Town of East Gwillimbury

2022 Asset Management Plan

For CORE Assets at Current Levels of Service

Document Control	2022 Asset Management Plan

Document ID :

Rev No	Date	Revision Details	Author	Reviewer	Approver
1	June 30, 2022	Review from Core AM Team. Revisions to inventory, updated graphs, revised stormwater lifecycle strategy and capital requirements	Jordan Gonda		
2	Aug 11, 2022	Feedback from Finance and Core AM Team. Changes to financial Strategy, modification of average annual requirements graphs	Jordan Gonda		
3	September 3, 2022	Corrected bridges average projected lifecycle activities, updated executive summary, corrected average annual requirements of first 10 years to include backlog	Jordan Gonda		
4	October 7, 2022	Revised Executive Summary, revised methodology for wet pond backlog calculation, projected bridge capital costs fix, update styling.	Jordan Gonda		
5	November 10, 2022	Revised capital projections. Fixed data error for wastewater and stormwater acquisition costs	Jordan Gonda		
6	April 21, 2023	Replaced risk matrix diagrams with risk rating diagrams for all chapters	Jordan Gonda		

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

Municipal infrastructure provides the foundation for the economic, social, and environmental health and growth of a community through the delivery of critical services. The goal of asset management is to deliver an adequate level of service in the most cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

1.1 Scope

This Asset Management Plan identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the Town can ensure that public infrastructure is managed to support the sustainable delivery of municipal services. This asset management plan includes the following asset categories:

- Transportation Network (roads, structural bridges & culverts, sidewalks, streetlighting, traffic signs, etc.)
- Water Network (watermains, valves, chambers, hydrants, meters, service connections, etc.)
- Wastewater Network (wastewater mains, manholes, service connections, pumping stations, etc.)
- Stormwater Network (storm mains, manholes, catchbasins, driveway culverts, ponds, etc.)

With the development of this asset management plan, the Town has achieved compliance with Ontario Regulation 588/17 to the extent of the requirements that must be completed by July 1, 2022. Additional requirements with respect to the inclusion of all asset portfolios, and the consideration of appropriate or "proposed" levels of service and growth must be met by 2024, and 2025 respectively.

1.2 Asset Portfolio Summary

East Gwillimbury's core assets are valued at $1.876 billion, based on inflated construction unit cost estimates, and engineering studies. The following table details the replacement value, short and long-term annual capital requirements, and replacement cost method. Details of the quantities of asset managed within each of these portfolios can be referenced in Sections 4.1, 5.1, 6.1, and 7.1.

Asset Segment	Replacement Value	Average Annual Requirement		Replacement Cost Method
		2022 - 2031	Long-term[1]	
Road Network	$350,568,032	$4,709,907	$4,890,592	Cost/Unit & User-Defined
Bridges & Culverts	$26,595,135	$815,500	$621,344	User-Defined
Stormwater Network	$539,877,630	$5,618,401	$11,579,579	CPI
Water Network	$660,571,406	$4,945948	$13,077,195	CPI
Wastewater Network	$298,080,443	$878,015	$5,771,915	CPI
TOTAL	**$1,875,692,646**	**$17,293,423**	**$35,940,625**	

71% of all assets analysed in this asset management plan are in fair or better condition and a backlog of $42.8 million [2]exists. For the remaining 82% of assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making

[1] Theoretical value considering the requirements averaged over the full lifecycle of every asset

[2] The backlog represents the total value of overdue renewal, rehabilitation, and replacement needs for each asset. Specifically, roads, bridges and culverts, and storm ponds have backlogs defined as the total value of capital lifecycle costs for triggers that have not been met (e.g., ponds that have exceeded the dredging criteria); all other assets utilize a replace at end-of-life strategy and have the backlog defined as the total replacement value of assets where the age exceeds the estimated useful life

assessments essential to accurate asset management planning, and a recurring recommendation in this asset management plan. The following table summarizes the condition of the asset portfolio.

Asset Segment	Average Condition	Backlog	Condition Assessment Method
Road Network	63%	$15.5m (4%)	81% Assessed
Bridges & Culverts	75%	$2.0m (8%)	100% Assessed
Stormwater Network	67%	$3.4m (6.3%)	5% Assessed
Water Network	72%	$20.6m (3%)	Age-Based
Wastewater Network	61%	$1.3m (4%)	Age-Based
TOTAL	**65%**	**$42.8m (2.3%)**	**18% Assessed**

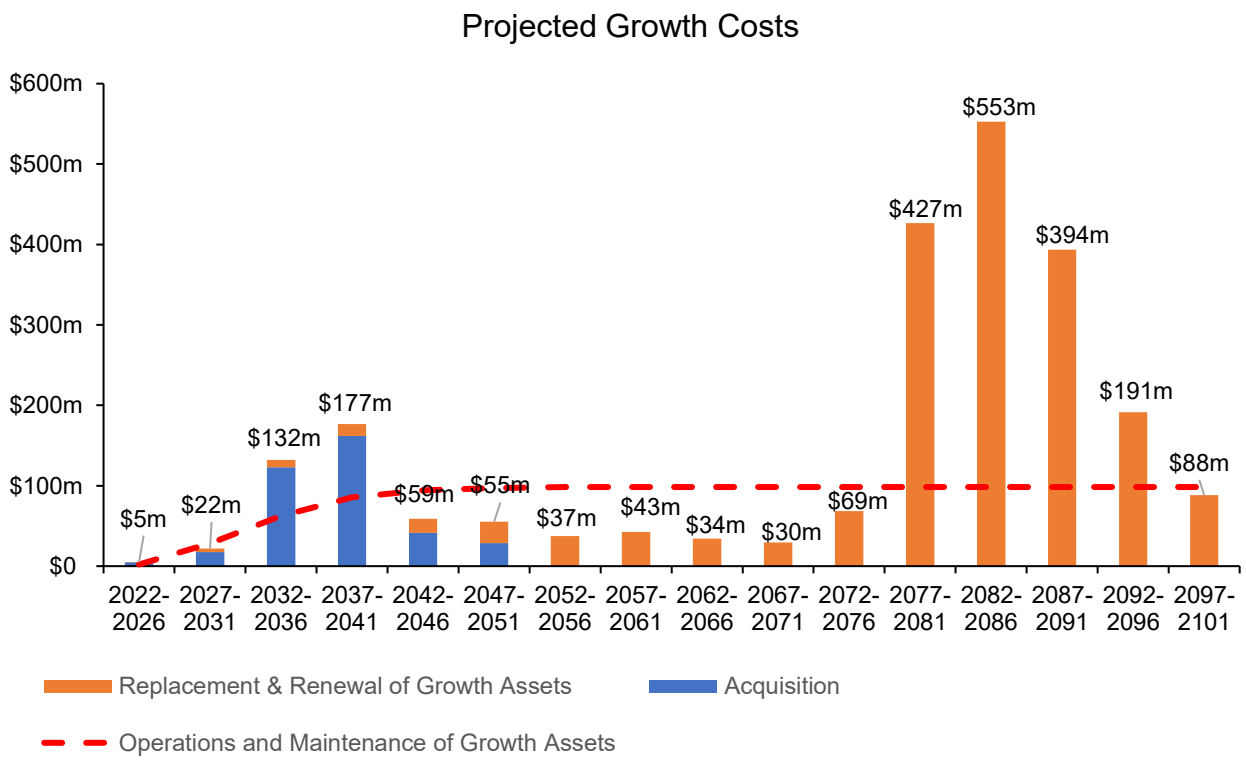
1.3 Levels of Service

71% of assets in this asset management plan are in fair or better condition, the remaining 22% can expect capital renewal over the next decade. Due to the identified backlog of renewal needs, and the expanding cost of asset renewal, the Town can expect to increase expenditures over the long-term to maintain the current levels of service. The Town will require capital investments of $17.3 million per year in the first ten years, eventually increasing to $120 million per year during years 2082 - 2091. This increase is because the Town's core infrastructure assets are relatively new now, requiring extensive renewals many years in the future.

1.4 Growth Management Plan

In alignment with the Town's Official Plan, circa June 2022, the Town of East Gwillimbury is projected to experience significant growth; population growth of 62% between 2021 and 2031 and 250% growth between 2031 and 2051. Employment is projected to follow a similar growth trend as population with 63% growth between 2021 and 2031 and 325% growth between 2031 and 2051. To meet the needs of a growth population the Town anticipates acquiring new assets through the Development Charges Bylaw and developer contributions through plans of subdivisions and site plans, roughly doubling the size of the Town's core asset networks. As a result of growth, additional demands will be placed on the network, which includes maintaining current levels of service, provisions for new servicing, climate change adaptation, urbanization, and various regional drivers (e.g. York Region wastewater treatment capacity constraints). The demands of a growth infrastructure portfolio may also result in higher demands on staff resources to sustain current levels of service.

Acquiring new assets to accommodate growth will place pressures on the Town's financial capacity. The following figure demonstrates these pressures, illustrating moderate financial impacts in the short to medium terms, and quite severe impacts long term. Acquisition costs peak between 2037 and 2041, at $162 million over this five-year period. This means the Town can expect to pay $32.3 million each year, on average, to construct newly developed assets during the peak years. Long term, starting in year 2077, the Town will have significant costs related to replacement and renewal of growth acquired assets. Replacement and renewal of growth assets peaks in years 2082 to 2086 at $553 million, or $111 million per year on average for the five-year period. Ongoing operations and maintenance costs due to growth assets are estimated to be $98 million for each five-year period, or $19.6 million per year.



1.5 Lifecycle Management Strategy

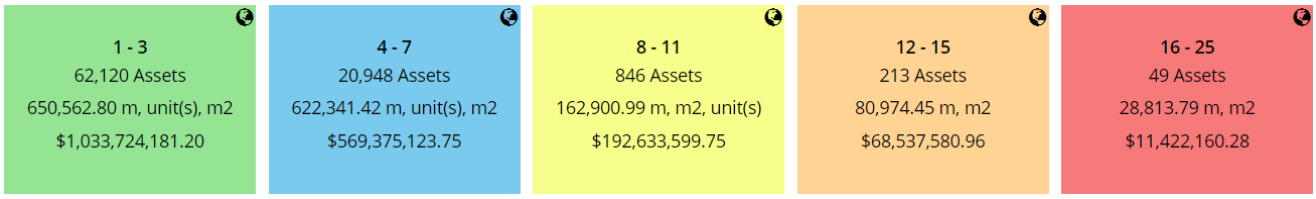
The condition or performance of most assets will deteriorate over time, negatively affecting the ability of an asset to fulfill its intended function. Field interventions are undertaken to extend the service life, reduce the rate of deteriorate, or improve the performance of this asset. These interventions make up the lifecycle management strategy, generally categorized as acquisition, operations and maintenance, rehabilitation/renewal, replacement/reconstruction, and disposal. Costs, timing, and impacts of these activities have been defined for each asset segment.

New asset acquisitions anticipated between 2022 and 2051, have been projected, from projects identified in the Town's Development Charges Background Study and Bylaw as well as anticipated developer contributions through future plans of subdivisions and site plans. Operations and maintenance costs are projected from historical expenditures. Disposal costs are included in the replacement of each asset. Renewal and rehabilitation lifecycle activities have been specified for road surfaces, structural bridges and culverts, and stormwater management ponds. All other assets rely on an end-of-life replacement strategy, where assets are theoretically replaced once the condition score nears or reaches 0. The following table summarizes the operations and maintenance, and renewal and replacement strategies for each asset category and segment.

Asset Category	Asset Segment	Operations and Maintenance	Renewal and Replacement
Transportation	Road surfaces	Road inspections, line painting, street sweeping, gravel dust control, pothole patching, crack sealing, sightline maintenance, winter maintenance, gravel road grading, gravel road shoulder repair	Assumed road surfaces are triggered for rehabilitation and replacement via the decision trees developed by Stantec's Pavement Management System (PMS). Events include thin milling and resurface, full asphalt milling and resurface, thin asphalt milling and resurface with geotextile, reconstruction, crack sealing, surface treatment. Unassumed roads were not under the scope of analysis of Stantec's PMS, and modelled with the same events in CityWide AM.
	Bridges and Culverts	Sweeping, Winter Maintenance, operations and maintenance of the road surface	The timing and cost of bridge component renewals and replacement was taken from the 2021 Bridge Inspection Report
	Other	Sidewalk concrete repair, grinding trip ledge	End-of-life replacement
Stormwater	Wet Ponds	Stormwater pond inspections	Dredging at 50% sediment fill, as specified in the Stormwater Master Plan
	Other	Culvert blockage program, oil grit separator inspection program, winter maintenance program, inspection of Nelson Drain, Dyke Operations, Culvert inspection, inventory and replacement program, catch basin cleaning program, catch basin lid cleaning, CCTV inspection and flushing	End-of-life replacement
Wastewater	All	Proactive CCTV inspections, life station inspection/monitoring, Wastewater Charges, Wastewater pumping station maintenance, sewer flushing, lateral inspection and cleaning, sewer main hydrojet	End-of-life replacement
Water	All	Valve turning, Drinking Water Quality Management System, water main monitoring, water meter reading, small drinking water system operations and maintenance, water purchased, hydrant maintenance, watermain flushing and maintenance, auto flushing device inspection and maintenance, curb box maintenance, water meter repair and maintenance, water equipment repair	End-of-life replacement

1.6 Risk

Risk models were developed for each asset category using likelihood and consequence of failure metrics. In total, $80.0 million of assets are considered to be high or very high risk. The figure summarizes the number of assets, quantities and value in each risk category.



The assets having the highest risk rankings are summarized in the following tables for each asset category:

Bridges and Culverts

		Asset	Probability of Failure	Consequence of Failure	Risk Rating
1		000110 - Queensville SDRD Bridge	4	3.67	14.7 – High
2		000109 - Rutledge Bridge	4	3.42	13.67 – High
3		000102 – Pony Hill Bridge	3	3.94	11.83 – Moderate
4	A	000114 - East Townline Bridge	3	3.85	11.56 – Moderate
	B	000113 – East Townline Bridge	3	3.67	11.02 – Moderate
5		000403 – Stonehill Blvd Culvert	3	3.6	10.79 – Moderate

Road Network

		Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	A	Harry Walker Parkway – Corcoran Court to Green Lane East	5	3.43	17.17 – Very High
	B	Harry Walker Parkway – Corcoran Court to 228m south of Corcoran Court	5	3.42	17.17 – Very High
2		Toll Road – Centennial Avenue to Oriole Drive	5	3.18	15.89 – High
3		Centre Street – Mount Albert Road to Elizabeth Street	5	3.13	15.67 – High
4		Doane Road – Centre Street to East Townline	5	3	15 – High
5		Corcoran Court – Harry Walker Parkway to End	5	2.98	14.92 – High

Water Network					
		Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	A	200mm Thinwall PVC: Yonge Street	5	2.28	11.4 – Moderate
	B	150mm Thinwall PVC: Yonge Street	5	2.04	10.2 – Moderate
2	A	200mm Thinwall PVC: Thompson Drive	5	2.28	11.4 – Moderate
	B	150mm Thinwall PVC: Thompson Drive	5	2.04	10.2 – Moderate
3		150mm Thinwall PVC: Tyson Drive	5	2.04	10.2 – Moderate
4		350mm Ductile Iron: Centre Street	3.75	2.52	9.45 – Moderate
5		350mm Ductile Iron: Main Street	3.75	2.52	9.45 – Moderate

