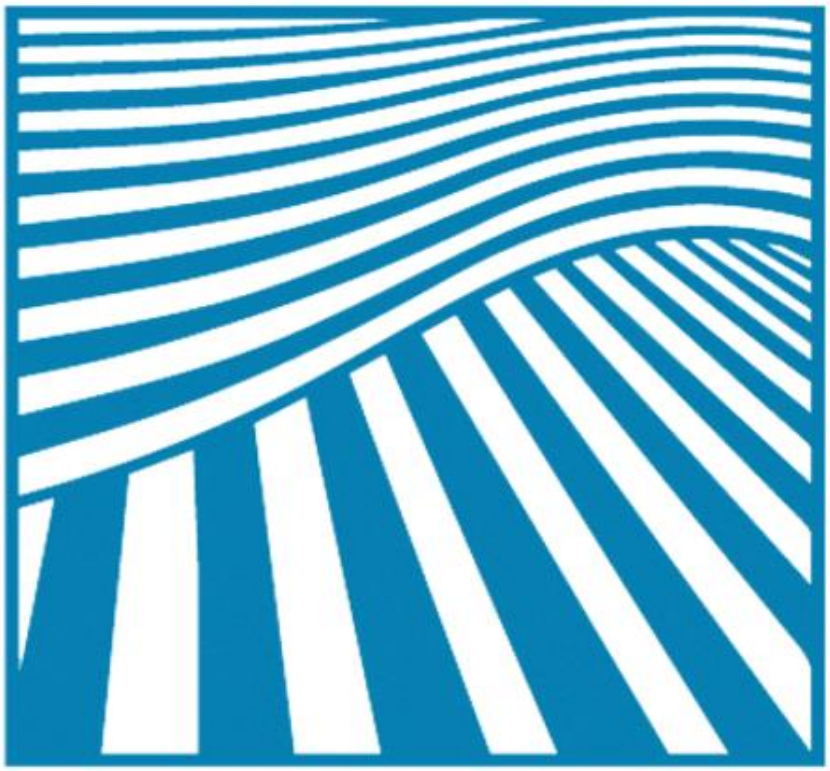

The Asset Management Plan for the Municipality of South Dundas

Prepared by the Municipality of South Dundas
www.southdundas.com
July 2022

THE MUNICIPALITY OF SOUTH DUNDAS

Key Statistics

$330 Million Value of infrastructure as of 2022	**20%** Portion of total 2022 revenues spent on infrastructure
43% Percentage of annual infrastructure funding needs currently being met	**$520** Annual infrastructure deficit per property
14% Portion of total core infrastructure funding that comes from the Gas Tax	**18%** Annual cost savings for roads through proactive lifecycle management
10 years Recommended timeframe for eliminating annual infrastructure deficit for tax funded assets	**15 years** Recommended timeframe for eliminating annual infrastructure deficit for rate funded assets

THE MUNICIPALITY OF SOUTH DUNDAS

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Executive Summary

This asset management plan (AMP) provides data-driven guidance to the Municipality of South Dundas on managing its core municipal infrastructure capital asset portfolio, valued at $330 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 2022 data, 71% of all assets analyzed in this AMP are in fair or better condition. Field condition assessments were used to determine the actual condition for only 32% of assets. For 68% of assets, assessment data was unavailable, and age was used to approximate condition; this data gap persists in most municipalities. Age can understate the true condition of assets, making condition assessments essential for accurate financial asset management planning.

As required by O. Reg 588/17, South Dundas has established current levels of service for its core asset classes which include roads, bridges and culverts, water, wastewater, and stormwater. Based on 2022 data, the average surface condition for the Municipality's road network was rated as 'good'. For bridges, the average condition index is 36%, indicating that bridges are in poor condition. There were 11 water main breaks and one precautionary boil-water advisory issued in 2021. There are no combined sewers in South Dundas. The stormwater network is designed to handle a 5-year storm event; however, it is unclear whether the stormwater network would be able to withstand a 100-year storm event. This leaves the community vulnerable to more extreme and unpredictable weather.

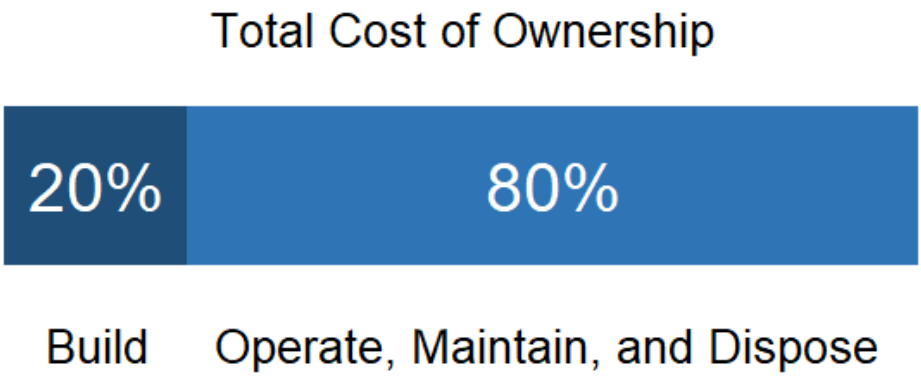
Central to asset management is selecting and applying the right combination of maintenance and rehabilitation options to minimize lifecycle costs and risks, extend the asset's useful life, and maximize value. When a proactive lifecycle strategy was applied to the Municipality's road network, it reduced annual financial requirements by 18% and extended useful lives by as much as 15 years.

As staff further develop the asset management program and consolidate data, similar strategies may be identified and applied to other asset classes to reduce the financial burden on ratepayers.

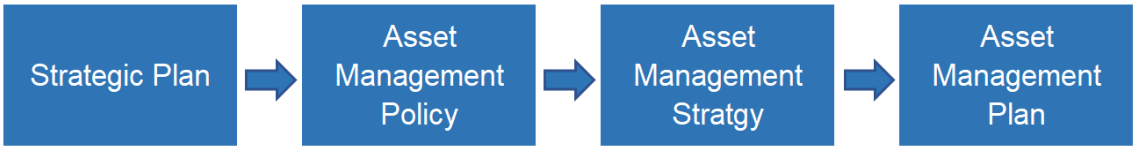
Currently, in addition to the $8.2 million infrastructure backlog, South Dundas has a total annual infrastructure funding shortfall of approximately $3.3 million. To eliminate the $1.9 million deficit for tax funded assets, we recommend increasing tax revenues by 3.2% per year for 10 years. For rate funded assets, a 15-year phase-in period is recommended, based on a 5.8% revenue increase for water, and 3.6% for sanitary services.

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.



These costs can span decades, requiring planning and foresight to spread fiscal responsibility 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.



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, but this will be completed per legislation for 2025.

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 the 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 scheduled 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 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 often 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

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 category, 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.

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, the province has provided qualitative descriptions that are required to be included in the AMP. For non-core asset categories, due 2024, the Municipality will determine 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

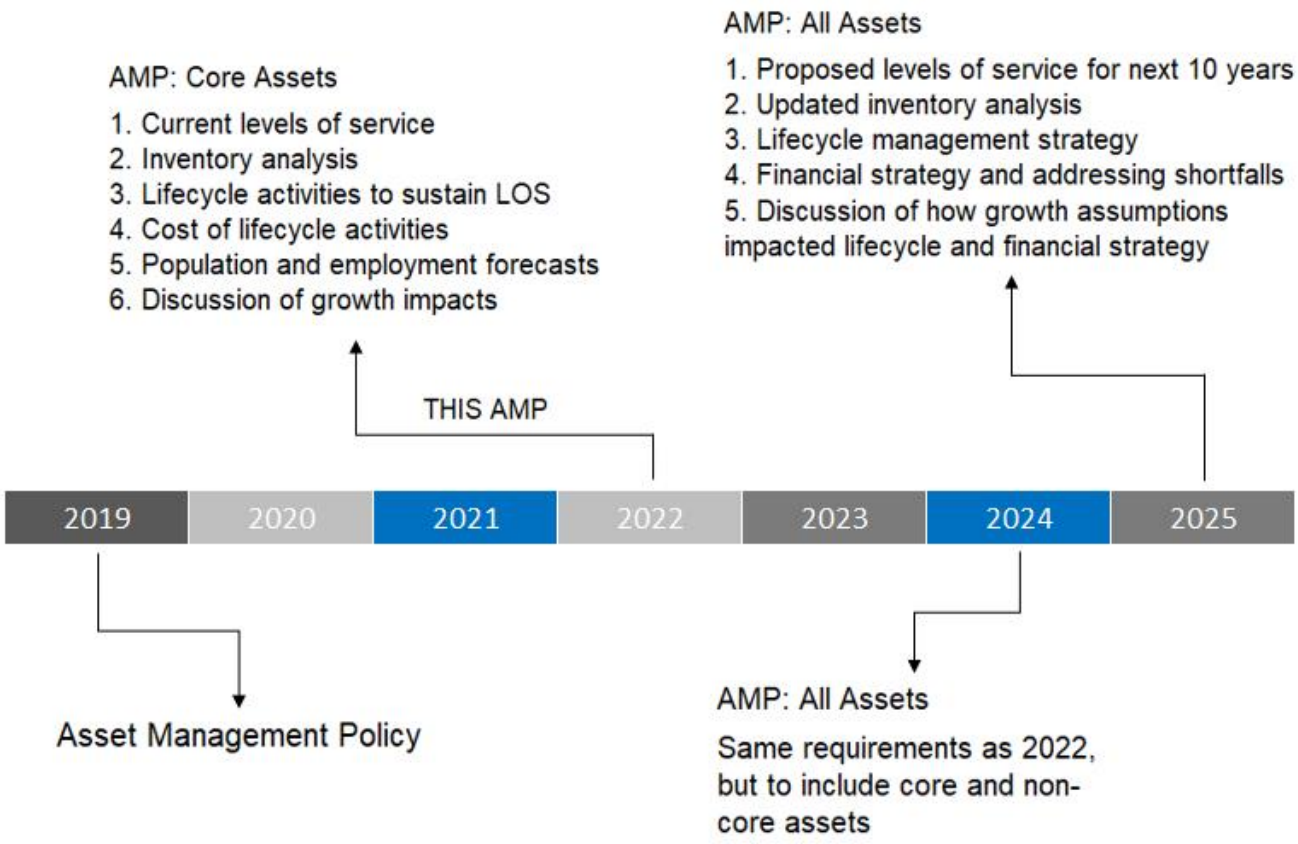
Technical levels of service provide a quantitative measure of key technical attributes of the service being provided to the community. For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the province, through O. Reg. 588/17, has provided technical metrics that are required to be included in the AMP. For non-core asset categories, the Municipality will determine 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 livable 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.



Scope and Methodology

Assets classes included in this AMP

This asset management plan for the Municipality of South Dundas is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs— requires analysis of only core assets.

This AMP 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 five asset classes listed below.

Asset Category	Source of Funding
Road Network	Tax Levy
Bridges & Culverts	
Storm Sewer Network	
Water Network	User Rates
Wastewater Network	

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. The 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, 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, substantial 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 in 2019 by McIntosh Perry as part of a Road Needs Study. The bi-annual OSIM (Ontario Structure Inspection Manual) assessment of bridges and culverts was completed in 2021 by Keystone Bridge Management Corp.

This AMP relies on assessed condition data for only 32% of assets; for the remaining portfolio, age is used as an approximation of condition. The table on pg. 15 outlines how condition ratings were assigned to assets.

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:

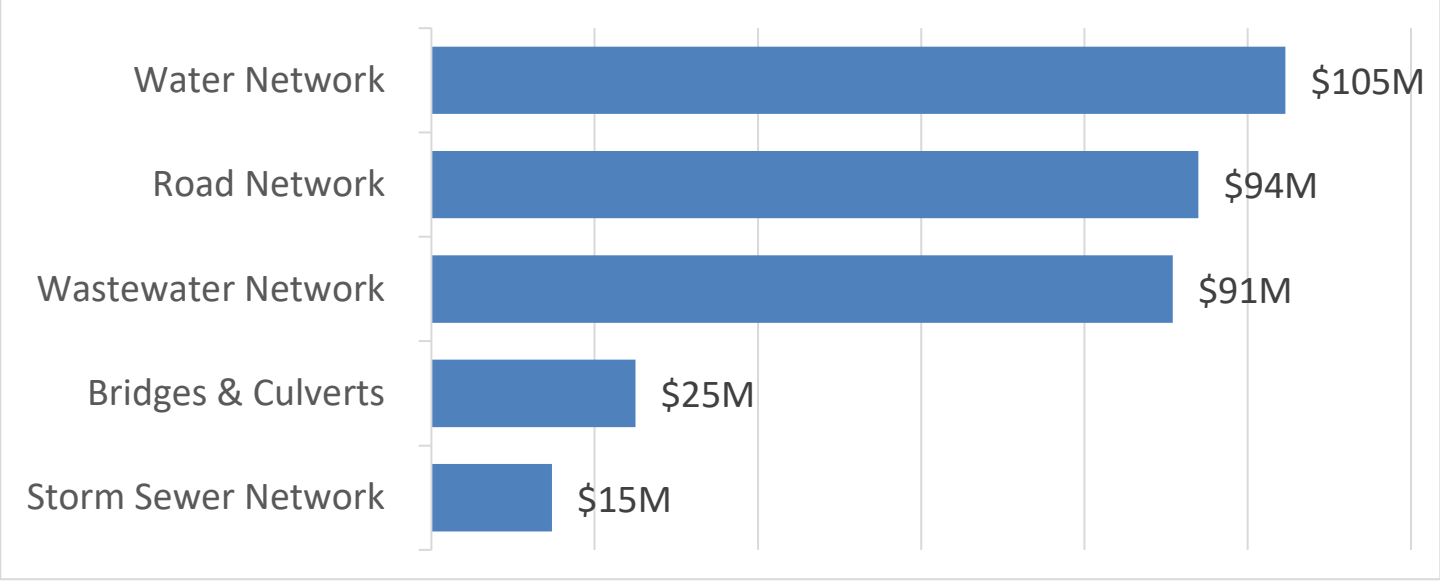
$$Service\ Life\ Remaining\ (SLR) = In\ Service\ Date + Estimated\ Useful\ Life\ (EUL) - Current\ Year$$

Portfolio Overview

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

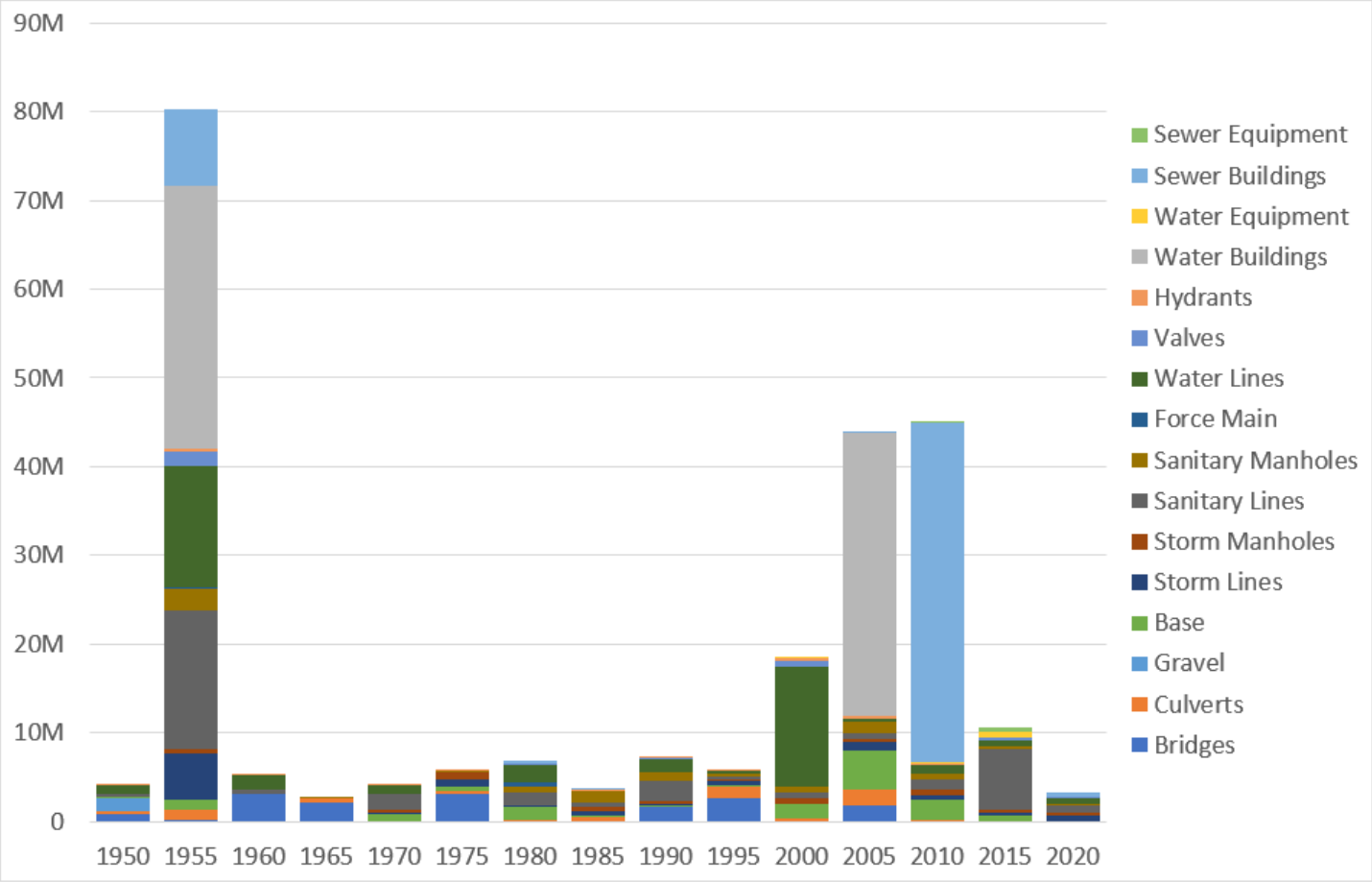
Current Value of Asset Portfolio

For this AMP, the 2022 replacement costs for the asset categories analyzed total $330 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.



