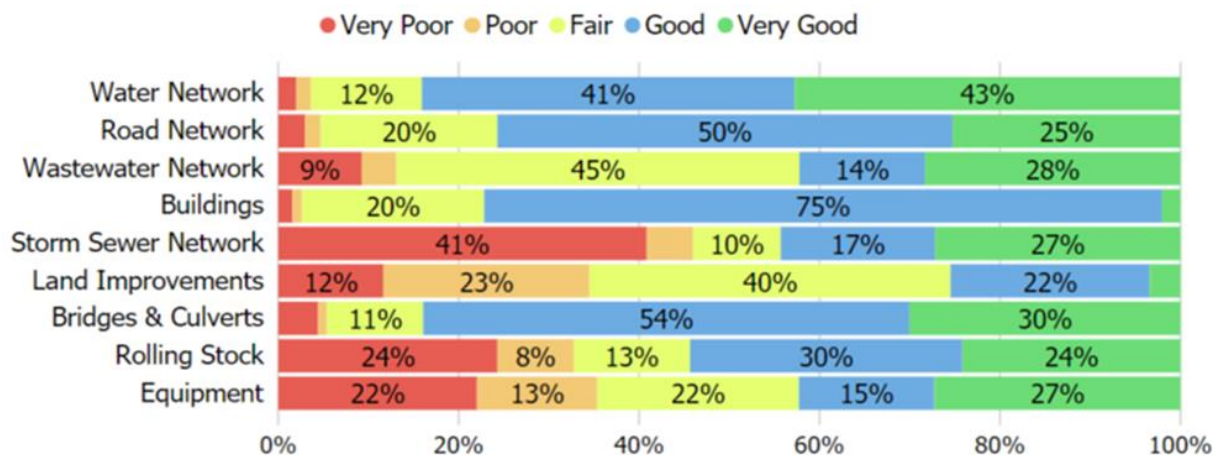
Field condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. A 2015 PSD study of 93 municipalities determined that using only age-based data can understate the condition of roads, bridges, and culverts by as much as 30%--leading to overstatement of financial needs. The table below identifies the source of condition data used throughout this AMP.

Asset Class	Asset Segment	Type of Condition Data	Source of Condition Data
Road Network	Paved	88% Assessed	2017 Road Needs Study (BM Ross)
	Tar & Chip	96% Assessed	2017 Road Needs Study (BM Ross)
Bridges & Culverts	Bridges	100% Assessed	2017 OSIM Inspection (BM Ross)
	Culverts	51% Assessed	2017 OSIM Inspection (BM Ross)
Storm Sewer Network	All	Age-based	In-Service Date and EUL
Water Network	All	Age-based	In-Service Date and EUL
Wastewater	All	Age-based	In-Service Date and EUL
Buildings	All	72% Assessed	2018 Assessments (Coin/Coulter)
Machinery & Equipment	All	2% Assessed	2018 Assessments (Coin/Coulter)
Land Improvements	All	58% Assessed	2018 Assessments (Coin/Coulter) & Staff Assessments
Rolling Stock	All	Age-based	In-Service Date and EUL

Service Life Remaining

Except for storm, most of the municipality's core assets have at least 10 years of service life remaining. At 67%, storm and equipment had the highest portion of assets that will reach the end of their established useful life within the next decade.
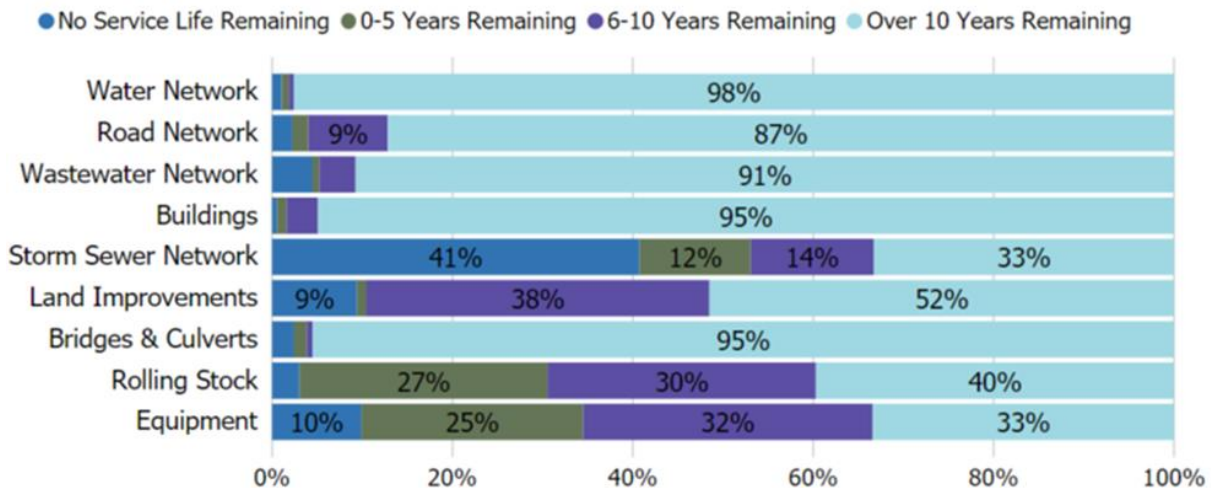
Comprehensive Analysis of Tax Funded Assets

Key Findings

- Tax funded assets are valued at $279 million in 2018 dollars, making up 37% of the municipality's total asset portfolio.
- 83% of tax funded assets are in fair or better condition
- Assets are currently funded at only 48% of their long-term requirements.
- To reach sustainability, tax revenues need to be increased by 1.5% annually for the next 20 years to eliminate annual deficits.
- Project prioritization is needed to gradually eliminate the infrastructure backlog of $19 million.

Road Network

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Road Network inventory. Gravel roads have been included as they comprise a significant portion of the municipality's road network. However, the lifecycle management strategies for these assets consist of perpetual maintenance activities and do not require capital costs for rehabilitation activities or end-of-life replacement. Operating costs will not be considered in the financial strategy for this AMP.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Gravel Roads	135km	Not Planned for Replacement	
Road Surface - Paved	145km	Cost/Unit	$127,694,705
Road Surface - Tar & Chip	50km	Cost/Unit	$22,078,563
Sidewalks	38km	Cost/Unit	$5,088,218
Signs	5,816	NRBCPI Quarterly (Toronto)	$804,399
Streetlights & Traffic Lights	1,368	NRBCPI Quarterly (Toronto)	$1,569,221
		Total:	$157,235,106

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Road Surface - Paved	73%	Good	88% Assessed
Road Surface - Tar & Chip	55%	Fair	96% Assessed
Sidewalks	40%	Fair	Age-Based
Signs	42%	Fair	Age-Based
Streetlights & Traffic Lights	64%	Good	Age-Based
Average:	69%	Good	58% Assessed
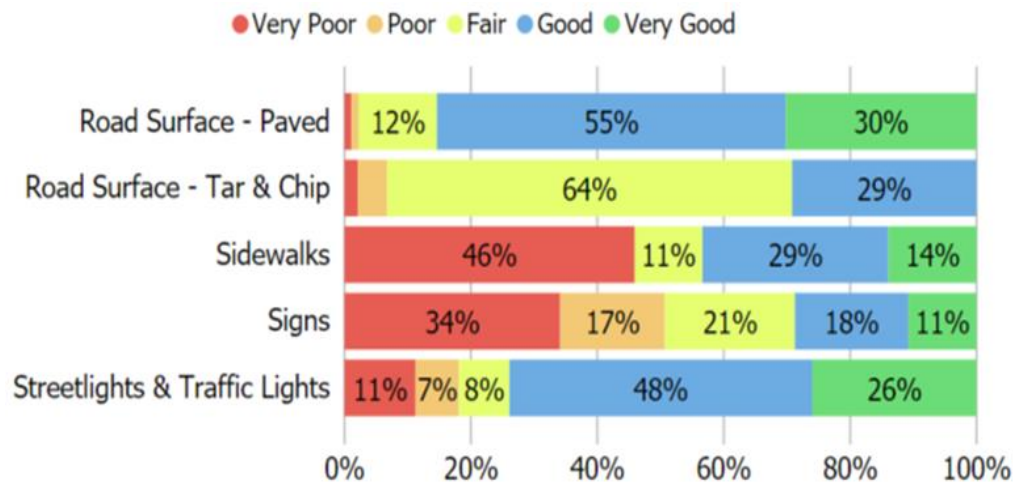
To ensure that the municipality's Road Network continues to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Road Network.

Estimated Useful Life & Average Age

The Estimated Useful Life for Road Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Road Surface - Paved	20	8	17
Road Surface - Tar & Chip	15	6	9
Sidewalks	30	24	6
Signs	10	6	4
Streetlights & Traffic Lights	30	14	16
Average:		12	13
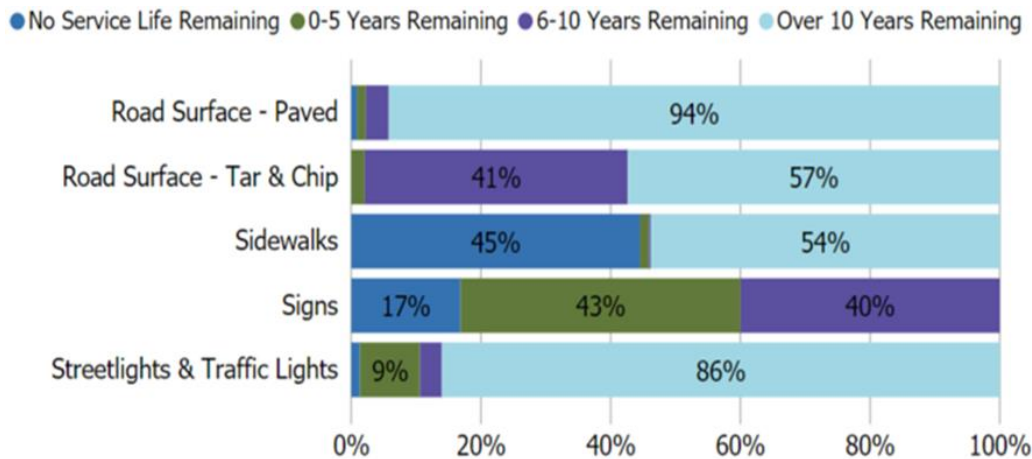
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Condition Assessment & Data Collection

- The municipality has a Road Needs Study completed by an external consultant every six years. The Study identifies a Road Condition Rating (0-10) for every municipal road.
- The Road Needs Study is a valuable source of information and heavily informs capital planning processes that address the need for rehabilitation and replacement activities

Lifecycle Management Strategy

Operations & Maintenance

- Summer:
  - Sidewalk repairs, grading, re-gravelling, dust control, ditching, roadside mowing, tree trimming, brush cleanup, road sign installation/maintenance, construction projects, pavement patching, line painting
- Winter:
  - Snow plowing, sanding/salting, ice blading of gravel roads, snow removal
- Significant operating costs include:
  - Asphalt patching/repairs, gravel material purchase, tree cutting

Rehabilitation & Replacement

- Rehabilitation activities are determined based on a combination of both external expertise (Road Needs Study) and internal expertise (knowledge of evolving road condition, organizational priorities, available budget)

- Tar & chip roads are managed proactively and are subject to regular re-surfacing activities (single and double lift) to maintain a suitable driving surface
- Paved road rehabilitation and replacement is more of a reactive process at this time
- A 10-year capital plan is developed that identifies both replacement and rehabilitation events

Lifecycle Strategy - Roads

The following lifecycle strategies have been developed as a proactive approach to managing the lifecycle of tar & chip and paved roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost.

Tar & Chip Roads		
Event Name	Event Class	Event Trigger
Single Lift (First Treatment)	Rehabilitation	7 Years
Single Lift (Second Treatment)	Rehabilitation	15 Years
Double Lift	Rehabilitation	25 Years
Full Reconstruction	Replacement	40 Years

Paved Roads		
Event Name	Event Class	Event Trigger
Partial Mill & Re-surface (First Treatment)	Rehabilitation	15 Years
Partial Mill & Re-surface (Second Treatment)	Rehabilitation	30 Years
Full Reconstruction	Replacement	52 Years

Forecasted Capital Requirements

Based on the lifecycle strategies identified for both tar & chip and paved roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the Road Network. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $4,641,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Asset Prioritization List

The following table identifies the highest risk Road Network assets according to the risk criteria identified in Appendix E.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g., no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
1461	Road Surface - Paved	King Street	$192,200	0 - Very Poor	20 - Very High
1510	Road Surface - Paved	Main Street	$932,170	0 - Very Poor	20 - Very High
1653	Road Surface - Paved	Shoreline Drive S	$96,100	23.86 - Poor	16 - Very High
7031	Road Surface - Paved	King St E	$209,498	24.23 - Poor	16 - Very High
7231	Road Surface - Paved	Cameron Street	$166,253	0 - Very Poor	15 - Very High

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
1631	Road Surface - Paved	River Road	$336,350	51.16 - Fair	12 - High
1652	Road Surface - Paved	Shoreline Drive N	$96,100	51.16 - Fair	12 - High
1471	Road Surface - Paved	Klondyke Road	$576,600	51.75 - Fair	10.5 - High
1682	Road Surface - Paved	Union Street	$336,350	56.93 - Fair	10.5 - High
1219	Road Surface - Tar & Chip	Arkona Road	$283,200	17.46 - Very Poor	10 - High

Levels of Service

The following tables identify the municipality's current level of service for the Road Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix D for map
Quality	Description or images that illustrate the different levels of road class pavement condition	See Appendix D for map

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0 km/km^2
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.16 km/km^2
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	0.43 km/km^2
Quality	Average pavement condition index for paved roads in the municipality	74.2
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	Good
Performance	Capital re-investment rate	1.01%

Recommendations

Replacement Costs

- Review and update replacement costs on an annual basis to ensure that short-, medium-, and long-term planning are based on the best available estimate of future costs.