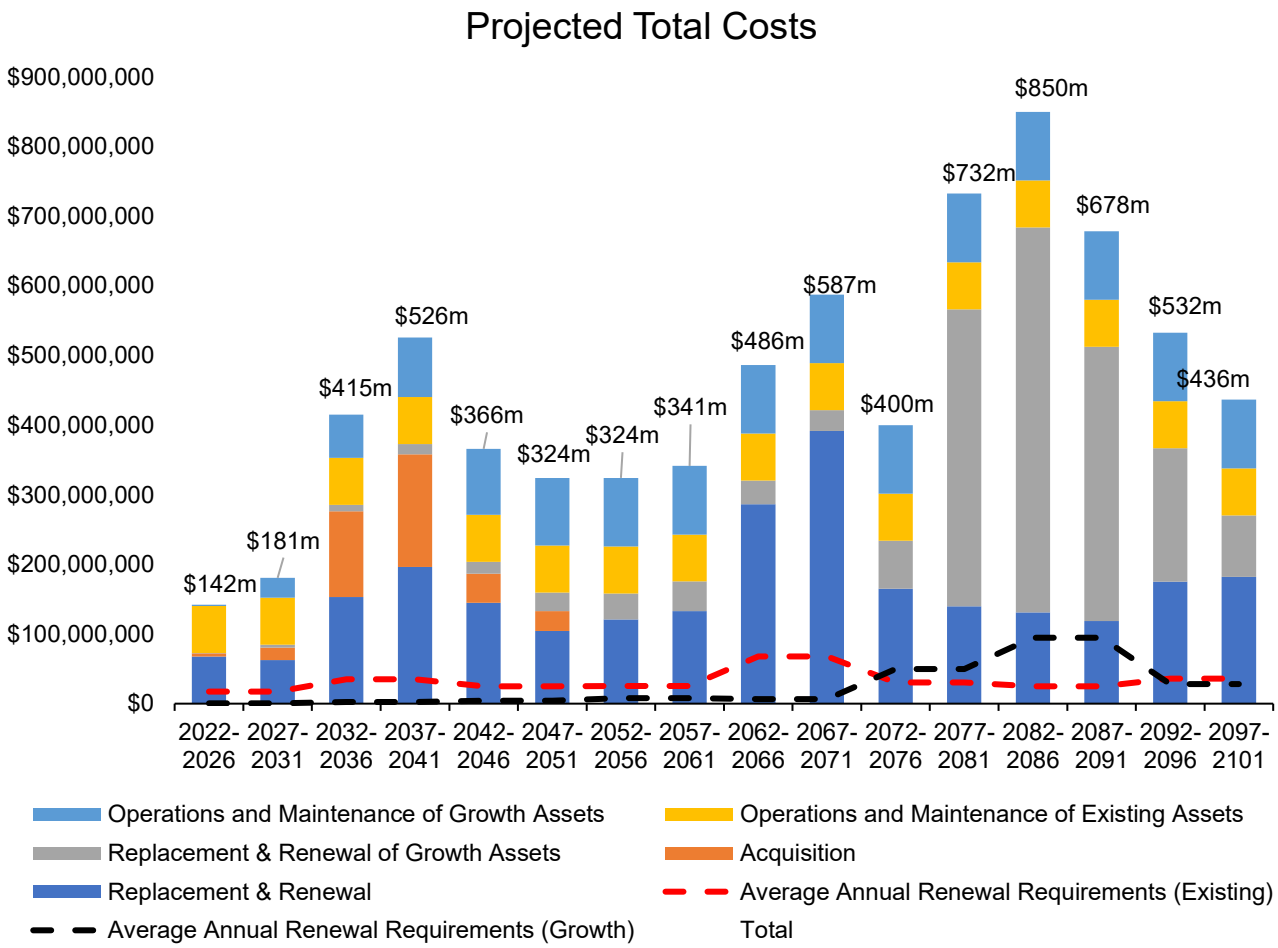
Wastewater Network				
	Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	250mm AC Gravity Line: Centre Street	4	2.83	11.3 – Moderate
2	Holland River Boulevard Pumping Station[3]	5	2.2	11 – Moderate
3	Industrial Commercial Institutional Service Connection: Yonge Street	4	2.5	10 – Moderate
4	250mm AC Gravity Line: Alice Street	4	2.23	8.9 – Moderate
5	350mm AC Gravity Line: Peter Street	4	2.23	8.9 – Moderate

Stormwater Network				
	Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	1050mm Concrete Gravity Sewer: Grist Mill Road	5	4.4	22 – Very High
2	1200mm Concrete Gravity Sewer: Veronica Crescent	5	4.1	20.5 – Very High
3	Green Lane East Storm Water Detention Facility (8)	4	5	20 – Very High
4	1350mm Concrete Gravity Sewer: King Street	5	3.95	19.75 – Very High
5	1200mm Concrete Gravity Sewer: Donlands Avenue	5	3.5	17.5 – Very High

[3] Holland River Boulevard Pumping Station rehabilitated and upgraded in 2022

1.7 Financial Summary

The Town will require capital investments of $17.3 million per year in the first ten years, eventually increasing to $67.8 million per year after 50 years, to renew existing infrastructure only. Additionally, the Town will acquire new assets between 2022 and 2051, peaking at an average annual requirement of $32.3 million between 2037 and 2041. Current operating requirements are assessed at $13.5 million per year and increasing to $33.2 million. The following figure outlines the full lifecycle costs of the core asset portfolio over the next 80 years.



1.8 Recommendations

A costing summary was developed to identify the short and long-term capital and operating requirements to maintain current levels of service. Going forward the Town should identify the funding available, identify the funding gap, and develop a financial strategy to close this funding gap. This strategy may consider raising taxes and rates, reallocating budgets, and adapting lifecycle strategies.

The 2025 requirements of O. Reg. 588/17 will require the Town to develop a financial strategy that states the funding requirements to achieve an appropriate or “proposed” levels of service, funding available from sustainable funding sources, and identifies the gap between the funding need and funding available

Recommendations to guide continuous refinement of the Town’s asset management program are identified below:

- Review data to update and maintain a complete and accurate dataset
- Review and update lifecycle management strategies, including consideration for expansion of operating and maintenance practices that may defer longer term and costly renewal requirements
- Development and regularly review short and long-term plans to meet capital requirements
- Continue to measure current levels of service and identify sustainable proposed levels of service
- Review and execute on asset-specific recommendations identified within Section 9.2

2 INTRODUCTION

2.1 An Overview of Asset Management

Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal 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.

The acquisition of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% derives from operations and maintenance. This asset management plan focuses its analysis on the capital costs to maintain, rehabilitate and replace existing municipal infrastructure assets.

These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the 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.

2.1.1 Asset Management Policy

An asset management policy represents a statement of the principles guiding the Town's approach to asset management activities. It aligns with the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program.

The Town of East Gwillimbury adopted Policy No. 20-300-CP-001 "Strategic Asset Management Policy" on August 13, 2019, in accordance with Ontario Regulation 588/17. The policy defines a corporate-wide asset management program that will promote "the adoption of industry best practices, continuous improvement protocols and lifecycle and risk management of all municipal infrastructure assets, with the goal of achieving the lowest total cost of ownership while meeting desired levels of service."

The policy also stipulates the need to develop an asset management plan in accordance with Ontario Regulation 588/17 requirements. The Town must demonstrate an organization-wide commitment to efficiently manage municipal infrastructure assets and improve accountability to the community through the adoption of holistic asset management practices.

The Town of East Gwillimbury additionally adopted Policy No. 20-300-OP-002 "Strategic Asset Management Procedures" on August 13, 2019. This policy defines the wide range of duties, responsibilities, and actions required to support the Town's asset management program.

2.1.2 Asset Management Plan

The asset management plan presents the outcomes of the Town's asset management program and identifies the resource requirements needed to achieve a defined level of service. An asset management plan typically includes the following content:

- State of Infrastructure
- Asset Management Strategies
- Levels of Service
- Financial Strategies

The asset management plan is a living document that should be updated regularly as additional asset and financial data becomes available. This will allow the Town to re-evaluate the state of infrastructure and identify how the organization's asset management and financial strategies are progressing.

2.1.3 Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

Lifecycle Management Strategies

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. Asset deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk and even service disruption.

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation, and replacement. The following table provides a description of each type of activity and the general difference in cost.

Lifecycle Activity	Description	Example (Roads)	Cost
Maintenance	Activities that prevent defects or deteriorations from occurring	Crack Seal	$
Rehabilitation/ Renewal	Activities that rectify defects or deficiencies that are already present and may be affecting asset performance	Mill & Re-surface	$$
Replacement/ Reconstruction	Asset end-of-life activities that often involve the complete replacement of assets	Full Reconstruction	$$$

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

The Town's approach to lifecycle management is described within each asset category outlined in this asset management plan. Developing and implementing a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

Risk Management Strategies

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

By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets and determine where maintenance efforts and spending should be focused. This asset management plan includes a high-level evaluation of asset risk and criticality through quantitative and qualitative methodologies.

Quantitative Approach to Risk

Asset risk is defined using the following formula:

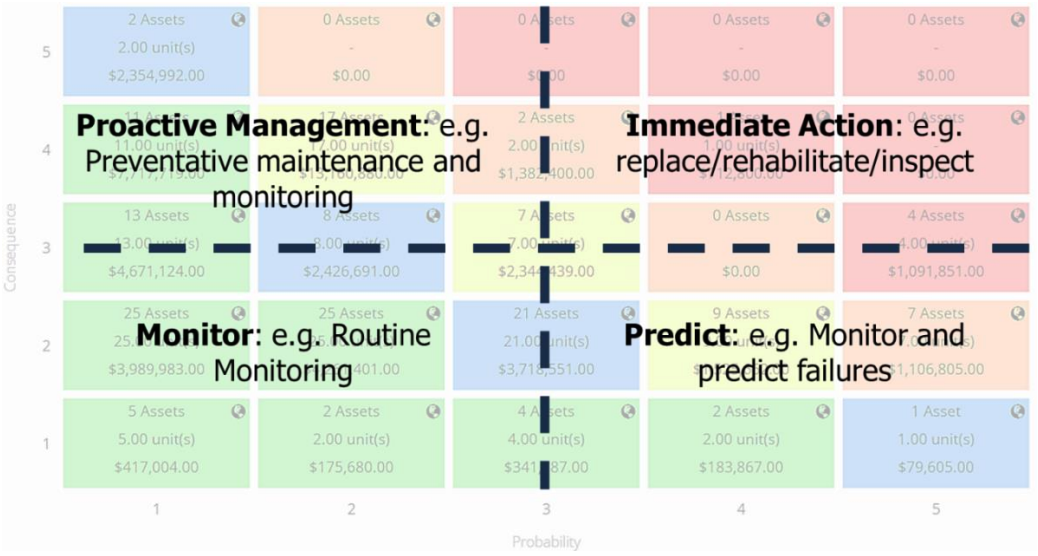
$$Risk = Probability\ of\ Failure\ (POF) \times Consequence\ of\ Failure\ (COF)$$

The probability of failure relates to the likelihood that an asset will fail at a given time. The probability of failure focuses on two highly imperative impacts for risk assessment – structural and functional impacts. Structural impacts are related to the

structural aspects of an asset such as load carrying capacity, condition, or breaks; whereas the functional impacts can include parameters, slope, traffic count, and other impacts that can affect the performance of an asset.

The consequence of failure describes the overall effect that an asset's failure will have on an organization's asset management goals. Consequences of failure can range from non-eventful to impactful. the consequence of failure parameters aims to align with the Triple Bottom Line approach – economic, social, environmental – to risk management as well as other fields including operational, health and safety, and strategic.

Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize maintenance, rehabilitation, and replacement strategies for critical assets. The following diagram describes how the risk matrices can be interpreted for risk management:



Qualitative Approach to Risk

The qualitative risk assessment involves the documentation of risks to the delivery of services that the municipality faces given the current state of the infrastructure and asset management strategies. These risks can be understood as corporate level risks. Municipal staff provided information related to the following potential risks: asset data confidence, lifecycle management strategies, organizational cognizance/capacity, infrastructure design/installation, aging infrastructure, climate change and extreme weather events, growth, and infrastructure re-investment. The qualitative risks identified can guide information and data gathering in the future.

Levels of Service

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

These metrics include the technical and community level of service metrics that are required as part of Ontario Regulation 588/17 as well as additional performance measures that the Town has selected in accordance with best practices defined by the International Infrastructure Management Manual (IIMM).

In this asset management plan, service levels are defined in three ways, customer values, customer levels of service, and technical levels of services. The customer values identify the customer satisfaction measures that will guide future assessments of the customer levels of service through a public forum. The customer values indicate the following:

- Which aspects of the service are important to the customer;
- Whether customers see value in what is currently provided; and,
- The likely trend over time based on the current budget provision.

Customer levels of service are considered in terms of three overarching measures: quality, function, and capacity.

- Quality: What is the condition of the service?
- Function: Is the service suitable for its intended purpose?
- Capacity: Is the service over or under used?

Technical levels of service impact the customer levels of service and are required to achieve the customer values. The technical measures relate to the activities and allocation of resources required to achieve the desired customer outcomes.

Appendix A includes a summary of the technical and community levels of service as defined by Ontario Regulation 588/17.

Current and Proposed Levels of Service

This asset management plan focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the Town plans to establish proposed levels of service over a 10-year period, in accordance with Ontario Regulation 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the Town. 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 2025, the Town must identify a lifecycle management and financial strategy which allows these targets to be achieved.

2.2 Ontario Regulation 588/17 Compliance Review

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

The diagram below outlines key reporting requirements under Ontario Regulation 588/17 and the associated timelines.

2019	Strategic Asset Management Policy
2022	Asset Management Plan for Core Assets with the following components: current levels of service, inventory analysis, lifecycle activities to sustain LOS, cost of lifecycle activities, population and employment forecasts, and discussion of growth impacts
2024	Asset Management Plan for core and non-core assets (same components as 2022) and Asset Management Policy update
2025	Asset Management Plan for All Assets with the following additional components: proposed levels of service for next 10 years, updated inventory analysis, lifecycle management strategy, financial strategy and addressing shortfalls, and discussion of how growth assumptions impacted lifecycle and financial

The following table identifies the requirements outlined in Ontario Regulation 588/17 for municipalities to meet by July 1, 2022. Next to each requirement a page or section reference is included in addition to any necessary commentary.

Requirement	Ontario Regulation Section	Asset Management Plan Section Reference	Status – Core Assets
Summary of assets in each category	S.5(2), 3(i)	4.1, 5.1, 6.1, 7.1	Complete
Replacement cost of assets in each category	S.5(2), 3(ii)	4.1.1, 5.1.1, 6.1.1, 7.1.1	Complete
Average age of assets in each category	S.5(2), 3(iii)	4.1.2, 5.1.2, 6.1.2, 7.1.2	Complete
Condition of core assets in each category	S.5(2), 3(iv)	4.1.2, 5.1.2, 6.1.2, 7.1.2	Complete
Description of municipality's approach to assessing the condition of assets in each category	S.5(2), 3(v)	4.1.1, 5.1.1, 6.1.1, 7.1.1	Complete
Current levels of service in each category	S.5(2), 1(i-ii)	4.2, 5.2, 6.2, 7.2	Complete
Current performance measures in each category	S.5(2), 2	4.2, 5.2, 6.2, 7.2	Complete

Lifecycle activities needed to maintain current levels of service for 10 years	S.5(2), 4	4.1, 5.1, 6.1, 7.1	Complete
Costs of providing lifecycle activities for 10 years	S.5(2), 4	4.5, 5.5, 6.5, 7.5	Complete
Growth assumptions	S.5(2), 5(i-ii) S.5(2), 6(i-vi)	3, 4.3, 5.3, 6.3, 7.3	Complete

2.3 East Gwillimbury Community Profile

Census Characteristic	Town of East Gwillimbury	Ontario
Population 2021	34,637	14,223,942
Population Change 2016-2021	44.4%	5.8
Total Private Dwellings	11,869	5,929,250
Population Density	141.4/km^2	15.9/km^2
Land Area	244.91 km^2	892,411.76 km^2

The Town of East Gwillimbury is located in York Region and is part of the Greater Toronto Area. East Gwillimbury is within the Lake Simcoe watershed with the East Holland River running directly through Town. The region has a diverse and vibrant environment making it a centre for tourism and recreation and a beautiful place to live.

The region was initially established in the 1800s as part of the greater Toronto settling area. The Township and villages that made up the region experienced moderate growth as a centre for transportation (particularly river transportation) and agriculture; however, the area became a notable community independent of the major City nearby. Today, it remains a blend of urban and rural life with strong ties to the City of Toronto.

Like many municipalities in the greater Toronto area, the Town of East Gwillimbury is currently experiencing significant growth. Historically, the Town has experienced population growth slightly above the national average, however, since 2016, the population has increased at approximately 8.5 times the national average. According to the 2021 Census, East Gwillimbury is the fastest growing municipality in Canada.

The Town is focused on promoting efficient development and economic growth while also protecting the natural environment and agricultural lands. As of 2021, East Gwillimbury generates a total revenue of approximately $37.3 million from taxes and rates and dedicates approximately $3.3 million of sustainable funding[4] to the core infrastructure capital budget.