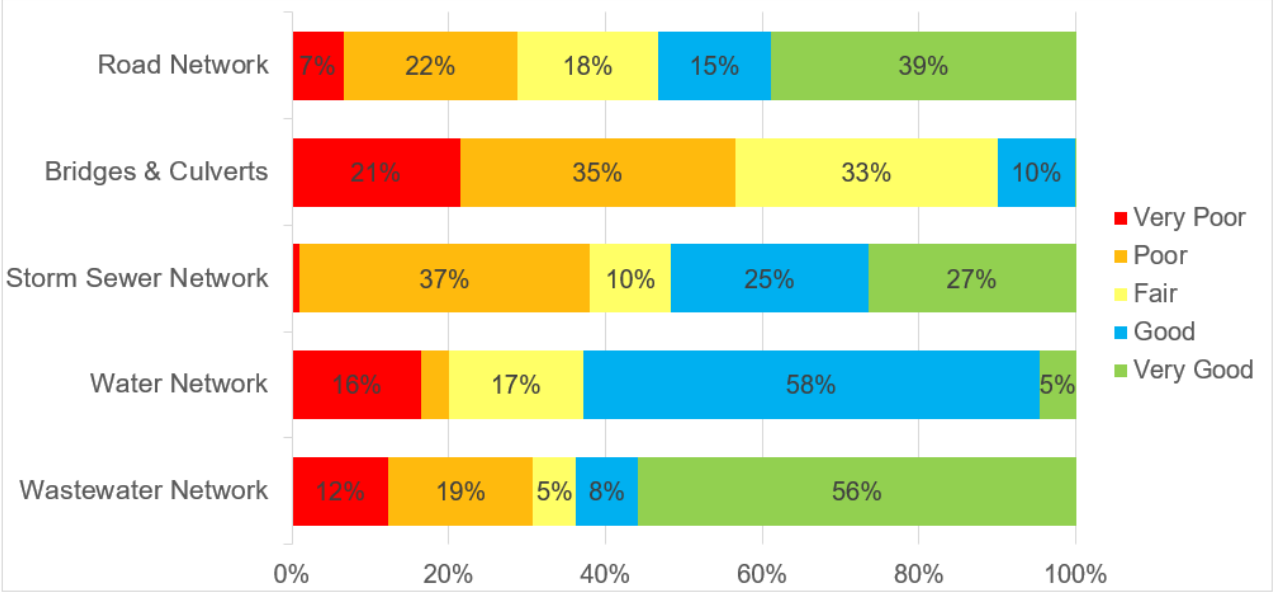
Historical Investments in Infrastructure

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 South Dundas has made since 1950 in the asset classes analyzed in this AMP.



Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 71% of assets in South Dundas are in fair or better condition. This estimate relies on both age-based and field condition data.

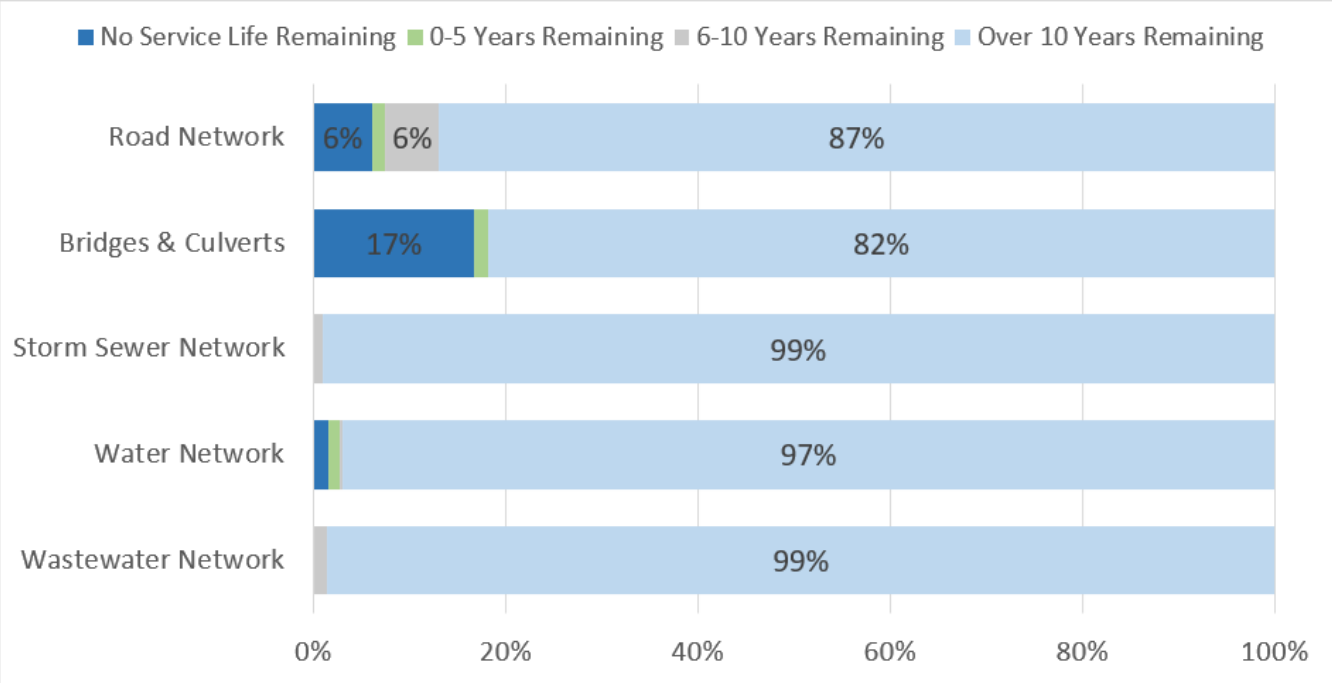


Field condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

Asset Category	Asset Segment	Types of Condition Data	Source of Condition Data
Bridges & Culverts	Bridges	100% Assessed	2021 Ontario Structure Inpection Manual (OSIM) Report (Keystone)
	Culverts	95% Assessed	2021 Ontario Structure Inpection Manual (OSIM) Report (Keystone)
Road Network	HCB Surfaces	95% Assessed	2019 Road Needs Study (McIntosh Perry)
	LCB Surfaces	96% Assessed	2019 Road Needs Study (McIntosh Perry)
	Gravel	100% Assessed	2019 Road Needs Study (McIntosh Perry)
	Base	Age-Based Condition	2019 Road Needs Study (McIntosh Perry)
Storm Sewer Network	Storm Lines	Age-Based Condition	In-Service Date and Estimated Useful Life
	Storm Manholes	80% Assessed	2017 Closed Circuit Television Video (CCTV) Inpsection (Clean Water Works)
Water Network	Water Lines	Age-Based Condition	In-Service Date and Estimated Useful Life
	Water Valves	Age-Based Condition	In-Service Date and Estimated Useful Life
	Fire Hydrants	Age-Based Condition	In-Service Date and Estimated Useful Life
	Buildings	Age-Based Condition	In-Service Date and Estimated Useful Life
	Machinery & Equipment	Age-Based Condition	In-Service Date and Estimated Useful Life
Wastewater Network	Sanitary Lines	Age-Based Condition	In-Service Date and Estimated Useful Life
	Sanitary Manholes	Age-Based Condition	2016 Closed Circuit Television Video (CCTV) Inpsection (Clean Water Works)
	Force Main	Age-Based Condition	In-Service Date and Estimated Useful Life
	Buildings	Age-Based Condition	In-Service Date and Estimated Useful Life
	Machinery & Equipment	Age-Based Condition	In-Service Date and Estimated Useful Life

Service Life Remaining

With the exceptions of bridges & culverts, the majority of the municipality's core assets have at least 10 years of service life remaining. At 18%, bridges and culverts had the highest portion of assets that will reach the end of their established useful life within the next decade. 87% of the road network will need to be replaced after 10 years assuming life cycle activities (micro surface, mill and pave, etc.) occur.



Comprehensive Analysis of Tax Funded Assets

Key Findings

- Tax funded assets are valued at $135 million, making up 41% of the Municipality's total asset portfolio.
- 65% of tax funded assets are in fair or better condition
- Assets are currently funded at only 40% of their long-term requirements.
- To reach sustainability, tax revenues need to be increased by 3.2% annually for each of the next 10 years to potentially eliminate annual deficits.
- Project prioritization is needed to gradually eliminate the infrastructure backlog of $6.4 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 sizable 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.

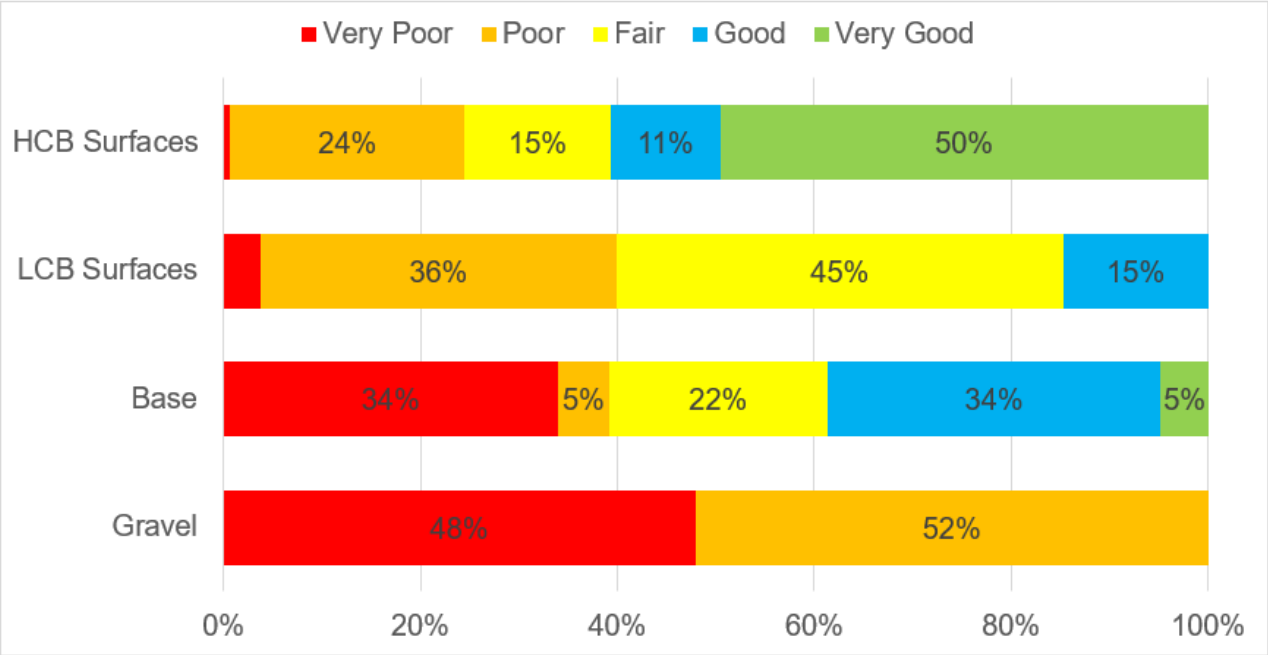
Category	Quantity	Replacement Cost Method	Total Replacement Cost
Gravel	35 km	CPI Tables - NRBCPI Quarterly (Toronto)	$ 1,413,298.00
Base	310 km	User-Defined Cost	$ 13,852,509.96
HCB Surfaces	193 km	User-Defined Cost	$ 72,265,863.61
LCB Surfaces	117 km	User-Defined Cost	$ 6,423,585.00
		Total:	$ 93,955,256.57

NRBCPI - Non-Residential Building Construction Price Index

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 Category	Average Condition (%)	Average Condition Rating	Condition Source
Gravel	21%	Poor	100% Assessed
Base	39%	Poor	Age-Based
HCB Surfaces	67%	Good	95% Assessed
LCB Surfaces	42%	Fair	96% Assessed
Average:	60%	Good	81% Assessed

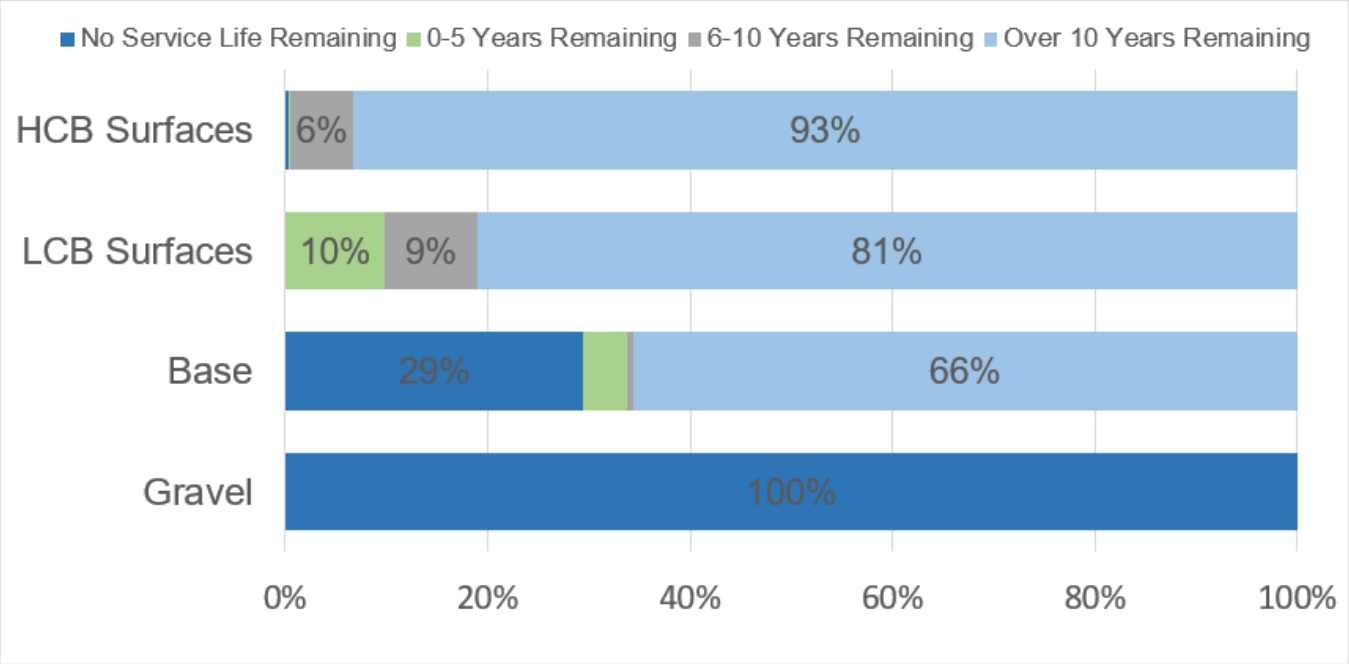


To ensure that the Municipality's Road Network continues to provide an acceptable level of service,the Municipality should monitor the average condition of all assets within the road network. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine 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. 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. The assessed condition may increase or decrease the average service life remaining. Assuming life cycle events occur, 93% and 81% of High Class Bituminous (HCB) and Low Class Bituminous (LCB), respectively, will need to be replaced after 10 years.

Asset Category	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Base	40	43	-7
HCB Surfaces	40	22	66
LCB Surfaces	30	10	22
	Average:	32	23



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

- A Road Needs Study is contracted to an external consultant every six years to have the roadways assessed. The Study identifies a Road Condition Rating (0-10) for every municipal road.
- The Road Needs Study is a valuable source of information that is relied on for capital planning purposes to address the need for rehabilitation and replacement activities

Lifecycle Management Strategy

Operations & Maintenance

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

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, and available budget)
- Double surface treated 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 currently more of a reactive process
- A 10-year capital plan is developed that identifies both replacement and rehabilitation events

Lifecycle Strategy - Roads

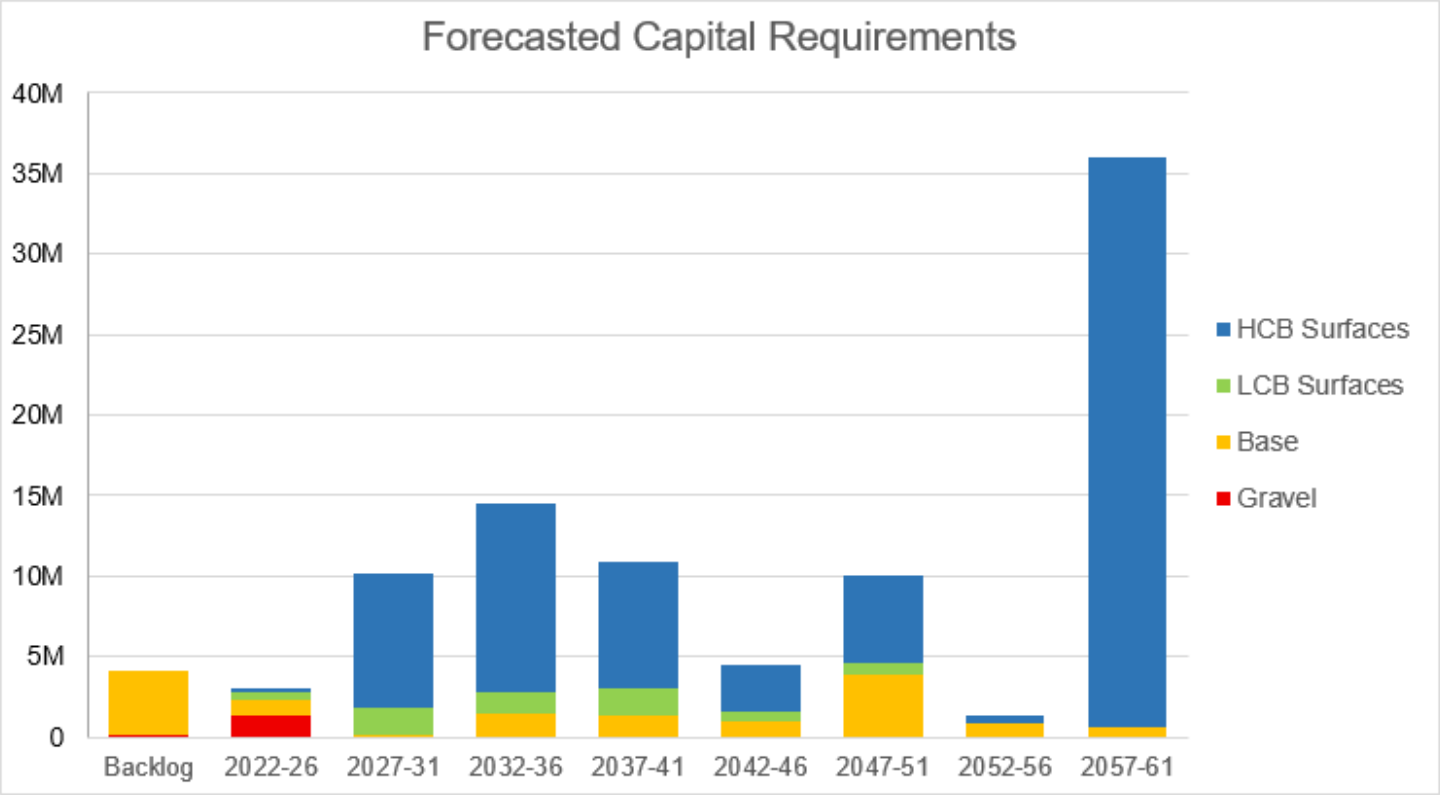
The following lifecycle strategies have been developed as a proactive approach to manage the lifecycle of asphalt and double surface treated roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost. The standard lifecycle of LCB Roads includes a single surface treatment after approximately 7-8 years, a single micro surface treatment after another 7-8 years, and then the road is pulverized and a new surface is constructed. The target lifecycle of HCB Roads includes a partial mill and resurface that extends the useful life of the road by 15 years. After approximately 50 years, the road may need to be reconstructed.