Condition Assessment Strategies

- Review and establish a formal condition assessment program for the Road Network.
    - Condition assessments for roads should continue to be completed on a regular cycle (every six years) and may be expanded to include sidewalks.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
    - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the municipality believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Bridges & Culverts

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Bridges & Culverts inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	8	User-Defined Cost/NRBCPI Quarterly	$5,906,226
Culverts	74	User-Defined Cost/NRBCPI Quarterly	$12,381,918
Guide Rails	726m	NRBCPI Quarterly (Toronto)	$184,817
		Total:	$18,472,961

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Bridges	91%	Very Good	100% Assessed
Culverts	64%	Good	51% Assessed
Guide Rails	84%	Very Good	Age-based
Average:	73%	Good	52% Assessed
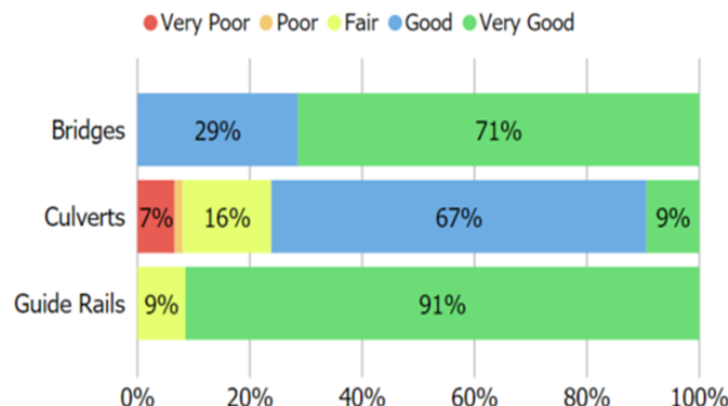
To ensure that the municipality's Bridges & Culverts continue to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what

combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the Bridges & Culverts.

Estimated Useful Life & Average Age

The Estimated Useful Life for Bridges & Culverts assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges	50	9	41
Culverts	50	30	20
Guide Rails	10-30	4	23
Average:		26	22
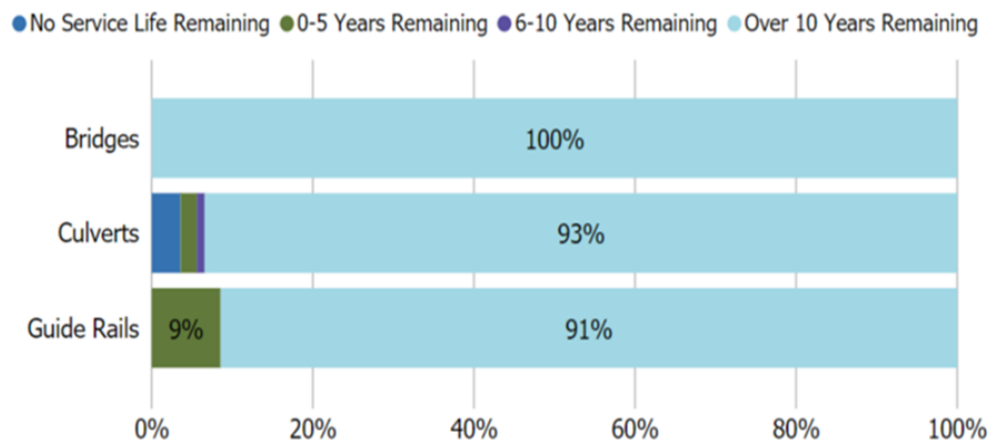
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Condition Assessment & Data Collection

- All bridges and culverts with a span greater than or equal to three metres are inspected every two years according to provincial regulations outlined in the Ontario Structure Inspection Manual (OSIM)

- The municipality uses an engineering firm to complete inspections. The Inspection Report identifies maintenance, rehabilitation and replacement needs as well as an overall Bridge Condition Index (0-100) for each structure

Lifecycle Management Strategy

Operations & Maintenance

- Operating costs identified in the Inspection Reports are integrated into annual operating budgets to ensure these structures are kept in an adequate state of repair
- Annual operating budget includes basic patch repairs, power-washing etc.

Rehabilitation & Replacement

- Capital costs identified in the Inspection Reports are integrated into annual capital budgets as well as the 10-year capital plan to ensure these structures are being rehabilitated and replaced when necessary

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for the Bridges & Culverts. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $373,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Consequence	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5 Severe	1 Asset $2,884,000.00	0 Assets $0.00	0 Assets $0.00	0 Assets $0.00	0 Assets $0.00
4 Major	0 Assets $0.00	1 Asset $1,025,674.00	0 Assets $0.00	0 Assets $0.00	0 Assets $0.00
3 Moderate	1 Asset $942,038.00	2 Assets $1,242,592.00	0 Assets $0.00	0 Assets $0.00	0 Assets $0.00
2 Minor	4 Assets $1,281,302.00	16 Assets $5,340,756.00	4 Assets $1,483,612.00	0 Assets $0.00	0 Assets $0.00
1 Insignificant	9 Assets $441,939.00	15 Assets $2,347,323.00	8 Assets $485,988.00	5 Assets $181,888.00	22 Assets $815,849.00
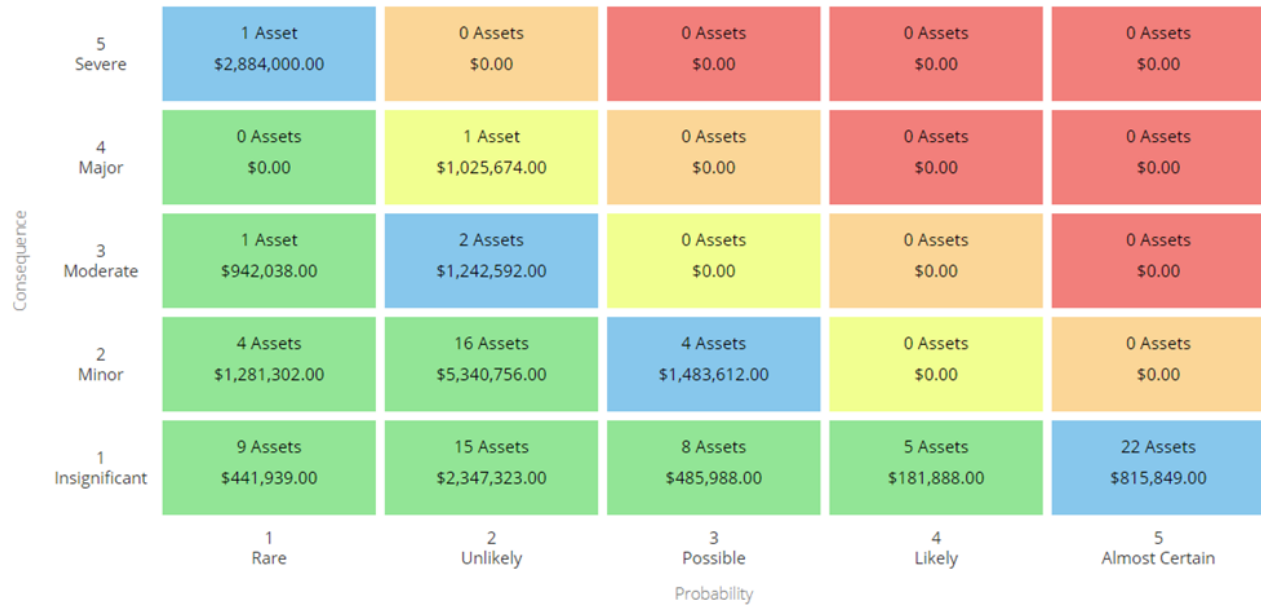
Probability

Asset Prioritization List

The following table identifies the highest risk Bridges & Culverts assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
2187	Bridges	Lakeshore Road (Highway 21)	$2,884,000	55.57 - Fair	15 - Very High
2185	Culverts	Main Street	$1,025,674	71.03 - Good	8 - Moderate

Levels of Service

The following tables identify the municipality's current level of service for Bridges & Culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Bridges & Culverts.

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	Bridges and structural culverts are a key component of the municipal transportation network. None of the municipality's structures have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction. Many structures also support pedestrian traffic.
Quality	Description or images of the condition of bridges & culverts and how this would affect use of the bridges & culverts	The municipality is required to complete biennial inspections of all bridges and structural culverts greater than or equal to 3 metres in span according to the Ontario Structure Inspection Manual. Each structure is inspected by a licensed engineer and any maintenance, rehabilitation or replacement requirements are provided to the municipality. The most recent OSIM inspection report completed identified six replacement and rehabilitation events within the next 1-5 years. When bridges or structural culverts need to be closed or replaced it can have a significant impact on the efficiency of the transportation network and detours may be required. The OSIM inspection program helps the municipality to implement lifecycle strategies that minimize the impacts of these potential service disruptions.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	% of bridges in the municipality with loading or dimensional restrictions	0%
Quality	Average bridge condition index value for bridges in the municipality	OSIM: 78%
	Average bridge condition index value for structural culverts in the municipality	OSIM: 68%
Performance	Capital re-investment rate	0.36%

Recommendations

Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2 years.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
    - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Lifecycle Management Strategies

- This AMP only includes capital costs associated with the reconstruction of bridges and culverts. The municipality should work towards identifying projected capital rehabilitation and renewal costs for bridges and culverts and integrating these costs into long-term planning.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the municipality believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Storm Sewer Network

Asset Inventory & Replacement Cost

The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Storm Sewer Network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Catch Basins	195	Cost/Unit	$329,355
Storm Ponds	4	NRBCPI Quarterly (Toronto)	$946,719
Storm Sewers	41,904m	Cost/Unit	$28,513,244
		Total:	$29,789,318

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Catch Basins	72%	Good	Age-Based
Storm Ponds	100%	Very Good	Age-Based
Storm Sewers	42%	Fair	Age-Based
Average:	44%	Fair	100% Age-Based
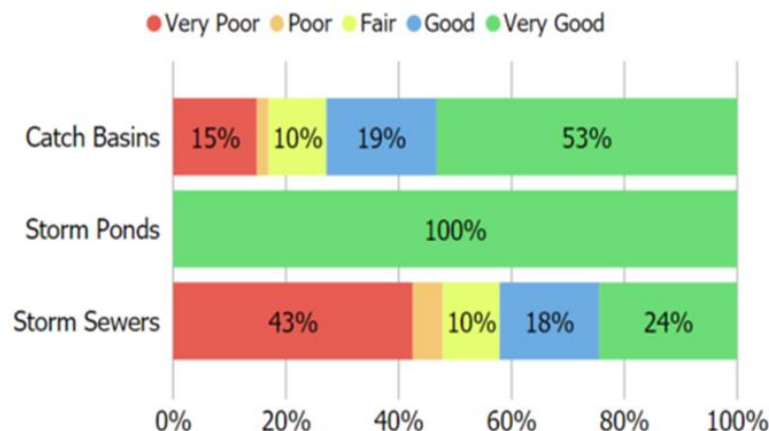
To ensure that the municipality's Storm Sewer Network continues to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what

combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the Storm Sewer Network.

Estimated Useful Life & Average Age

The Estimated Useful Life for Storm Sewer Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Lif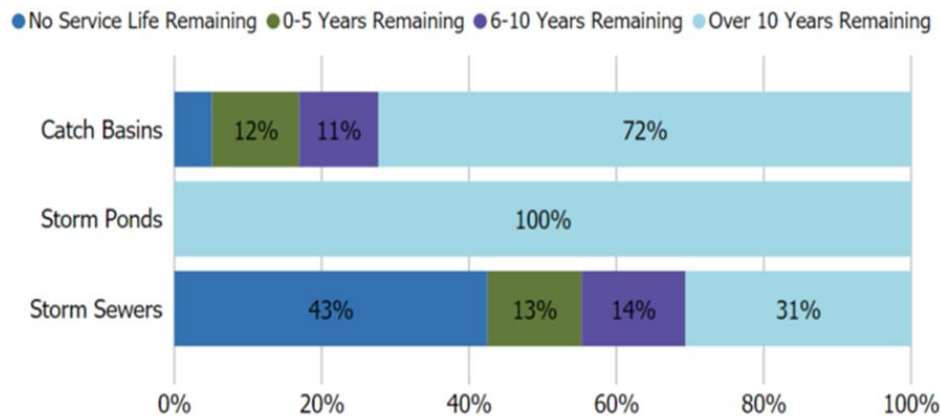e and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Catch Basins	30-50	28	21
Storm Ponds	60	4	56
Storm Sewers	30-60	33	7
Average:		32	10

● No Service Life Remaining ● 0-5 Years Remaining ● 6-10 Years Remaining ● Over 10 Years Remaining

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

Asset Management Strategies

Condition Assessment & Data Collection

- There is no routine condition assessment process in place for stormwater infrastructure.
- CCTV inspection occurs only on a case-by-base basis when reconstruction of stormwater infrastructure can be combined with other capital projects (roads, water, sanitary etc.).

- There are no immediate plans for system-wide inspections and the municipality is instead focusing on Area Master Plans to determine service attributes.

Lifecycle Management Strategy

Operations & Maintenance

- There are very few maintenance activities routinely completed to maintain the storm sewer network other than catch basin cleaning to ensure that stormwater can flow from the surface into stormwater mains without obstruction.

Rehabilitation & Replacement

- Most storm sewer infrastructure is replaced solely once it reaches the end of its estimated useful life without many major rehabilitative efforts during its lifecycle.
- Reconstruction projects are completed only when they can be combined with planned road rehabilitation or reconstruction projects.
- Capital projects for the storm sewer network are included in the 10-year capital plan, but are only included as part of the roads budget.

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for the Storm Sewer Network. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $732,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Consequence	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5 Severe	155.00 m $261,795	- $0	461.50 m $935,461	- $0	570.80 m $1,025,935
4 Major	1,881.60 m $1,828,986	480.60 m $406,429	723.00 m $631,444	18.10 m $16,815	302.46 m $300,717
3 Moderate	2,056.30 m $1,669,479	788.40 m $553,633	618.00 m $464,836	39.60 m $31,442	945.90 m $713,604
2 Minor	3,541.40 m $2,147,557	2,887.00 m $1,727,721	929.50 m $556,567	2,124.10 m $1,276,959	6,730.40 m $4,026,603
1 Insignificant	1,640.98 m $1,066,646	3,974.25 m $2,348,782	473.48 m $279,827	321.50 m $190,007	10,240.27 m $6,052,000

Probability

Asset Prioritization List

The following table identifies the highest risk Storm Sewer Network assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g., no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
4317	Storm Sewers	Bayley Street	$190,519	0 - Very Poor	25 - Very High

4321	Storm Sewers	Broadway Street	$186,484	0 - Very Poor	25 - Very High
4336	Storm Sewers	CNR Easement	$184,457	0 - Very Poor	25 - Very High
4342	Storm Sewers	Easement	$464,475	0 - Very Poor	25 - Very High
4337	Storm Sewers	CNR Easement	$14,678	0 - Very Poor	20 - Very High
4338	Storm Sewers	CNR Easement	$6,249	0 - Very Poor	20 - Very High
4344	Storm Sewers	Easement	$78,750	0 - Very Poor	20 - Very High
4502	Storm Sewers	Townsend Line	$84,795	0 - Very Poor	20 - Very High
4503	Storm Sewers	Townsend Line	$116,244	0 - Very Poor	20 - Very High
4573	Storm Sewers	Ontario Street	$16,815	31.19 - Poor	16 - Very High

Levels of Service

The following tables identify the municipality's current level of service for the Storm Sewer Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Storm Sewer Network.