Municipal staff have identified the transportation, stormwater, water, and wastewater networks as primary infrastructure priorities. All core networks are critical in the promotion of efficient growth and development. Staff aim to maintain the current level of service as the Town continues to grow through comprehensive capital planning and advanced asset management practices.

2.4 Climate Change

Climate change can cause severe impacts on human and natural systems around the world. The effects of climate change include increasing temperatures, higher levels of precipitation, droughts, and extreme weather events. In 2019, Canada's Changing Climate Report (CCCR 2019) was released by Environment and Climate Change Canada (ECCC).

The report revealed that between 1948 and 2016, the average temperature increase across Canada was 1.7°C; moreover, during this time period, Northern Canada experienced a 2.3°C increase. The temperature increase in Canada has doubled that of the global average. If emissions are not significantly reduced, the temperature could increase by 6.3°C in Canada by the year 2100 compared to 2005 levels. Observed precipitation changes in Canada include an increase of approximately 20% between 1948 and 2012. By the late 21st century, the projected increase could reach an additional 24%. During the summer months, some regions in Southern Canada are expected to experience periods of drought at a higher rate. Extreme weather events and climate conditions are more common across Canada. Recorded events include droughts, flooding, cold extremes, warm extremes, wildfires, and record minimum arctic sea ice extent.

The changing climate poses a significant risk to the Canadian economy, society, environment, and infrastructure. The impacts on infrastructure are often a result of climate-related extremes such as droughts, floods, higher frequency of freeze-thaw cycles, extended periods of high temperatures, high winds, and wildfires. Physical infrastructure is vulnerable

[4] Sustainable funding only includes revenue from taxes and rates and other sustainable funding sources such as the OCIF grant and the Canada Community-Building Fund.

to damage and increased wear when exposed to these extreme events and climate variabilities. Canadian Municipalities are faced with the responsibility to protect their local economy, citizens, environment, and physical assets.

2.4.1 East Gwillimbury Climate Profile

The Town of East Gwillimbury is part of the Greater Toronto Area located in Southern Ontario within the Lake Simcoe watershed along the East Holland River. The Town is expected to experience notable effects of climate change which include higher average annual temperatures, an increase in total annual precipitation, and an increase in the frequency and severity of extreme events. According to Climatedata.ca – a collaboration supported by Environment and Climate Change Canada (ECCC) – the Town of East Gwillimbury may experience the following trends:

Higher Average Annual Temperature:

- Between the years 1981 and 2010 the annual average temperature was 6.5 °C
- Under a high emissions scenario, the annual average temperatures are projected to increase by 9 °C by the year 2050 and over 12 °C by the end of the century.

Increase in Total Annual Precipitation:

- Under a high emissions scenario, East Gwillimbury is projected to experience an 7% increase in precipitation by the year 2050 and a 14% increase by the end of the century.

Increase in Frequency of Extreme Weather Events:

- It is expected that the frequency and severity of extreme weather events will change.
- In some areas, extreme weather events will occur with greater frequency and severity than others especially those impacted by Great Lake winds.

2.4.2 Lake Simcoe Watershed[5]

Lake Simcoe is the fourth largest lake wholly located in Ontario. The Lake Simcoe watershed covers 3,400 square kilometres and 20 municipal borders, including the entirety of East Gwillimbury. There are over 500,000 residents in the watershed and the population in the southern portion of the region is growing quickly. Land use in the watershed is evolving over time, currently with 8% classified as urban land and 36% classified as agricultural land.

The physical impacts of climate change are most noticeable due to a shorter ice season, seasonal changes in river and creek flow, and more phosphorus in the water. The shorter ice season can have profound impacts on the natural habitat as it affects the distribution of oxygen and nutrients in the lake. The seasonal changes in the river and creek flow include less water flowing in the spring and more flowing in the winter; such changes can impact infrastructure networks located near the East Holland River due to flooding or decline in groundwater. Finally, the amount of phosphorus in the Lake, most likely as a result of more extreme weather such as rainstorms, can lead to degraded water quality and algal blooms. Public health and safety depend on the stability and predictability of the ecosystem in the Lake Simcoe watershed.

2.4.3 Integration of Climate Change and Asset

Asset management practices aim to deliver sustainable service delivery - the delivery of services to residents today without compromising the services and well-being of future residents. Climate change threatens sustainable service delivery by reducing the useful life of an asset and increasing the risk of asset failure. Desired levels of service can be more difficult to achieve as a result of climate change impacts such as flooding, high heat, drought, and more frequent and intense storms.

In order to achieve the sustainable delivery of services, climate change considerations should be incorporated into asset management practices. The integration of asset management and climate change adaptation observes industry best practices and enables the development of a holistic approach to risk management. The Town has developed a number of

[5] Source: Lake Simcoe Region Conservation Authority. Climate Change. LSRCA. https://www.lsrca.on.ca/watershed-health/climate-change & Source: Lake Simcoe Region Conservation Authority. Our Watershed. LSRCA. https://www.lsrca.on.ca/Pages/watershed.aspx

documents and strategies to guide climate change adaptation and mitigation efforts. The Town has established the Environmental Advisory Committee and adopted the Thinking Green and Sustainable Development strategies, water conservation initiatives, waste diversion from landfill studies, and energy retrofits among many other approaches. These strategies along with others will further advance the Town's capacity to develop asset management strategies that incorporate climate change mitigation and adaptation considerations.

2.5 Scope and Methodology

This asset management plan for the Town of East Gwillimbury is produced in compliance with Ontario Regulation 588/17. This is the first of three asset management plans completed under the regulation. The 2022 deadline requires analysis of only core assets (roads, bridges and culverts, water, wastewater, and stormwater).

2.5.1 Asset Categories Included in this Asset Management Plan

The asset management plan summarizes the state of the infrastructure for the Town's asset portfolio, establishes current levels of service and the associated technical and customer oriented key performance indicators (KPIs), outlines lifecycle strategies for maintaining current levels of service, assesses the impacts of growth, and provides financial summary of infrastructure needs.

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

2.5.2 Deriving Replacement Costs

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

- User-Defined Cost and Cost/Unit: 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/CPI Tables: 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 Town incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

2.5.3 Estimated Useful Life and Service life remaining

The estimated useful life (EUL) of an asset is the period over which the Town expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this asset management plan 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 Town can determine the service life remaining (SLR) for each asset. Using condition data and the asset's SLR, the Town 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

2.5.4 Deriving Asset Condition

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 Town's asset portfolio. The table below outlines the condition rating system used in this asset management plan to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, service life remaining is used to approximate asset condition.

Condition	Description	Criteria	Service Life Remaining (%)
Very Good	Fit for the future	Well maintained, good condition, new or recently rehabilitated	80-100
Good	Adequate for now	Acceptable, generally approaching mid-stage of expected service life	60-80
Fair	Requires attention	Signs of deterioration, some elements exhibit significant deficiencies	40-60
Poor	Increasing potential of affecting service	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-40
Very Poor	Unfit for sustained service	Near or beyond expected service life[6], widespread signs of advanced deterioration, some assets may be unusable	0-20

The analysis in this asset management plan is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition.

2.5.5 Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. target reinvestment rate the Town can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

$$\textit{Target Reinvestment Rate} = \frac{\textit{Annual Capital Requirement}}{\textit{Total Replacement Cost}}$$

$$\textit{Actual Reinvestment Rate} = \frac{\textit{Annual Capital Funding}}{\textit{Total Replacement Cost}}$$

[6] Assets in this condition category include backlog. A condition score of 0% implies the asset is at or beyond failure.

2.6 Portfolio Overview

2.6.1 Levels of Service

This asset management plan is a key document that provides line of sight from the strategic vision of the Mayor and Member of Council to the tactical management of assets. To do so, the levels of service have considered the 2019 – 2022 Strategic Plan's vision, mission, goals, and objectives. The purpose, vision, and values of the Town can be summarized as the following:

- Core Purpose: To be a safe, connected community, focused on liveability, and high quality, affordable services.
- Community Vision: To be a balanced community evolving to meet the changing needs of our residents.
- Strategic Values: The Town of East Gwillimbury is a Character Community. These values are incorporated and promoted throughout the workplace and have been embedded in the Strategic Plan and include compassion, integrity, courage, optimism, fairness, perseverance, honesty, respect, inclusiveness, responsibility, initiative, and trust.

The priorities and actions of the Strategic Plan that are relevant to this asset management plan are summarized in the table below.

Strategic Priority	Strategic Action	How they are addressed in this Asset Management Plan
Responsible growth & environmental protection	To promote the stewardship, preservation, conservation, protection, and enhancement of the natural environment in East Gwillimbury	Infrastructure assets provide essential services to communities, and these infrastructure program can enhance the quality of life for residents and promote an environment to support businesses. This plan investigates the long-term planning of infrastructure assets.
	Ensure development occurs in a sustainable fashion, with a focus on preserving the Town's cultural heritage and environmental features	
	Attract and support business development and job creation in East Gwillimbury	
	Ensure that communities are built in a respectful manner, with resident and business quality of life protected.	
	Advocate for a variety of housing and employment options for residents in every stage of life	
Quality programs & services	Continue to develop high quality programs that promote healthy and active living that encompass the diverse interests of our residents	Assets exist to support and provide services to the community. Planning and long-term management of these assets is essential to the sustainability of these services.
	Provide programs and services that are inclusive, affordable, and accessible to all residents	
	Continue to build and leverage natural heritage features, allowing residents to connect with the environment	
	Continue to advocate for a safe and liveable community for our residents while leveraging opportunities and partnerships	
	Continue to support and promote the arts, culture, and heritage of East Gwillimbury	
Build Complete Communities	Enhance the Town's core infrastructure network including roads, sidewalks, water, sewer, and broadband	The asset management plan identifies the current state of the infrastructure and the current levels of service provided by the core infrastructure network: transportation, water, wastewater, and stormwater. In conjunction with the Long-term Financial Plan, Master Plans, and other key planning documents, the asset management plan will identify resources required to maintain the existing network and acquire new infrastructure. The 2025 update of this asset management plan will determine a proposed levels of service suitable to enhance existing infrastructure assets and revitalize key areas of the Town.
	Create infrastructure to support healthy and active lifestyles and connect residents with nature	
	Effectively manage new and existing assets to deliver exceptional services to residents while ensuring a sustainable community	
	Focus on improving availability and quality of telecommunications servicing	
	Revitalize and rejuvenation of key downtown areas to provide a sense of place for the community	

Strategic Priority	Strategic Action	How they are addressed in this Asset Management Plan
Culture of Municipal Excellence	Build an engaged and strategically aligned staff team to deliver high quality programs	Identification of risks and lifecycle needs within the asset management plan will better enable the Town to sustainably deliver infrastructure programs in a fiscally responsible way. The levels of service, risk, and lifecycle management plans document the current strategies of the Town to manage infrastructure assets. The 2025 update will identify innovative options for the Town's services to excel.
	Ensure strong fiscal responsibility and program delivery	
	Enhance Customer Service focused culture with increased engagement and communications	
	Build strong partnerships and leverage volunteerism for an engaged community	
	Continue to create an inclusive community that celebrates diversity	
	Foster an environment of innovation and flexibility	

In addition to alignment with the strategic direction of the Town, this asset management plan seeks to align to relevant legislation at the Provincial and Federal Level. The following table summarizes legislation applicable to all CORE asset categories and their relevance. Additional asset specific legislation is identified in Chapters 4 to 7.

Legislation	Requirement	Significance
Municipal Act, 2001	The Act is the main statute governing the creation, administration and government of municipalities in Ontario, specifying the powers and duties afforded to each municipality. A lower tier municipality may pass by-laws, subject to the rules set out in subsection (4), as follows: 1. Governance structure of the municipality and its local boards. 2. Accountability and transparency of the municipality and its operations and of its local boards and their operations. 3. Financial management of the municipality and its local boards. 4. Public assets of the municipality acquired for the purpose of exercising its authority under this or any other Act. 5. Economic, social and environmental well-being of the municipality, including respecting climate change. 6. Health, safety and well-being of persons. 7. Services and things that the municipality is authorized to provide under subsection (1). 8. Protection of persons and property, including consumer protection. 2006, c.32, Sched. A, s.8; 2017, c.10, Sched.1, s.2.	By-laws and other forms of governance serve as an element of the asset management strategies available to the Town. This Act places rules on by-laws the Town may wish to incorporate for asset management purposes.

Legislation	Requirement	Significance
Planning Act, R.S.O. 1990	The Act is a central piece of legislation governing land-use planning. The purposes of the act are: • to promote sustainable economic development in a healthy natural environment within the policy and by the means provided under this Act; • to provide for a land use planning system led by provincial policy; • to integrate matters of provincial interest in provincial and municipal planning decisions; • to provide for planning processes that are fair by making them open, accessible, timely and efficient; • to encourage co-operation and co-ordination among various interests; • to recognize the decision-making authority and accountability of municipal councils in planning.	Land use planning is one aspect of an asset management program, as it can influence the acquisition of new assets to accommodate growth.
Infrastructure for Jobs and Prosperity Act, 2015, and **the Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure**	The purpose of this Act is to establish mechanisms to encourage principled, evidence-based and strategic long-term infrastructure planning that supports job creation and training opportunities, economic growth and protection of the environment, and incorporate design excellence into infrastructure planning. Furthermore, to provide a framework for the development and implementation of the Town's Corporate Asset Management Program. It is intended to guide the consistent use of asset management practices across the organization, to facilitate logical and evidence-based decision making for the management of municipal infrastructure assets and to support the delivery of sustainable community services now and in the future. By using sound asset management practices, the Town will work to ensure that all municipal infrastructure assets meet expected performance levels and continue to provide desired service levels in the most efficient and effective manner. Linking service outcomes to infrastructure investment decisions will assist the Town in focusing on service, rather than budget driven asset management approaches.	The Act and Regulation provide a set of staged requirements, from 2019 to 2025 and beyond, that the Town's asset management program must adhere to. This asset management plan document contains content necessary to demonstrate the current levels of service of CORE infrastructure assets.
Development Charges Act, 1997	The council of a municipality may by by-law, impose development charges against land to pay for increased capital costs required because of increased needs for services arising from development of the area to which the by-law applies.	Acquisition of new assts due to growth falls under the purview of asset management strategies and should be considered within the asset management program. Development charges provide a mechanism to fund growth. Although not in the scope of this asset management plan, the financial impacts of growth at a quantitative level may be investigated in

Legislation	Requirement	Significance
		future iterations of the asset management plan.

A levels of service framework has been developed at an asset category level, contained within chapters 4 to 7 of this report. The levels of service framework document the current levels of service observed in 2021 (unless otherwise stated) for customer and technical levels of service. Customer values noted in this asset management plan have been derived from a variety of interactions with the public and Council that include and are not limited to, formal public information centres related to Official Plan, infrastructure master plan updates, and engineering project development, as well as feedback received from Council through reports, presentations, and workshops. Additionally, a review of historical Service Requests from the Town's customer relationship management system also contributes to customer value development. These values are proposed to be validated and/or updated, in concert with the developed of proposed service levels, required for the 2025 asset management plan.

The Town will be required to provide a proposed levels of service in 2025, and it is recommended that the Town engage the public to determine values and priorities. These inputs, supplemented with staff insight and technical plans and documents, will better enable the Town to determine a proposed levels of service that balances the desires of service users with constraints of service providers.