LCB Roads		
Event Name	Event Class	Event Trigger
Single / Double Lift (First Treatment)	Rehabilitation	7 Years
Single / Double Micro (Second Treatment)	Rehabilitation	15 Years
Pulverize / Full Reconstruction	Replacement	25-30 Years

HCB 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	50 Years

Forecasted Capital Requirements

Based on the lifecycle strategies identified for both asphalt and double surface treated 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.



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	2	3	4	5
5	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
4	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
3	3 Assets 4.38 km $35,265,499	11 Assets 46.7 km $7,036,992	17 Assets 55.15 km $8,763,853	21 Assets 72.88 km $12,398,374	0 Assets - $0
2	15 Assets 22.51 km $1,225,455	73 Assets 126.38 km $6,605,168	93 Assets 128.39 km $7,960,135	130 Assets 93.13 km $8,555,453	184 Assets 202.3 km $6,144,327
1	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0

Probability

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 but 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	Risk Rating
806	HCB Surfaces	Whittaker Rd	$ 1,042,319.20	14.4 - High
1061	HCB Surfaces	Beckstead Rd	$ 1,553,645.60	14.4 - High
1012	HCB Surfaces	Coyle Dr	$ 147,498.00	13.5 - High
1067	HCB Surfaces	Bath Rd	$ 117,998.40	13.5 - High
801	HCB Surfaces	Winchester Springs Rd	$ 550,659.20	13.2 - High
891	HCB Surfaces	Nudell Bush Rd	$ 570,325.60	13.2 - High
912	HCB Surfaces	Marcellus Rd	$ 884,988.00	13.2 - High
972	HCB Surfaces	Grantley Rd	$ 943,987.20	13.2 - High
980	HCB Surfaces	Garlough Rd	$ 540,826.00	13.2 - High
983	HCB Surfaces	Froatburn Rd	$ 825,988.80	13.2 - High

Asset ID	Segment	Name	Replacement Cost	Risk Rating
893	LCB Surfaces	Nine Mile Rd	$ 115,542.00	13.5 - High
847	LCB Surfaces	Shannette Rd	$ 269,598.00	12 - High
858	LCB Surfaces	Saddlemire Rd	$ 66,024.00	12 - High
1013	LCB Surfaces	Coughler Rd	$ 60,522.00	12 - High
838	LCB Surfaces	South Branch Road	$ 104,538.00	10.8 - High
839	LCB Surfaces	Snowbird Road	$ 176,064.00	10.8 - High
840	LCB Surfaces	Smiths Rd	$ 115,542.00	10.8 - High
846	LCB Surfaces	Shaver Rd	$ 115,542.00	10.8 - High
850	LCB Surfaces	Seely Rd	$ 110,040.00	10.8 - High
865	LCB Surfaces	Robertson Rd	$ 209,076.00	10.8 - High

Levels of Service

The following tables identify the Municipality's current levels 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
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 levels of service provided by the Road Network.

Service Attribute	Technical Metric	Current LOS
Scope	Lane-km of arterial roads (MMS class 1 and 2) per land area (km/km^2)	0 km/km2
	Lane-km of collector roads (MMS class 3 and 4) per land area (km/km^2)	0 km/km2
	Lane-km of local roads (MMS class 5 and 6) per land area (km/km^2)	0.60 km/km2
Reliability	Average pavement condition index for paved roads	47.3
	Average surface condition for unpaved roads(e.g., excellent, good, fair, poor)	Fair

Recommendations

Replacement Costs

- Review and update replacement costs on an annual basis to ensure that short, medium, and long-term planning is 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 five to ten 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

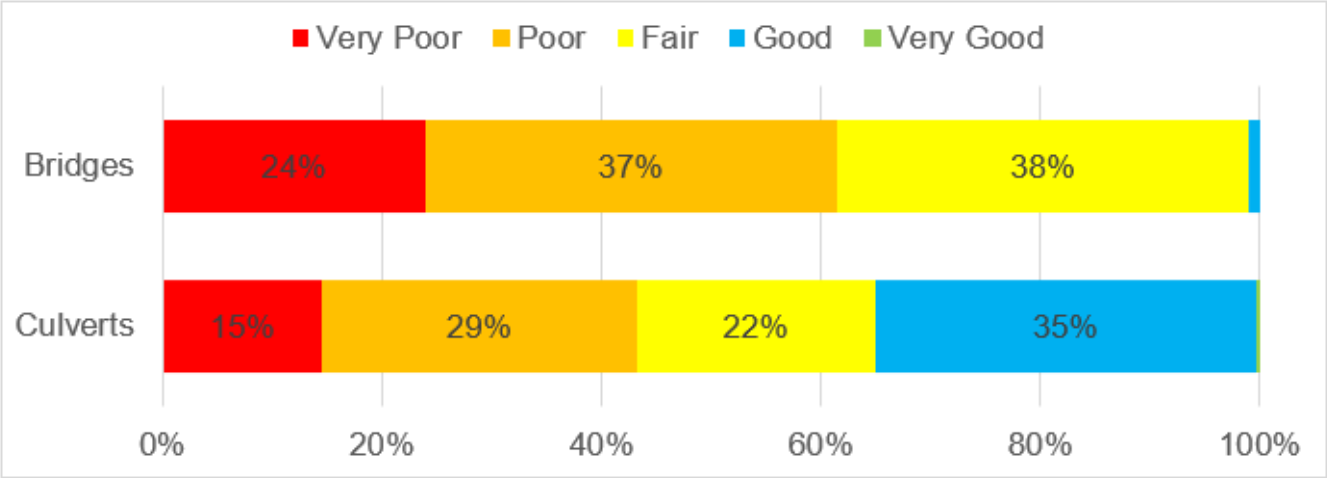
The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Municipality's Bridges & Culverts inventory.

Category	Quantity	Replacement Cost Method	Total Replacement Cost
Bridges	14	OSIM Reports - Keystone Bridge Management Corp	$ 18,374,670.00
Culverts	20	OSIM Reports - Keystone Bridge Management Corp	$ 6,629,404.00
		Total:	$ 25,004,074.00

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 Category	Average Condition (%)	Average Condition Rating	Condition Source
Bridges	34%	Poor	100% Assessed
Culverts	48%	Fair	95% Assessed
Average:	38%	Poor	99% Assessed

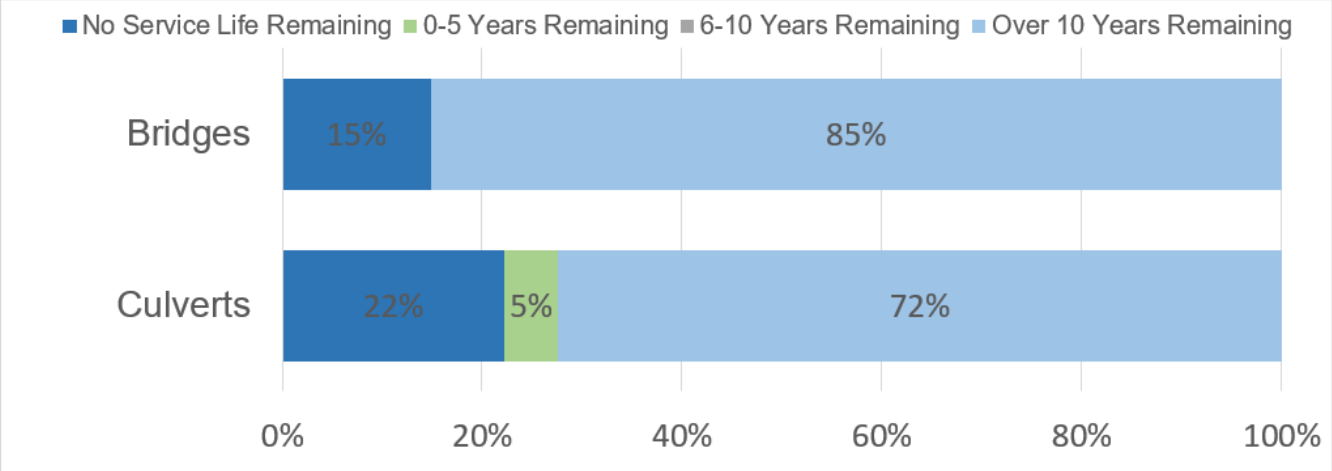


To ensure that the Municipality's Bridges & Culverts continue to provide an acceptable level of service, the Municipality should monitor the average condition of all bridges and culverts. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what 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 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. 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. The assessed condition may increase or decrease the average service life remaining.

Asset Category	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Bridges	100	54	42
Culverts	50	33	18
	Average:	42	28



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 contracts an engineering consultant 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

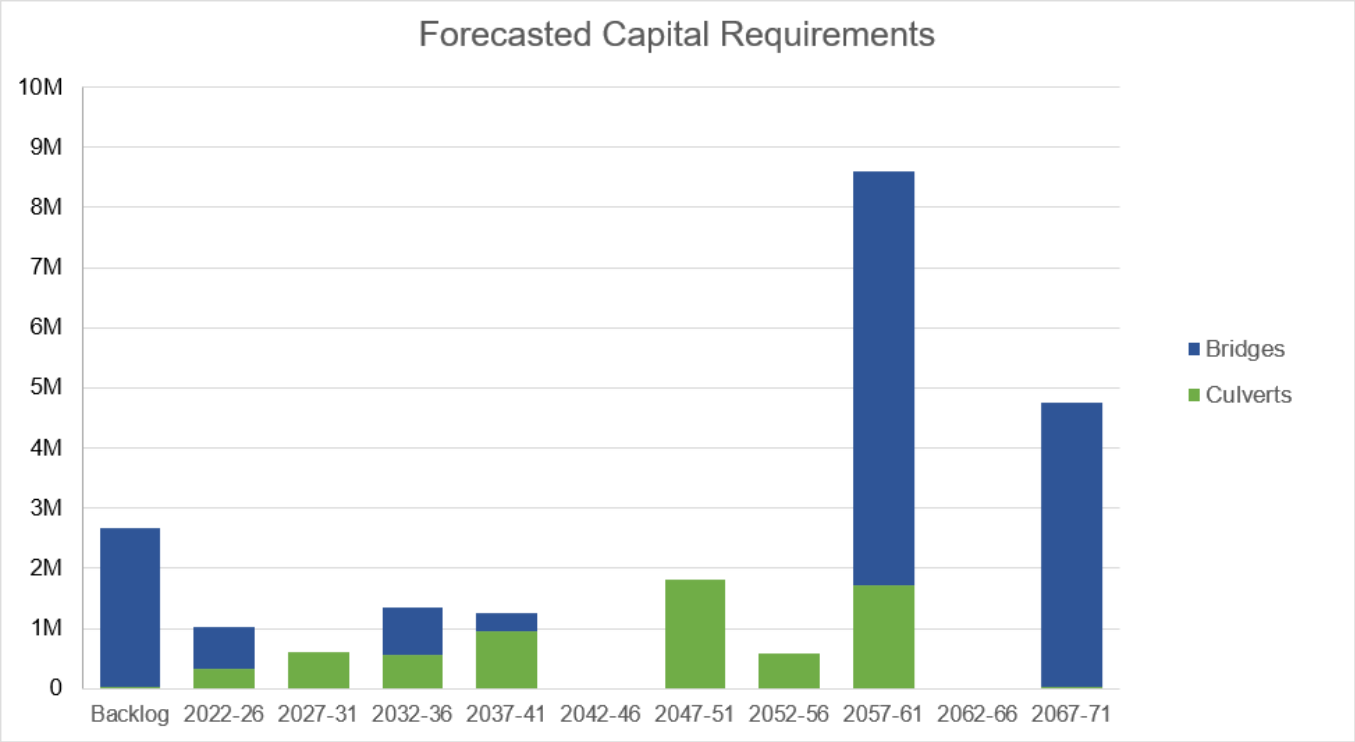
- Operating costs identified in the Inspection Reports are integrated into annual operating budgets to ensure these structures are kept in an adequate state of repair
- Annual operating budget includes basic patch repairs, power-washing etc.

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

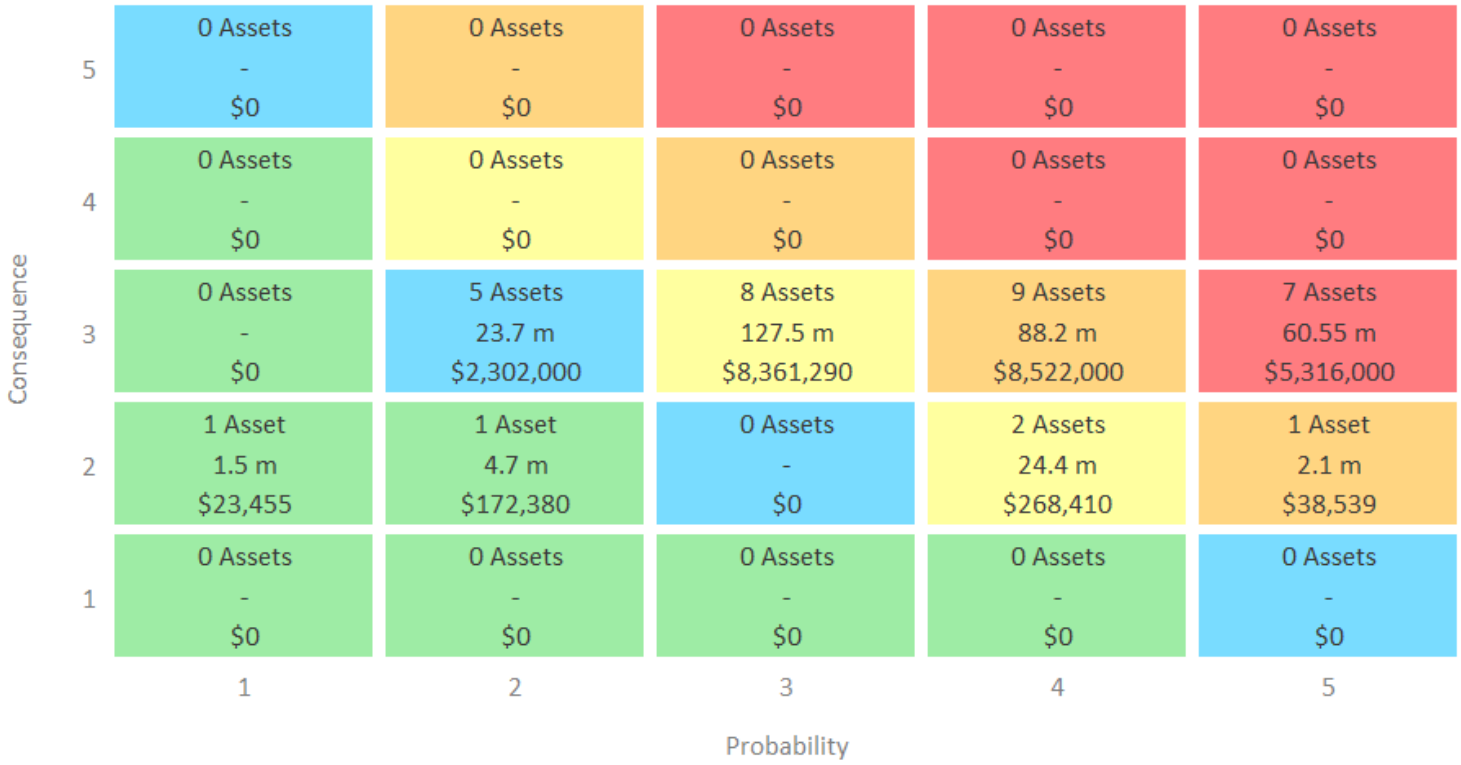
Based on the assumption that all assets will require replacement at the end of their service life, the following graph forecasts capital requirements for the Bridges & Culverts. The annual capital requirement represents the average amount per year that the Municipality should allocate towards funding rehabilitation and replacement needs. 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 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 but 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	Risk Rating
10	Bridges	Taylor Road Bridge 1	$ 2,622,000.00	18 - Very High
24	Bridges	Colquhoun Road Bridge	$ 697,000.00	16.5 - Very High
30	Bridges	Forest Road Bridge	$ 791,000.00	16.5 - Very High
9	Culverts	Taylor Road Culvert	$ 318,000.00	15 - Very High
17	Culverts	Zeron Road Culvert	$ 252,000.00	15 - Very High
21	Culverts	Coughler Road Culvert	$ 354,000.00	15 - Very High
29	Bridges	Taylor Road Bridge 2	$ 282,000.00	15 - Very High
5	Bridges	Gilmour Road Bridge	$ 1,674,000.00	14.4 - Very High
23	Bridges	Barkley Road Bridge	$ 1,533,000.00	14.4 - Very High
25	Bridges	Saving Street Bridge	$ 1,533,000.00	14.4 - Very High