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system	The Community Services Department oversees the maintenance of the urban storm water collection systems in Arkona, Forest, Grand Bend, and Thedford. Most storm water systems are only designed to handle 1 to 5 year storm events. In other words, they are not designed to handle more extreme and unpredictable events and minor road flooding could occur in higher frequency events. New developments also often include storm water management ponds often referred to as "SWM Ponds" (pronounced Swim). These ponds are meant to improve the quality of the storm discharge and regulate the rate it discharges to reduce the potential downstream impacts. These ponds, while not requiring much in the way of maintenance when they are initially built do require maintenance as they start to fill with sediment. The municipality has an annual maintenance program to inspect all the storm water management ponds that the municipality owns.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	% of properties in municipality resilient to a 100-year storm	*No reliable data available*
	% of the municipal stormwater management system resilient to a 5-year storm	100%
Performance	Capital re-investment rate	2.42%

Recommendations

Condition Assessment Strategies

- Establish a routine condition assessment process for storm sewer mains. This may include the use of CCTV cameras to inspect a portion of the stormwater network on a regular cycle. Assets can be prioritized for assessment according to their age and/or risk of failure.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
  - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Lifecycle Management Strategies

- Identify the cost/benefit of optional lifecycle management strategies that may extend the life of storm sewer mains at a lower total cost of ownership. This may include the strategic use of structural pipe re-lining events.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the municipality believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Machinery & Equipment

Asset Inventory & Replacement Cost

The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Machinery & Equipment inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Corporate Services Equipment	318	CPI Monthly (ON)	$829,127
Protection Services Equipment	221	CPI Monthly (ON)	$2,076,130
Recreational Equipment	653	CPI Monthly (ON)	$846,078
Transportation Services Equipment	71	CPI Monthly (ON)	$455,585
		Total:	$4,206,920

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Corporate Services Equipment	35%	Poor	Age-Based
Protection Services Equipment	61%	Good	6% Assessed
Recreational Equipment	60%	Good	1% Assessed
Transportation Services Equipment	38%	Poor	2% Assessed
Average:	53%	Fair	2% Assessed
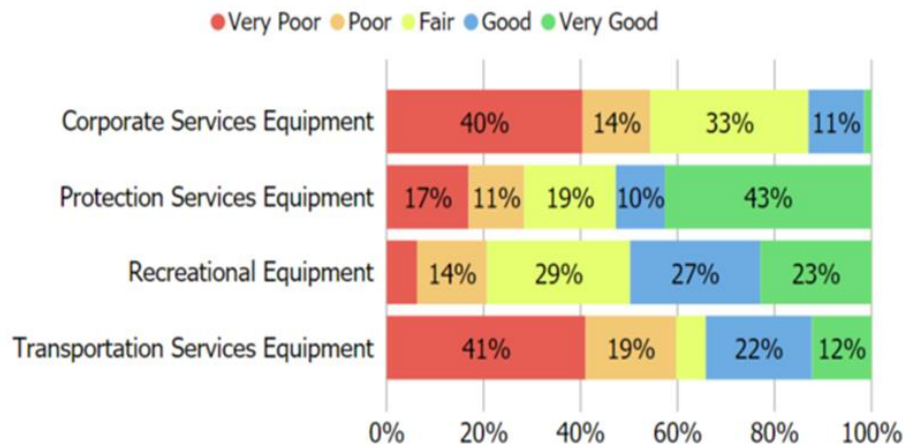
To ensure that the municipality's Machinery & Equipment continues to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Machinery & Equipment.

Estimated Useful Life & Average Age

The Estimated Useful Life for Machinery & Equipment assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Corporate Services Equipment	5-30	11	10
Protection Services Equipment	10-25	8	5
Recreational Equipment	10-35	7	10
Transportation Services Equipment	10-30	11	0
Average:		9	7
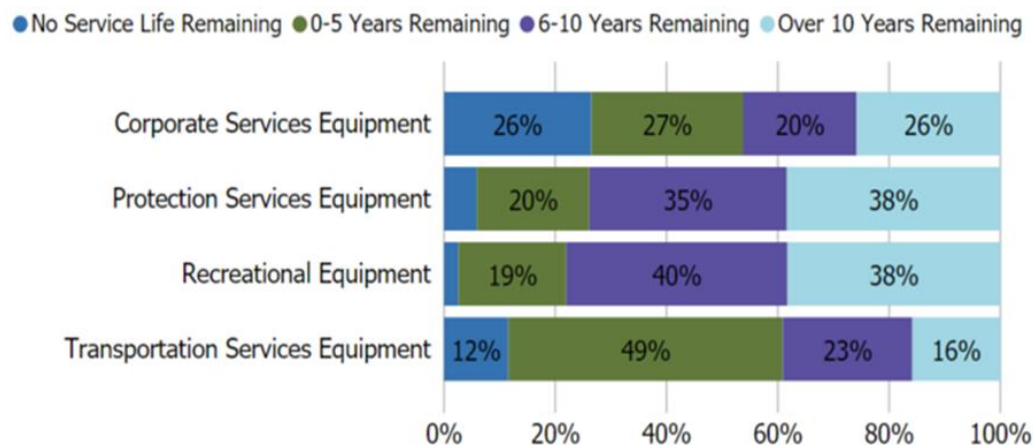
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Asset Management Strategies

Condition Assessment & Data Collection

- Municipal staff that operate machinery & equipment are responsible for inspecting all equipment before it is used
- There are no formal condition assessment strategies for machinery & equipment assets currently

Lifecycle Management Strategy

Operations & Maintenance

- All machinery & equipment is operated and maintained according to manufacturer guidelines

Rehabilitation & Replacement

- Equipment is replaced as needs are determined by both operators and users
- Some equipment is on a regimented replacement schedule (e.g. exercise equipment, fire gear)
- All projected capital needs for machinery & equipment are included in the 10-year capital plan

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for Machinery & Equipment. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $337,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Consequence	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5 Severe	1 Asset $371,358	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
4 Major	1 Asset $325,446	0 Assets $0	0 Assets $0	0 Assets $0	0 Assets $0
3 Moderate	1 Asset $102,965	2 Assets $166,002	2 Assets $119,547	1 Asset $106,684	4 Assets $313,573
2 Minor	8 Assets $207,635	8 Assets $191,896	20 Assets $471,661	14 Assets $297,939	28 Assets $350,703
1 Insignificant	19 Assets $132,912	41 Assets $274,229	92 Assets $348,992	24 Assets $156,498	61 Assets $268,880

Probability

Asset Prioritization List

The following table identifies the highest risk Machinery & Equipment assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
5197	Protection Services	Breathing Gear-Pooled Asset	$53,490	0 - Very Poor	18 - Very High
5120	Corporate Services	Software	$114,737	0 - Very Poor	15 - Very High
5382	Transportation Services	Parking Meter	$92,864	9.92 - Very Poor	15 - Very High
6953	Corporate Services	IT Equipment 2013	$52,482	0 - Very Poor	15 - Very High
5104	Protection Services	Portable Generator	$40,226	0 - Very Poor	14.5 - High
5112	Protection Services	Compressor / Cascade	$31,868	9.96 - Very Poor	14.5 - High
5202	Protection Services	Breathing Gear-Pooled Asset	$106,684	26.52 - Poor	14.4 - High
4746	Recreational	Zamboni 445	$93,496	0 - Very Poor	13.5 - High
5108	Protection Services	Compressor / Cascade	$37,804	39.83 - Poor	11.6 - High
5143	Transportation Services	GPS	$26,356	19.83 - Very Poor	11.5 - High

Levels of Service

The following tables identify the municipality's current level of service for Machinery & Equipment. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Machinery & Equipment.

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description or images of the types of equipment that the municipality operates and the services that they help to provide to the community	The provision of services to the community requires the municipality to own a diverse inventory of machinery & equipment. This asset management plan identifies 1,263 individual pieces of machinery & equipment that provide corporate, protection, recreational and transportation services to the community.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Quality	Average condition of equipment (e.g. very good, good, fair, poor, very poor)	Fair
Performance	Capital re-investment rate	4.0%

Recommendations

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
  - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the municipality has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Rolling Stock

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Rolling Stock inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Beach & Harbour	4	CPI Monthly (ON)	$285,797
Parks	18	CPI Monthly (ON)	$183,228
Protection Services	18	CPI Monthly (ON)	$4,256,737
Transportation	33	CPI Monthly (ON)	$3,904,355
Total:			$8,630,117

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Beach & Harbour	10%	Very Poor	Age-Based
Parks	61%	Good	Age-Based
Protection Services	66%	Good	Age-Based
Transportation	51%	Fair	Age-Based
Average:	57%	Fair	100% Age-based
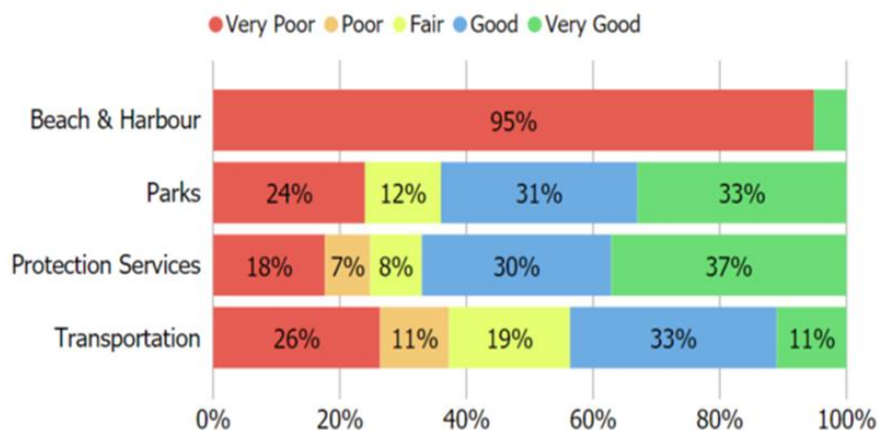
To ensure that the municipality's Rolling Stock continue to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Rolling Stock.

Estimated Useful Life & Average Age

The Estimated Useful Life for Rolling Stock assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Beach & Harbour	10-20	12	1
Parks	10-18	9	4
Protection Services	12-25	10	11
Transportation	3-18	5	6
Average:		8	7
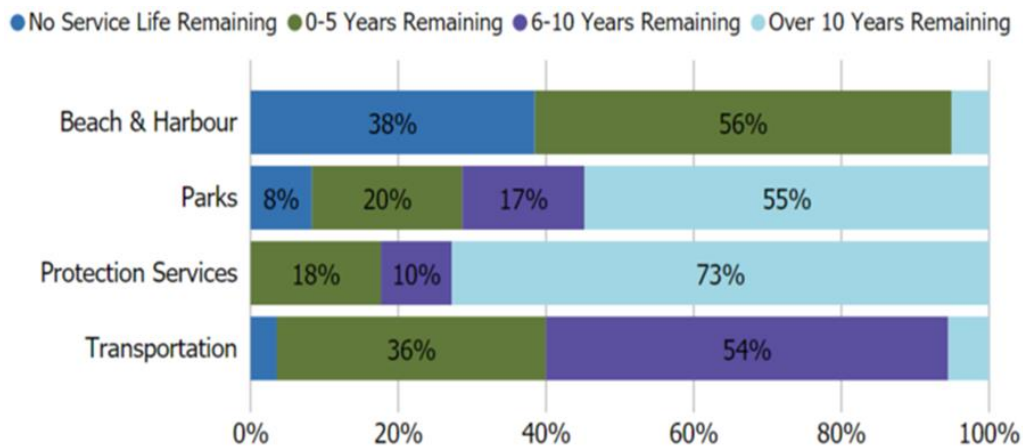
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Asset Management Strategies

Condition Assessment & Data Collection

- Rolling stock operators are responsible for inspecting vehicles before use and identifying any issues or deficiencies
- Currently there are no formal condition assessments completed for rolling stock.
    - Due to the relatively short lifecycle of vehicles and their regular inspection, a formal condition assessment program may not be necessary

Lifecycle Management Strategy

Operations & Maintenance

- Commercial vehicles are inspected annually, and maintenance events are identified accordingly
- Specialized inspections are completed for heavy duty vehicles to determine an optimal maintenance strategy

Rehabilitation & Replacement

- Every vehicle is replaced on a different cycle as defined by their estimated useful life
- Heavy duty vehicles are replaced on a stricter cycle, while light duty vehicles can have their projected replacement date adjusted based on actual condition
- All capital requirements are included in the 10-year capital plan

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for Machinery & Equipment. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $607,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Asset Prioritization List

The following table identifies the highest risk Rolling Stock assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
4749	Protection Services	Pumper	$353,780	19.92 - Very Poor	21.5 - Very High
4756	Protection Services	Pumper	$351,480	0 - Very Poor	21.5 - Very High
4760	Protection Services	Pumper	$353,934	0 - Very Poor	21.5 - Very High
4761	Protection Services	Pumper	$350,481	0 - Very Poor	21.5 - Very High
4765	Transportation	5 Ton Tandem	$297,187	16.55 - Very Poor	18.5 - Very High
4709	Transportation	5 Ton Tandem	$236,542	8.28 - Very Poor	15 - Very High
4764	Transportation	Articulating Tractor	$168,643	16.55 - Very Poor	15 - Very High
7329	Transportation	Articulating Tractor	$138,233	0 - Very Poor	15 - Very High
4750	Protection Services	Rescue	$188,225	35.88 - Poor	14.4 - High
4768	Transportation	5 Ton Tandem	$240,233	33.1 - Poor	12 - High

Levels of Service

The following tables identify the municipality's current level of service for Rolling Stock. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description or images of the types of vehicles (e.g. light, medium and heavy-duty) that the municipality operates and the services that they help to provide to the community	To assist with the delivery of services the municipality owns, operates and maintains a diverse stock of both light and heavy-duty vehicles. This include fire rescue vehicles to respond to emergencies, tractors and mowers to complete general maintenance activities, and a fleet of trucks that municipal staff use to address service needs in the community. To reduce costs, the municipality endeavours to procure vehicles that can be used for multiple purposes. For example, graders are used for grading gravel roads in the summer and plowing snow in the winter.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	# of light duty vehicles per 1,000 households	3.5
	# of heavy duty vehicles per 1,000 households	4.4
Quality	Average condition of vehicles (e.g. very good, good, fair, poor, very poor)	Good
Performance	Capital re-investment rate	7.2%

Recommendations

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
    - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the municipality has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Buildings & Facilities

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Buildings & Facilities inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Fire Buildings	5	CPI Monthly (ON)	$2,247,716
General Government Buildings	5	CPI Monthly (ON)	$883,251
Recreation Buildings	23	CPI Monthly (ON)	$31,855,407
Transportation Services Buildings	5	CPI Monthly (ON)	$2,268,838
		Total:	$37,255,212

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Fire Buildings	55%	Fair	85% Assessed
General Government Buildings	60%	Good	83% Assessed
Recreation Buildings	62%	Good	73% Assessed
Transportation Services Buildings	64%	Good	38% Assessed
Average:	61%	Good	72% Assessed
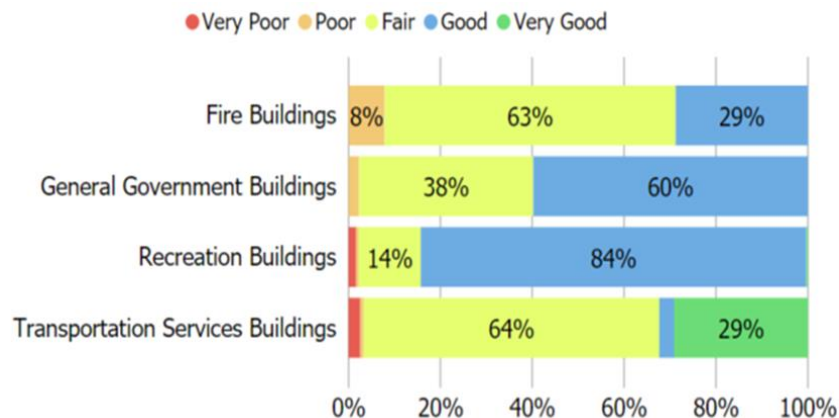
To ensure that the municipality's Buildings & Facilities continue to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Buildings & Facilities.