2.6.2 State of the Infrastructure

Asset Portfolio Replacement Value

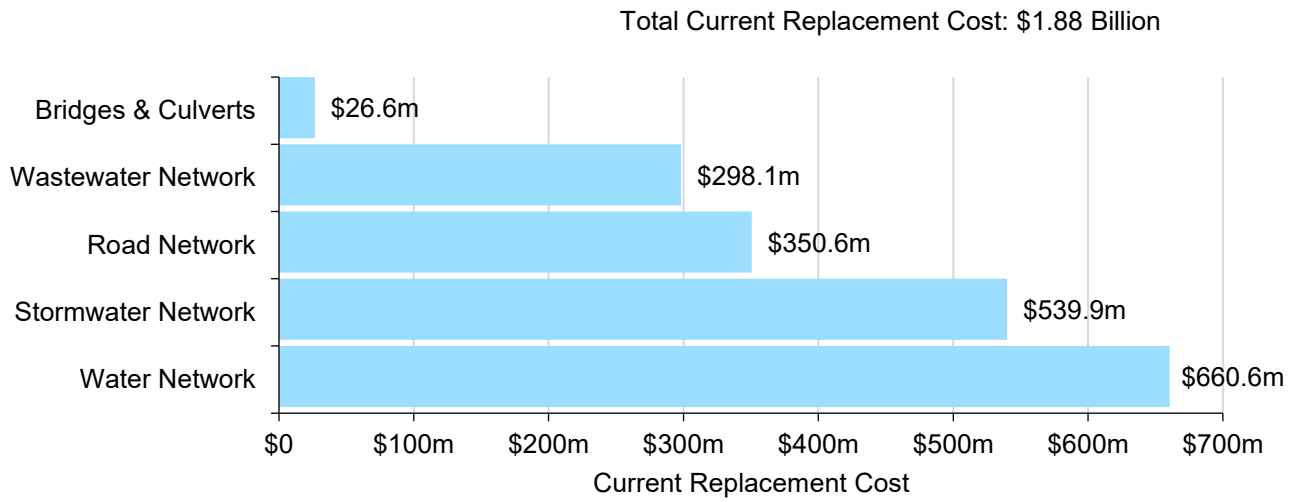
The asset categories analyzed in this asset management plan have a total replacement cost of $1.88 billion based on inventory data from 2021. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.

The following table identifies the replacement value, average annual requirement, and the methods employed to determine replacement costs across each asset category.

Asset Segment	Replacement Value	Average Annual Requirement		Replacement Cost Method
		2022 - 2031	Long-term[7]	
Road Network	$350,568,032	$4,709,907	$4,890,592	Cost/Unit & User-Defined
Bridges & Culverts	$26,595,135	$815,500		User-Defined
Stormwater Network	$539,877,630	$5,618,401	$11,579,579	CPI
Water Network	$660,571,406	$4,945948	$13,077,195	CPI
Wastewater Network	$298,080,443	$878,015	$5,771,915	CPI
TOTAL	**$1,875,692,646**	**$17,293,423**	**$35,940,625**	

The graph below visually illustrates the total replacement cost for each asset category.

[7] Theoretical value considering the requirements averaged over the full lifecycle of every asset

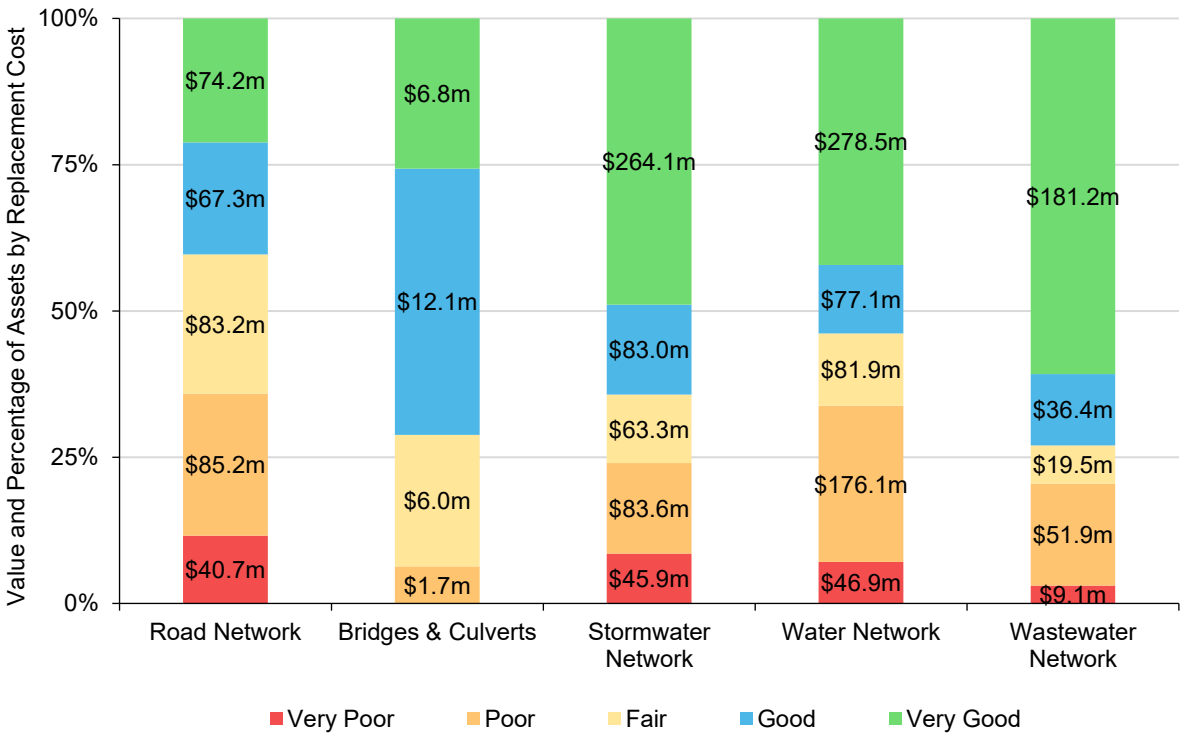


Asset Portfolio Condition

The current condition of the portfolio is central to all asset management planning. In summary, 71% of assets in the Town are in fair or better condition. Of note, approximately 49% of core assets were constructed within the last 11 years. There is a small backlog consisting of 2% of assets, representing those in need of renewal or replacement. The backlog represents the total value of overdue renewal, rehabilitation, and replacement needs for each asset. Specifically, roads, bridges and culverts, and storm ponds have backlogs defined as the total value of capital lifecycle costs for triggers that have not been met (e.g., ponds that have exceeded the dredging criteria); all other assets utilize a replace at end-of-life strategy and have the backlog defined as the total replacement value of assets where the age exceeds the estimated useful life. These estimates rely on both age-based condition and field recorded condition data. The following table identifies the average condition and condition data source across each asset category.

Asset Segment	Average Condition	Backlog	Condition Assessment Method
Road Network	63%	$15.5m (4%)	81% Assessed
Bridges & Culverts	75%	$2.0m (8%)	100% Assessed
Stormwater Network	67%	$3.4m (6.3%)	5% Assessed
Water Network	72%	$20.6m (3%)	Age-Based
Wastewater Network	61%	$1.3m (4%)	Age-Based
TOTAL	**65%**	**$42.8m (2.3%)**	**18% Assessed**

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale.

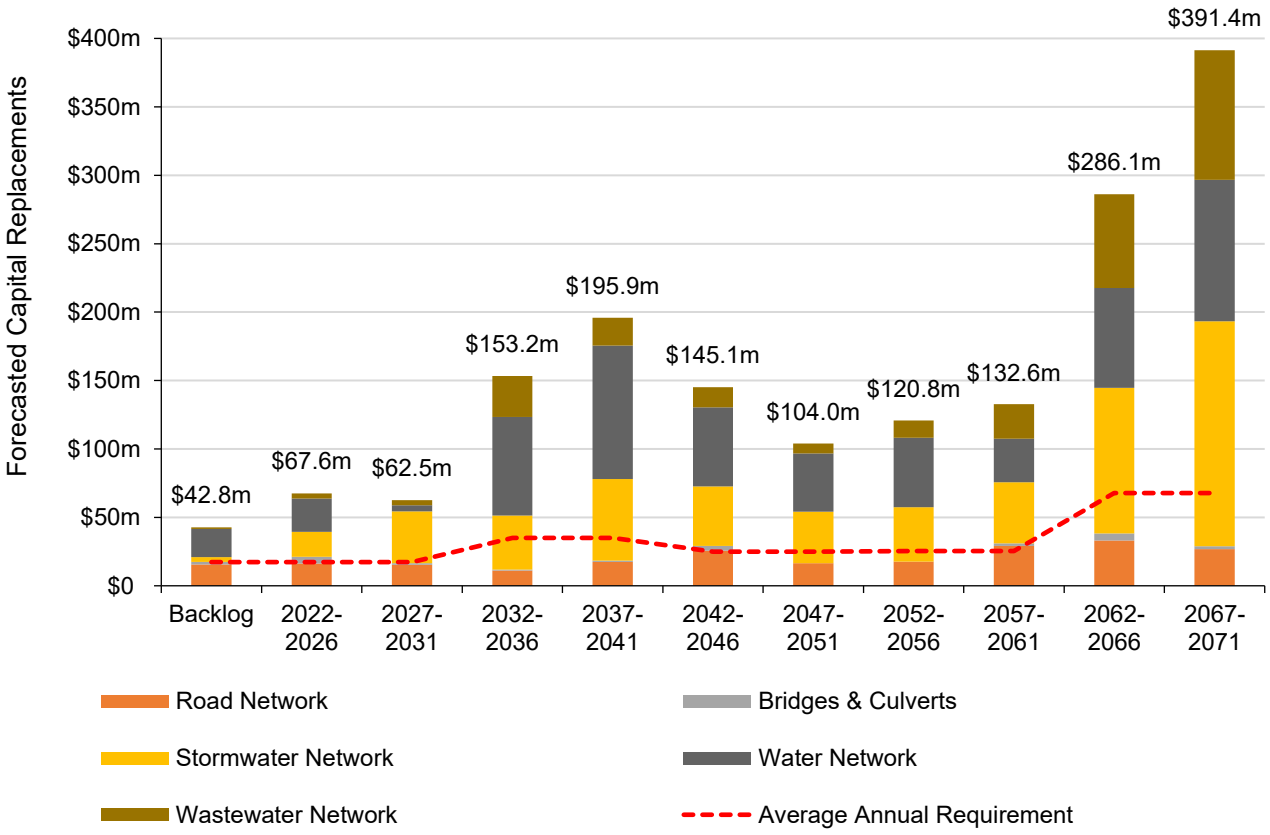


Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the Town can produce an accurate long-term capital forecast. The following table identifies the average annual capital requirements for each asset category for the next 10 years.

Category	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Road Network	$4.9m	$3.0m	$2.3m	$3.0m	$3.0m	$3.1m	$5.7m	$2.9m	$2.1m	$1.7m	$31.6 m
Bridges & Culverts	$770k	$450k	$1.6m	$230k	$2.0m	$530k	$150k	$180k	$270k	$0	$6.2m
Stormwater Network	$48k	$8k	$2.7m	$14.6m	$851k	$14.8 m	$2.8m	$8.0m	$3.2m	$9.1m	$56.0 m
Water Network	$821k	$236k	$75k	$22.9m	$352k	$626k	$447k	$1.6m	$1.5m	$402k	$28.9 m
Wastewater Network	$0	$27k	$0	$3.8m	$0	$1.4m	$82k	$0	$0	$2.2m	$7.5m
TOTAL	**$6.5m**	**$3.7m**	**$6.6m**	**$21.5m**	**$6.2m**	**$20.4m**	**9.2m**	**$12.6 m**	**$7.0m**	**$13.4 m**	**$130.2 m**

The graph below identifies capital requirements over the next 50 years for each asset category. The forecasted requirements are aggregated into 5-year bins.


Forecasted Capital Replacements
$400m
$350m
$300m
$250m
$200m
$150m
$100m
$50m
$0
$42.8m
$67.6m
$62.5m
$153.2m
$195.9m
$145.1m
$104.0m
$120.8m
$132.6m
$286.1m
$391.4m
Backlog
2022-2026
2027-2031
2032-2036
2037-2041
2042-2046
2047-2051
2052-2056
2057-2061
2062-2066
2067-2071
Road Network
Bridges & Culverts
Stormwater Network
Water Network
Wastewater Network
Average Annual Requirement

3 Growth

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Town to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

3.1 East Gwillimbury Official Plan

The Official Plan establishes the vision for long-term growth and development within the Town. The Plan provides policy guidance on land uses for parks, employment, housing, and other uses and informs the long-term objectives for core infrastructure and public services such as transportation, water, and wastewater.

The Town of East Gwillimbury adopted an updated Official Plan in 2022. The vision of the plan is to develop a sustainable community and ensure that growth does not place an undue financial burden on the residents of the Town. The Official Plan is developed in accordance with the Provincial Policy Statement (2005), the Provincial Growth Plan "Places to Grow", the Lake Simcoe Protection Plan, Green Energy & Economy Act and Greenbelt Plan.

The Plan is also structured to conform to the Region of York Official Plan, as well as the Region's comprehensive infrastructure master plans and Planning for Tomorrow. York Region has proposed a new Official Plan in 2022. Population and employment growth projections for the Town of East Gwillimbury were defined and utilized in the most recent version of the Town's Official Plan. The York Region population is projected to increase from 1.2 million residents to over 2 million residents by 2051. The Official Plan provides a regional analysis of this growth along with policy objectives to support efficient growth and a diversified economy for all municipalities within its borders.

3.2 Infrastructure Master Plans

The Town of East Gwillimbury has developed several key master plans that serve as guiding documents for municipal services with the expected growth. The master plans are deemed to be an integral component of the Town's Official Plan. East Gwillimbury has a Water and Wastewater Master Plan (2009), Transportation Master Plan (2010), and Stormwater Management Master Plan (2009). These plans will be regularly reviewed and updated every 5 years.

The Water and Wastewater Master Plan was developed with significant residential and employment growth in mind and is currently being updated. The target residential and employment population projections utilized in this study are 150,000 and 75,000 respectively. The Plan states that with expected growth, the previous water supply proposals will not be sufficient; the proposed water storage capacity must meet the Ministry of Environment, Conservation and Parks (MECP)'s requirements for peak equalization, fire and emergency uses. The Plan also states that the Region's wastewater collection and treatment system will require expansion to accommodate growth in East Gwillimbury.

The Transportation Master Plan is currently being updated. The updated Plan will identify the long-term transportation goals as well as specific solutions requiring further study. Some of the study subjects are already defined, such as public and stakeholder engagement, multimodal networks, managing peak travel demand, and community-oriented traffic control.

The Stormwater Management Master Plan is intended to prepare a practical framework that balances infrastructure and development requirements with economic, social, and environmental constraints. The Plan provides input to improve the management of stormwater for both existing and planned development. The Plan includes an assessment which found that a general increase in peak flow will occur as a result of proposed development. A post-to-pre approach (post-development infiltration must be equal to the pre-development infiltration) will be required and in some cases an over-control approach may be needed. This plan is proposed to be updated in 2023.

The Master Plans for core infrastructure largely indicate that the Town must integrate notable considerations for population and employment growth in new development. Further studies may be required to update the plans and strategies to improve growth management.

3.3 Growth Trends and Demand Drivers

Historically, the Town has experienced population growth above the national average. According to the 2021 Census, East Gwillimbury is the fastest growing municipality in Canada with over 44% population growth between 2016 and 2021. Population and employment in the Town is expected to continue to increase at significant rates.

This asset management plan relies on growth projections that were identified as part of East Gwillimbury's 2022 Official Plan review. The following table summarizes population and employment projections.

Type	Location	Current	2031	2041	2051
Population	Central Growth Area	24,500	45,300	68,000	113,600
	Mount Albert	6,000	8,000	8,000	8,000
	Rural Area	6,000	6,000	6,000	6,000
	TOTAL	**36,500**	**59,300**	**82,000**	**127,600**
Employment	Central Growth Area	8,300	14,300	23,500	40,800
	Mount Albert	1,000	1,500	2,000	2,000
	Rural Area	1,000	1,000	1,000	1,000
	TOTAL	**10,300**	**16,800**	**26,500**	**43,800**

The Town of East Gwillimbury is projected to experience significant growth; population growth of 62% between 2021 and 2031 and 250% growth between 2021 and 2051. Employment is projected to follow a similar growth trend as population with 63% growth between 2021 and 2031 and 325% growth between 2021 and 2051.

As stated in the Official Plan, the Town will continue to support a wide range of employment opportunities and a diverse economy within its borders. East Gwillimbury is committed to diversifying commercial land use while also supporting the existing rural/agricultural economy.

3.4 Impact of Growth

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

By July 1, 2025, the Town's asset management plan must include a discussion of how the assumptions regarding future changes in population and economic activity informed the preparation of the lifecycle management and financial strategy. In this asset management plan, high-level analysis has been conducted to determine infrastructure and service needs that will result from projected growth. This analysis includes consideration of new acquisition and the related capital and operations and maintenance costs as well as potential staffing demands.

Of specific note, availability of wastewater allocation to service new development demand is limited. York Region's Upper York Sewage Solution, proposed for 2031, is the preferred solution to expand treatment capability for East Gwillimbury. Growth projections outlined in this plan are subject to the timing of this solution coming on-line.