Levels of Service

The following tables identify the Municipality's current levels 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
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	A small percentage 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 with minimal restrictions.
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 five 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
Scope	Percentage of bridges in the Municipality with loading or dimensional restrictions	14%
Quality	Average bridge condition index value for bridges in the Municipality	OSIM: 35%
	Average bridge condition index value for structural culverts in the Municipality	OSIM: 50%

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

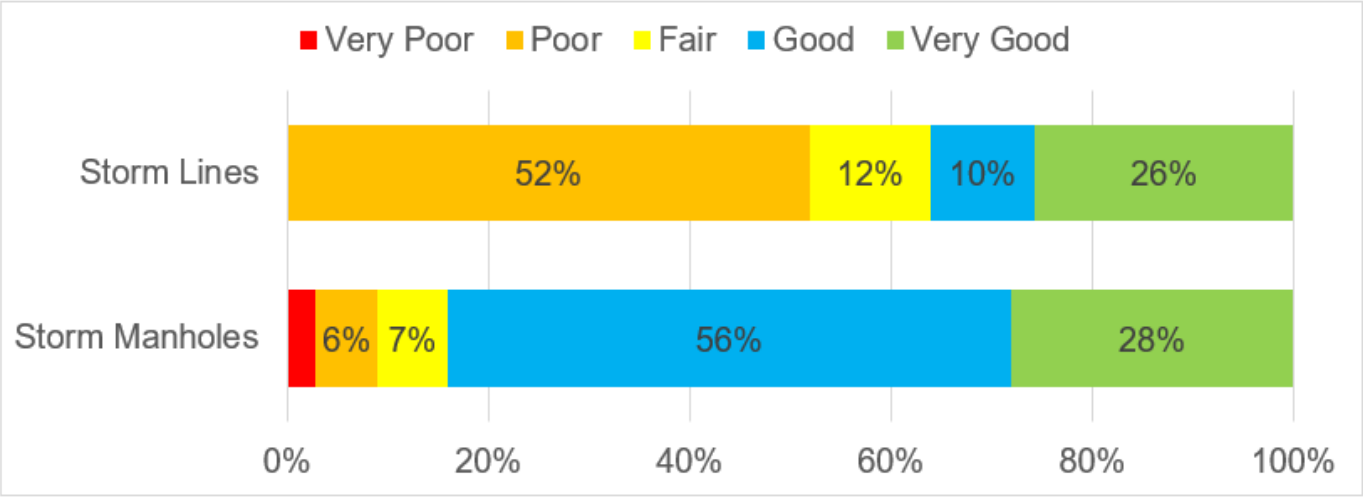
The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the Municipality's Storm Sewer Network inventory.

Category	Quantity	Replacement Cost Method	Total Replacement Cost
Storm Lines	15491 m	User-Defined Cost	$ 9,996,117.88
Storm Manholes	436	User-Defined Cost	$ 4,774,601.79
		Total:	$ 14,770,719.67

Current Asset Condition

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

Asset Category	Average Condition (%)	Average Condition Rating	Condition Source
Storm Lines	54%	Fair	Age-Based
Storm Manholes	66%	Good	80% Assessed
Average:	58%	Fair	26% Assessed

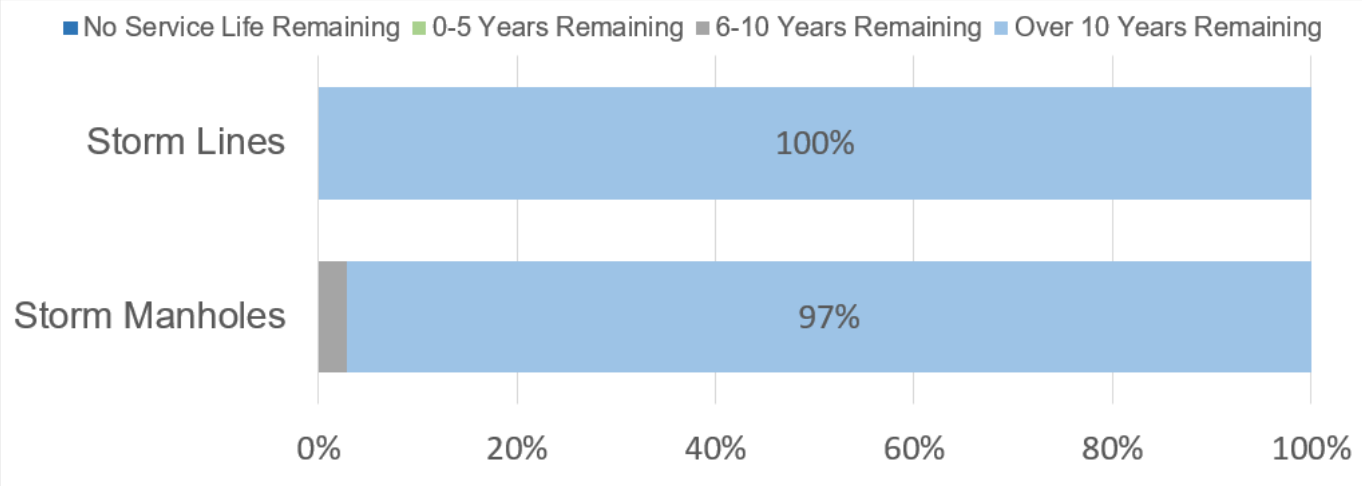


To ensure that the Municipality's Storm Sewer Network continues to provide an acceptable level of service, the Municipality should monitor the average condition of all assets within the storm sewer network. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase theoverall 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 assetis based on the number of years each asset has been in service. 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. The assessed condition may increase or decrease the average service life remaining.

Asset Category	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Storm Lines	100	39	58
Storm Manholes	75	29	45
	Average:	34	52



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-case basis when reconstruction of stormwater infrastructure can be combined with other capital projects (roads, water, sanitary etc.).

Lifecycle Management Strategy

Operations & Maintenance

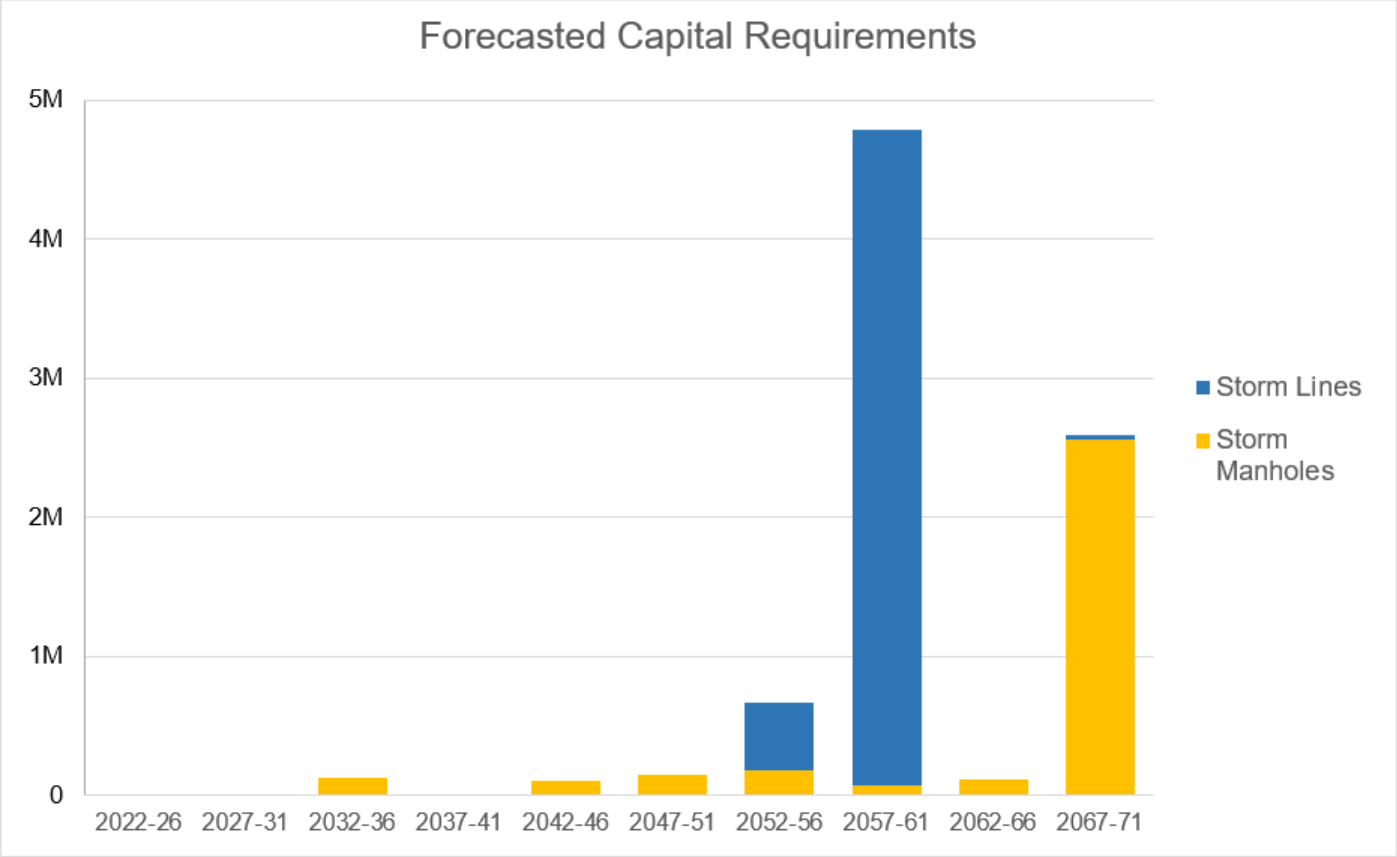
- There are very few maintenance activities routinely completed to maintain the storm sewer network other than catch basin cleaning to ensure that stormwater can flow from the surface into stormwater mains without obstruction.

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.

Forecasted Capital Requirements

Based on the assumption that all assets will require replacement at the end of their service life, thefollowing 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.



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	2	3	4	5
5	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
4	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
3	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
2	2 Assets 228.22 m, units $214,728	0 Assets - $0	0 Assets - $0	10 Assets 1306.69 m, units $1,339,216	0 Assets - $0
1	260 Assets 3936.3 m, units $3,702,359	313 Assets 2035.37 m, units $3,707,025	95 Assets 2072.23 m, units $1,527,383	201 Assets 6331.818 m, units $4,144,333	16 Assets 16 m, units $135,677

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 but 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	Risk Rating
3890	Storm Lines	lstl38	$ 146,928.55	8 - Low
3960	Storm Lines	Mstl29	$ 174,520.44	8 - Low
3970	Storm Lines	Mstl39	$ 104,898.71	8 - Low
3974	Storm Lines	Mstl43	$ 134,254.63	8 - Low
3978	Storm Lines	Mstl47	$ 124,894.69	8 - Low
3981	Storm Lines	Mstl50	$ 131,052.21	8 - Low
4014	Storm Lines	Mstl83	$ 114,126.97	8 - Low
4066	Storm Lines	Mstl138	$ 120,846.63	8 - Low
4099	Storm Lines	Mstl172	$ 140,732.15	8 - Low
4164	Storm Lines	Mstl239	$ 146,960.80	8 - Low

Levels of Service

The following tables identify the Municipality's current levels 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
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	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.

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
Scope	Percentage of properties in Municipality resilient to a 100-year storm	No reliable data available
	Percentage of the municipal stormwater management system resilient to a 5-year storm	100%

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.

Comprehensive Analysis of Rate Funded Assets

Key Findings

- Rate funded assets are valued at $195 million, making up 59% of the Municipality's total asset portfolio.
- 75% of rate funded assets are in fair or better condition.
- Assets are currently funded at only 45% of their long-term requirements.
- To eliminate annual infrastructure deficits for water and wastewater services, rate revenues need to increase by 5.8% 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 $1.6 million.

Water Network

Asset Inventory & Replacement Cost

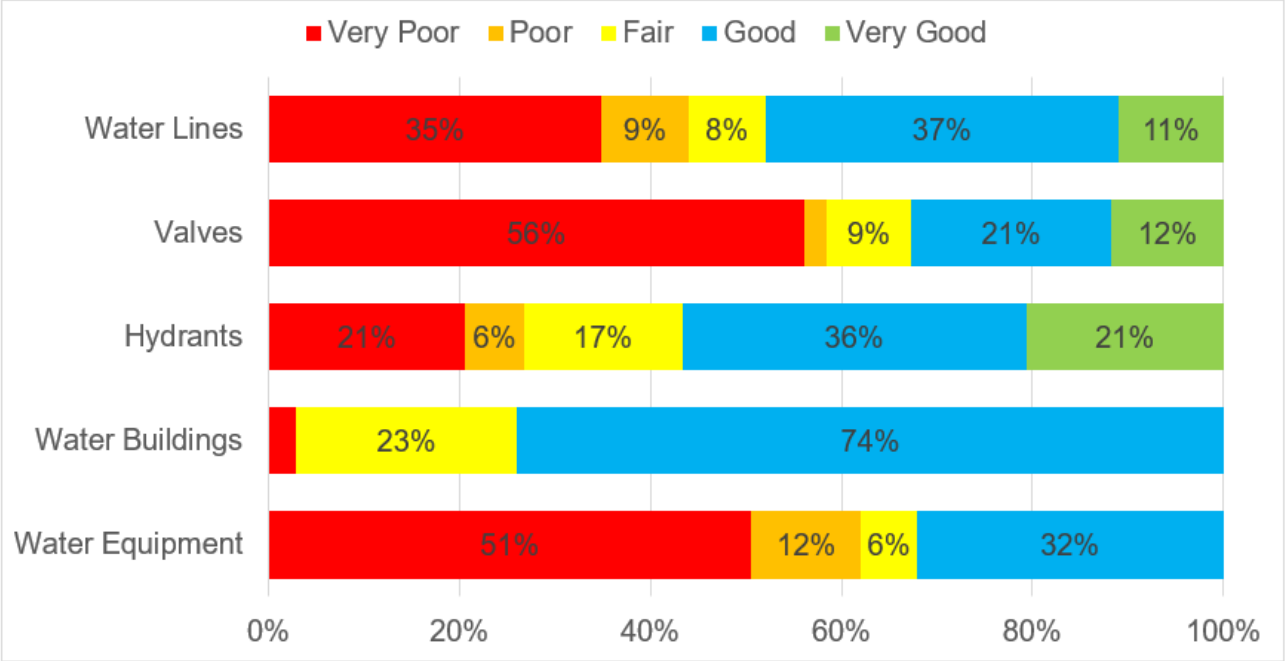
The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Municipality's Water Network inventory.

Category	Quantity	Replacement Cost Method	Total Replacement Cost
Water Lines	63459 m	User-Defined Cost	$ 37,159,850.46
Valves	534	User-Defined Cost	$ 3,009,422.75
Hydrants	247	User-Defined Cost	$ 1,901,900.00
Water Buildings	6	CPI Tables - NRBCPI Quarterly (Toronto)	$ 61,699,713.00
Water Equipment	24	CPI Tables - CPI Monthly (ON)	$ 836,213.00
		Total:	$ 104,607,099.21

Current Asset Condition

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

Asset Category	Average Condition (%)	Average Condition Rating	Condition Source
Water Lines	50%	Fair	Age-Based
Valves	29%	Poor	Age-Based
Hydrants	57%	Fair	Age-Based
Water Buildings	70%	Good	Age-Based
Water Equipment	35%	Poor	Age-Based
Average:	61%	Good	100% Age-Based

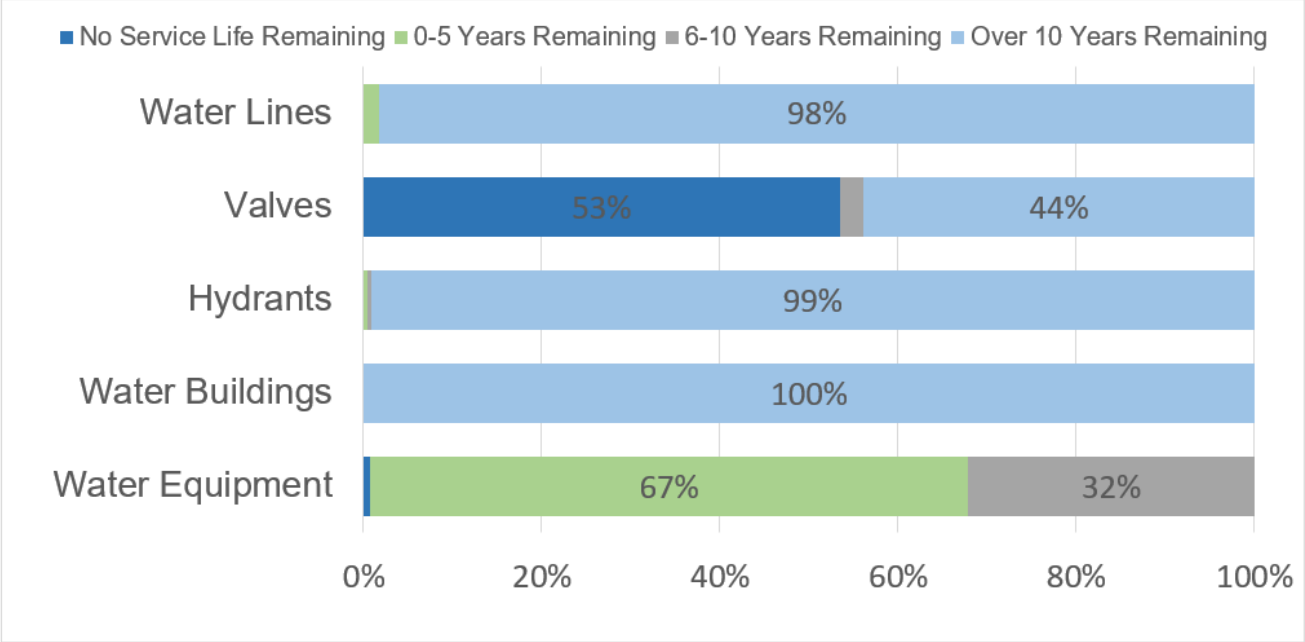


To ensure that the Municipality's Water Network continues to provide an acceptable level of service, the Municipality should monitor the average condition of all assets within the water network. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine 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. 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. The assessed condition may increase or decrease the average service life remaining.