Estimated Useful Life & Average Age

The Estimated Useful Life for Buildings & Facilities assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Fire Buildings	15-95	17	23
General Government Buildings	15-95	17	26
Recreation Buildings	15-95	18	25
Transportation Services Buildings	15-95	15	26
Average:		18	25
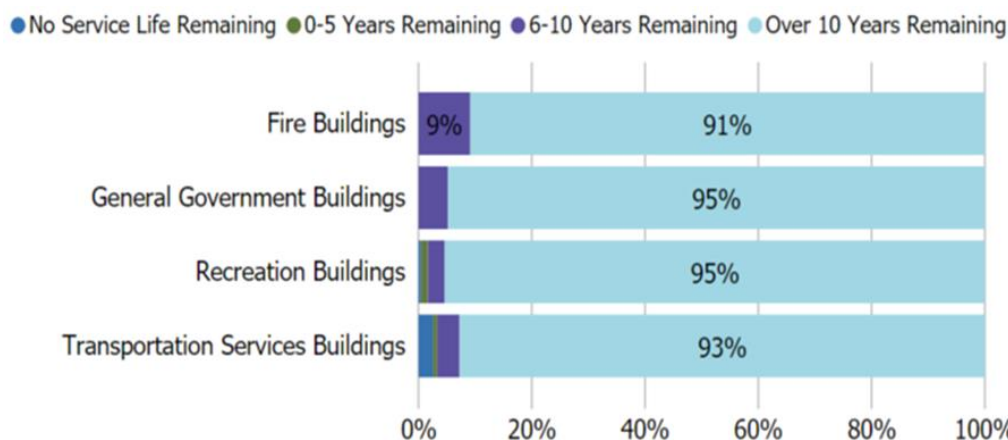
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Asset Management Strategies

Condition Assessment & Data Collection

- Recently completed facility condition assessments (2018) for all municipally owned facilities. This is the first time that detailed condition assessments have been completed.
- For all facilities a condition rating was provided as well as recommendations for rehabilitation and replacement
- Health & safety inspections are completed by internal staff regularly to identify any specific deficiencies that need to be addressed by the municipality

Lifecycle Management Strategy

Operations & Maintenance

- Maintenance schedules vary greatly based on what the facility is used for and the type of building components that were used in its construction
- Municipal staff are typically responsible for all operating and maintenance activities for facilities

Rehabilitation & Replacement

- Similar to maintenance activities, the rehabilitation strategy varies based on the usage and design of each facility
- Major renewal events include re-roofing and equipment replacement
- Renewal activities are prioritized according to the risk asset failure would pose to the services each facility is expected to provide
- Asset replacement requirements are informed by the building condition assessments and supplemented through internal discussion with municipal staff
- All rehabilitation and replacement requirements are included in the 10-year capital plan

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for Buildings & Facilities. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $1,109,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Figure 1 Risk Matrix – Buildings & Facilities

Asset Prioritization List

The following table identifies the highest risk Buildings & Facilities assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
6070	Shores Recreation Centre	B. Shell - Roof	$326,506	16.57 - Very Poor	13.5 - High
6084	Works Garage	E. Special Construction	$58,334	0 - Very Poor	13 - High
5886	Arkona Fire Hall	B. Shell - Other	$98,709	26.32 - Poor	11.6 - High
5913	Northville Fire Hall	C. Services - Other	$78,362	31.56 - Poor	11.6 - High
5878	Forest Fire Hall	B. Shell - Other	$265,671	49.17 - Fair	10.8 - High
6052	Forest Arena	E. Special Construction - Arena	$711,467	55.81 - Fair	10.2 - High
6162	Pork Franks Harbour - Pavilion	C. Services - Other	$55,645	0 - Very Poor	10 - High
5902	Northville Garage and Office	B. Shell - Other	$351,955	59.46 - Fair	9.9 - Moderate
5904	Northville Garage and Office	C. Services - HVAC	$299,207	50.5 - Fair	9.9 - Moderate
5905	Northville Garage and Office	C. Services - Other	$288,614	47.51 - Fair	9.9 - Moderate

Levels of Service

The following tables identify the municipality's current level of service for Buildings & Facilities. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Buildings & Facilities.

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description, which may include maps, of the types of facilities that the municipality operates and maintains	The municipality operates and maintains several types of facilities that provide both administrative and recreational services to the community. These include arenas, gymnasiums, community centres, libraries, recreation centres, fitness centres, meeting rooms and more. A full listing and interactive map of all municipal facilities can be found at: https://facilities.lambtonshores.ca/. This webpage identifies facility hours, location and descriptions and allows citizens to rent available facilities for special events, business meetings, workshops or conferences.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	Square metres of indoor recreation facilities per 1,000 people	2,327 m^2
	# of facilities per 1,000 households	5.08
Quality	Average facility condition index value for facilities in the municipality	Good
Performance	Capital re-investment rate	0.82%

Recommendations

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
    - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the municipality has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Land Improvements

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Land Improvements inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Beach & Harbour Improvements	151	CPI Monthly (ON)	$6,981,796
Fencing	1,111m	CPI Monthly (ON)	$61,202
Parking Lots	46	CPI Monthly (ON)	$4,091,807
Retaining Walls & Other Improvements	33	CPI Monthly (ON)	$9,703,476
Sports Fields & Play Structures	56	CPI Monthly (ON)	$2,815,994
		Total:	$23,654,275

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Beach & Harbour Improvements	53%	Fair	25% Assessed
Fencing	34%	Poor	80% Assessed
Parking Lots	52%	Fair	72% Assessed
Retaining Walls & Other Improvements	31%	Poor	24% Assessed
Sports Fields & Play Structures	65%	Good	83% Assessed
Average:	45%	Fair	58% Assessed
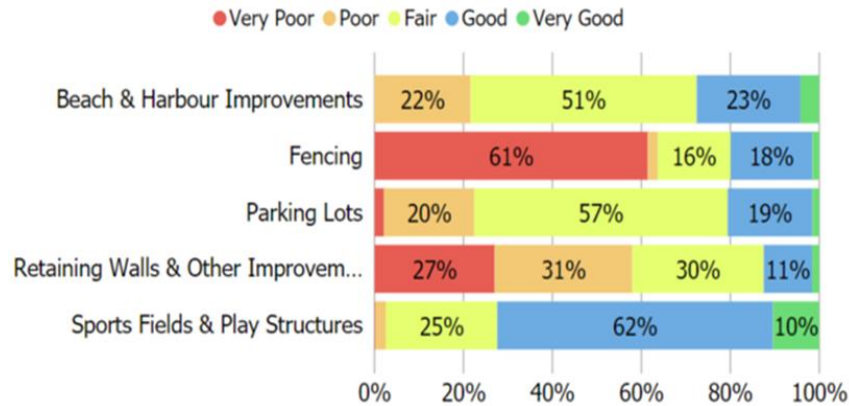
To ensure that the municipality's Land Improvements continue to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the land improvement.

Estimated Useful Life & Average Age

The Estimated Useful Life for Land Improvements assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Beach & Harbour Improvements	10-40	11	12
Fencing	15	7	8
Parking Lots	15-50	13	14
Retaining Walls & Other Improvements	15-50	18	14
Sports Fields & Play Structures	15-30	8	13
	Average:	12	13
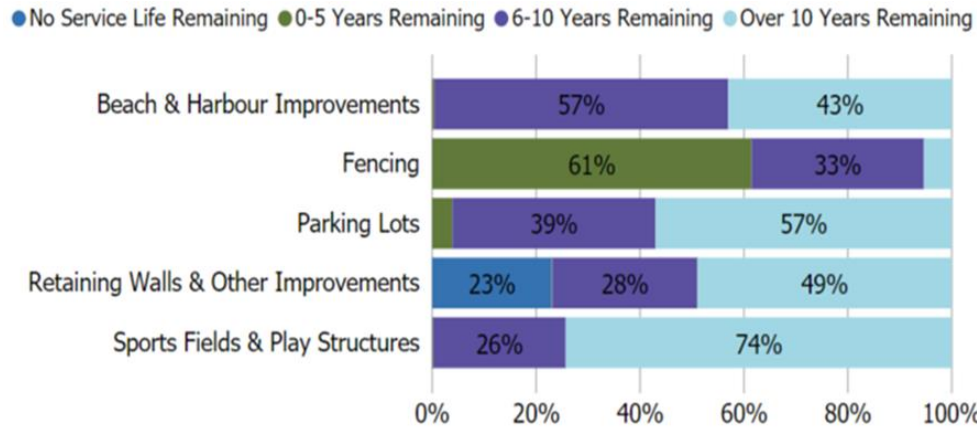
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Asset Management Strategies

Condition Assessment & Data Collection

- Parks and play structures are inspected regularly and deficiencies that require treatment are identified
- Trail inspections occur after major rainfall events
- There are no formalized condition assessment programs in place apart from regular deficiency inspections

Lifecycle Management Strategy

Operations & Maintenance

- Significant operating events include: beach maintenance, grass cutting, garbage collection

Rehabilitation & Replacement

- Inspection data informs replacement and rehabilitation plans, and all identified capital requirements are included in the 10-year capital plan

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for Land Improvements. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $889,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Consequence	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5 Severe	0 Assets $0.00	0 Assets $0.00	2 Assets $5,373,279.00	0 Assets $0.00	1 Asset $2,231,513.00
4 Major	0 Assets $0.00	1 Asset $1,215,039.00	2 Assets $1,206,484.00	3 Assets $2,555,809.00	0 Assets $0.00
3 Moderate	0 Assets $0.00	4 Assets $1,527,873.00	1 Asset $386,708.00	3 Assets $1,050,181.00	0 Assets $0.00
2 Minor	2 Assets $328,917.00	5 Assets $936,962.00	4 Assets $748,485.00	5 Assets $892,919.00	0 Assets $0.00
1 Insignificant	14 Assets $480,205.00	45 Assets $1,538,428.00	46 Assets $1,750,165.20	22 Assets $910,486.00	11 Assets $520,822.00

Probability

Asset Prioritization List

The following table identifies the highest risk Land Improvement assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
5743	Retaining Walls & Other Improvements	7574 Biddulph St, Port Franks	$2,231,513	0 - Very Poor	25 - Very High
5745	Beach & Harbour Improvements	7574 Biddulph St, Port Franks	$799,526	34.72 - Poor	16 - Very High
5747	Retaining Walls & Other Improvements	Eilber St, Grand Bend	$1,065,286	22.45 - Poor	16 - Very High
5749	Retaining Walls & Other Improvements	Morenze Lane, Grand Bend	$690,997	22.45 - Poor	16 - Very High
5737	Retaining Walls & Other Improvements	Lake Valley Grove	$2,068,713	41.93 - Fair	15 - Very High
5845	Beach & Harbour Improvements	Grand Bend Beach	$3,304,566	49.79 - Fair	15 - Very High
5736	Retaining Walls & Other Improvements	Lake Valley Grove	$532,451	41.93 - Fair	12 - High
5740	Retaining Walls & Other Improvements	Erie & Biddulph, Port Franks	$266,263	34.93 - Poor	12 - High
5752	Retaining Walls & Other Improvements	91 River Rd, Grand Bend	$483,173	22.45 - Poor	12 - High
5803	Parking Lots	5 Huron St	$300,745	34.44 - Poor	12 - High

Levels of Service

The following tables identify the municipality's current level of service for Land Improvements. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description, which may include maps, of the outdoor recreational facilities that the municipality operates and maintains	The municipality operates and maintains several outdoor recreational facilities, including: parks, playgrounds, trails, sports fields, picnic areas, splash pads and more. A full listing and interactive map of all outdoor recreational facilities can be found at: https://facilities.lambtonshores.ca/.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	Square metres of outdoor recreation facility space per 1,000 households	52,336 m^2
Quality	Average condition of outdoor recreational facilities in the municipality (e.g. very good, good, fair, poor, very poor)	Good
Performance	Capital re-investment rate per year	0.87%

Recommendations

Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.

o   In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the municipality has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Comprehensive Analysis of Rate Funded Assets

Key Findings

- Rate funded asset are valued at $466 million in 2018 dollars, making up 63% of the municipality's total asset portfolio.
- 95% of rate funded assets are in fair or better condition
- Assets are currently funded at only 31% of their long-term requirements.
- To eliminate annual infrastructure deficits for water and wastewater services, rate revenues need to increase by 3.5% and 3.6% each year, respectively. A 15-year phase-in period is recommended.
- Project prioritization is needed to gradually eliminate the infrastructure backlog of $7 million.