3.4.1 Infrastructure Acquisition

Population and employment growth in East Gwillimbury is projected to necessitate significant development and asset acquisition. Municipal staff utilized population growth projections and the existing inventory to predict the amount of linear assets that may be required to support growth. These figures for each asset category can be found in sections 4.4.2, 5.4.2, 6.4.2, and 7.4.2.

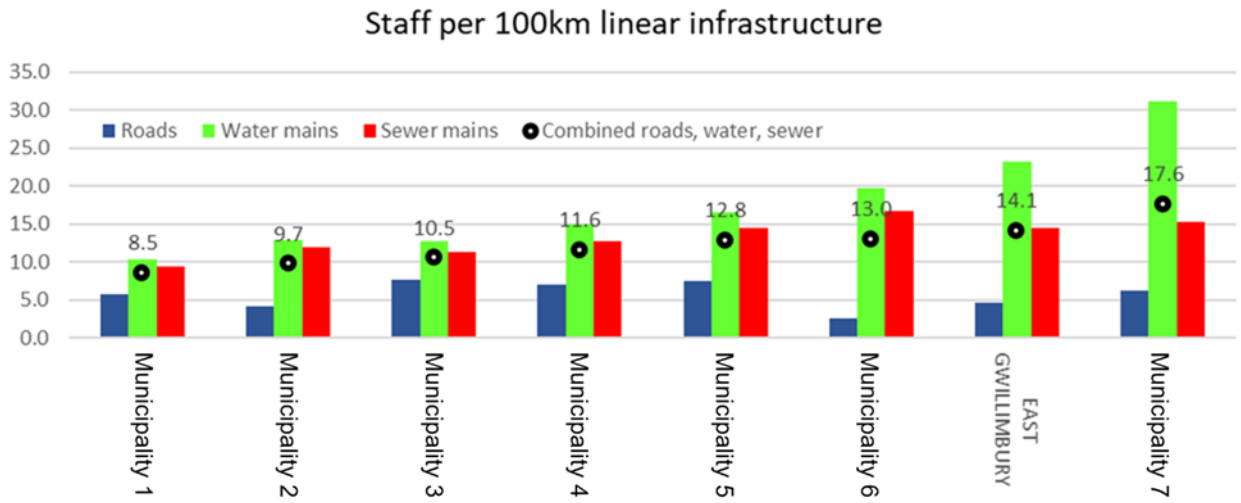
A financial analysis of the projected asset acquisition can be found in section 8.7. The average annual capital requirements for existing and newly acquired linear assets are estimated to be $72 million. The average annual operating and maintenance

requirements for existing and newly acquired assets are estimated to be $33 million.[8] This roughly doubles the current capital and operating requirements of the Town.

3.4.2 Impacts on Staffing

Each department is expected to require additional staffing to support growth and new development in the Town. Some divisions have already limited staffing to manage existing infrastructure. Newly acquired assets will require more staff resources to undertake the planning, lifecycle management, and administration needed to maintain the desired level of service.

The graph below shows staff complement per 100km of linear infrastructure in East Gwillimbury and compared with neighbouring communities. These statistics account for leadership, engineering, operations and maintenance technical staff members.



Staff compliment range from 8.5 full time equivalents to 17.6 per 100 km; East Gwillimbury is currently at 14.1 staff members per 100 km of linear infrastructure. Of this preliminary analysis, there is no direct correlation amongst the comparator group. This is due to a variety of factors including but not limited to:

- the level of service each municipality provides;
- the nature of core infrastructure assets each municipality manages; for example, complex assets such as the greater number of wastewater pumping stations and bridges each municipality manages, require more resources;
- the organization's structure and role and responsibility definition;
- the degree to which information technology is applied and the process efficiencies they bring.

It is very likely that East Gwillimbury will need to expand its team of 36, made up of leadership, engineering, operations and maintenance technical staff members, to accommodate population growth and asset acquisition.

[8] Asset acquisition is projected to the year 2051, however, the funding analysis was projected out to 2100 assuming no additional acquisition after 2051.

4 Transportation

The transportation system is a made up of a large inventory of roads, bridges, culverts, sidewalks, and roadside appurtenances. Each asset contributes to the provision of safe and efficient transportation services. The Town's roads, bridges, and sidewalks are maintained by the Road Operations and Engineering branches within the Community Infrastructure & Environmental Services department.

4.1 Summary of the Assets

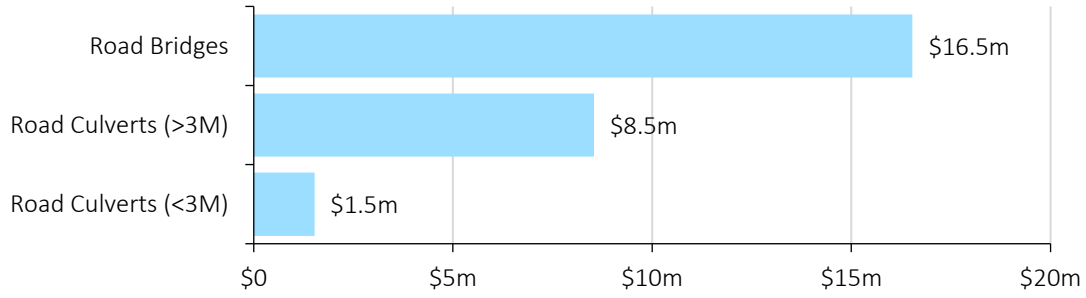
4.1.1 Asset Inventory & Costs

Bridges & Culverts

The following table includes the quantity, total replacement cost and replacement cost method of each asset in the Town's bridge and structural culvert inventory.

Asset Segment	Quantity	Replacement Value	Replacement Cost Method
Road Bridges	17 Assets 3,260 m^2	$16,533,329	User-Defined
Road Culverts (<3M)	4 Assets 203 m^2	$1,525,000	User-Defined
Road Culverts (>3M)	12 Assets 1,819 m^2	$8,536,806	User-Defined
TOTAL		**$26,595,135**	

The graph below visually illustrates the total replacement cost for bridges and culverts.

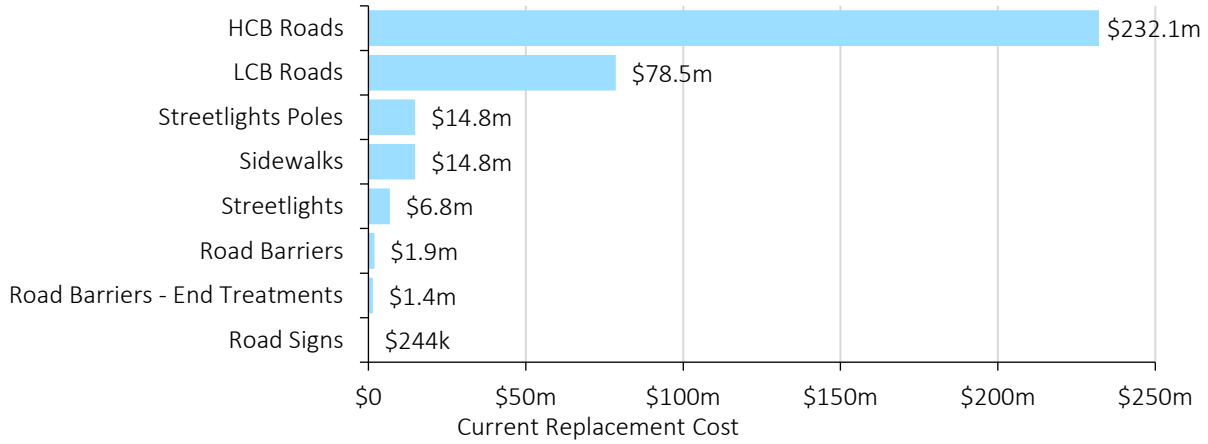


Road Network

The following table identifies the quantity, total replacement cost, and replacement cost method of each asset segment in the Town's road network inventory.

Asset Segment	Quantity	Replacement Value	Replacement Cost Method
HCB Roads	157,107.94 Meters	$232,074,721	Cost/Unit
LCB Roads	82,388.28 Meters	$78,532,467	Cost/Unit
Road Barriers	5,632.01 Assets	$1,886,722	Cost/Unit
Road Barriers - End Treatments	142 Assets	$1,420,000	User-Defined
Road Signs	3,054 Assets	$244,320	User-Defined
Sidewalks	128,288 Assets	$14,817,293	Cost/Unit
Streetlights	3,779 Assets	$6,768,480	User-Defined
Streetlights Poles	3,014.00	$14,824,030	User-Defined
TOTAL		$350,568,032	

The graph below visually illustrates the total replacement cost for each asset segment in the Town's road network.



4.1.2 Asset Condition & Age

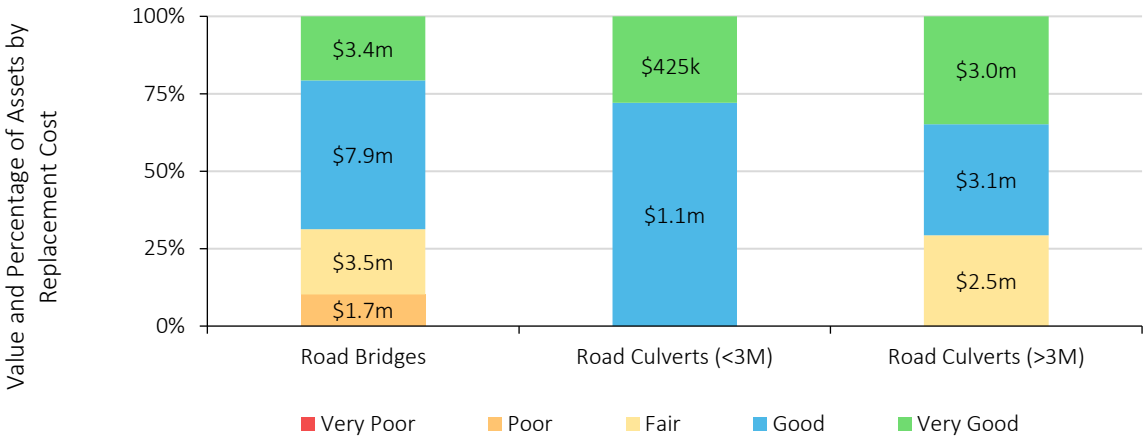
Bridges & Culverts

The following table identifies the average condition, condition assessment method, average age, and estimated useful life for bridges and culverts. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition	Condition Assessment Method	Estimated Useful Life (Years)	Average Age (Years)
Road Bridges	73%	100% Assessed	75	28.7
Road Culverts (<3M)	78%	100% Assessed	50	61.0[9]
Road Culverts (>3M)	81%	100% Assessed	50	21.1
TOTAL	75%	100% Assessed		

[9] Although this culvert's age exceeds the estimated useful life, the 2021 bridge inspection report rated this structure as having an overall good condition

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale



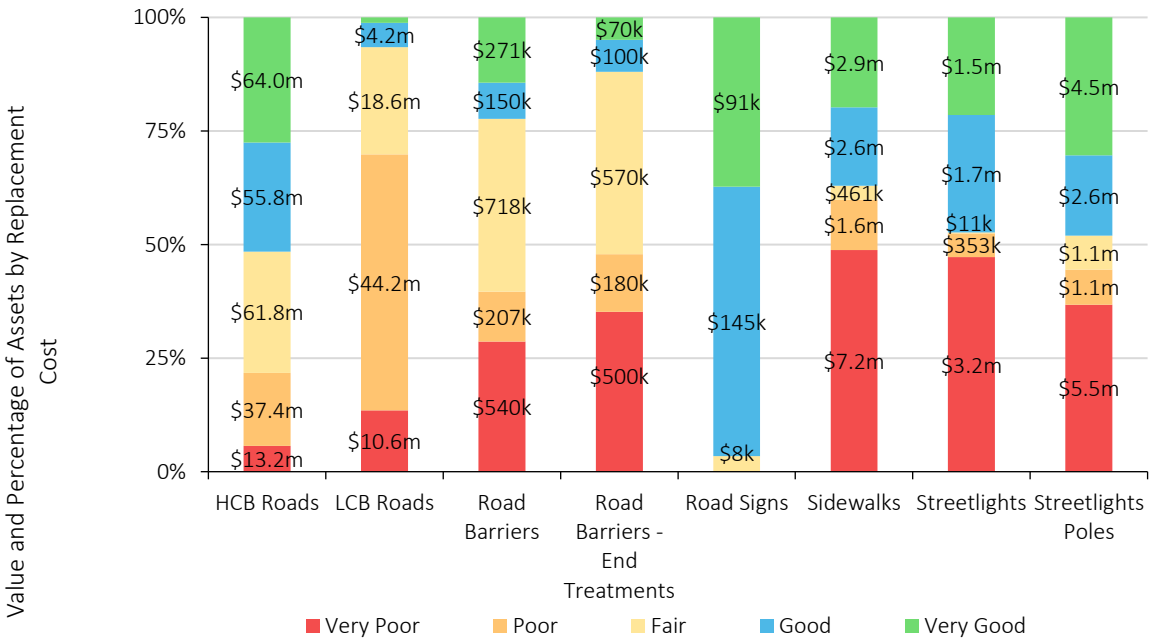
Of special note, bridge nos. 000110, 000113 and 000114 have declined in condition state since the data set for this plan was compiled. Bridge No. 000113 was closed in January 2022 and bridge no. 000114 is proposed to be closed prior to the start of the 2022-2023 winter operations season. Tonw staff are undertaking the engineering design for their replacement. Holding strategy(s) for bridge no. 000110 are being investigated in order to provide short term benefit and hold the bridge in its current condition state until bridge nos. 000113 and 000114 are replaced.

Road Network

The following table identifies the average condition, condition assessment method, average age, and estimated useful life for each asset segment in the road network. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition	Condition Assessment Method	Estimated Useful Life (Years)	Average Age (Years)
HCB Roads	72%	89% Assessed	20	16.4
LCB Roads	50%	99% Assessed	20	10.6
Road Barriers	40%	Age-Based	30	21.9
Road Barriers - End Treatments	32%	Age-Based	30	23.0
Road Signs	74%	99% Assessed	10	82.7[10]
Sidewalks	35%	Age-Based	20	19.3
Streetlights	40%	Age-Based	20	17.1
Streetlights Poles	46%	Age-Based	25	16.1
TOTAL	63%	81% Assessed		

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale. Of the assets in very poor condition $15.5m are currently backlog, representing 4.4% of the Roads portfolio



4.2 Levels of Service

The following tables identify the Town's current level of service for the transportation network. These metrics include the technical and community level of service metrics that are required as part of Ontario Regulation 588/17 as well as additional

[10] In-service dates for road signs will need to be reviewed for accuracy. However, condition assessments exist, and these results are used to inform the overall condition and replacement needs.

performance measures that the Town has selected in accordance with best practices defined by the International Infrastructure Management Manual (IIMM).

4.2.1 Customer Research and Expectations

The following table provides a high-level summary of the customer values and customer satisfaction measures that will guide future assessments of the customer levels of service through a public forum.

Customer Values	Customer Satisfaction Measure
The transportation network is safe to use	Infrastructure is suitably configured and predictable to use within the network's operating expectations
The transportation network is convenient, reliable, and available to use	The quality of infrastructure do not negatively impact the travelling experience
	The transportation network can support all types of traffic
	The Transportation Network gets me to my destination quickly

4.2.2 Legislative Requirements

There are several legislative requirements relating to the management of the transportation network. The table below summarizes some of the key requirements that apply specifically to the transportation network. Legislative requirements that apply to all assets are summarized in Section 2.5.

Legislation	Requirement	Significance
Ontario Regulation 239/02: Minimum Maintenance Standards for Municipal Highways	The Regulation requires that a municipality comply to a minimum standard of repair for highways under the municipality's jurisdiction. Minimum maintenance standards prescribe a response time and response criteria for winter maintenance and the repair of road defects. The regulation classifies roads into 6 classifications, based on traffic loading and speed limit, that determine the standard that applies.	Roads and bridges require a minimum level of repair, which can influence the Town's operations and maintenance programs. Roads that are a lower class (higher speed limit and traffic loading) will need to be maintained at a greater service level.
Ontario Regulations 104/97, 160/02 and 472/10: Standards for Bridges	The regulation specifies a set of procedures and standards that the municipality must adhere to when designing, inspecting, and maintaining the integrity of bridges and structural culverts. The regulation mandates that a bridge's safety and structural integrity must be assessed at least every second calendar year under the direction of a professional engineering, according to the Ontario Structural Inspection Manual (OSIM).	The OSIM inspection and reporting process has a significant operating cost for the Town. Additionally, findings of this report can influence the planned lifecycle activities and be used to prioritize those bridges that have safety or structural integrity concerns.