Asset Category	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Water Lines	100	48	37
Valves	50	44	9
Hydrants	75	32	42
Water Buildings	75	38	66
Water Equipment	15	9	4
	Average:	44	29



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.
- Without physical condition assessment data, staff use break history, pipe material, age, and consequence of failure to determine the appropriate lifecycle strategy.

Lifecycle Management Strategy

Operations & Maintenance

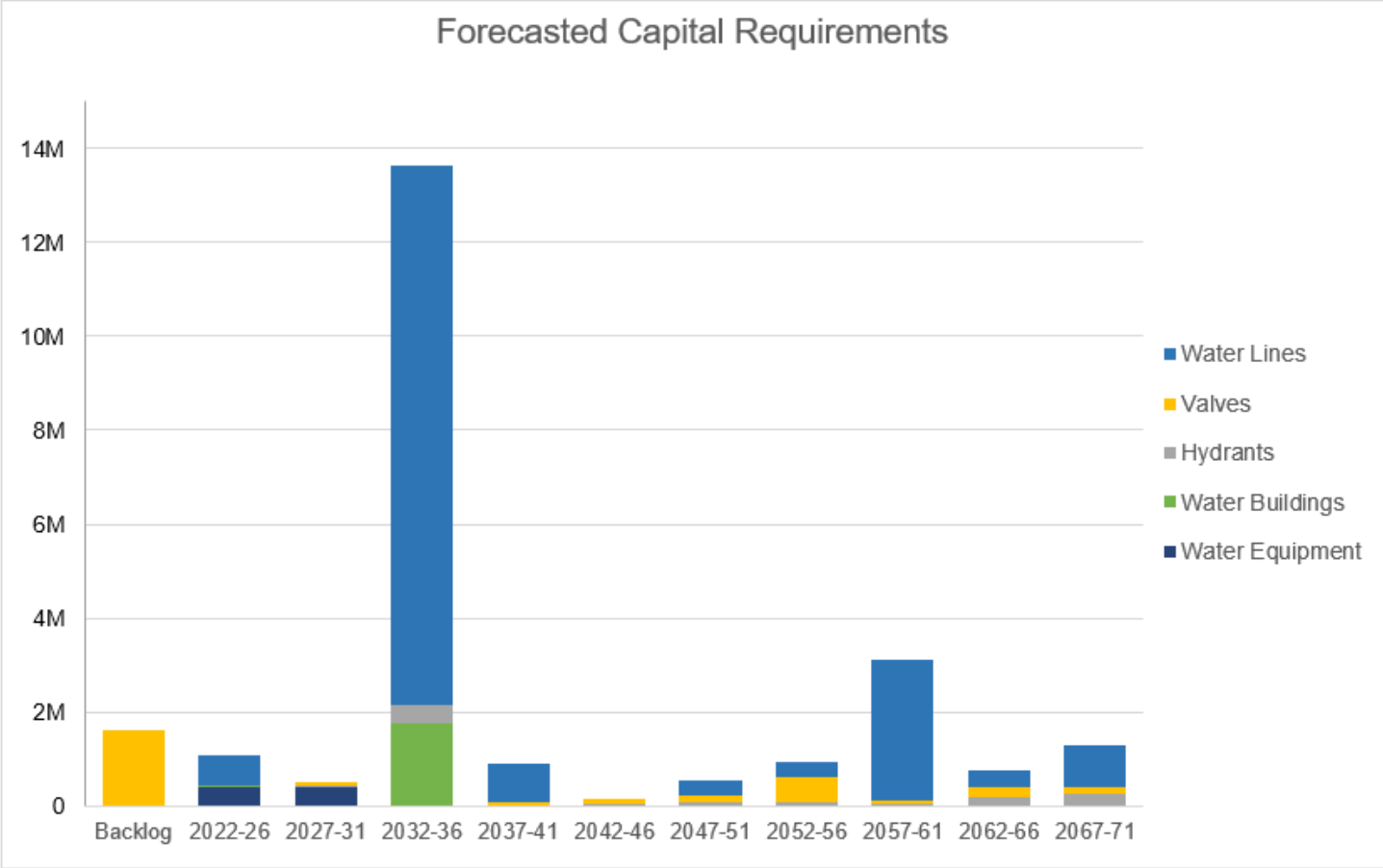
- As required by provincial regulations, the Municipality maintains a detailed operational plan that defines and documents the Drinking Water Quality Management System (DWQMS) for the water distribution systems. These systems are operated internally by the Municipality's Manager of Water & Wastewater, Villeneuve.
- The Municipality of South Dundas' water and wastewater department is responsible for regular flushing of dead-end system main lines, system pressure regulator valve testing, valve exercising, and the maintenance of all equipment within the distribution system
- All maintenance is completed within government regulations and American Water Works Association (AWWA) standards.

Rehabilitation & Replacement

- The Manager of Water and Wastewater 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 polyvinyl chloride (PVC) to install PVC pipes that are 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 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	2	3	4	5
5	0 Assets - $0	4 Assets 2462.9 m, units $47,839,380	1 Asset 1 m, units $14,317,924	0 Assets - $0	1 Asset 1 m, units $1,765,709
4	3 Assets 1239.4 m, units $1,122,896	20 Assets 9187 m, units $8,323,422	0 Assets - $0	0 Assets - $0	1 Asset 1337.3 m, units $810,404
3	132 Assets 5736.66 m, units $2,974,379	126 Assets 5704.45 m, units $3,441,634	96 Assets 6255.9 m, units $3,055,397	132 Assets 6838.93 m, units $3,458,249	441 Assets 24720.09 m, units $12,586,382
2	115 Assets 111 m, units $745,814	181 Assets 181 m, units $1,317,263	87 Assets 87 m, units $580,285	29 Assets 29 m, units $186,377	369 Assets 369 m, units $2,081,584
1	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0

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	Risk Rating
47	Water Buildings	AUGUSTA PUMP STATION	$ 1,765,709.00	25 - Very High
5322	Water Lines	mwl487 - Cty Rd 2	$ 810,403.80	20 - Very High
2141	Water Lines	iwl330 - Elizabeth - 616	$ 4,063.68	19 - Very High
2142	Water Lines	iwl328 - Elizabeth - 615	$ 19,148.80	19 - Very High
2485	Water Lines	iwl308 - Elizabeth - 6	$ 23,990.40	19 - Very High
2486	Water Lines	iwl329 - Elizabeth - 5	$ 3,013.76	19 - Very High
2487	Water Lines	iwl324 - Elizabeth - 3	$ 8,867.20	19 - Very High
5504	Water Lines	iwl325 - Elizabeth	$ 3,481.60	19 - Very High
5505	Water Lines	iwl326 - Elizabeth	$ 3,062.72	19 - Very High
5588	Water Lines	iwl327 - Elizabeth - 742	$ 2,992.00	19 - Very High

Levels of Service

The following tables identify the Municipality's current levels 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
Scope	Description, which may include maps, of the user groups or areas of the Municipality that are connected to the municipal water system	See Appendix D for map
	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 was one boil water advisory issued in 2021. There were 11 water main breaks in 2021.

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
Scope	Percentage of properties connected to the municipal water system	37%
	Percentage of properties where fire flow is available	37%
Reliability	Number 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	0.4795
	Number 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	0.00364

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 and cathodic protection.

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

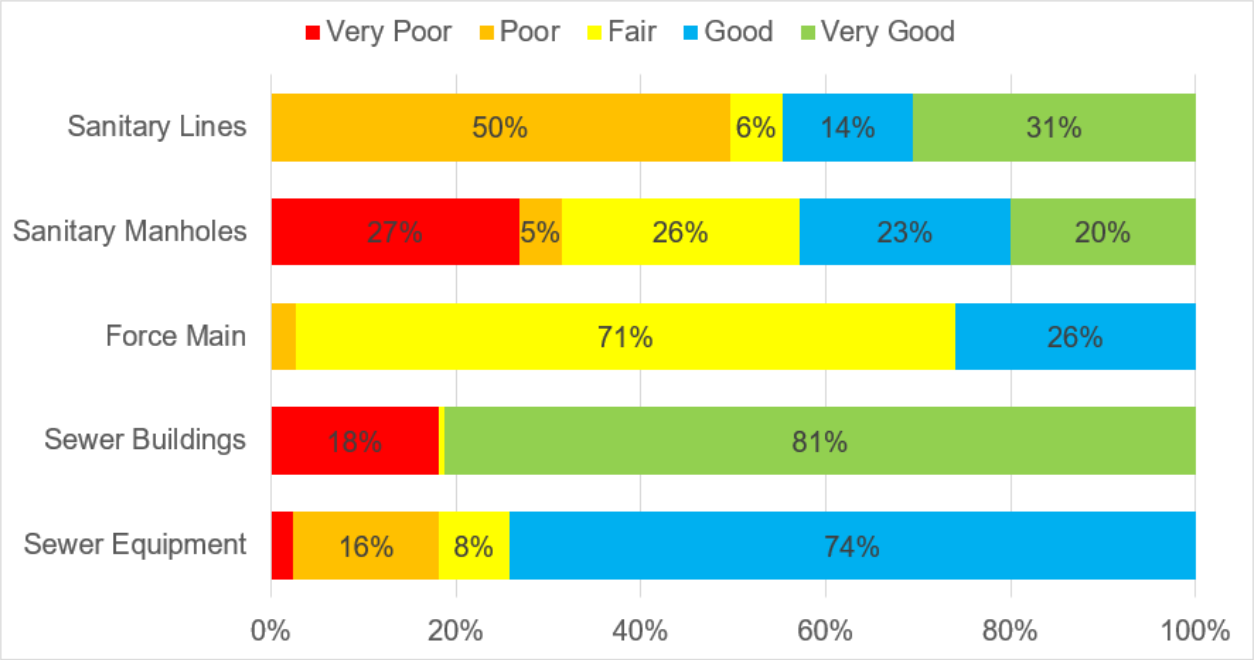
The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Municipality's Wastewater Network inventory.

Category	Quantity	Replacement Cost Method	Total Replacement Cost
Sanitary Lines	44613 m	User-Defined Cost	$ 32,880,455.88
Sanitary Manholes	540	User-Defined Cost	$ 9,153,441.36
Force Main	1982 m	User-Defined Cost	$ 505,183.00
Sewer Buildings	10	CPI Tables - NRBCPI Quarterly (Toronto)	$ 47,832,024.00
Sewer Equipment	8	CPI Tables - CPI Monthly (ON)	$ 432,042.00
		Total:	$ 90,803,146.24

Current Asset Condition

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

Asset Category	Average Condition (%)	Average Condition Rating	Condition Source
Force Main	57%	Fair	Age-Based
Sanitary Lines	57%	Fair	Age-Based
Sanitary Manholes	52%	Fair	Age-Based
Sewer Buildings	72%	Good	Age-Based
Sewer Equipment	53%	Fair	Age-Based
Average:	64%	Good	100% Age-Based

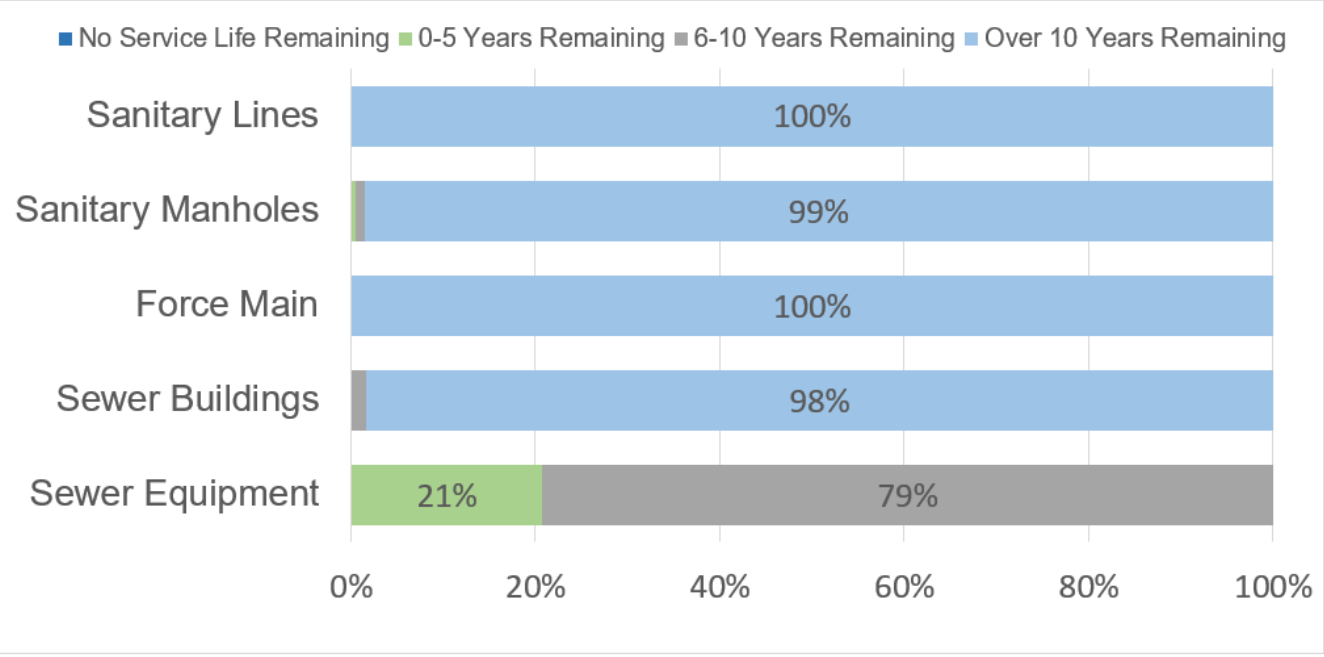


To ensure that the Municipality's Wastewater Network continues to provide an acceptable level of service, the Municipality should monitor the average condition of all assets within the wastewater network. If the average condition declines, staff should re-evaluate their lifecycle management strategy 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. 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. The assessed condition may increase or decrease the average service life remaining.

Asset Category	Estimated Useful Life (Years)	Average Age (Years)	Average Service Life Remaining (Years)
Force Main	100	44	55
Sanitary Lines	100	50	49
Sanitary Manholes	75	36	40
Sewer Buildings	75	31	40
Sewer Equipment	15	31	5
	Average:	43	44



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

- The Municipality of South Dundas completes closed-circuit television video (CCTV) & acoustic testing on a portion of sewer mains and laterals within 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

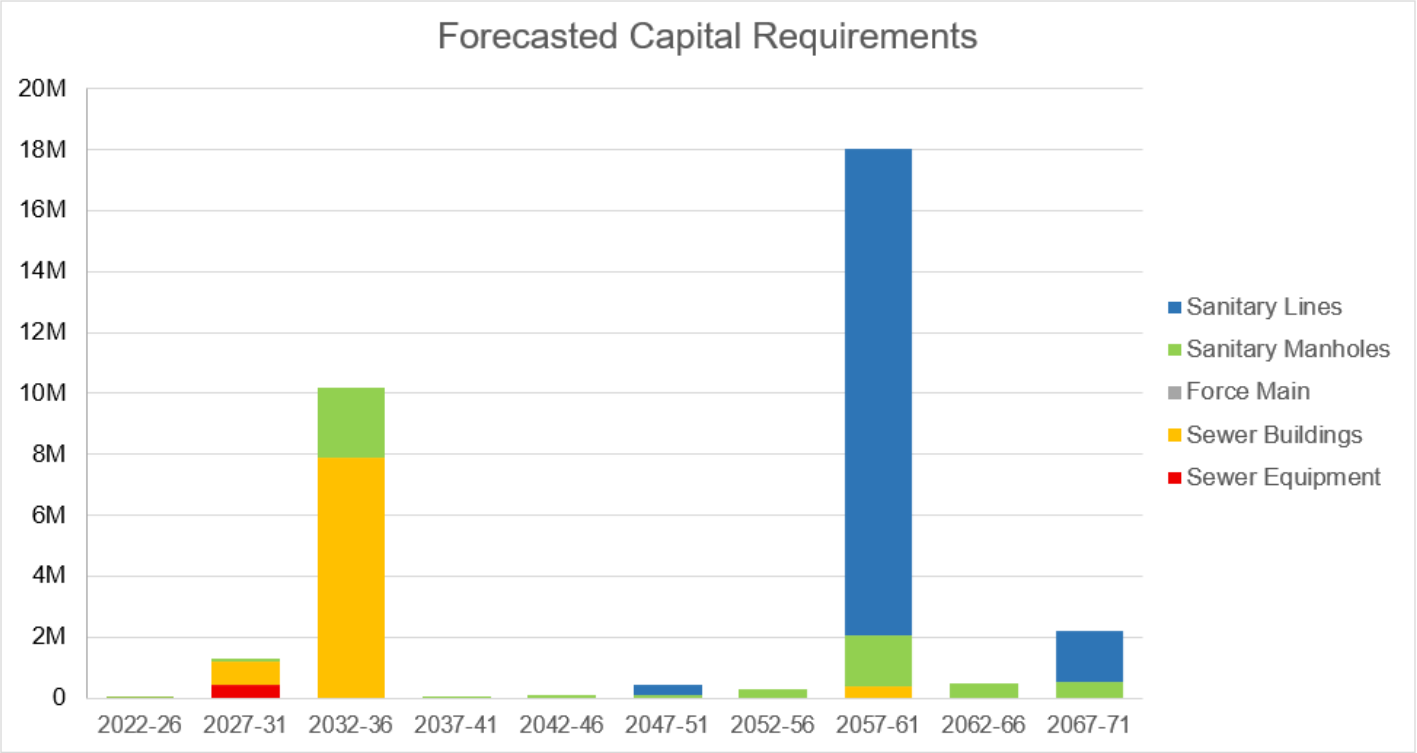
- The Manager of Water and Wastewater is responsible for operating and maintaining the wastewater collection and treatment system.
- Manholes with a high likelihood of failure or past blockages are inspected quarterly to ensure compliance with regulations mandated by the Ministry of the Environment.