Water Network

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Water Network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Hydrants	706	Cost/Unit	$4,653,775
Water Buildings	6	NRBCPI Quarterly (Toronto)	$6,555,824
Water Equipment	3	CPI Monthly (ON)	$67,351
Water Mains	385,099m	Cost/Unit	$375,036,667
Water Meters	6786	NRBCPI Quarterly (Toronto)	$3,733,614
		Total:	$390,047,231

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Hydrants	42%	Fair	Age-Based
Water Buildings	51%	Fair	Age-Based
Water Equipment	41%	Fair	33% Assessed
Water Mains	75%	Good	Age-Based
Water Meters	39%	Poor	Age-Based
Average:	74%	Good	<1% Assessed
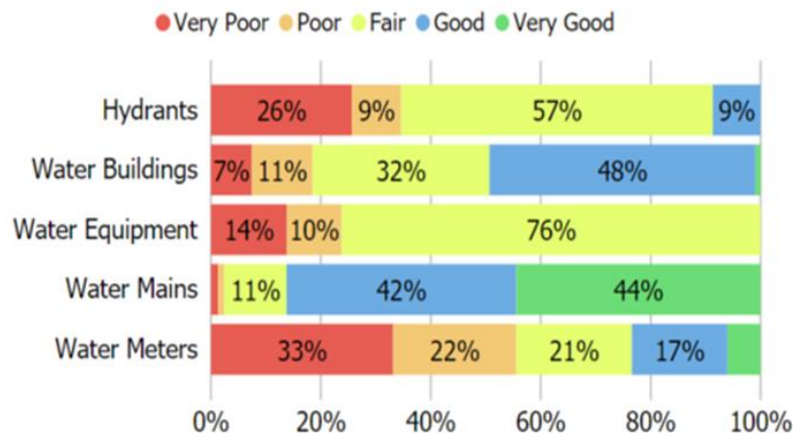
To ensure that the municipality's Water Network continues to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the organization's Water Network.

Estimated Useful Life & Average Age

The Estimated Useful Life for Water Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Hydrants	50	30	20
Water Buildings	20-60	26	10
Water Equipment	5-10	7	1
Water Mains	80-100	27	59
Water Meters	25	11	14
Average:		26	53
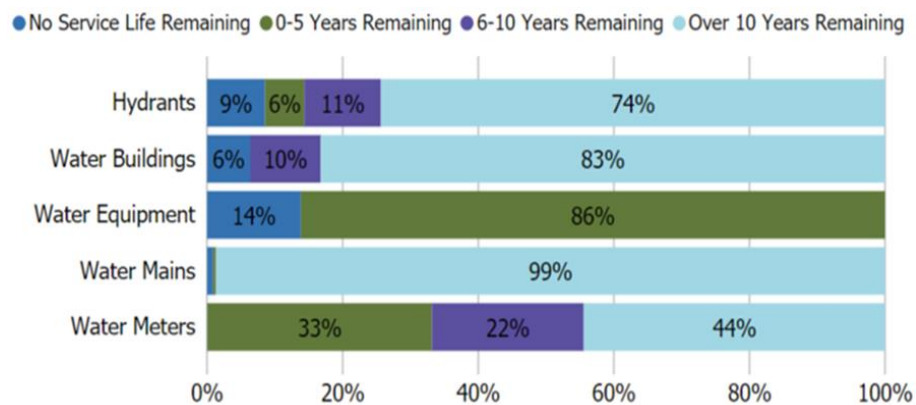
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Asset Management Strategies

Condition Assessment & Data Collection

- There is no formally documented condition assessment program for water infrastructure, although there is a budget for acoustic leak detection that helps to inform the municipality's maintenance strategy
- Without physical condition assessment data, staff use break history, pipe material and age to determine the appropriate lifecycle strategy

Lifecycle Management Strategy

Operations & Maintenance

- As required by provincial regulations, the municipality maintains a detailed operational plan that defines and documents the Quality Management System (QMS) for the water distribution systems. These systems are operated by Operations Management International Canada Inc. – Jacobs.
- Jacobs is responsible for regular flushing of dead-end system main lines, system pressure regulator valve testing, and valve exercising. They are also responsible for the maintenance of all equipment within the distribution system
- All maintenance is completed within government regulations and AWWA standards

Rehabilitation & Replacement

- Jacobs is responsible for determining the need of replacement parts within the infrastructure and add them to a capital replacement plan to be provided to the municipality
- There is an emphasis on replacing older water mains that are not PVC (e.g. transit or ductile iron) to install PVC pipes that are generally expected to last longer and have a lower failure rate

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for Water infrastructure. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $4,745,000

The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Consequence	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5 Severe	3,750.00 m $8,137,500	12,571.00 m $27,279,070	- $0	- $0	- $0
4 Major	16,565.00 m $19,579,830	20,457.00 m $29,696,402	6,715.00 m $8,360,532	- $0	- $0
3 Moderate	15,625.00 m $15,955,559	22,625.00 m $22,896,559	8,724.70 m $8,785,773	888.00 m $919,464	1,150.00 m $1,158,050
2 Minor	46,860.00 m $41,424,240	80,832.00 m $71,455,488	27,306.00 m $24,138,504	3,373.00 m $2,981,732	4,014.00 m $3,548,376
1 Insignificant	104,413.00 m $81,479,433	7,102.00 m $5,567,547	1,383.00 m $1,087,038	452.00 m $355,272	293.00 m $230,298

Probability

Asset Prioritization List

The following table identifies the highest risk Water assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
3630	Water Mains	Cedar Point Line	$1,158,050	0 - Very Poor	15 - Very High
3737	Water Mains	Townsend Line	$160,752	59.94 - Fair	12 - High
3738	Water Mains	Townsend Line	$94,560	59.94 - Fair	12 - High
3739	Water Mains	Townsend Line	$427,884	59.94 - Fair	12 - High
3740	Water Mains	Townsend Line	$124,110	59.94 - Fair	12 - High
3741	Water Mains	Townsend Line	$189,120	59.94 - Fair	12 - High
3817	Water Mains	Ontario Street North	$280,953	37.46 - Poor	12 - High
3819	Water Mains	Ontario Street South	$348,422	37.46 - Poor	12 - High
3823	Water Mains	Orchard Street	$290,089	37.46 - Poor	12 - High
7101	Water Mains	Lakeshore Rd	$5,538,852	59.94 - Fair	12 - High

Levels of Service

The following tables identify the municipality's current level of service for the Water Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are	See Appendix D for map

	connected to the municipal water system	
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	See Appendix D for map
Reliability	Description of boil water advisories and service interruptions	There were no boil water advisories issued in 2018. There were 16 water main breaks that impacted a total of 30 customers in 2018. All water main breaks were repaired within the same day that they occurred and extended service disruptions were avoided.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	% of properties connected to the municipal water system	79%
	% of properties where fire flow is available	86%
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	0.00436
Performance	Capital re-investment rate per year	0.37%

Recommendations

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
  - In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Lifecycle Management Strategies

- Identify the cost/benefit of optional lifecycle management strategies that may extend the life of water mains at a lower total cost of ownership. This may include the strategic use of structural pipe re-lining events.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the municipality believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Wastewater Network

Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the municipality's Wastewater Network inventory.

Asset Segment	Quantity	Replacement Cost Method	Total Replacement Cost
Force Mains	18,289m	Cost/Unit	$5,908,788
Lagoons	4	NRBCPI Quarterly (Toronto)	$2,024,999
Sanitary Sewer Mains	55,044m	Cost/Unit	$42,934,890
Wastewater Buildings	24	NRBCPI Quarterly (Toronto)	$25,004,446
		Total:	$75,873,123

Current Asset Condition

The following table identifies the source of available condition data and the average condition rating for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition (%)	Average Condition Rating	Condition Source
Force Mains	77%	Good	Age-Based
Lagoons	20%	Poor	Age-Based
Sanitary Sewer Mains	60%	Good	Age-Based
Wastewater Buildings	60%	Good	Age-Based
Average:	61%	Good	100% Age-Based
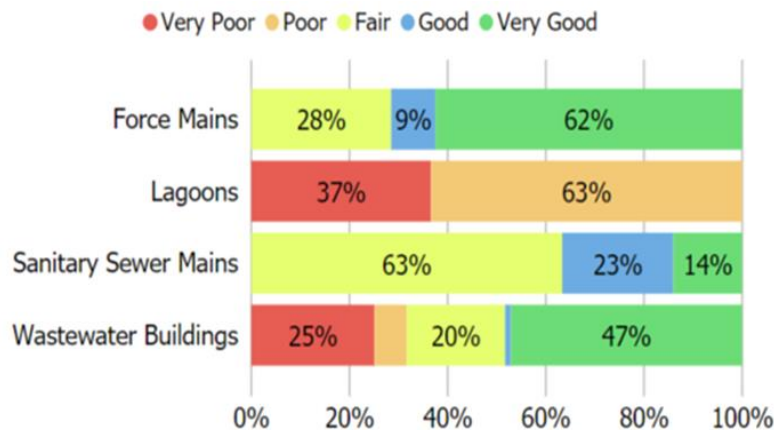
To ensure that the municipality's Wastewater Network continues to provide an acceptable level of service, the municipality should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the Wastewater Network.

Estimated Useful Life & Average Age

The Estimated Useful Life for Wastewater Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in service. Finally, the Average Service Life Remaining represents the difference between the Estimated Useful Life and the Average Age, except when an asset has been assigned an assessed condition rating. Assessed condition may increase or decrease the average service life remaining.

Asset Segment	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Force Mains	85	21	64
Lagoons	40-50	39	8
Sanitary Sewer Mains	85	34	51
Wastewater Buildings	20-60	23	11
Average:		30	39
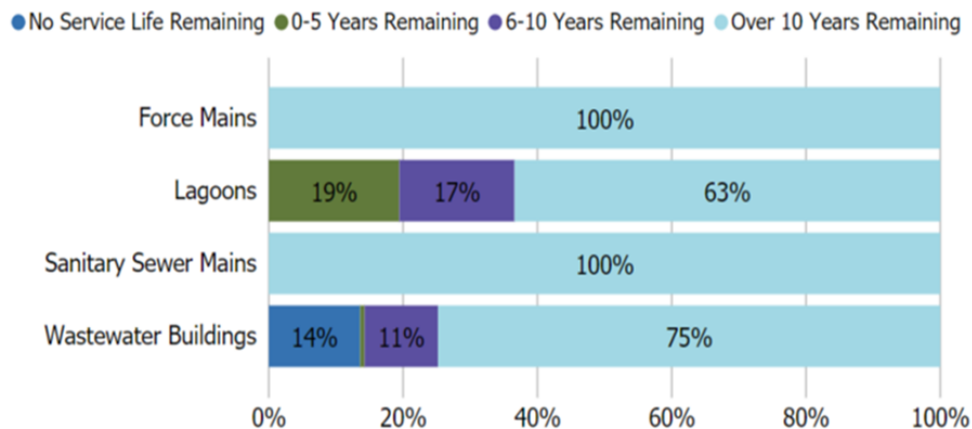
Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

Asset Management Strategies

Condition Assessment & Data Collection

- Jacobs is required to complete CCTV & acoustic testing on a portion of the collection system annually
- Acoustic testing provides a rating that identifies the degree to which blockages are expected to be present. This data helps to inform further inspection (CCTV) and maintenance requirements

Lifecycle Management Strategy

Operations & Maintenance

- Jacobs is responsible for operating and maintaining the wastewater collection and treatment system.
- The system is inspected annually to ensure compliance with regulations mandated by the Ministry of the Environment

Rehabilitation & Replacement

- The rehabilitation and replacement of sewer mains depends on several variables including pipe age, material and any concerns relating to capacity
- Rehabilitation and reconstruction projects are completed when they can be combined with other capital projects (e.g. water mains, roads) to minimize service disruptions
- Capital projects are included in the 10-year capital plan

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for Wastewater. The annual capital requirement represents the average amount per year that the municipality should allocate towards funding rehabilitation and replacement needs.

Annual Capital Requirement: $1,345,000

Legend:
- Force Mains
- Lagoons
- Sanitary Sewer Mains
- Wastewater Buildings
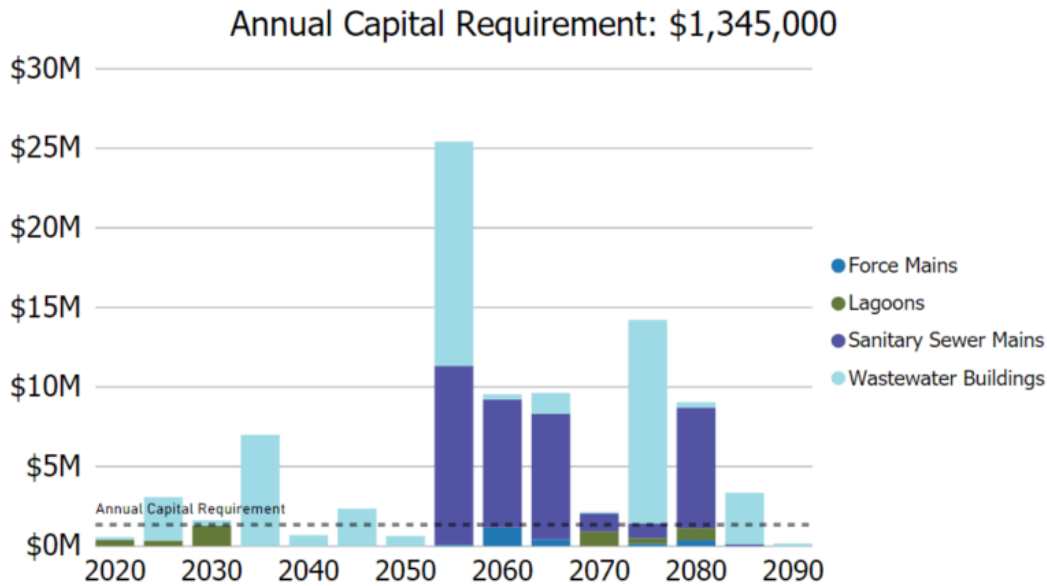
The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix C.

Risk & Criticality

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category. See Appendix E for the criteria used to determine the risk rating of each asset.

Consequence	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5 Severe	- $0	- $0	828.80 m $942,346	- $0	- $0
4 Major	- $0	- $0	581.80 m $619,035	- $0	- $0
3 Moderate	9,792.80 m $3,895,079	142.00 m $129,504	9,084.40 m $6,339,273	- $0	- $0
2 Minor	8,906.90 m $5,700,638	12,622.63 m $9,593,199	27,425.39 m $20,074,755	- $0	- $0
1 Insignificant	505.00 m $116,536	2,152.46 m $533,810	1,290.40 m $899,504	- $0	- $0

Probability

Asset Prioritization List

The following table identifies the highest risk Wastewater assets according to the risk criteria identified in Appendix E. The risk rating is calculated by multiplying the probability of failure and the consequence of failure for each asset.

This is not meant to be a definitive list of how the municipality should prioritize assets for rehabilitation and replacement. It is meant to be a decision-support tool that is supplemented by the knowledge and expertise of municipal staff when prioritizing capital needs. In some cases, assets may have a higher risk rating than expected due to a lack of available data (e.g. no assessed condition data).