4.2.3 Customer Levels of Service

The following table identifies the current performance of the transportation network within three overarching measures of the customer experience: quality, function, and capacity.

Type of Measure	Level of Service	Performance Measure	Current Performance
Quality	Condition of Roads, bridges, and structural culverts	% of the network in very poor condition	12%
		% of the network in poor condition	24%
		% of the network in fair condition	24%
		% of the network in good condition	19%
		% of the network in very good condition	21%
		Average pavement condition index (PCI) for HCB paved roads in the Town	72%
		Average pavement condition index (PCI) for LCB paved roads in the Town	50%
		Average Bridge Condition Index (BCI) of Road Bridges	71%
		Average Bridge Condition Index (BCI) of Structural Culverts	81%
		Description or images of the condition of bridges and structural culverts, and how this would affect the use of bridges and culverts	See Appendix B
		Average surface condition for unpaved roads in the Town	N/A
		Description or images that illustrate the different levels of road class pavement condition	See Appendix B
		Average detour distance	15.5 km
Function	Scope of arterial, collector, and local roads in the Town	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km2)	0 km
		Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km2)	115.6 km
		Lane-km of local roads (MMS classes 5 and 6) per land area (km/km2)	364.5 km
	Measure of appropriateness and connectivity of the transportation network	Description, which may include maps, of the road network in the municipality and its level of connectivity.	See Appendix B
		Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	See Appendix B
Capacity	Measure of whether the service is adequate to meet traffic needs	Cycling measure(s) to be updated and included in the 2024 asset management plan	
		Pedestrian traffic measure(s) to be updated and included in the 2024 asset management plan	
		% of network in service category A	Proposed to be included in 2024 asset management plan
		% of network in service category B	
		% of network in service category C	
		% of network in service category D	
		% of network in service category E	
		% of network in service category F	

4.2.4 Technical Levels of Service

The following table identifies the current level of service of the transportation network within two overarching measures of the technical asset performance: lifecycle activities and service quality.

Type of Measure	Level of Service	Performance Measure	Current Performance
Lifecycle Activities	Acquisition	Frequency	As identified in plans and studies
		Budget	See Section 8.7
	Operation	Road Inspections	Ongoing
		Line Painting	Annual
		Street Sweeping	Annual
		Gravel Road Dust Control	Annual
		O&M Budget	$3,492,939
	Maintenance	Pothole Patching	Ongoing – identified from routine inspections
		Crack Sealing	As per trigger identified in Pavement Management System
		Winter Maintenance	Undertaken at each winter event
		Sightline Maintenance	Three times per year
		Gravel Road Grading	Annual
		Gravel Road Shoulder Work	As Needed
		Sidewalk Concrete Repair	Annual
		Grinding Trip Ledge	Annual
		O&M Budget (2021)	$3,492,939
	Renewal	Frequency	Budgeted and prioritized as per Pavement Management System and routine inspections
		Budget	$5.44 million average annual requirement
	Disposal	Frequency	Disposed assets are accounted for within the renewal process
		Budget	Part of renewal costs
Service Quality	Staff Capacity	Full-time Engineering staff members divided by lane km of roads	10 / 480 lane km = 0.021
		Full-time Operations staff members divided by meters of roads	16 / 480 lane km = 0.033
		Full-time Engineering staff members divided by total number of service requests	10 / 498 = 0.02
		Full-time Operations staff members divided by total number of service requests	16 / 498 = 0.032
		Number of service requests divided by total lane kilometer of roads	498 / 480 = 1.04

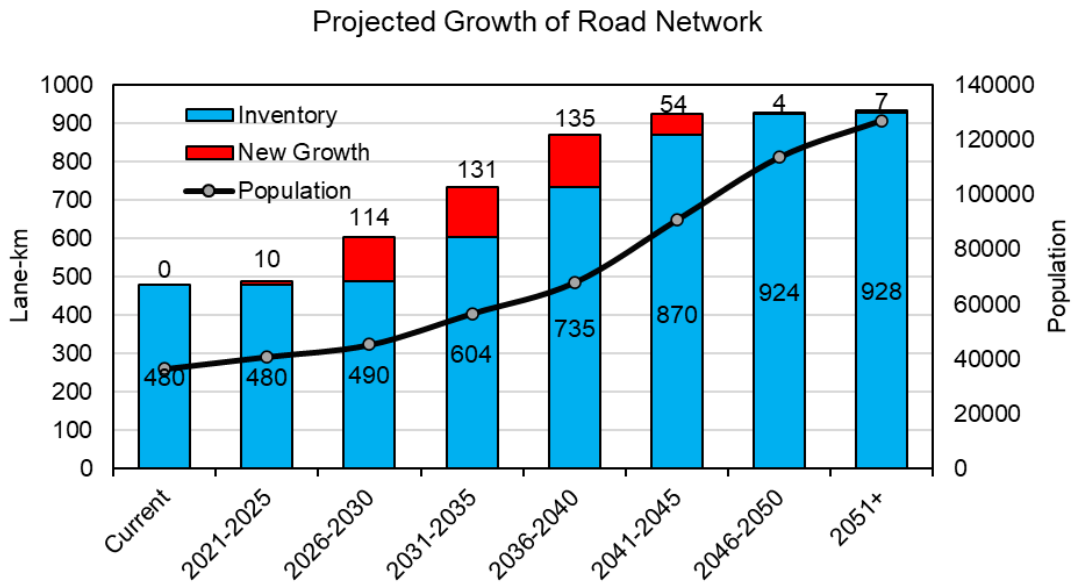
4.3 Growth Management Plan

4.3.1 Trends

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

4.3.2 Population and Economic Growth Forecasts

Growth of population within the Town results in a need to acquire new transportation infrastructure. Between DC bylaw and developer contributed assets, the road network is expected to double in size by 2051, with significant growth occurring between years 2026 and 2040. This growth generally follows the expected population growth, as illustrated in the figure below. Growth in the transportation network will place pressure on staff time and resourcing to undertake the necessary lifecycle activities to manage service levels.



4.3.3 Demand Impact on Assets

As a result of growth, additional demand will be placed on the transportation network. The following table summarizes the demand drivers and expected impact on services.

Demand drivers	Description	Impact on services
New Servicing	New development is expected to accommodate growth of the town. This will require new transportation assets to service new households and businesses, and may increase traffic loads on existing transportation assets	Increased traffic loads will cause roads to deteriorate more rapidly, which may lead to decreased service levels or higher lifecycle costs. The Town may consider new lifecycle activities, such as micro-surfacing, to reduce the rate of deterioration. Servicing of new households and business will require the acquisition of new assets, which will add to the capital, maintenance, and operating requirements if the Town wishes to maintain current service levels.

Demand drivers	Description	Impact on services
		The major east-west corridor of the rural transportation network may require road widening, turning lanes, and traffic signals to maintain service levels.
Climate Change	An increased frequency and intensity of storm events is expected.	If the stormwater network cannot manage the increased storm demands, transportation infrastructure may be damaged during storm events. Heavier and more frequent snowfall events may challenge staffing resources to respond in a timely manner and clear the roads for users.
Urbanization	New growth and development will grow urban areas, which have different service expectations from rural areas.	Transitioning gravel and surface treated roads to paved roads will require more capital intensive lifecycle management. As the Town densifies from urban growth, roads and bridges may have increased traffic loads and speed limits, resulting in higher maintenance requirements to comply with the Minimum Maintenance Standards. Populations that move from larger urban areas in the south (e.g. Toronto and surrounding area) will be accustomed to a higher level of service. This change in demographics may result in a higher expectations for the Town's transportation services.
Regional Drivers	Additional transportation assets may be downloaded from the region, or uploaded to the region.	Any new roads the Town acquires from York Region will result in additional maintenance requirements, further consuming staff resources and budgets.

4.3.4 Impact on Staffing

Staffing needs are expected to scale with population growth, as demonstrated in Section 3.4.2. Staff have identified limited capacity in the Road Operations and Engineering departments to deal with projected growth. The Town may need to consider contracting out work if staff resources do not scale appropriately with growth. Finding new avenues of funding, along with a focus on project prioritization, can reduce the impact on staffing.

4.4 Lifecycle Management Plan

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

4.4.1 Background Data

Condition Assessment Strategies

The condition of bridges and structural culverts is established via biennial inspections, which produce a bridge condition index (BCI) score for each structure, as well as detailed condition information on each structure element.

The condition of roads is collected every two years by an external consultant, utilizing a detailed visual inspection of the entire network. A pavement condition index (PCI) and surface distress index (SDI) are calculated from observed defects, geometry and drainage, and rideability.

Streetlights, barriers, sidewalks, signs and signals are assessed through a combination of age-based condition where the useful life and age is used to estimate deterioration, inspection records where defects are noted, and engineering studies.

All transportation assets have their respective condition ratings transformed to a 0 - 100 condition rating scale, spread across five condition increments: very poor, poor, fair, good, very good. This scale conforms with the 1 - 5 grading system specified in the Canadian Infrastructure Report Card – Rating Scale for Asset Condition. Appendix C outlines these condition ranges.

Asset Capacity and Performance

Infrastructure assets provide the Town value by enabling the delivery of key services. Over time these assets will deteriorate, which will lower the service they provide. The following is a summary of capacity and performance considerations for the transportation network:

- Bridges and structural culvert deficiencies are documented in detail as part of the biennial OSIM inspection process. Loading and dimensional restrictions and criticality of deficiencies are identified for each structure.
- The road network is organized into functional classes and maintenance classes, which determine the level of maintenance they require, the type of traffic they can accommodate, speed limit, and volume of traffic.

4.4.2 Acquisition

The following table identifies expected asset acquisition based on the current asset inventory, projected population growth, and the development charges background study.

Asset Type	Source	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046 -2050	2051+
Roads (lane-metre)	DC Bylaw	0	0	0	42,752	16,100	9,921	0
	Developer Contributed	9,921	114,216	131,147	92,032	37,403	4,353	7,019
	Total	**9,921**	**114,216**	**131,147**	**134,784**	**53,503**	**14,274**	**7,019**
Streetlight Fixture (count)	DC Bylaw	0	0	862	228	238	0	0
	Developer Contributed	112	1,268	1,463	1,028	414	53	80
	Total	**112**	**1,268**	**2,325**	**1,256**	**652**	**53**	**80**
Streetlight Pole (count)	DC Bylaw	0	0	862	228	238	0	0
	Developer Contributed	112	1,268	1,463	1,028	414	53	80
	Total	**112**	**1,268**	**2,325**	**1,256**	**652**	**53**	**80**
	DC Bylaw	0	0	21,235	56,780	59,010	0	0

Asset Type	Source	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046 -2050	2051+
Sidewalk (metre)	Developer Contributed	4,695	58,541	65,366	45,550	19,354	912	3,121
	Total	**4,695**	**58,541**	**86,601**	**102,330**	**78,364**	**912**	**3,121**
Bridge (count)	DC Bylaw	1	0	2	4	2	0	0
	Developer Contributed	0	3	4	3	1	0	0
	Total	**1**	**3**	**6**	**7**	**3**	**0**	**0**
Culvert (count)	DC Bylaw	0	0	5	10	0	0	0
	Developer Contributed	0	3	4	3	1	0	0
	Total	**0**	**3**	**9**	**13**	**1**	**0**	**0**

See section 3.3 for growth projections.

Acquiring new assets will require additional operating and maintenance requirements in addition to capital costs.

4.4.3 Operations and Maintenance Plan

The following table identifies actual operations and maintenance spending for the transportation network within the last three years. A summary of these activities, including their frequency, is provided in section 4.2.4.

Year	Operations and Maintenance Actuals & Budget $
2019 (actual)	$3,493,926
2020 (actual)	$3,327,036
2021 (actual)	$3,492,939

4.4.4 Renewal/Replacement Plan

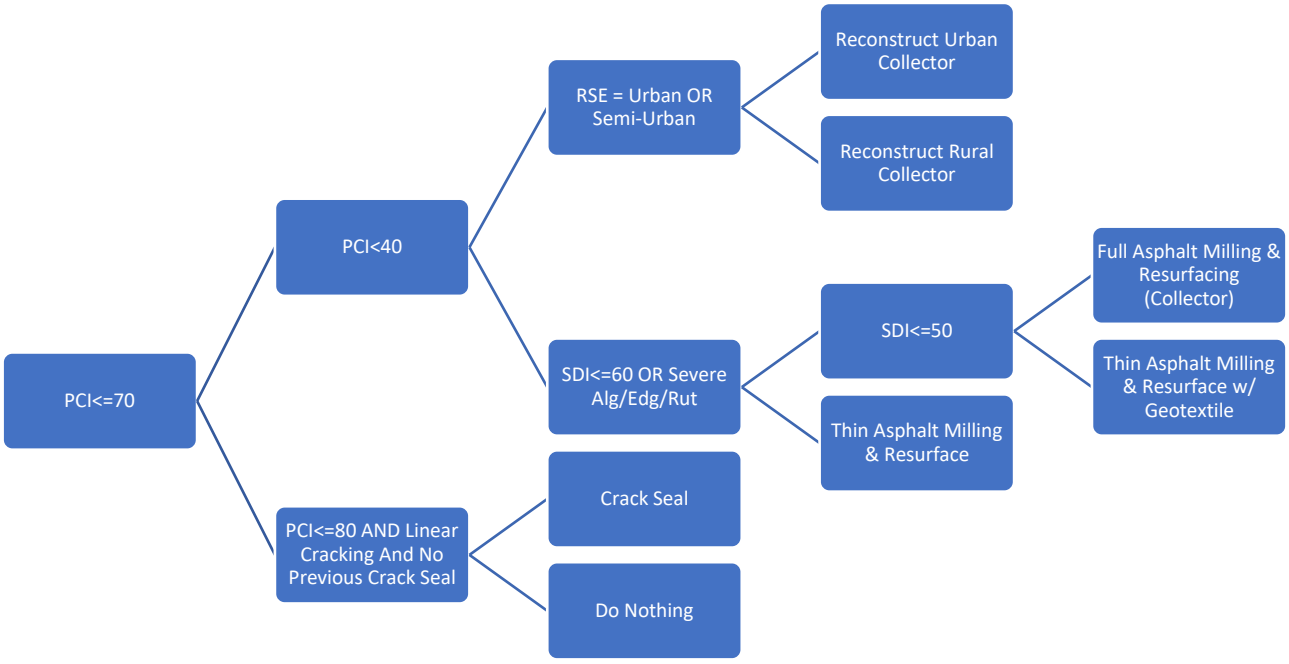
The Town of East Gwillimbury currently owns 480 lane-km of road surfaces, that are either in-service or on maintenance. Of these roads, 410 lane-km are assumed, and the remainder are unassumed. The renewal and replacement strategy for asphalt roads uses a combination of thin asphalt milling and resurfacing, full asphalt milling and resurfacing and reconstruction. Surface treated roads are generally resurfaced on a regular cycle, when the pavement condition index drops below 55. specific triggers for these activities are dependent on numerous factors, including pavement condition index, surface distress index, roadside class and material.

Projections of renewal and replacement requirements have been modelled in two ways within this plan. Assumed roads are modelled using Stantec's Road Matrix Pavement Management System, and unassumed roads are modelled using PSD's Citywide Asset Manager.

Bridge and culvert renewals are scheduled as per the cost estimates and timelines recommended by the 2021 OSIM report.