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.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years tomaintain 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	2	3	4	5
5	1 Asset 1 m, units $18,996,406	0 Assets - $0	0 Assets - $0	0 Assets - $0	2 Assets 2 m, units $7,878,746
4	5 Assets 125.2 m, units $26,761,360	1 Asset 722.4 m, units $125,844	2 Assets 1142.3 m, units $344,747	15 Assets 1640.3 m, units $2,026,391	1 Asset 1 m, units $781,465
3	81 Assets 5036.04 m, units $3,128,699	109 Assets 7833.41 m, units $4,965,818	49 Assets 3570.4 m, units $2,256,381	334 Assets 26532.76 m, units $14,373,431	2 Assets 2 m, units $10,417
2	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0	0 Assets - $0
1	112 Assets 112 m, units $1,826,775	124 Assets 124 m, units $2,094,694	124 Assets 124 m, units $2,353,669	28 Assets 28 m, units $421,196	152 Assets 152 m, units $2,457,108

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	Risk Rating
42	Sewer Buildings	IROQUOIS SEWER PLANT OFFICE	$ 4,718,629.00	25 - Very High
49	Sewer Buildings	IROQUOIS PUMP STATION	$ 3,160,117.00	25 - Very High
48	Sewer Buildings	MORRISBURG SEWER PLANT	$ 781,465.00	23.5 - Very High
1437	Sanitary Lines	Isl126	$ 140,971.60	16.4 - Very High
1438	Sanitary Lines	Isl127	$ 102,138.40	16.4 - Very High
1510	Sanitary Lines	Msl201	$ 119,086.68	16.4 - Very High
1511	Sanitary Lines	Msl202	$ 130,467.54	16.4 - Very High
1512	Sanitary Lines	Msl203	$ 119,911.38	16.4 - Very High
1513	Sanitary Lines	Msl204	$ 146,631.66	16.4 - Very High
1514	Sanitary Lines	Msl205	$ 161,311.32	16.4 - Very High
1515	Sanitary Lines	Msl206	$ 157,352.76	16.4 - Very High
1516	Sanitary Lines	Msl207	$ 153,064.32	16.4 - Very High
1517	Sanitary Lines	Msl208	$ 157,517.70	16.4 - Very High
1520	Sanitary Lines	Msl210	$ 132,941.64	16.4 - Very High
1695	Sanitary Lines	Msl467	$ 111,994.26	16.4 - Very High

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
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 intostreets or backup into homes	Stormwater can enter 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 eavestrophes and weeping tiles through downspouts 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 that meet or are below ministry standard. 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
Scope	Percentage of properties connected to the municipal wastewater system	35%
Reliability	Number 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
	Number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	Number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	0

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 lifeof 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. The following information is from the 2016 and 2021 census completed by Statistics Canada.

Year	Single and Semi Detached	Other	Total Units	Total Population
2016	3,930	625	4,555	10,833
2021	4,050	600	4,650	11,044
2026	4,174	576	4,747	11,259
2031	4,302	552	4,846	11,478
2036	4,433	530	4,947	11,702
5-year change	120	- 25	95	211
10-year change	244	- 49	192	426
20-year change	503	- 95	392	869

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 the Municipality of South Dundas 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 may avoid long-term funding deficits.

Financial Strategy Overview

This report develops a financial plan by presenting several scenarios for consideration 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 dependent on receiving a one-time grant, the replacement cost included in the financial strategy is the net of such grant being received.

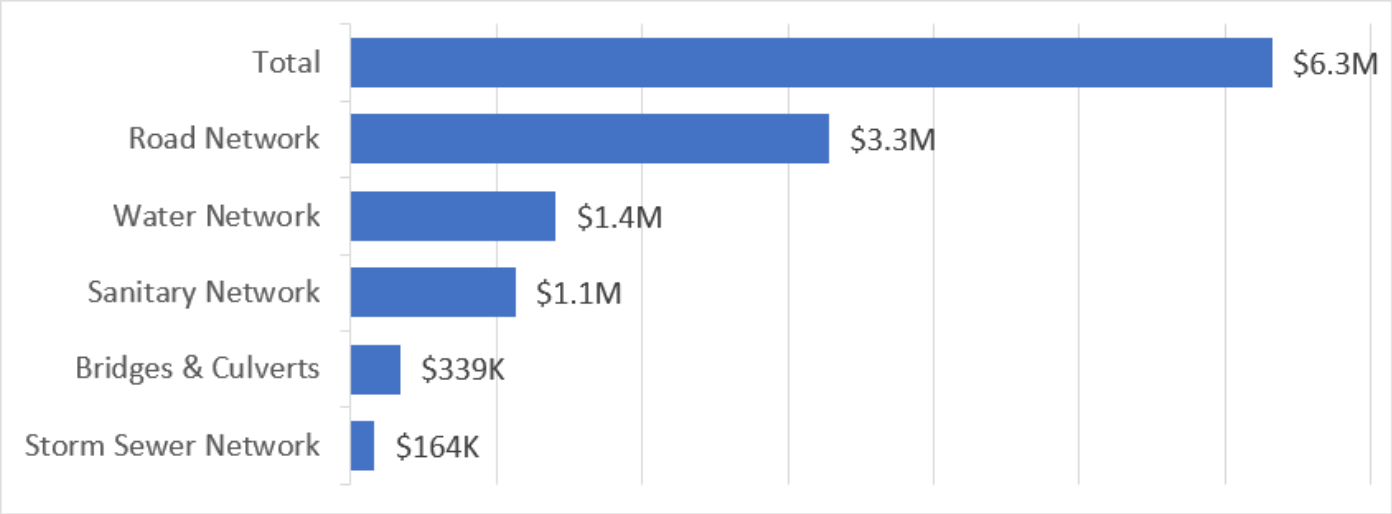
If the financial plan results in a funding shortfall, the province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the province may evaluate a Municipality's approach to the following:

1. 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, prevent infrastructure backlogs, and achieve long-term sustainability. In total, the Municipality would need to allocate approximately $6.3 million annually to address capital requirements for the assets included in this AMP.



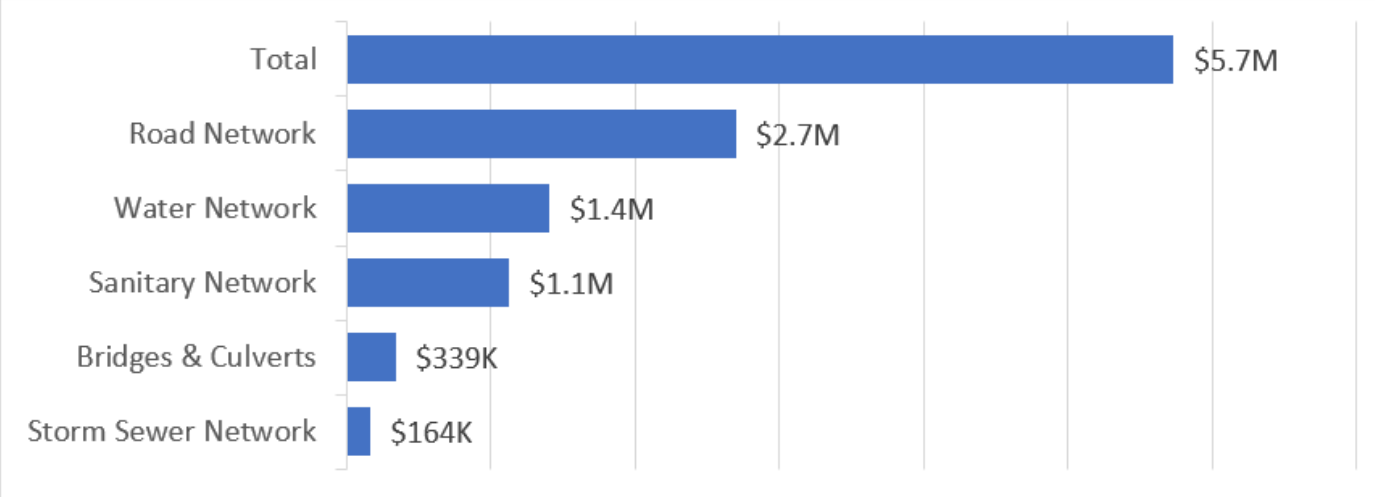
For most asset categories the annual requirement has been calculated based on a “replacement only” scenario, in which capital costs are only incurred at the construction and replacement of each asset.

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 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.

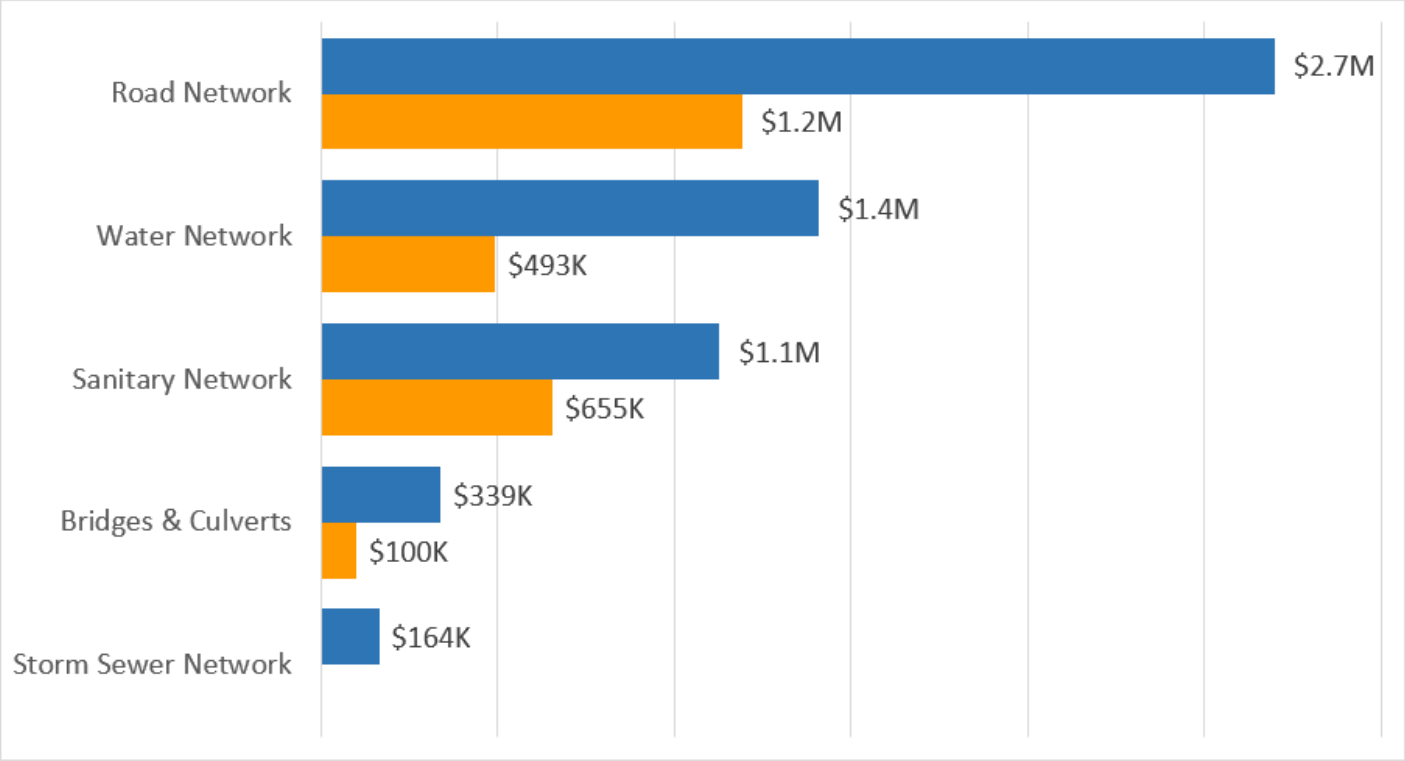
Asset Category	Annual Requirement (Replacement Only)	Annual Requirement (Lifecycle Strategy)	Difference
Road Network	$ 3,282,517	$ 2,696,874	$ 585,643

The implementation of a proactive lifecycle strategy for the Road Network leads to a potential cost avoidance of $585,463 and reduces the overall annual requirement by 18%. As this is the lowest cost option available to the Municipality, we have used this value in the development of the financial strategy. After considering lifecycle events, the overall annual requirement reduces to $5.7 million.



Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $2,438,381 towards capital projects per year. Given the annual capital requirement of $5,734,632, there is currently a funding gap of $3,296,251 annually. The following graph illustrates the difference between the Municipality's target annual requirement and the annual funding allocated to capital projects for all five core asset categories.



Funding Objective

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

1. Tax Funded Assets: Bridges & Culverts, Road Network, Storm Sewer Network

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, South Dundas' average annual asset investment requirements, current funding positions and funding increases required to achieve full funding on the assets funded by taxes.

Asset Category	Average Annual Investment Required	Annual Funding Available				Annual Deficit / Surplus
		Tax Levy for Capital Projects	Gas Tax (CCBF)	OCIF	Total Funding Available for Capital Projects	
Road Network	$2,696,875	$32,529	$343,570	$813,990	$1,190,089	$1,506,786
Bridges & Culverts	$338,865	$100,000	$0	$0	$100,000	$238,865
Storm Sewer Network	$163,623	$0	$0	$0	$0	$163,623
Total	$3,199,362	$132,529	$343,570	$813,990	$1,290,089	$1,909,273

The average annual investment requirement for the above categories is $3,199,362. Annual revenue currently allocated to these assets for capital purposes is $1,290,089, or 60% of the requirement, which leaves an annual funding deficit of $1,909,273.

Full Funding Requirements

In 2022, the Municipality of South Dundas has $7,715,416 in budgeted annual tax revenues. To cover the annual deficit, the road network requires a 127% increase and bridges & culverts require a 239% increase to the total funding available for capital projects.

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

a) South Dundas' formula based OCIF grant is expected to remain at $813,990 in 2023.
b) South Dundas' debt payments for tax funded asset categories will be increasing by $207,051 over the next 5 years and decreasing by $294,169 over the next 10 years. Over the next 15 years, debt payments are expected to decrease by $667,086.

The changes noted above should be considered in reference to the infrastructure deficit. The chart below projects the impacts of those changes over the short and medium term:

	Considering the Changes				Without Considering Changes			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	$9,546,364	$9,546,364	$9,546,364	$9,546,364	$9,546,364	$9,546,364	$9,546,364	$9,546,364
Change in Debt Costs	$207,051	-$294,169	-$667,086	-$667,086	$0	$0	$0	$0
Resulting Infrastructure Decifit	$9,753,415	$9,252,196	$8,879,279	$8,879,279	$9,546,364	$9,546,364	$9,546,364	$9,546,364
Resulting Tax Increase Required	121.5%	104.4%	90.7%	82.2%	118.9%	107.7%	97.5%	88.3%
Annually:	24.3%	20.9%	18.1%	16.4%	23.8%	21.5%	19.5%	17.7%

Financial Strategy Recommendations

There are three options available for phase in periods and resulting tax levy increases required per year to achieve full funding for tax funded assets.

Option 1: Increase tax levy by 3.2% per year for 10 years to reach 2032's expected levy requirement of $12,370,091.

Option 2: Increase tax levy by 2.4% per year for 15 years to reach 2037's expected levy requirement of $14,078,916.

Option 3: Increase tax levy by 2.0% per year for 20 years to reach 2042's expected levy requirement of $16,069,322.

Considering the above information, the 10-year option could achieve full funding by:

a) reallocating the debt cost reductions to the infrastructure deficit,
b) increasing tax revenue by 3.2% in each of the next 10 years for the sole 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 funding revenue from other asset categories to fund those in a deficit position, and
f) increasing future infrastructure budgets to account for the annual inflation index in addition to the phase-in model.

Notes:

1. As in the past, periodic senior government infrastructure funding may 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 since this funding is a multi-year commitment.
2. While increasing tax revenue to fund infrastructure by the amounts presented may prove difficult, an extended phase-in period could result in consequences in terms of infrastructure failure.

Although this option could achieve full funding 10 years and provide financial stability periods identified, the recommendations will need capital projects to be prioritized to fit the annual funding envelope.

Current data shows backlog of $4,010,497 for the Road Network and $2,663,751 for Bridges & Culverts.

Prioritizing future projects will require the current data to be replaced by condition-based data.

Financial Profile: Rate Funded Assets

Current Funding Position

The following table shows, by asset category, the municipality of South Dundas' average annual capital requirements, current funding positions and funding increases required to achieve full funding on the assets funded by user rates.

Asset Category	Average Annual Investment Required	Annual Funding Available				Annual Deficit / Surplus
		Rate Revenues	Reserve & External Funding	Less: Allocated to Operations	Total Funding Available for Capital Projects	
Water Network	$1,407,812	$1,516,424	$1,160,004	$2,183,136	$493,292	$914,520
Wastewater Network	$1,127,459	$1,244,260	$706,885	$1,296,145	$655,000	$472,459
Total	$2,535,270	$2,760,684	$1,866,889	$3,479,281	$1,148,292	$1,386,978

The average annual investment requirement for the Wastewater and Water Networks is $2,535,270. Annual rate revenue currently allocated to these assets for capital purposes is $1,148,292 or 45% of the requirement. This results in an annual deficit of $1,386,978.

Full Funding Requirements

In 2022, South Dundas has budgeted for total water revenue of $2,676,428 and wastewater revenue of $1,951,145. The rate increase required to cover the annual deficit for the water network would be 60% and the wastewater network would require an increase of 38%.

The following changes in debt charges over the next 20 years should also be considered in the financial strategy:

a) South Dundas' debt payments for the Water Network will be decreasing by $148,804 over the next 5 years, by $1,842,524 over the next 10 years, by $2,072,287 over the next 15 years and by $2,358,726 over the next 20 years.

b) For the Wastewater Network, debt payments are expected to remain at $38,870 per year over the next 20 years.