Asset ID	Segment	Name	Replacement Cost	Projected Condition	Risk Rating
2791	Sanitary Sewer Mains	Thedford Lagoon Outfall Pipe	$942,346	52.89 - Fair	15 - Very High
2706	Sanitary Sewer Mains	Main Street East	$317,498	54.06 - Fair	12 - High
2718	Sanitary Sewer Mains	Easement	$135,128	51.71 - Fair	12 - High
2719	Sanitary Sewer Mains	Easement	$25,962	51.71 - Fair	12 - High
2721	Sanitary Sewer Mains	Municipal Drive	$140,448	54.06 - Fair	12 - High
2533	Sanitary Sewer Mains	Ann Street	$199,206	45.84 - Fair	9 - Moderate
2547	Sanitary Sewer Mains	Easement	$289,904	44.66 - Fair	9 - Moderate
2548	Sanitary Sewer Mains	Easement	$53,626	44.66 - Fair	9 - Moderate
2549	Sanitary Sewer Mains	Easement	$550,939	44.66 - Fair	9 - Moderate
2550	Sanitary Sewer Mains	Easement	$82,258	44.66 - Fair	9 - Moderate

Levels of Service

The following tables identify the municipality's current level of service for the Wastewater Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the municipality has selected for this AMP.

Community Levels of Service

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

Service Attribute	Qualitative Description	Current LOS (2018)
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system	See Appendix D for map
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes	The municipality does not own any combined sewers.
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	The municipality does not own any combined sewers.
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	Stormwater can enter into sanitary sewers due to cracks in sanitary mains or through indirect connections (e.g. weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed capacity. In some cases, this can cause water and/or sewage to overflow into streets or backup into homes. the disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits as an alternative can help to reduce the chance of this occurring.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration	The municipality follows a series of design standards that integrate servicing requirements and land use considerations when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups. Newer sanitary mains are made of gasketed PVC piping to reduce potential leaks occurring between fitted pipe segments.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Effluent refers to water pollution that is discharged from a wastewater treatment plant, and may include suspended solids, total phosphorous and biological oxygen demand. The Environmental Compliance Approval (ECA) identifies the effluent criteria for municipal wastewater treatment plants.

Technical Levels of Service

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

Service Attribute	Technical Metric	Current LOS (2018)
Scope	% of properties connected to the municipal wastewater system	33%
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	0
	# of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system	0.00070
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0.00244
Performance	Capital re-investment rate	0.20%

Recommendations

Risk Management Strategies

- This AMP includes a cursory review of risk and criticality. The municipality should work towards developing a formal risk management process to inform project prioritization and lifecycle management strategies with the goal of minimizing risk.
  - o In the short-term, staff should review the highest risk assets and establish appropriate risk mitigation strategies.

Lifecycle Management Strategies

- Identify the cost/benefit of optional lifecycle management strategies that may extend the life of sanitary mains at a lower total cost of ownership. This may include the strategic use of structural pipe re-lining events.

Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the municipality believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

Impacts of Growth

Planning for forecasted population growth will require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the municipality's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the municipality will need to review the lifecycle costs of growth-related infrastructure[1]. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

The municipality completed a Development Charges Background Study with B.M. Ross in 2017. This study includes an assessment of general growth and development trends over a 20-year planning period. These projections are based on an analysis of statistical data, recent population projections, building permit data and other background research. The following tables from the Study identify gross residential units and population forecasts.

Year	Usually Occupied Units			Seasonal Units	Total Units
	Single and Semi Detached	Multiples	Apartments		
2017	4,155	276	390	2,233	7,054
2022	4,306	283	392	2,306	7,287
2027	4,457	289	393	2,380	7,519
2032	4,607	295	395	2,454	7,751
2037	4,757	302	397	2,529	7,985
5-year change	151	7	2	73	233
10-year change	302	13	3	147	465
20-year change	602	26	7	296	931

Year	Seasonal Population	Permanent Population	Total
2017	7,815	10,700	18,515
2022	8,073	11,047	19,120
2027	8,383	11,394	19,777
2032	8,591	11,740	20,331
2037	8,851	12,086	20,937
5-year change	258	347	605
10-year change	568	694	1,262
20-year change	1,036	1,386	2,422

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[1] The 2017 Development Charges Background Study identified lifecycle costs totaling $13,733,730.89 for growth-related projects. Annual capital costs are projected to increase by $370,465.53 per year to fund the lifecycle costs of these additional projects.

Financial Strategy

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

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

Financial Strategy Overview

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

1. The financial requirements for:
   a. Existing assets
   b. Existing service levels
   c. Requirements of contemplated changes in service levels (none identified for this plan)
   d. Requirements of anticipated growth (none identified for this plan)
2. Use of traditional sources of municipal funds:
   a. Tax levies
   b. User fees
   c. Reserves
   d. Debt
   e. Development charges
3. Use of non-traditional sources of municipal funds:
   a. Reallocated budgets
   b. Partnerships
   c. Procurement methods
4. Use of Senior Government Funds:
   a. Gas tax
   b. Annual grants

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

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

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

Annual Requirements & Capital Funding

Annual Requirements

The annual requirements represent the amount the municipality should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the municipality must allocate approximately $14.8 million annually to address capital requirements for the assets included in this AMP.

Category	Amount
Total	$14,778,000
Water Network	$4,745,000
Road Network	$4,641,000
Wastewater Network	$1,345,000
Buildings & Facilities	$1,109,000
Land Improvements	$889,000
Storm Sewer Network	$732,000
Rolling Stock	$607,000
Bridges & Culverts	$373,000
Machinery & Equipment	$337,000
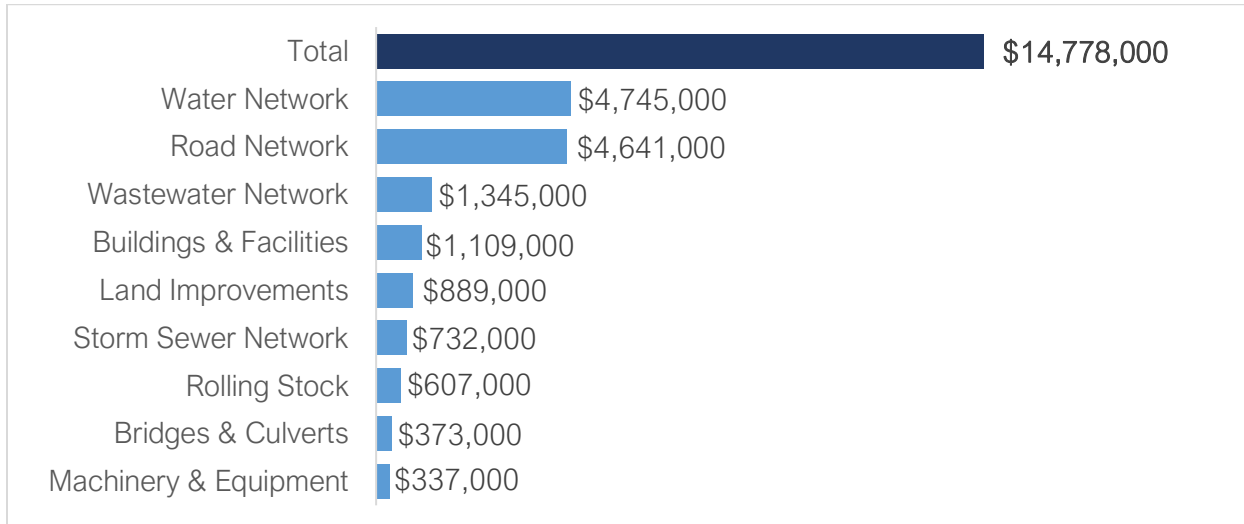
For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

However, for the Road Network, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the municipality's roads. The development of this strategy allows for a comparison of potential cost avoidance if the strategy were to be implemented across all municipal roads. The following table compares two scenarios for the Road Network:

1. **Replacement Only Scenario**: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

Asset Category	Annual Requirements (Replacement Only)	Annual Requirements (Lifecycle Strategy)	Difference
Road Network	$6,883,000	$4,641,000	$2,242,000

The implementation of a proactive lifecycle strategy for roads leads to a potential cost avoidance of $2,242,000 and reduces the overall annual requirements for the Road Network by 33%. As this is the lowest cost option available to the municipality, we have used this value in the development of the financial strategy.

Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the municipality is committing approximately $6,049,000 towards capital projects per year. Given the annual capital requirement of $14,778,000, there is currently a funding gap of $8,729,000 annually.
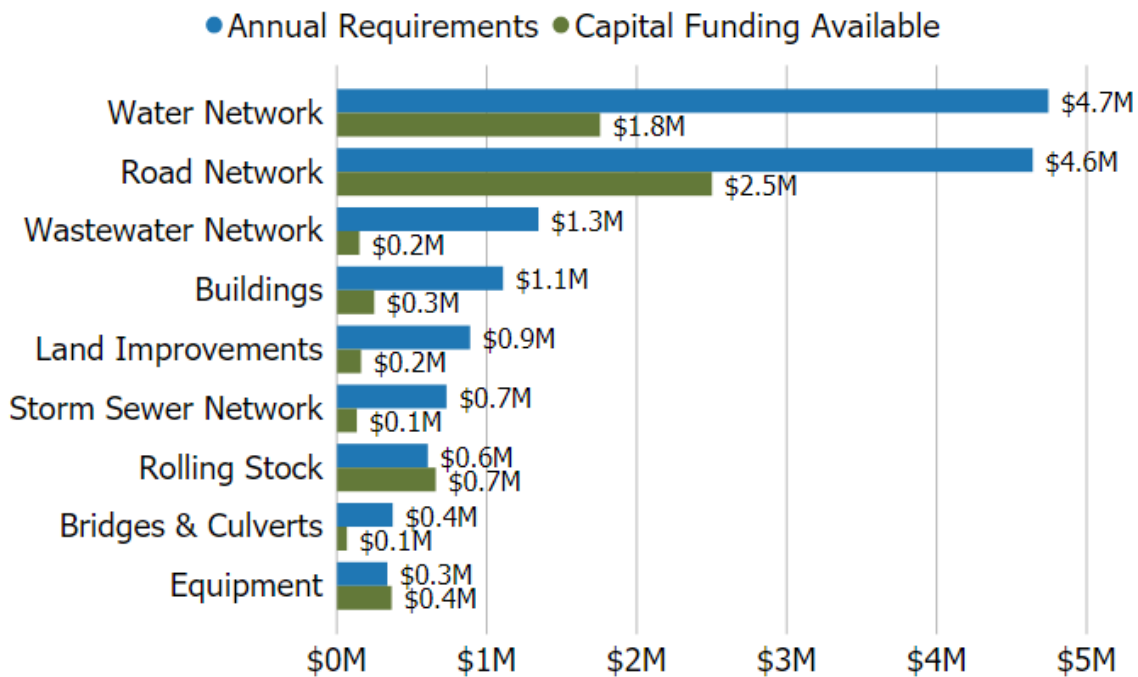
Funding Objective

We have developed two scenarios that would enable Lambton Shores to achieve full funding within 1 to 20 years for the following assets:

1. Tax Funded Assets: Bridges & Culverts, Buildings & Facilities, Land Improvements, Machinery & Equipment, Road Network, Rolling Stock
2. Rate Funded Assets: Wastewater Network, Water Network

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

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

Financial Profile: Tax Funded Assets

Current Funding Position

The following tables show, by asset category, Lambton Shores' average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

Asset Category	Average Annual Investment Required	Annual Funding Available				Annual Deficit/Surplus
		Taxes	Gas Tax	OCIF	Total Funding Available	
Road Network	4,641,000	1,260,000	323,000	919,000	2,502,000	2,139,000
Bridges & Culverts	373,000	68,000	0	0	68,000	305,000
Storm Sewer Network	732,000	134,000	0	0	134,000	598,000
Facilities	1,109,000	250,000	0	0	250,000	859,000
Land Improvements	889,000	162,000	0	0	162,000	727,000
Machinery & Equipment	337,000	366,000	0	0	366,000	-29,000
Rolling Stock	607,000	660,000	0	0	660,000	-53,000
Total:	8,688,000	2,900,000	323,000	919,000	4,142,000	4,546,000

The average annual investment requirement for the above categories is $8,688,000. Annual revenue currently allocated to these assets for capital purposes is $4,142,000 leaving an annual deficit of $4,546,000. Put differently, these infrastructure categories are currently funded at 48% of their long-term requirements.

Full Funding Requirements

In 2019, Municipality of Lambton Shores has annual tax revenues of $12,140,000. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

Asset Category	Tax Change Required for Full Funding
Road Network	17.6%
Bridges & Culverts	2.5%
Storm Sewer Network	4.9%
Facilities	7.1%
Land Improvements	6.0%
Machinery & Equipment	-0.2%
Vehicles	-0.4%
Total:	37.5%

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

a) Lambton Shores' formula based OCIF grant is scheduled to grow from $603,000 in 2018 to $919,000 in 2019.
b) Lambton Shores' debt payments for these asset categories will be decreasing by $183,000 over the next 5 years and by $312,000 over the next 10 years. Although not shown in the table, debt payment decreases will be $526,000 and $580,000 over the next 15 and 20 years respectively.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents a number of options:

	Without Capturing Changes				With Capturing Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	4,546,000	4,546,000	4,546,000	4,546,000	4,546,000	4,546,000	4,546,000	4,546,000
Change in Debt Costs	N/A	N/A	N/A	N/A	-183,000	-312,000	-526,000	-580,000
Change in OCIF Grants	N/A	N/A	N/A	N/A	-317,000	-317,000	-317,000	-317,000
Resulting Infrastructure Deficit:	4,546,000	4,546,000	4,546,000	4,546,000	4,046,000	3,917,000	3,703,000	3,649,000
Resulting Tax Increase Required	37.4%	37.4%	37.4%	37.4%	33.3%	32.3%	30.5%	30.1%
Annually:	7.5%	3.7%	2.5%	1.9%	6.7%	3.2%	2.0%	1.5%

Financial Strategy Recommendations

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

a) when realized, reallocating the debt cost reductions of $580,000 to the infrastructure deficit as outlined above.
b) increasing tax revenues by 1.5% 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.
c) allocating the current gas tax and OCIF revenue as outlined previously.
d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

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

Although this option achieves full funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $2,880,000 for the Road Network, $330,000 for Bridges & Culverts, $9,332,000 for the Storm Sewer Network, $178,000 for Machinery & Equipment, $135,000 for Facilities, and $153,000 for Rolling Stock.

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.

Financial Profile: Rate Funded Assets

Current Funding Position

As the tables below outline, by asset category, municipality of Lambton Shores' average annual capital requirements, current funding positions and funding increases required to achieve full funding on assets funded by rates.

Asset Category	Average Annual Investment Required	Annual Funding Available				Annual Deficit/Surplus
		Rates	Less: Allocated to Operations	Other	Total Funding Available	
Wastewater Network	1,345,000	1,892,000	-1,741,000	0	151,000	1,194,000
Water Network	4,745,000	4,656,000	-2,900,000	0	1,756,000	2,989,000
Total:	6,090,000	6,548,000	-4,641,000	0	1,907,000	4,183,000

The average annual investment requirement for Wastewater Network and Water Network is $6,090,000. Annual revenue currently allocated to these assets for capital purposes is $1,907,000 leaving an annual deficit of $4,183,000. Put differently, these infrastructure categories are currently funded at 31% of their long-term requirements.