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

	Water Network				Sanitary Sewer Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	$4,572,599	$4,572,599	$4,572,599	$4,572,599	$2,362,293	$2,362,293	$2,362,293	$2,362,293
Change in Debt Costs	-$148,804	-$1,842,524	-$2,072,287	-$2,358,726	$0	$0	$0	$0
Resulting Infrastructure Decifit	$4,423,795	$2,730,075	$2,500,313	$2,213,873	$2,362,293	$2,362,293	$2,362,293	$2,362,293
Resulting Rate Increase Required	280.3%	156.7%	130.0%	104.2%	182.4%	165.2%	149.6%	135.5%
Annually:	56.1%	31.3%	26.0%	20.8%	36.5%	33.0%	29.9%	27.1%

	Water Network				Sanitary Sewer Network			
	5 Years	10 Years	15 Years	20 Years	5 Years	10 Years	15 Years	20 Years
Infrastructure Deficit	$4,572,599	$4,572,599	$4,572,599	$4,572,599	$2,362,293	$2,362,293	$2,362,293	$2,362,293
Resulting Rate Increase Required	289.72%	262.40%	237.67%	215.26%	182.41%	165.22%	149.64%	135.53%
Annually:	57.94%	52.48%	47.53%	43.05%	36.48%	33.04%	29.93%	27.11%

Financial Strategy Recommendations

There are three options available for phase in periods and resulting rate revenue increases required per year to achieve full funding for rate funded assets.

Option 1: Increase rate revenues by 6.4% per year for 10 years. This includes a 7.7% increase for water service revenues and a 4.8% increase for sanitary service revenues. This option would allow the Municipality to reach 2032's expected rate revenue requirement of $3,268,734 for water services and $2,250,550 for sanitary services.

Option 2: Increase rate revenues by 4.8% per year for 15 years. This includes a 5.8% increase for water service revenues and a 3.6% increase for sanitary service revenues. This option would allow the Municipality to reach 2037's expected rate revenue requirement of $3,810,761 for water services and $2,588,951 for sanitary services.

Option 3: Increase rate revenues by 4.1% per year for 20 years. This includes a 4.9% increase for water service revenues and a 3.1% increase for sanitary service revenues. This option would allow the Municipality to reach 2042's expected rate revenue requirement of $4,458,887 for water services and $2,988,340 for sanitary services.

Considering all 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 for water services to the infrastructure deficit.
b) increasing rate revenues by 5.8% for water services and 3.6% for sanitary services in each of the next 15 years for the sole purpose of phasing in full funding for these asset categories. Note: Recommendations may change after the DFA water and wastewater rate study is completed.
c) increasing future infrastructure budgets to account for the annual inflation index in addition to the phase-in model.

Notes:

1. As in the past, periodic senior government infrastructure funding may 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. While increasing user rates to fund infrastructure by the amounts presented may prove difficult, an extended phase-in period could result in 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 could achieve full funding in 15 years and provide financial stability over the periods identified, the recommendations will need capital projects to be prioritized to fit the annual funding envelopes.

Current data shows an infrastructure backlog of $1,614,556 for the Water Network.

Prioritizing future projects will require the current data to be replaced by condition-based data.

Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0% over 10 years would result in a 15.87% premium or $158,700 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

Premium Paid to Borrow (Interest Cost)						
Interest Rate	**Number of Years Financed**					
	5	**10**	**15**	**20**	**25**	**30**
8.0%	21.66%	45.59%	72.02%	100.75%	131.54%	164.16%
7.5%	20.23%	42.44%	66.86%	93.34%	121.70%	151.72%
7.0%	18.81%	39.33%	61.79%	86.07%	112.03%	139.51%
6.5%	17.40%	36.26%	56.80%	78.94%	102.56%	127.54%
6.0%	16.00%	33.22%	51.89%	71.94%	93.29%	115.84%
5.5%	14.61%	30.23%	47.08%	65.09%	84.23%	104.40%
5.0%	13.23%	27.28%	42.34%	58.39%	75.38%	93.26%
4.5%	11.86%	24.37%	37.70%	51.84%	66.75%	82.41%
4.0%	10.50%	21.49%	33.14%	45.44%	58.35%	71.87%
3.5%	9.15%	18.66%	28.68%	39.19%	50.19%	61.66%
3.0%	7.81%	15.87%	24.30%	33.10%	42.26%	51.78%
2.5%	6.48%	13.12%	20.02%	27.18%	34.59%	42.24%
2.0%	5.17%	10.42%	15.83%	21.41%	27.16%	33.06%
1.5%	3.86%	7.75%	11.73%	15.81%	19.98%	24.24%
1.0%	2.56%	5.12%	7.73%	10.37%	13.06%	15.79%
0.5%	1.28%	2.54%	3.82%	5.10%	6.40%	7.71%
0.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

It should be noted that interest rates are currently trending upwards from 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 Debt Usage

The following tables outline how South Dundas has historically used debt for investing in the asset categories as listed. There is currently outstanding core infrastructure debt of $8,855,953 ($1,522,794 in tax funded assets and $7,333,159 in rate funded assets) with principal and interest payments of $4,832,975 over the next 10 years.

Asset Category	Current Debt Outstanding	Debt Payments in the Last Five Years				
		2017	2018	2019	2020	2021
Road Network	$1,090,582	$0	$0	$144,247	$140,726	$137,027
Bridges & Culverts	$432,212	$0	$0	$0	$0	$0
Storm Sewer Network	$0	$0	$0	$0	$0	$0
Total Tax Funded:	$1,522,794	$0	$0	$144,247	$140,726	$137,027
Water Network	$6,736,052	$439,543	$429,615	$419,688	$409,978	$440,753
Wastewater Network	$597,107	$0	$0	$0	$0	$0
Total Rate Funded:	$7,333,159	$439,543	$429,615	$419,688	$409,978	$440,753
Total Tax and Rate Funded:	$8,855,953	$439,543	$429,615	$563,934	$550,703	$577,780

THE MUNICIPALITY OF SOUTH DUNDAS

Current Principal & Interest Payments

Asset Category	Principal & Interest Payments (2022-2031)									
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Road Network	$133,417	$129,807	$126,247	$122,588	$118,978	$115,368	$111,768	$0	$0	$0
Bridges & Culverts	$0	$52,230	$52,230	$52,230	$52,230	$52,230	$52,230	$52,230	$52,230	$52,230
Storm Sewer Network	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Tax Funded:	$133,417	$182,037	$178,477	$174,817	$171,208	$167,598	$163,998	$52,230	$52,230	$52,230
Water Network	$471,745	$461,818	$451,999	$441,963	$432,035	$422,107	$188,842	$81,840	$81,840	$81,840
Wastewater Network	$38,870	$38,870	$38,870	$38,870	$38,870	$38,870	$38,870	$38,870	$38,870	$38,870
Total Rate Funded:	$510,616	$500,688	$490,869	$480,833	$470,905	$460,978	$227,713	$120,710	$120,710	$120,710
Total Tax and Rate Funded:	$644,033	$682,725	$669,346	$655,651	$642,113	$628,576	$391,711	$172,940	$172,940	$172,940

The revenue options outlined in this plan allow South Dundas 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 South Dundas.

Asset Category	Balance at December 31, 2021
Road Network	$276,231
Bridges & Culverts	$222,897
Storm Sewer Network	$0
Total Tax Funded:	$499,128
Water Network	$835,042
Wastewater Network	$1,658,939
Total Rate Funded:	$2,493,981

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 consider 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 South Dundas' 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 South Dundas 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 C	Appendix A: Infrastructure Report Card						
Asset Category	Asset Health (Condition)			Financial Capacity			Overall Grade
Road Network	Grade	Condition Ratings		Grade	Current Financial Capacity		C
	B	Very Good	39%	C	Annual Requirement:	$2,696,875	
		Good	15%		Funding Available:	$1,190,089	
		Fair	18%		Deficit:	$1,506,786	
		Poor	22%				
		Very Poor	7%				
Asset Category	Asset Health (Condition)			Financial Capacity			Overall Grade
Bridges & Culverts	Grade	Condition Ratings		Grade	Current Financial Capacity		D
	C	Very Good	0%	D	Annual Requirement:	$338,865	
		Good	10%		Funding Available:	$100,000	
		Fair	33%		Deficit:	$238,865	
		Poor	35%				
		Very Poor	21%				
Asset Category	Asset Health (Condition)			Financial Capacity			Overall Grade
Storm Sewer Network	Grade	Condition Ratings		Grade	Current Financial Capacity		D
	B	Very Good	27%	F	Annual Requirement:	$163,623	
		Good	25%		Funding Available:	$0	
		Fair	10%		Deficit:	$163,623	
		Poor	37%				
		Very Poor	1%				
Asset Category	Asset Health (Condition)			Financial Capacity			Overall Grade
Water Network	Grade	Condition Ratings		Grade	Current Financial Capacity		C
	B	Very Good	5%	D	Annual Requirement:	$1,407,812	
		Good	58%		Funding Available:	$493,292	
		Fair	17%		Deficit:	$914,520	
		Poor	3%				
		Very Poor	16%				
Asset Category	Asset Health (Condition)			Financial Capacity			Overall Grade
Wastewater Network	Grade	Condition Ratings		Grade	Current Financial Capacity		C
	B	Very Good	56%	C	Annual Requirement:	$1,127,459	
		Good	8%		Funding Available:	$655,000	
		Fair	5%		Deficit:	$472,459	
		Poor	19%				
		Very Poor	12%				

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 fundingstrategies 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 ofassets in the short- and medium-term will be deferred to future years.
D	Poor	The asset's performance and function metrics are below the desired level and immediate repair/rehabilitation isrequired. 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 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.

Asset Category	Appendix C: 10-Year Capital Requirements											
Road Network (No Events)	**Backlog**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Road Surfaces	$9,697,644	$5,086,840	$3,192,833	$3,537,406	$4,050,893	$1,548,165	$509,196	$127,461	$673,350	$2,212,502	$1,380,385	$577,363
Road Bases	$2,374,763	$0	$0	$186,160	$49,975	$0	$381,855	$989,756	$0	$810,095	$974,710	$1,379,807
Total Road Network	$12,072,406	$5,086,840	$3,192,833	$3,723,566	$4,100,868	$1,548,165	$891,050	$1,117,217	$673,350	$3,022,598	$2,355,095	$1,957,171

Bridges & Culverts	**Backlog**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Bridges & Culverts	$2,660,539	$0	$0	$0	$1,015,000	$0	$0	$0	$0	$0	$606,000	$0
Total Bridges & Culverts	$2,660,539	$0	$0	$0	$1,015,000	$0	$0	$0	$0	$0	$606,000	$0

Storm Sewer Network	**Backlog**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Storm Lines	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Manholes	$0	$0	$0	$0	$0	$0	$0	$17,852	$0	$7,727	$0	$127,950
Total Storm Sewer Network	$0	$0	$0	$0	$0	$0	$0	$17,852	$0	$7,727	$0	$127,950

Total Tax Funded:	$14,732,945	$5,086,840	$3,192,833	$3,723,566	$5,115,868	$1,548,165	$891,050	$1,135,068	$673,350	$3,030,324	$2,961,095	$2,085,121

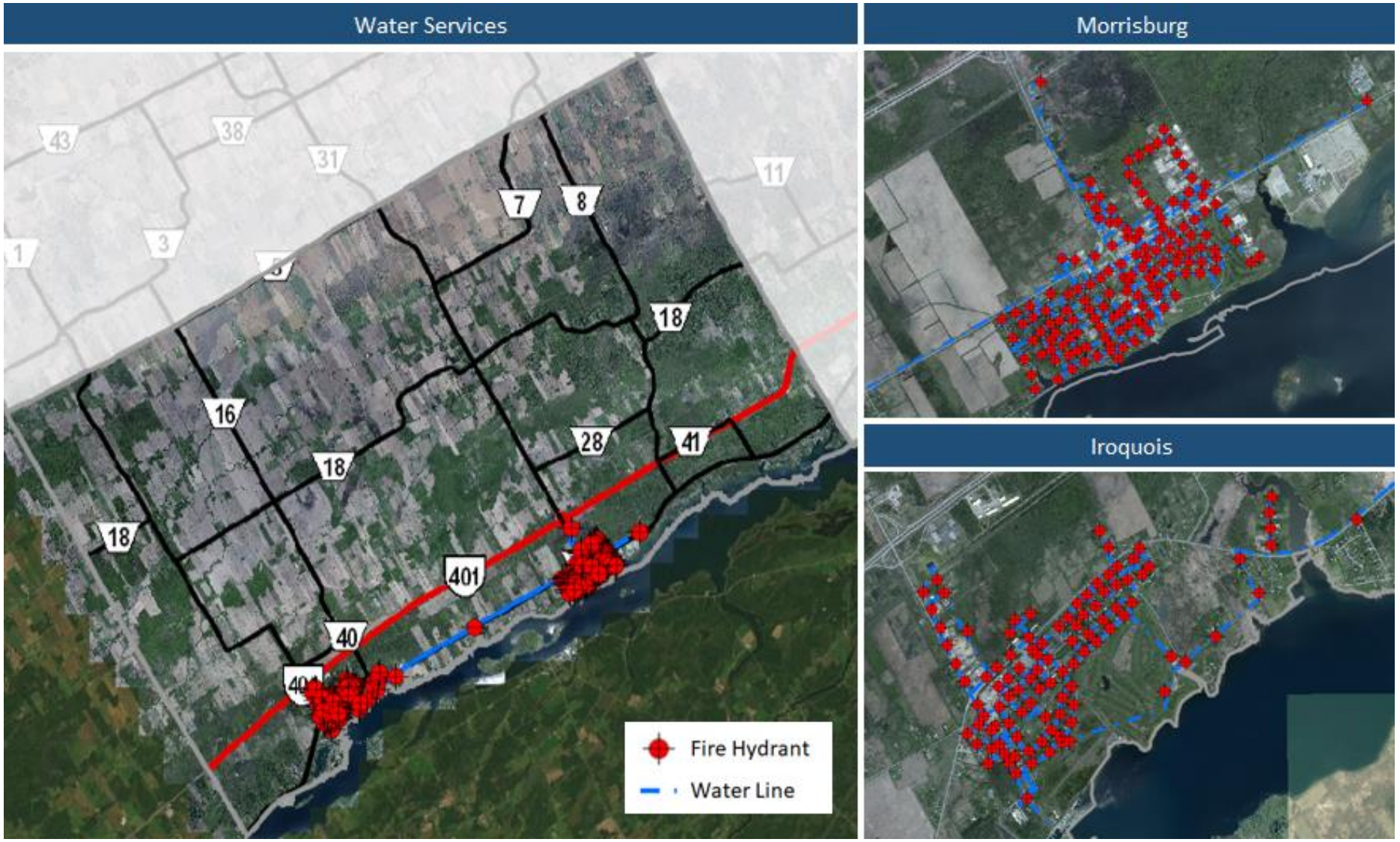
Water Network	**Backlog**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Water Lines	$0	$0	$0	$0	$654,065	$0	$0	$0	$0	$0	$0	$0
Water Valves	$1,608,396	$0	$0	$0	$0	$0	$0	$0	$0	$80,488	$0	$0
Fire Hydrants	$0	$0	$0	$0	$7,700	$0	$0	$0	$0	$0	$7,700	$0
Water Buildings	$0	$0	$0	$0	$972	$0	$0	$0	$0	$0	$0	$0
Water Equipment	$6,160	$0	$0	$0	$384,348	$32,364	$144,414	$0	$268,927	$0	$0	$0
Total Water Network	$1,614,556	$0	$0	$0	$1,047,085	$32,364	$144,414	$0	$268,927	$80,488	$7,700	$0

Wastewater Network	**Backlog**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Sanitary Lines	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Force Main	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sanitary Manholes	$0	$0	$0	$0	$37,242	$0	$11,675	$0	$0	$85,863	$0	$0
Sewer Buildings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$781,465	$0	$3,160,117
Sewer Equipment	$0	$0	$0	$0	$603	$9,814	$79,325	$21,410	$320,890	$0	$0	$0
Total Wastewater Network	$0	$0	$0	$0	$37,845	$9,814	$91,000	$21,410	$320,890	$867,328	$0	$3,160,117