Full Funding Requirements

In 2019, Lambton Shores has annual sanitary revenues of $1,892,000 and annual water revenues of $4,656,000. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

Asset Category	Rate Increase Required for Full Funding
Wastewater Network	63.1%
Water Network	64.2%

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

a) Lambton Shores' debt payments for the Wastewater Network will be decreasing by $18,000 over the next 5 years and by $117,000 over the next 10 years. Although not shown in the table, debt payment decreases will be $165,000 over the next 15 years and $165,000 over

the next 20 years. For the Water Network, the amounts are $518,000, $518,000, $518,000 and $518,000 respectively.

In the following tables, we have expanded the above scenario to present multiple options. Due to the significant increases required, we have provided phase-in options of up to 20 years:

	Sanitary Sewer Network				Water System			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,194,000	1,194,000	1,194,000	1,194,000	2,989,000	2,989,000	2,989,000	2,989,000
Rate Increase Required	63.1%	63.1%	63.1%	63.1%	64.2%	64.2%	64.2%	64.2%
Annually:	12.6%	6.3%	4.2%	3.2%	12.8%	6.4%	4.3%	3.2%

	Sanitary Sewer Network				Water System			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	1,194,000	1,194,000	1,194,000	1,194,000	2,989,000	2,989,000	2,989,000	2,989,000
Change in Debt Costs	-18,000	-117,000	-165,000	-165,000	-518,000	-518,000	-518,000	-518,000
Resulting Infrastructure Deficit	1,176,000	1,077,000	1,029,000	1,029,000	2,471,000	2,471,000	2,471,000	2,471,000
Rate Increase Required	62.2%	56.9%	54.4%	54.4%	53.1%	53.1%	53.1%	53.1%
Annually:	12.4%	5.7%	3.6%	2.7%	10.6%	5.3%	3.5%	2.7%

Financial Strategy Recommendations

Considering all of the above information, we recommend the 15-year option that includes debt cost reallocations. This involves full funding being achieved over 15 years by:

a) when realized, reallocating the debt cost reductions of $165,000 for sanitary services and $518,000 for water services to the applicable infrastructure deficit.
b) increasing rate revenues by 3.6% for sanitary services and 3.5% for water services each year for the next 15 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.

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

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
2. We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.
3. Any increase in rates required for operations would be in addition to the above recommendations.

Although this option achieves full funding on an annual basis in 15 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 $3,194,000 for the Wastewater Network and $3,672,000 for the Water Network. 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.

Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[2] 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.

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

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

Historical Prime Business Interest Rate

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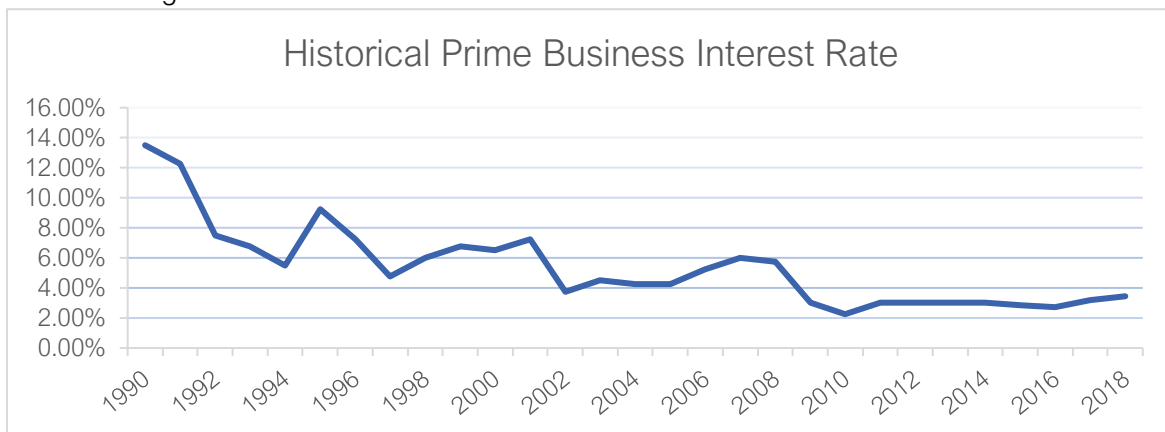
[2] Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

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.

The following tables outline how Lambton Shores has historically used debt for investing in the asset categories as listed. There is currently $9,608,000 of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $1,455,000, well within its provincially prescribed maximum of $5,366,000.

Asset Category	Current Debt Outstanding	Use of Debt in the Last Five Years				
		2014	2015	2016	2017	2018
Road Network	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0
Storm Sewer Network	0	0	0	0	0	0
Facilities	5,780,000	0	4,063,000	0	0	0
Land Improvements	1,154,000	0	0	1,111,000	0	0
Machinery & Equipment	0	0	0	0	0	0
Rolling Stock	0	0	0	0	0	0
Total Tax Funded:	6,934,000	0	4,063,000	1,111,000	0	0
Wastewater Network	1,184,000	0	0	0	622,000	0
Water Network	1,490,000	0	0	0	0	0
Total Rate Funded:	2,674,000	0	0	0	622,000	0

Asset Category	Principal & Interest Payments in the Next Ten Years						
	2019	2020	2021	2022	2023	2024	2029
Road Network	0	0	0	0	0	0	0
Bridges & Culverts	0	0	0	0	0	0	0
Storm Sewer Network	0	0	0	0	0	0	0
Facilities	460,000	460,000	460,000	460,000	460,000	460,000	460,000
Land Improvements	312,000	221,000	129,000	129,000	129,000	129,000	0
Machinery & Equipment	0	0	0	0	0	0	0
Rolling Stock	0	0	0	0	0	0	0
Total Tax Funded:	772,000	681,000	589,000	589,000	589,000	589,000	460,000
Wastewater Network	165,000	161,000	158,000	154,000	151,000	147,000	48,000
Water Network	518,000	518,000	319,000	120,000	120,000	0	0
Total Rate Funded:	683,000	679,000	477,000	274,000	271,000	147,000	48,000

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

Use of Reserves

Available Reserves

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

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

By asset category, the table below outlines the details of the reserves currently available to Lambton Shores.

Asset Category	Balance at December 31, 2018
Road Network	1,878,000
Bridges & Culverts	102,000
Storm Sewer Network	200,000
Facilities	1,006,000
Land Improvements	443,000
Machinery & Equipment	205,000
Rolling Stock	738,000
Total Tax Funded:	4,572,000
Wastewater Network	17,000
Water Network	9,327,000
Total Rate Funded:	9,344,000

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

a) breadth of services provided
b) age and condition of infrastructure
c) use and level of debt
d) economic conditions and outlook
e) internal reserve and debt policies.

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Lambton Shores' 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.

Recommendation

In 2024, Ontario Regulation 588/17 will require Lambton Shores to integrate proposed levels of service for all asset classes in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

Appendices

Overall Grade **D**	Appendix A: Infrastructure Report Card					
Asset Category	**Asset Health (Condition)**			**Financial Capacity**		**Overall Grade**
Road Network	Grade **C**	Condition Ratings		Grade **D**	Current Financial Capacity	**D**
		Very Good	25%		Annual Requirement: $4,641,000	
		Good	50%			
		Fair	20%		Funding Available: $2,502,000	
		Poor	2%			
		Very Poor	3%		Deficit: $2,139,000	
Bridges & Culverts	Grade **B**	Condition Ratings		Grade **F**	Current Financial Capacity	**D**
		Very Good	30%		Annual Requirement: $373,000	
		Good	54%			
		Fair	11%		Funding Available: $68,000	
		Poor	1%			
		Very Poor	4%		Deficit: $305,000	
Storm Sewer Network	Grade **D**	Condition Ratings		Grade **F**	Current Financial Capacity	**F**
		Very Good	27%		Annual Requirement: $732,000	
		Good	17%			
		Fair	10%		Funding Available: $134,000	
		Poor	5%			
		Very Poor	41%		Deficit: $598,000	
Water Network	Grade **B**	Condition Ratings		Grade **F**	Current Financial Capacity	**D**
		Very Good	43%		Annual Requirement: $4,745,000	
		Good	41%			
		Fair	12%		Funding Available: $1,756,000	
		Poor	2%			
		Very Poor	2%		Deficit: $2,989,000	
Wastewater Network	Grade **C**	Condition Ratings		Grade **F**	Current Financial Capacity	**F**
		Very Good	28%		Annual Requirement: $1,345,000	
		Good	14%			
		Fair	45%		Funding Available: $151,000	
		Poor	4%			
		Very Poor	9%		Deficit: $1,194,000	

Machinery & Equipment	Grade	Condition Ratings		Grade	Current Financial Capacity		
	C	Very Good	27%	A	Annual Requirement:	$337,000	B
		Good	15%				
		Fair	22%		Funding Available:	$366,000	
		Poor	13%				
		Very Poor	22%		Surplus:	$29,000	
Rolling Stock	Grade	Condition Ratings		Grade	Current Financial Capacity		
	C	Very Good	24%	A	Annual Requirement:	$607,000	B
		Good	30%				
		Fair	13%		Funding Available:	$660,000	
		Poor	8%				
		Very Poor	24%		Surplus:	$53,000	
Buildings & Facilities	Grade	Condition Ratings		Grade	Current Financial Capacity		
	C	Very Good	2%	F	Annual Requirement:	$1,109,000	F
		Good	75%				
		Fair	20%		Funding Available:	$250,000	
		Poor	1%				
		Very Poor	2%		Deficit:	$859,000	
Land Improvements	Grade	Condition Ratings		Grade	Current Financial Capacity		
	D	Very Good	3%	F	Annual Requirement:	$889,000	F
		Good	22%				
		Fair	40%		Funding Available:	$162,000	
		Poor	23%				
		Very Poor	12%		Deficit:	$727,000	

Appendix B: Infrastructure Report Card Description

Current Financial Capacity	A municipality's financial capacity grade is determined by the level of funding available (0-100%) for each asset category for the purpose of meeting the average annual investment requirements.	
Asset Health	Using either field inspection data as available or age-based data, the asset health component of the report card uses condition (0-100%) to estimate how capable assets are in performing their required functions. We use replacement cost to determine the weight of each condition group within the asset category.	

Letter Grade	Rating	Description
A	Very Good	The asset is functioning and performing well; only normal preventive maintenance is required. The municipality is fully prepared for its long-term replacement needs based on its existing infrastructure portfolio.
B	Good	The municipality is well prepared to fund its long-term replacement needs but requires additional funding strategies in the short-term to begin to increase its reserves.
C	Fair	The asset's performance or function has started to degrade, and repair/rehabilitation is required to minimize lifecycle cost. The municipality is underpreparing to fund its long-term infrastructure needs. The replacement of assets in the short- and medium-term will likely be deferred to future years.
D	Poor	The asset's performance and function metrics are below the desired level and immediate repair/rehabilitation is required. The municipality is not well prepared to fund its replacement needs in the short-, medium- or long-term. Asset replacements will be deferred, and levels of service may be reduced.
F	Very Poor	The municipality is significantly underfunding its short-term, medium-term, and long-term infrastructure requirements based on existing funds allocation. Asset replacements will be deferred indefinitely. The municipality may have to divest some of its assets (e.g., bridge closures, arena closures) and levels of service will be reduced significantly.

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

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	75-89 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	60-74 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.

Appendix C: 10-Year Capital Requirements

The following tables identify the capital cost requirements for each of the next 10 years in order to meet projected capital requirements.

Road Network										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Road Surface - Paved	$1,535,600	$808,680	$967,100	$152,000	$1,750,622	$1,841,610	$149,500	$4,751,910	$6,329,340	$2,181,660
Road Surface - Tar & Chip	$362,250	$48,000	$392,100	$500,400	$0	$0	$112,350	$845,150	$18,000	$0
Sidewalks	$69,930	$0	$0	$0	$0	$0	$0	$12,488	$0	$0
Signs	$84,946	$54,149	$60,691	$72,533	$75,059	$90,469	$65,201	$79,094	$86,788	$0
Streetlights & Traffic Lights	$14,543	$99,109	$10,653	$10,607	$10,543	$10,581	$10,608	$10,594	$10,602	$10,572
Total:	$2,067,269	$1,009,938	$1,430,544	$735,540	$1,836,224	$1,942,660	$337,659	$5,699,236	$6,444,730	$2,192,232

Bridges & Culverts										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Bridges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Culverts	$205,271	$0	$0	$0	$43,744	$54,849	$0	$0	$27,344	$40,643
Guide Rails	$0	$0	$0	$0	$15,805	$0	$0	$0	$0	$0
Total:	$205,271	$0	$0	$0	$59,549	$54,849	$0	$0	$27,344	$40,643

Storm Sewer Network										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Catch Basins	$32,091	$0	$6,756	$0	$0	$0	$0	$5,067	$28,713	$1,689
Storm Ponds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Sewers	$955,537	$559,686	$0	$544,349	$1,576,238	$0	$561,690	$185,858	$0	$3,274,803
Total:	$987,628	$559,686	$6,756	$544,349	$1,576,238	$0	$561,690	$190,925	$28,713	$3,276,492

Water Network										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Hydrants	$0	$6,419	$115,542	$134,799	$12,838	$0	$44,933	$25,676	$327,369	$128,380
Water Buildings	$0	$0	$0	$0	$0	$0	$35,837	$647,485	$0	$0

Water Equipment	$0	$0	$0	$6,717	$51,315	$9,319	$0	$0	$0	$0
Water Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Meters	$1,236,149	$0	$0	$0	$0	$0	$31,258	$48,233	$677,469	$79,846
Total:	$1,236,149	$6,419	$115,542	$141,516	$64,153	$9,319	$112,028	$721,394	$1,004,838	$208,226

Wastewater Network										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Force Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Lagoons	$393,541	$0	$0	$0	$0	$0	$0	$0	$0	$347,594
Sanitary Sewer Mains	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Wastewater Buildings	$153,387	$13,077	$0	$0	$0	$2,598,591	$0	$0	$88,476	$41,511
Total:	$546,928	$13,077	$0	$0	$0	$2,598,591	$0	$0	$88,476	$389,105

Machinery & Equipment										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Corporate Services Equipment	$50,080	$31,425	$55,583	$74,918	$14,030	$178,465	$39,188	$31,506	$106,127	$38,551
Protection Services Equipment	$94,771	$135,550	$40,554	$189,283	$26,299	$42,074	$131,166	$171,014	$287,986	$38,053
Recreational Equipment	$17,138	$13,899	$91,983	$9,463	$31,396	$56,322	$70,423	$82,196	$43,233	$85,436
Transportation Services Equipment	$95,253	$34,736	$85,038	$32,245	$5,464	$4,456	$50,920	$20,901	$29,758	$0
Total:	$257,242	$215,610	$273,158	$305,909	$77,189	$281,317	$291,697	$305,617	$467,104	$162,040