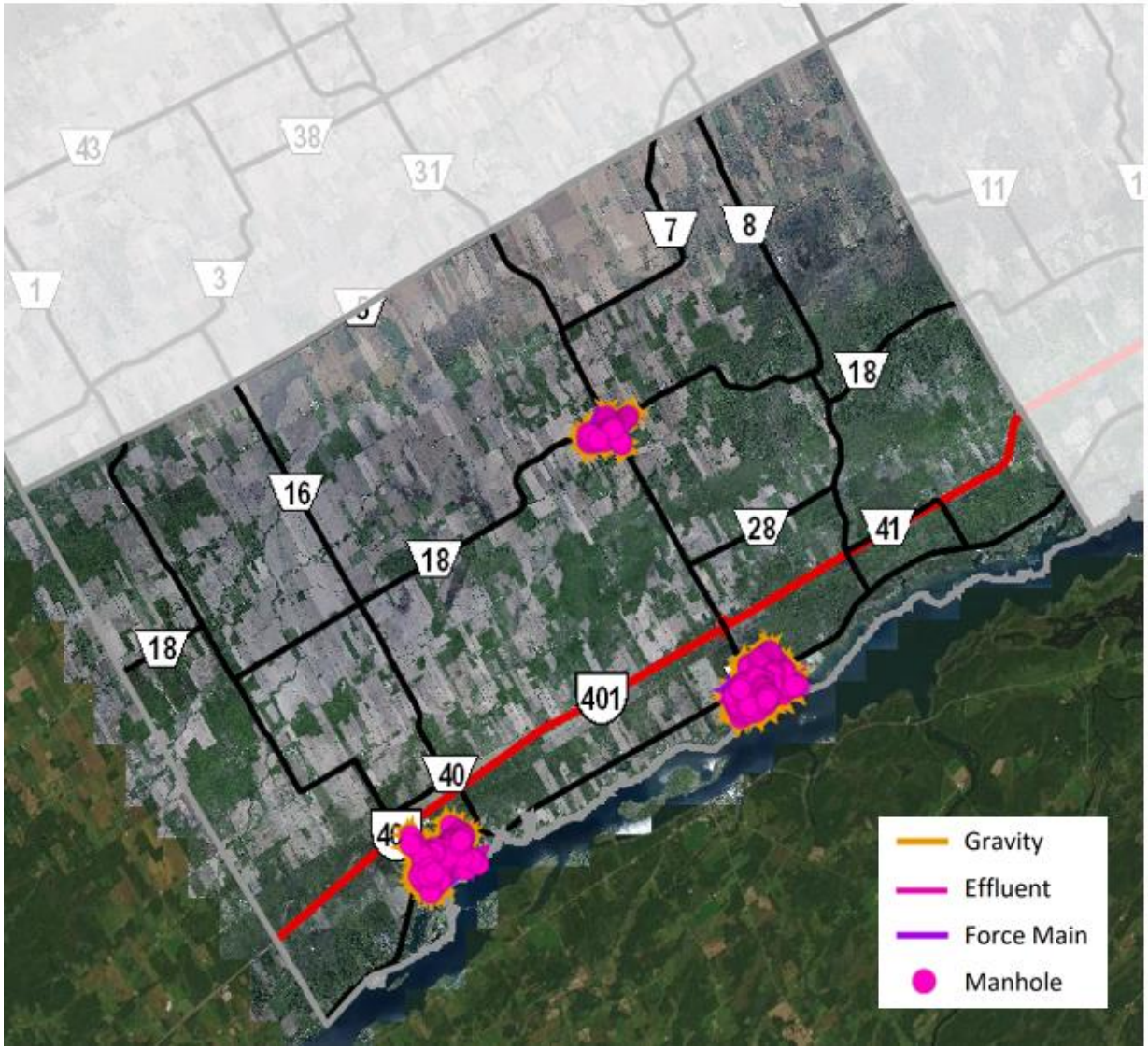
Total Rate Funded:	$1,614,556	$0	$0	$0	$1,084,930	$42,178	$235,414	$21,410	$589,817	$947,816	$7,700	$3,160,117

Total Core Assets:	$16,347,502	$5,086,840	$3,192,833	$3,723,566	$6,200,798	$1,590,343	$1,126,464	$1,156,478	$1,263,167	$3,978,140	$2,968,795	$5,245,238

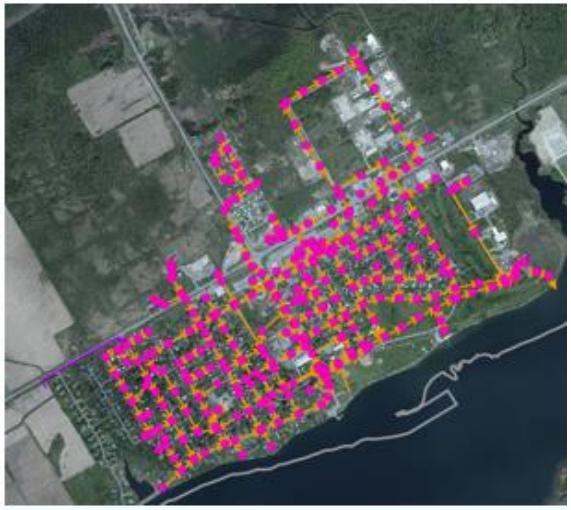
Appendix D: Level of Service Maps



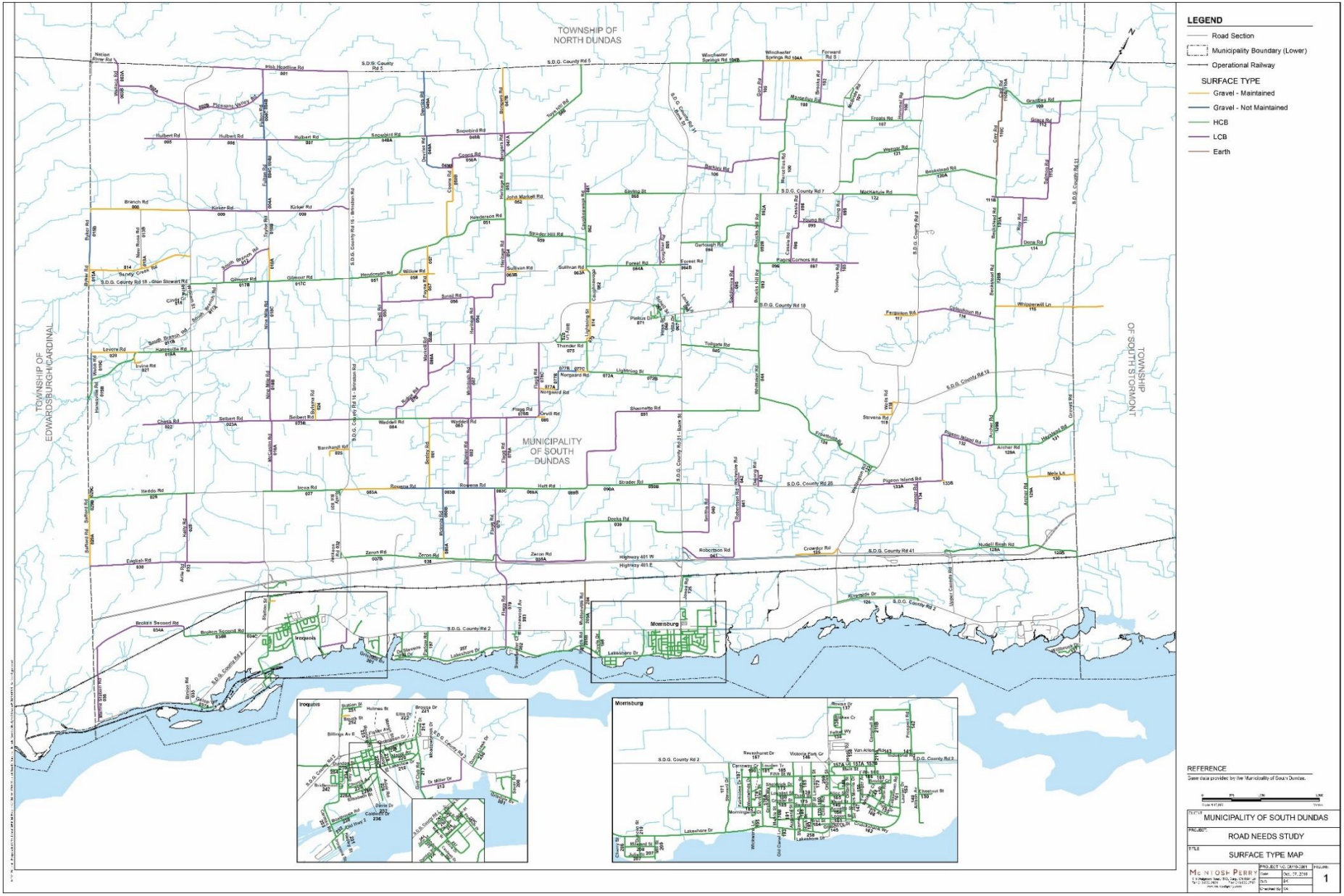
Sewer Services



Morrisburg



Iroquois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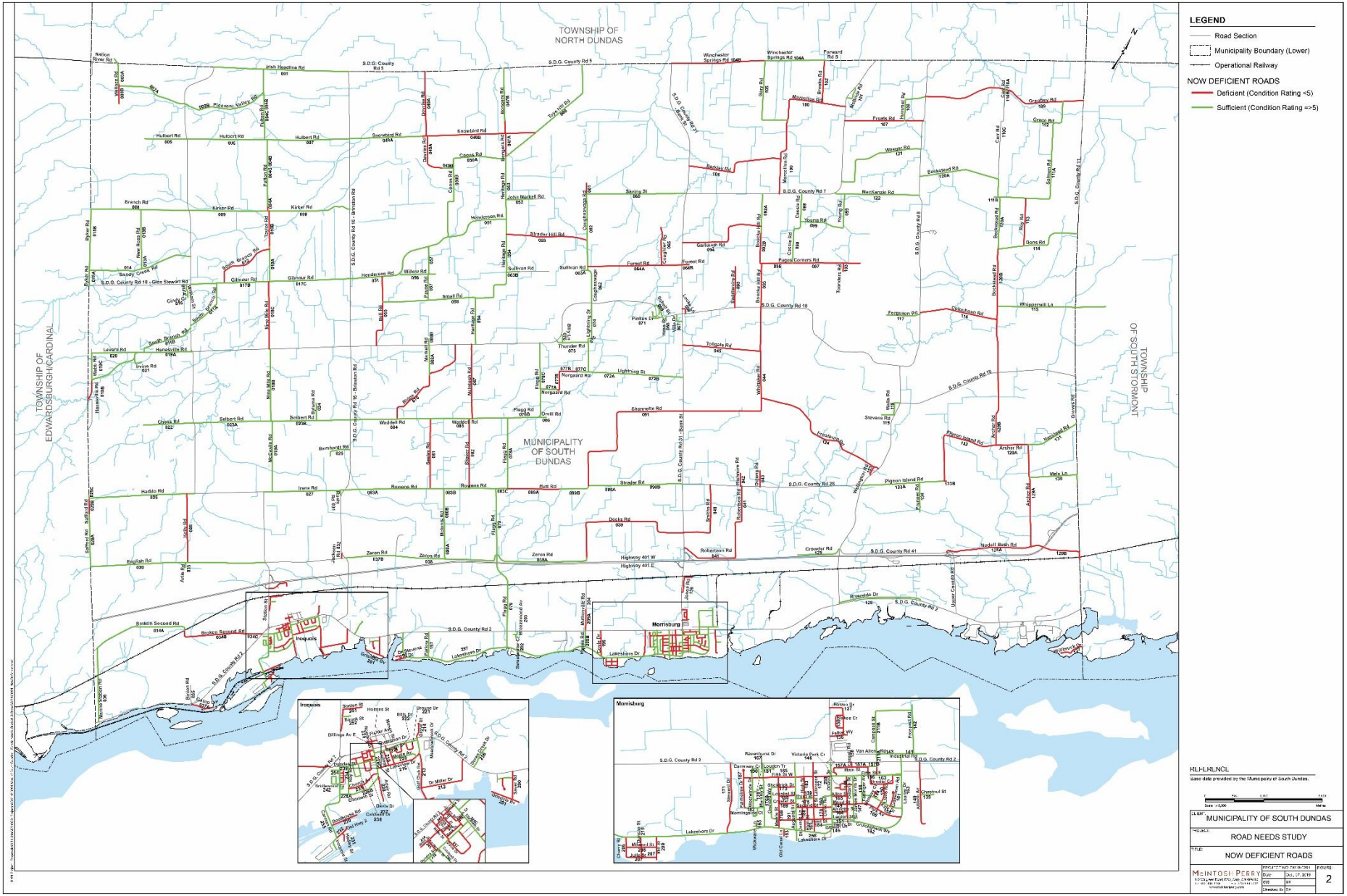
TOWNSHIP OF EDWARDSBURGH/CARDINAL
MUNICIPALITY OF SOUTH DUNDAS
TOWNSHIP OF SOUTH STORMONT
Iroquois
Morrisburg
LEGEND
Road Section
Municipality Boundary (Lower)
Operational Railway
SURFACE TYPE
Gravel - Maintained
Gravel - Not Maintained
HCB
LCB
Earth
REFERENCE
Base data provided by the Municipality of South Dundas.
MUNICIPALITY OF SOUTH DUNDAS
ROAD NEEDS STUDY
SURFACE TYPE MAP
McINTOSH PERRY
1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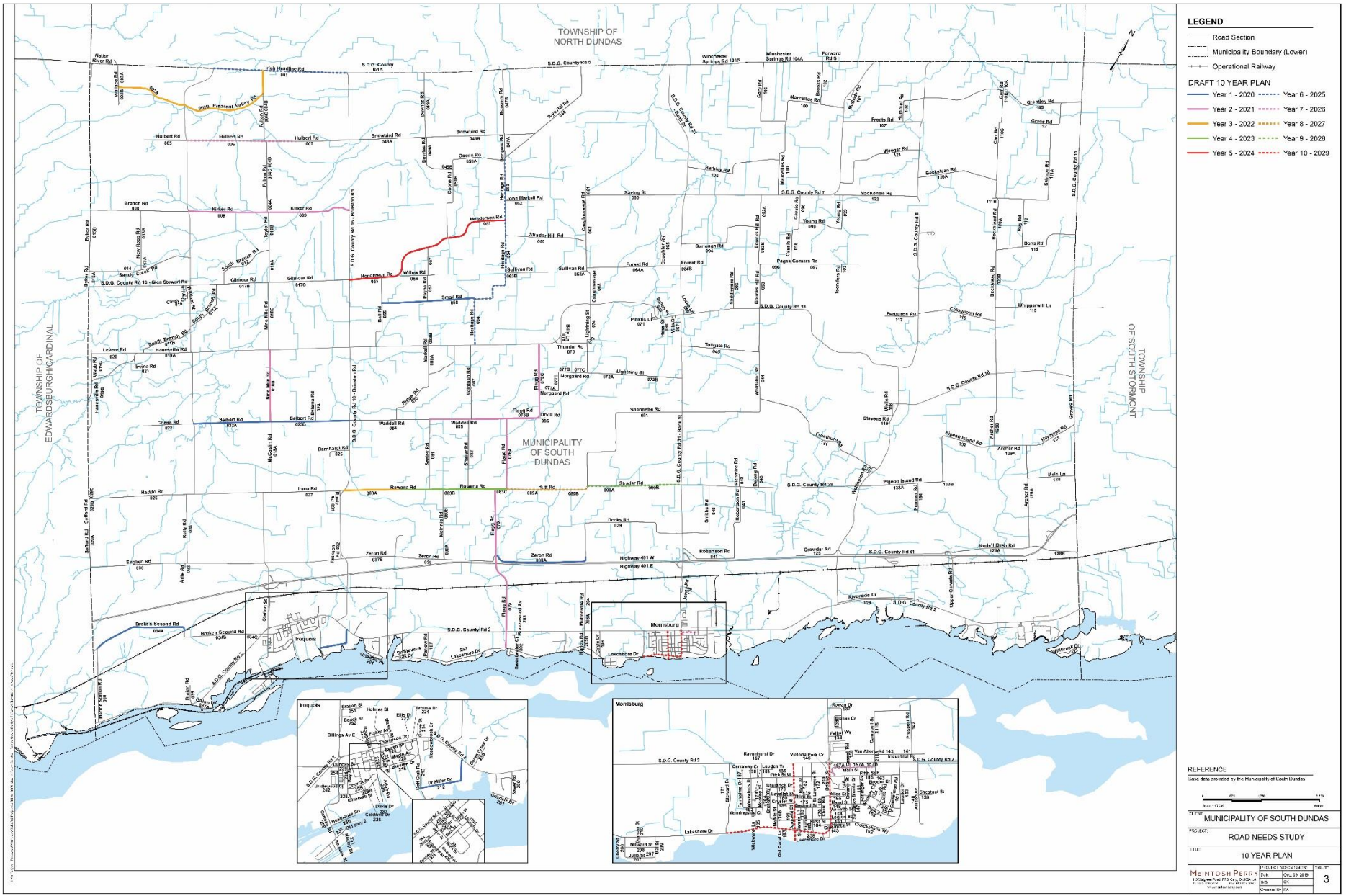
TOWNSHIP OF EDWARDSBURGH/CARDINAL
MUNICIPALITY OF SOUTH DUNDAS
TOWNSHIP OF SOUTH STORMONT
Iroquois
Morrisburg
LEGEND
Road Section
Municipality Boundary (Lower)
Operational Railway
NOW DEFICIENT ROADS
Deficient (Condition Rating <5)
Sufficient (Condition Rating =>5)
MUNICIPALITY OF SOUTH DUNDAS
ROAD NEEDS STUDY
NOW DEFICIENT ROADS
McINTOSH PERRY
FIGURE
2


TOWNSHIP OF NORTH DUNDAS
TOWNSHIP OF EDWARDSBURGH/CARDINAL
TOWNSHIP OF SOUTH STORMONT
MUNICIPALITY OF SOUTH DUNDAS
Iroquois
Morrisburg
LEGEND
Road Section
Municipality Boundary (Lower)
Operational Railway
DRAFT 10 YEAR PLAN
Year 1 - 2020
Year 2 - 2021
Year 3 - 2022
Year 4 - 2023
Year 5 - 2024
Year 6 - 2025
Year 7 - 2026
Year 8 - 2027
Year 9 - 2028
Year 10 - 2029
REFERENCE
Base data provided by the Municipality of South Dundas
MUNICIPALITY OF SOUTH DUNDAS
ROAD NEEDS STUDY
10 YEAR PLAN
McINTOSH PERRY
Date: Oct. 03 2019
Checked by: DA
3

Appendix E: Risk Rating Criteria

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

Asset Category	Risk Criteria	Criteria Weighting	Range	Score
All	Replacement Cost	30%	0 -100k	1
			101k - 250k	2
			251k - 500k	3
			501k - 1M	4
			1M +	5
All	Category Value	70%	1	1
			2	2
			3	3
			4	4
			5	5

Category Value (Core Assets)	
Score	**Asset Groups**
5	Transmission Water Lines, Raw Water Lines, Major Water Lines, Trunk Sewer Lines, Water Buildings, Sewer Buildings
4	Minor Water Lines, Branch Sewer Lines, Water Equipment, Sewer Equipment
3	Road Surfaces, Road Bases, Bridges & Culverts, Water Valves, Fire Hydrants
2	Sanitary Manholes, Storm Sewer Lines
1	Storm Manholes

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 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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AMP Revision Record				
Rev. No.	**Date**	**Prepared by:**	**Reviewed by:**	**Description**
1	June 20, 2022	Tyler Nelson, Asset Management Coordinator	Lachlan McDonald, Acting Treasurer	Draft
2	June 27, 2022	Tyler Nelson, Asset Management Coordinator	Council of South Dundas	Final