Rolling Stock										
Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Beach & Harbour	$0	$74,820	$0	$0	$0	$0	$0	$0	$0	$86,377
Parks	$18,494	$10,223	$0	$0	$8,578	$7,495	$0	$8,566	$14,292	$0
Protection Services	$42,616	$354,657	$0	$353,780	$0	$53,708	$116,140	$24,109	$215,692	$0
Transportation	$266,452	$546,127	$50,389	$452,497	$108,002	$579,229	$484,309	$420,453	$542,225	$257,468
Total:	$327,562	$985,827	$50,389	$806,277	$116,580	$640,432	$600,449	$453,128	$772,209	$343,845

Buildings & Facilities

Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Fire Buildings	$0	$0	$0	$0	$0	$0	$0	$78,362	$126,995	$27,982
General Government Buildings	$0	$0	$0	$0	$0	$3,225	$0	$0	$42,564	$0
Recreation Buildings	$0	$0	$373,329	$0	$0	$7,416	$0	$26,516	$922,330	$0
Transportation Services Buildings	$0	$0	$0	$0	$16,589	$0	$0	$0	$89,873	$0
Total:	$0	$0	$373,329	$0	$16,589	$10,641	$0	$104,878	$1,181,762	$27,982

Land Improvements

Asset Segment	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Beach & Harbour Improvements	$0	$0	$33,602	$0	$229,499	$41,614	$139,414	$60,071	$265,073	$3,445,659
Fencing	$0	$11,866	$0	$4,193	$0	$1,356	$0	$39,032	$1,471	$0
Parking Lots	$0	$0	$0	$87,273	$292,959	$0	$300,745	$907,893	$557,122	$230,984
Retaining Walls & Other Improvements	$11,663	$0	$0	$0	$0	$425,125	$0	$15,029	$2,315,157	$0
Sports Fields & Play Structures	$51,320	$184,095	$94,753	$94,283	$191,764	$65,353	$67,314	$119,651	$30,590	$73,182
Total:	$62,983	$195,961	$128,355	$185,749	$714,222	$533,448	$507,473	$1,141,676	$3,169,413	$3,749,825

All Asset Categories

Asset Category	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Road Network	$2,067,269	$1,009,938	$1,430,544	$735,540	$1,836,224	$1,942,660	$337,659	$5,699,236	$6,444,730	$2,192,232
Bridges & Culverts	$205,271	$0	$0	$0	$59,549	$54,849	$0	$0	$27,344	$40,643
Storm Sewer Network	$987,628	$559,686	$6,756	$544,349	$1,576,238	$0	$561,690	$190,925	$28,713	$3,276,492
Water Network	$1,236,149	$6,419	$115,542	$141,516	$64,153	$9,319	$112,028	$721,394	$1,004,838	$208,226
Wastewater Network	$546,928	$13,077	$0	$0	$0	$2,598,591	$0	$0	$88,476	$389,105
Machinery & Equipment	$257,242	$215,610	$273,158	$305,909	$77,189	$281,317	$291,697	$305,617	$467,104	$162,040
Rolling Stock	$327,562	$985,827	$50,389	$806,277	$116,580	$640,432	$600,449	$453,128	$772,209	$343,845
Buildings & Facilities	$0	$0	$373,329	$0	$16,589	$10,641	$0	$104,878	$1,181,762	$27,982
Land Improvements	$62,983	$195,961	$128,355	$185,749	$714,222	$533,448	$507,473	$1,141,676	$3,169,413	$3,749,825
Total:	$5,691,032	$2,986,518	$2,378,073	$2,722,229	$4,460,744	$6,071,257	$2,410,996	$8,616,853	$13,184,589	$10,390,390

Appendix D: Level of Service Maps

Road Services

Legend

- ⋯⋯ Gravel
- ─── HCB
- ─── LCB
- ─── County of Lambton
- ─── Province of Ontario
- ─── Other (Private)
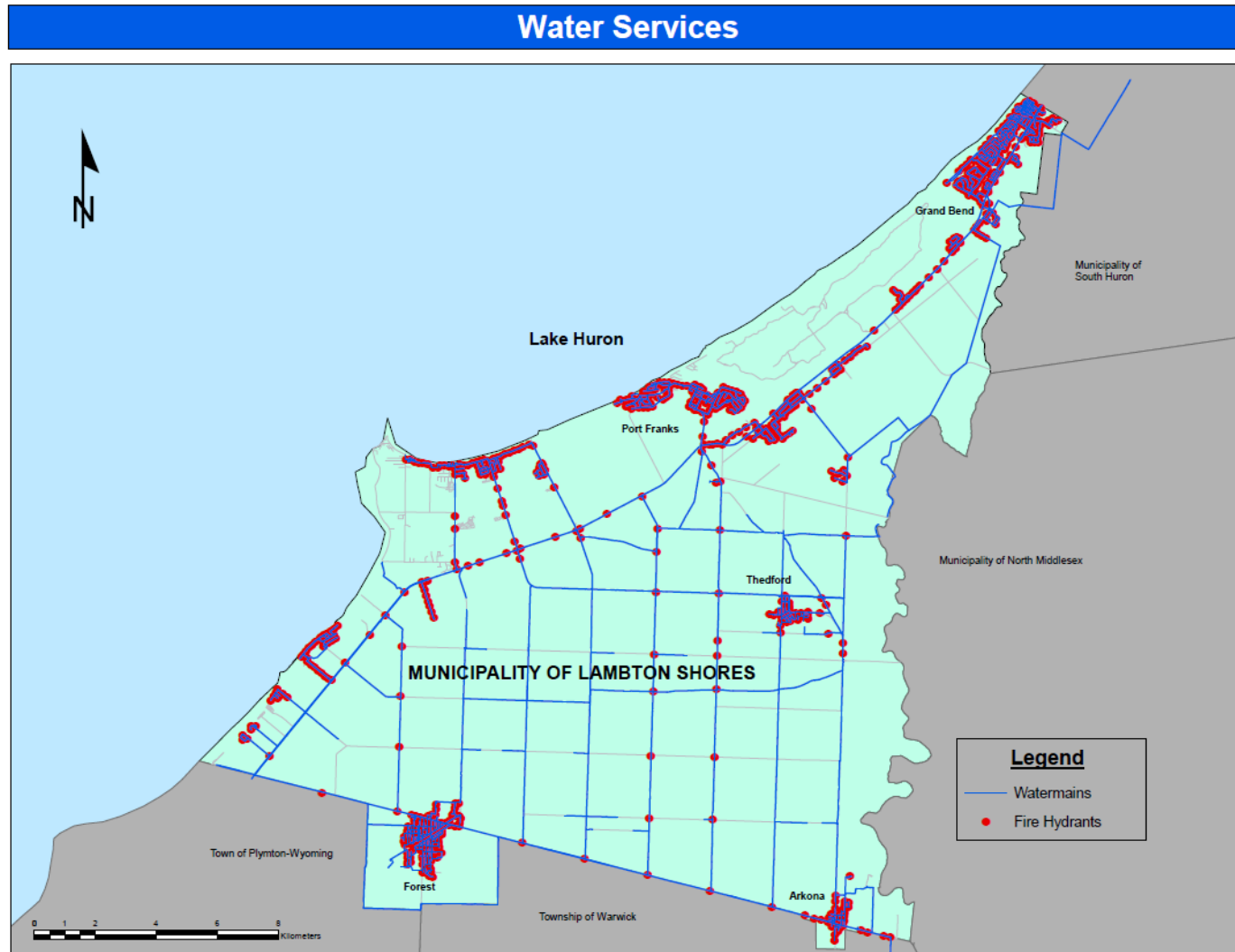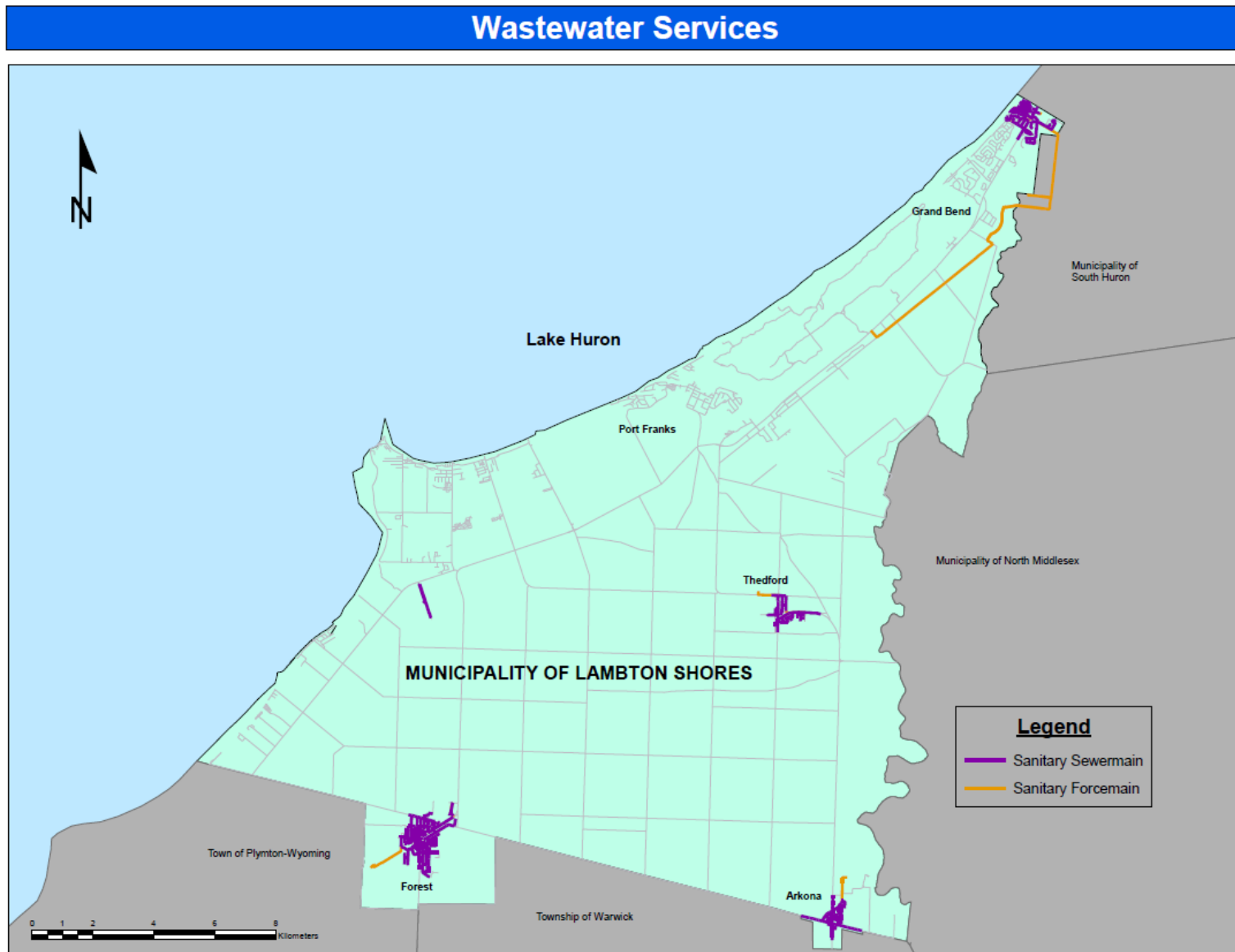
Appendix E: Risk Rating Criteria

Probability of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Consequence of Failure Score
All	Condition	100%	80-100	1
			60-79	2
			40-59	3
			20-39	4
			0-19	5

Consequence of Failure

Asset Category	Risk Criteria	Criteria Weighting	Value/Range	Consequence of Failure Score
Road Network (Roads)	Surface Material	50%	Paved	4
			Tar & Chip	2
	Traffic Range	50%	8000-9999	5
			6000-7999	4
			5000-5999	4
			1000-1999	3
			500-999	3
			200-499	2
			50-199	2
			0-49	1
Bridges & Culverts	Replacement Cost	100%	$2,500,001 and above	5
			$2,500,000 and below	4
			$1,000,000 and below	3
			$500,000 and below	2
			$250,000 and below	1

Storm Sewer Network (Mains)	Diameter	100%	1001mm and above	5
			1000mm and below	4
			600mm and below	3
			450mm and below	2
			250mm and below	1
Water Network (Mains)	Diameter	100%	451mm and above	5
			450mm and below	4
			250mm and below	3
			150mm and below	2
			100mm and below	1
Wastewater Network (Mains)	Diameter	100%	501mm and above	5
			500mm and below	4
			350mm and below	3
			200mm and below	2
			150mm and below	1
Equipment	Replacement Cost	70%	$350,001 and above	5
			$350,000 and below	4
			$125,000 and below	3
			$50,000 and below	2
			$25,000 and below	1
	Segment	30%	Protection Services	5
			Corporate Services	3
			Transportation Services	3
			Recreation	2
Rolling Stock	Replacement Cost	70%	$500,001 and above	5
			$500,000 and below	4
			$250,000 and below	3
			$125,000 and below	2
			$50,000 and below	1
	Segment	30%	Protection Services	5
			Transportation	3

			Parks	2
			Beach & Harbour	2
Buildings	Replacement Cost	70%	$2,000,001 and above	5
			$2,000,000 and below	4
			$500,000 and below	3
			$250,000 and below	2
			$50,000 and below	1
	Segment	30%	Fire	5
			General Government	4
			Transportation Services	4
			Recreation	2
Land Improvements	Replacement Cost	100%	$2,000,001	5
			$2,000,000	4
			$500,000	3
			$250,000	2
			$125,000	1

Appendix F: Condition Assessment Guidelines

The foundation of good asset management practice is accurate and reliable data on the current condition of infrastructure. Assessing the condition of an asset at a single point in time allows staff to have a better understanding of the probability of asset failure due to deteriorating condition.

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the municipality's condition assessment strategy should outline several key considerations, including:

1. The role of asset condition data in decision-making
2. Guidelines for the collection of asset condition data
3. A schedule for how regularly asset condition data should be collected

Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the municipality's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the municipality can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the municipality can develop long-term financial strategies with higher accuracy and reliability.

Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete

condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.

There are many options available to the municipality to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource-intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the municipality should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

1. **Relevance**: every data item must have a direct influence on the output that is required
2. **Appropriateness**: the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
3. **Reliability**: the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
4. **Affordability**: the data should be affordable to collect and maintain

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PSD is an industry leading research, consulting services and software solutions firm for enterprise asset management and budgeting. Our team consists of former local government executives, senior managers, and technical specialists with decades of hands-on experience in the fields of corporate services, public works, asset management and finance.

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