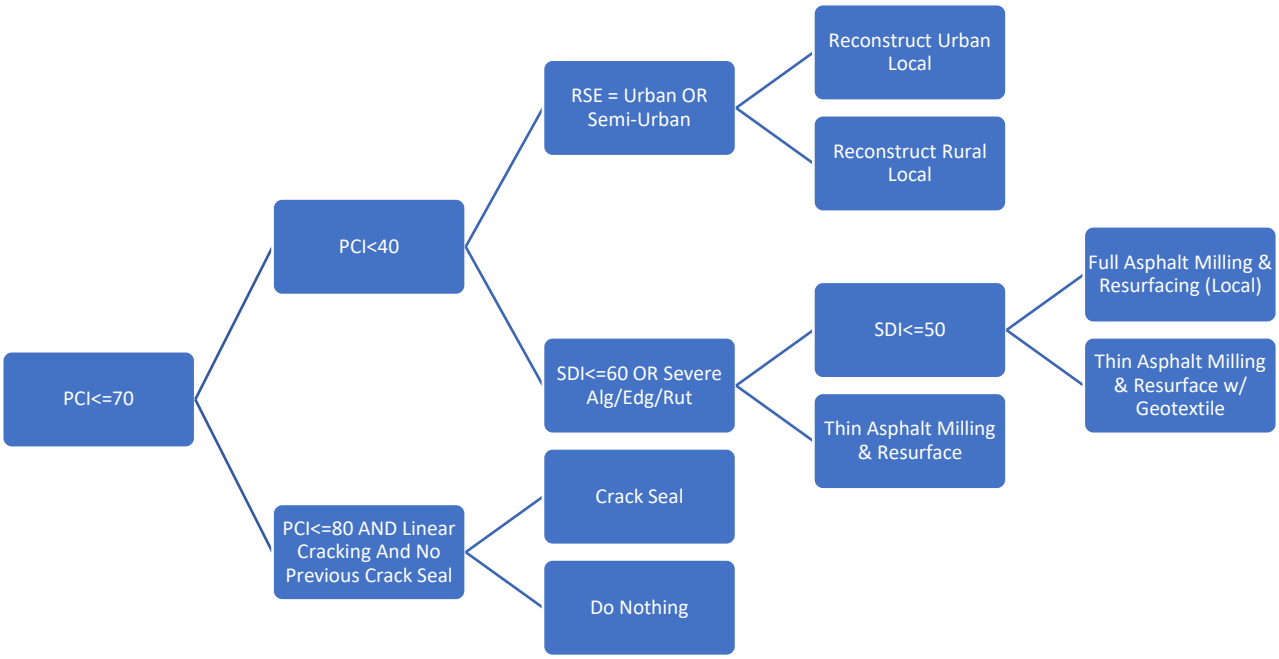
Renewal/Replacement Strategy: Assumed Assets

Asphalt roads are triggered for rehabilitation and replacement via the decision trees developed by Stantec's PMS. High traffic paved roads follow the logic in the first figure and include the following: Rural (1000ADT and over); Semi-urban/Urban (Collector Commercial or Industrial, Collector Residential, Local Commercial, and Industrial). Low traffic paved roads follow the logic of the second figure and include the following: Rural (under 1000 ADT); Semi-Urban/Urban (Alleyway, Local Residential, Laneway). Surface Treated Roads follow the logic in the third figure, including surface treated roads of all road class. Results were obtained by running the model over a 50-year period with an unconstrained budget and optimized for cost effectiveness. This scenario best accounts for the current levels of service, as it determines the rehabilitation program for lifecycle needs at the lowest cost option.

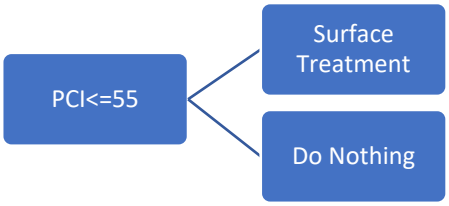


The diagram below illustrates the lifecycle decision tree for HCB high traffic roads.

The diagram below illustrates the lifecycle decision tree for HCB low traffic roads.



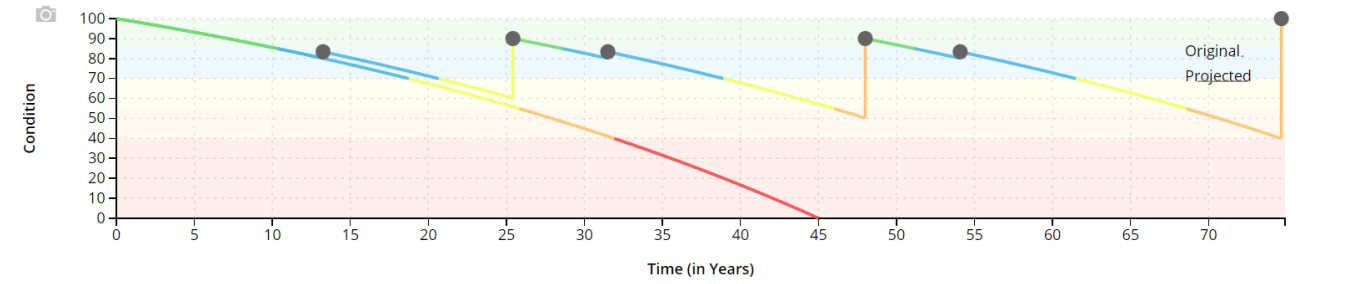
The diagram below illustrates the lifecycle decision tree for surface treated roads.



Renewal/Replacement Strategy: Unassumed Assets

The lifecycle program for unassumed roads is summarized in the following Figures. Both Low and High traffic roads follow the scheme presented in the figure below; where local roads use the local road unit costs, and collector roads use collector road unit costs. There are no unassumed surface treated roads, therefore, surface treated roads have not been modelled in Citywide AM.

Event Name	Event Class	Event Trigger
Crack Seal	Maintenance	PCI<80
Thin Asphalt Mill & Resurface	Rehabilitation	PCI<60
Full Asphalt Mill & Resurface	Rehabilitation	PCI<50
Full Reconstruction	Replacement	PCI<40



4.4.5 Disposal

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition, or relocation. In the case of the Transportation assets, disposal is typically completed along with replacement of the assets, and the costs are included within the renewal costs.

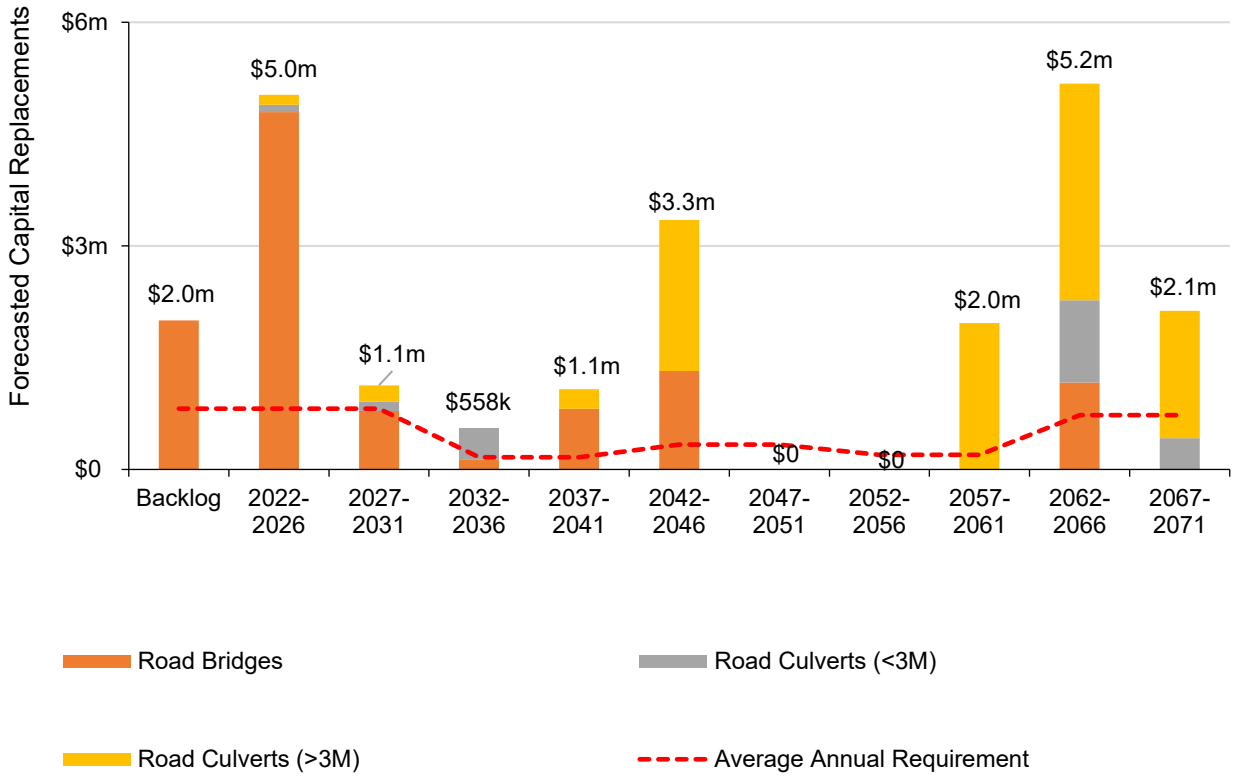
4.5 Average Annual Requirements

Bridges & Culverts

The annual capital requirement represents the average amount per year that the Town should allocate towards rehabilitation and replacement needs. The following table identifies the average annual capital requirements for bridges and culverts for the next 10 years.

Category	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Road Bridges	$2.0m	$770k	$450k	$1.6m	$0	$2.0m	$450k	$150k	$70k	$115k	$0	$7.6m
Road Culverts (<3M)	$0	$0	$0	$0	$100k	$0	$0	$0	$110	$15k	$0	$225k
Road Culverts (>3M)	$0	$0	$0	$0	$130k	$0	$80k	$0	$80k	$140k	$0	$350k
TOTAL	**$2.0m**	**$770k**	**$450k**	**$1.6m**	**$230k**	**$2.0m**	**$530k**	**$150k**	**$180k**	**$270k**	**$0**	**$8.2m**

The graph below identifies capital requirements over the next 50 years for bridges and culverts. The forecasted requirements are aggregated into 5-year bins.



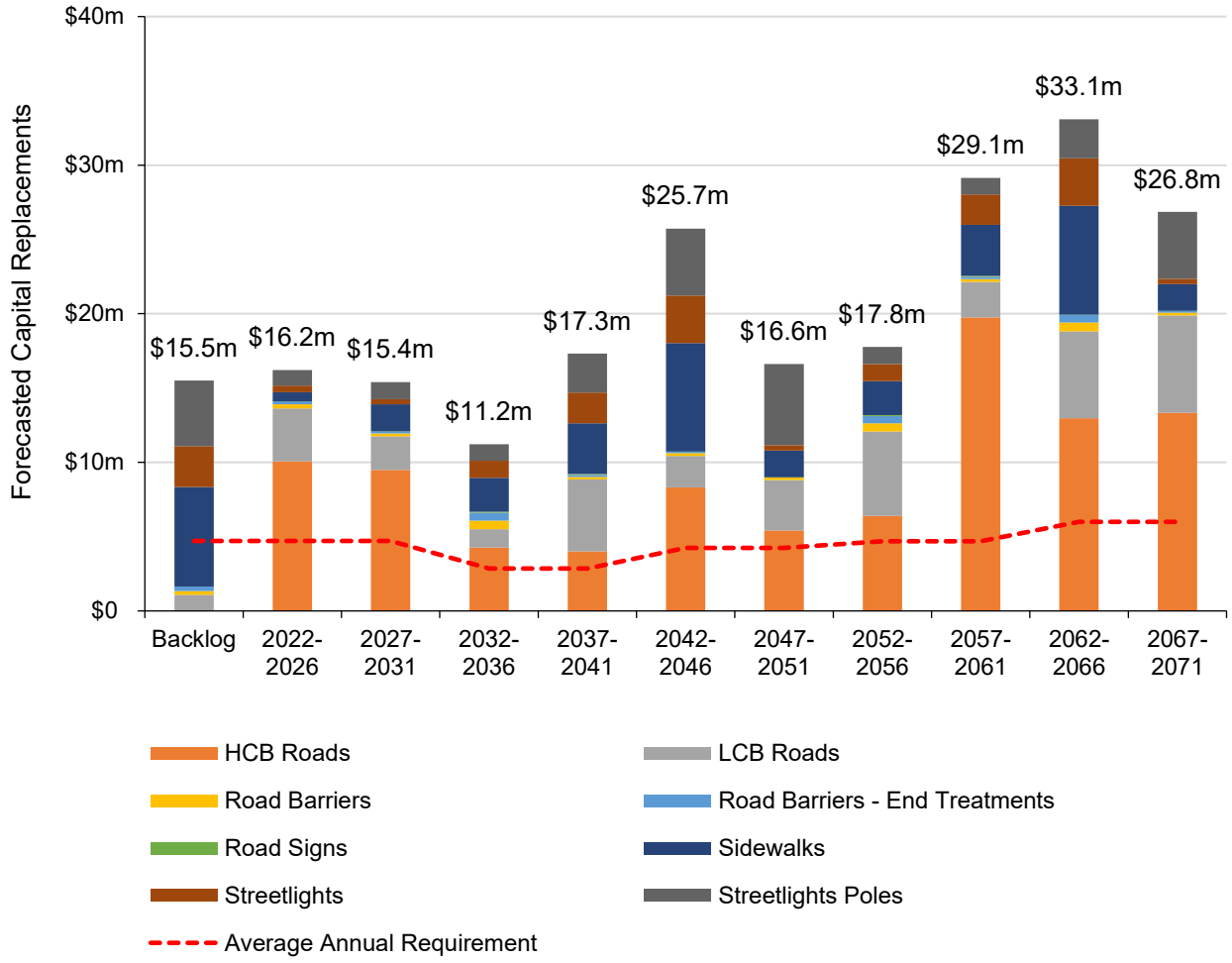
Road Network

The following table identifies the average annual capital requirements for each asset segment in the road network for the next 10 years.

Category	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
HCB Roads	$0	$3.8m	$2.0m	$1.4m	$1.1m	$1.7m	$1.7m	$3.2m	$1.7m	$1.7m	$1.3 m	$19.6 m
LCB Roads	$1.1m	$234k	$232k	$664k	$1.2m	$1.2m	$919k	$620k	$357k	$243k	$129 k	$6.9m
Road Barriers	$259k	$31k	$108k	$20k	$123k	$0	$0	$42k	$44k	$59k	$38k	$723k
Road Barriers - End Treatments	$300k	$40k	$60k	$0	$100k	$0	$0	$40k	$20k	$40k	$60k	$660k
Road Signs	$0	$80	-	-	-	$1k	$7k	$109k	$36k	$88k	$3k	$244k
Sidewalks	$6.7m	$259k	$162k	$55k	$44k	$82k	$327k	$823k	$407k	$75k	$162 k	$9.1m
Streetlights	$2.7m	$89k	$251k	$120k	$0	$0	$0	$267k	$86k	$5k	$0	$3.6m
Streetlights Poles	$4.4m	$480k	$128k	$41k	$320k	$69k	$174k	$719k	$251k	$0	$0	$6.6m
TOTAL	**$15.5m**	**$4.9m**	**$3.0m**	**$2.3m**	**$3.0m**	**$3.0m**	**$3.1m**	**$5.8m**	**$2.9m**	**$2.2m**	**$1.7 m**	**$47.3 m**

Road Network

The graph below identifies capital requirements over the next 50 years for each asset segment in the road network. The forecasted requirements are aggregated into 5-year bins.



4.6 Risk

4.6.1 Corporate Risk Assessment

The following table identifies corporate level risks the Town faces given the current state of the infrastructure and asset management strategies. The table also includes a high-level risk treatment plan for the identified risks.

What can Happen	Risk Rating	Risk Treatment Plan
Road/Bridge Failure	Very High	• Complete formal condition assessment every 2 years to determine PCI rating • Complete biennial OSIM report to determine BCI ratings • Crack sealing to promote better drainage and reduce deterioration of the road base • Monitor areas that are prone to flooding as they may be more at risk of damage caused by a higher frequency of freeze/thaw cycles • Rehabilitation including resurfacing (HBC) or surface treatment (LCB) to improve surface condition • Consider full replacement of road surface and base and bridge/culvert with sustainable infrastructure • Monitor areas that are prone to flooding as water and ice may lead to increase deterioration of road surfaces
Fiscal Capacity	High	• Optimize risk assessments to improve short- and long-term capital planning
Municipal Staff Capacity Constraints	High	• Align staff functions and maintenance contracts with appropriate business unit
Information Management Constraints	High	• Operationalize Citywide for effective use of SR's and Work Orders and improve metrics

4.6.2 Asset Level Risks

Bridges and Culverts

The following figure summarizes the extent and value of assets at each level of risk for the Bridges and Culverts, based on the 2021 inventory:

This is a high-level model developed for the purposes of this asset management plan and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure. See Appendix D for a summary of the model metrics. The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

The following table identifies the five bridge and structural culvert assets with the highest risk ratings.

	Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	000110 - Queensville SDRD Bridge	4	3.67	14.7 – High

2		000109 - Rutledge Bridge	4	3.42	13.67 – High
3		000102 – Pony Hill Bridge	3	3.94	11.83 – Moderate
4	A	000114 - East Townline Bridge	3	3.85	11.56 – Moderate
	B	000113 – East Townline Bridge	3	3.67	11.02 – Moderate
5		000403 – Stonehill Blvd Culvert	3	3.6	10.79 – Moderate

Road Network

The following figure summarizes the extent and value of assets at each level of risk for the Road Network, based on the 2021 inventory:

The following table identifies the five assets with the highest risk ratings.

		Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	A	Harry Walker Parkway – Corcoran Court to Green Lane East	5	3.43	17.17 – Very High
	B	Harry Walker Parkway – Corcoran Court to 228m south of Corcoran Court	5	3.42	17.17 – Very High
2		Toll Road – Centennial Avenue to Oriole Drive	5	3.18	15.89 – High
3		Centre Street – Mount Albert Road to Elizabeth Street	5	3.13	15.67 – High
4		Doane Road – Centre Street to East Townline	5	3	15 – High
5		Corcoran Court – Harry Walker Parkway to End	5	2.98	14.92 – High

5 Water Network

The water services provided by the Town are overseen by Water Operations and Engineering branches within the Community Infrastructure & Environmental Services department. The department is responsible for both the underground and above ground infrastructure.

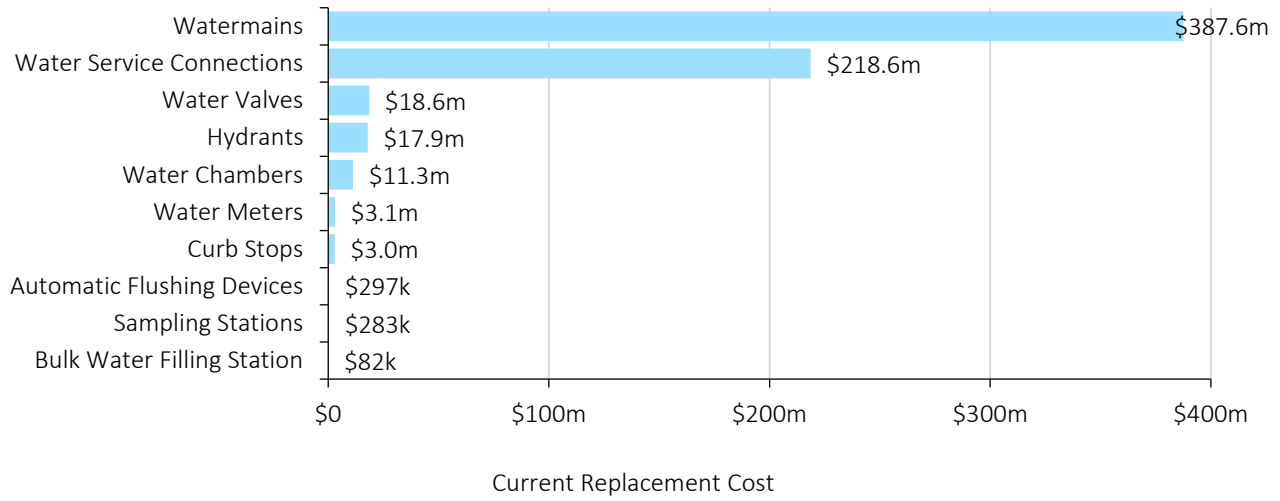
5.1 Summary of the Assets

5.1.1 Asset Inventory & Costs

The following table identifies the quantity, total replacement cost, and replacement cost method of each asset segment in the Town's water network inventory.

Asset Segment	Quantity	Replacement Value	Replacement Cost Method
Automatic Flushing Devices	45 Assets	$297,405	2018 unit cost inflated by CPI
Bulk Water Filling Station	1 Assets	$81,562	2018 unit cost inflated by CPI
Curb Stops	11,301 Assets	$3,017,367	2018 unit cost inflated by CPI
Hydrants	1,229 Assets	$17,884,408	2018 unit cost inflated by CPI
Sampling Stations	41 Assets	$282,654	2018 unit cost inflated by CPI
Water Chambers	882 Assets	$11,278,134	2018 unit cost inflated by CPI
Water Meters	9,696 Assets	$3,112,416	2018 unit cost inflated by CPI
Water Service Connections	105,267.86 Meters	$218,550,686	2018 unit cost inflated by CPI
Water Valves	2,702 Assets	$18,569,449	2018 unit cost inflated by CPI
Watermains	168,355.72 Meters	$387,570,024	2018 unit cost inflated by CPI
TOTAL		**$660,644,105**	**CPI**

The graph below visually illustrates the total replacement cost for each asset segment.

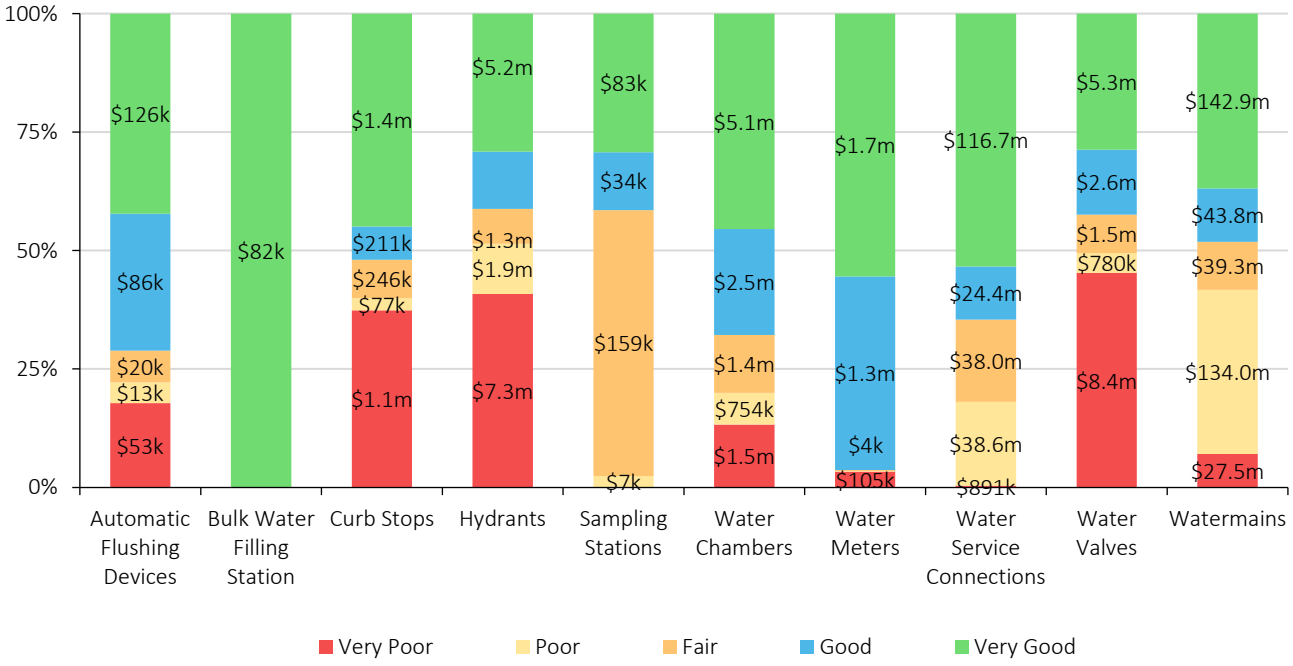


5.1.2 Asset Condition & Age

The following table identifies the average condition, condition assessment method, average age, and estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition	Condition Assessment Method	Estimated Useful Life (Years)	Average Age (Years)
Automatic Flushing Devices	62%	Age-Based	30	12.6
Bulk Water Filling Station	88%	Age-Based	30	3.0
Curb Stops	49%	Age-Based	30	18.0
Hydrants	42%	Age-Based	30	19.8
Sampling Stations	61%	Age-Based	30	11.1
Water Chambers	65%	Age-Based	30	10.3
Water Meters	79%	Age-Based	15	3.4
Water Service Connections	70%	Age-Based	60	17.4
Water Valves	41%	Age-Based	30	21.3
Watermains	57%	Age-Based	52	22.4
TOTAL	**61%**	**Age-Based**		

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale. Of the assets in very poor condition $20.6m are currently backlog, representing 3% of the Water Network



5.2 Levels of Service

The following tables identify the Town's current level of service for the water network. These metrics include the technical and community level of service metrics that are required as part of Ontario Regulation 588/17 as well as additional performance measures that the Town has selected in accordance with best practices defined by the International Infrastructure Management Manual (IIMM).

5.2.1 Customer Research and Expectations

The following table provides a high-level summary of the customer values and customer satisfaction measures that will guide future assessments of the customer levels of service through a public forum.

Customer Values	Customer Satisfaction Measure
The Water Network is Safe to Use	The water is safe to consume
	Adequate water pressure is available
The Water Network is Available to users	Water servicing is available
Quality Experience	The water does not have unexpected odors/tastes or colours
The Water Network is Reliable	Water outages/shortages are not common
Affordability	Rates are affordable

5.2.2 Legislative Requirements

There are several legislative requirements relating to the management of the water network. The table below summarizes some of the key requirements that apply specifically to the water network. Legislative requirements that apply to all assets are summarized in Section 2.5.

Legislation	Requirement	Significance
Safe Drinking Water Act, 2002 (SDWDA)	All drinking water systems must obtain an approval from the Director of the Ministry of Environment, Conservation and Parks to operate, and water operators must obtain specific training and certification required in the Act. Municipalities must establish a drinking water quality management system (DWQMS) which comprises of the following: • Accreditation protocols • Risk assessment • An operational plan • Best management practices related to the monitoring and testing of water to ensure water quality	This Act may incur increased operating requirements on the part of the Town to comply with testing, reporting, and accreditation protocols. Compliance with the Act will better enable the Town to deliver high quality water.
Ontario Water Resources Act, R.S.O. 1990	The Ontario Water Resources Act regulates sewage disposal and sewage works, and regulates permits to take more than 50,000 liters per day of surface water and ground water. The Act also requires approvals for water works, sewage works, regulates the drilling and construction of wells, and designates the protection of sources of public water supply. There are a set of regulations under the Act that can be enacted on water and wastewater related matters. These include: • Water taking and transfers • Exempting minor watermain, sewer or stormwater management projects from approval • Classifying water works and sewage works, licensing of facility operators and operating standards • Licensing of well contractors and technicians and requirements for well construction, operation and abandonment • Contraventions by secured creditors, receivers and trustees in bankruptcy.	The Act is quite large is scope, but generally affects the acquisition, operation, and disposal of water supply assets. Many of the requirements relate to water extraction, which is under the purview of the Region
Sustainable Water and Sewage Systems Act,	The Act has passed its third reading in 2002 and is still awaiting Royal Assent. The act outlines requirements for the full cost accounting and long-term sustainability of water supply systems. The municipality must assess costs of supplying water, and	A cost recovery plan will require a detailed understanding of the capital and operating requirements of a water and wastewater system.

2002, S.O. 2002	develop plans to charge rates sufficient to cover the capital and operating costs of the water and sewer systems. The plan must be reviewed and approved by an auditor, and then submitted by the municipality to the Minister.	However, the Region is responsible for supplying water and setting water supply rates.

5.2.3 Customer Levels of Service

The following table identifies the current performance of the water network within three overarching measures of the customer experience: quality, function, and capacity.

Type of Measure	Level of Service	Performance Measure	Current Performance
Quality	Condition of watermains	% of watermains in very poor condition	7%
		% of watermains in poor condition	35%
		% of watermains in fair condition	10%
		% of watermains in good condition	11%
		% of watermains in very good condition	37%
	Service Interruptions	# 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
		Description of boil water advisories and service interruptions	See Appendix A
		# 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	2
Function	Scope of the municipal water system	Percentage of properties connected to the municipal water system	71%
		Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system	See Appendix B
		Percentage of properties where fire flow is available	Currently being assessed in the W&WW Master Plan
		Description, which may include maps, of the user groups or areas of the municipality that have fire flow	Currently being assessed in the W&WW Master Plan
Capacity	System capacity to support water flow	Cubic meters of water purchased annually	2,514 ML (2020)

5.2.4 Technical Levels of Service

The following table identifies the current level of service of the water network within two overarching measures of the technical asset performance: lifecycle activities and service quality.

Type of Measure	Level of Service	Performance Measure	Current Performance
Lifecycle Activities	Acquisition	Frequency	As identified in plans and studies
		Budget	See Section 8.7
	Operation	Valve Turning	25% valves per year
		Drinking Water Quality Management System	Daily
		Water main monitoring	As required
		Water meter reading	As per billing cycle
		Small drinking water systems operations and maintenance	2 times per week
		Water purchased	Continuous, as per demand
		O&M Budget	$5,875,162
	Maintenance	Hydrant Maintenance	Annual, during Fall
		Watermain flushing and maintenance	As required
		Auto flushing device inspection and maintenance	Monthly
		Curb box maintenance	As Needed
		Water meter repair and maintenance	As Needed
		Water equipment repair	As Needed
		O&M Budget	$5,875,162
	Renewal	Frequency	Budgeted and prioritized as per Water Master Plan and staff assessments
		Budget	$13.08 million average annual requirement
	Disposal	Frequency	Disposed assets are accounted for within the renewal process
		Budget	Part of renewal costs
Service Quality	Staff Capacity	Full-time staff members divided by number of serviced households	36 / 9891 = 0.0036
		Full-time staff members divided by kilometers of water mains	36 / 168.4 = 0.214
		Number of service requests divided by total number of full time Water Operations staff	329 / 11 = 29.9
	Service requests	Number of service requests divided by total number of serviced households	329 / 9891 = 0.033

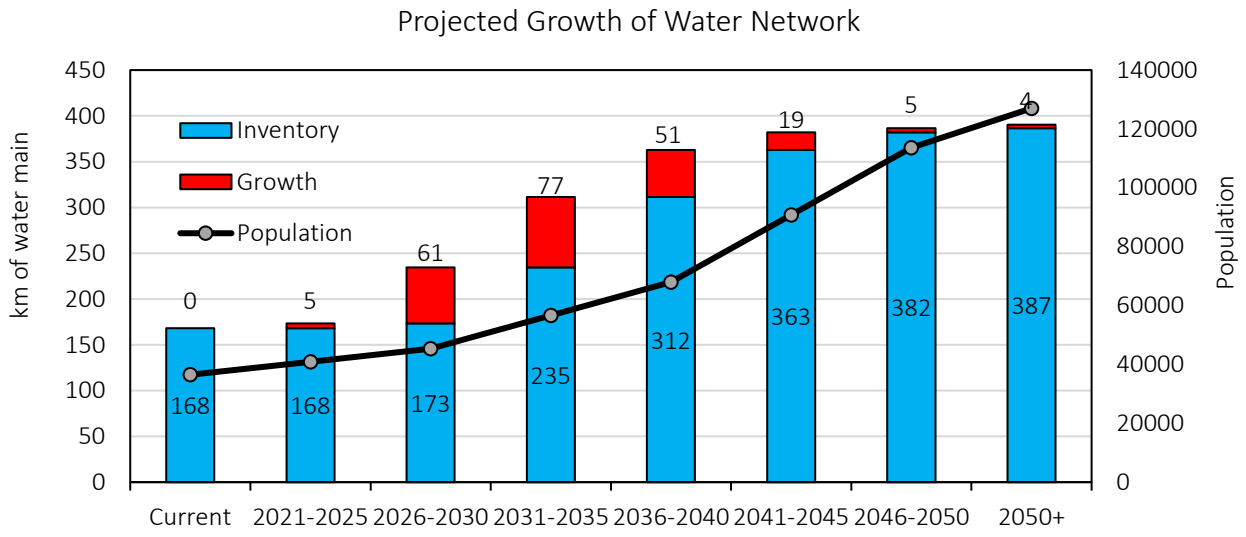
5.3 Growth Management Plan

5.3.1 Trends

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

5.3.2 Population and Economic Growth Forecasts

Growth of population within the Town results in a need to acquire new water infrastructure. Between DC bylaw and developer contributed assets, the water network is expected to increase 2.4 times by 2051, with significant growth occurring between years 2026 and 2040. This growth generally follows the expected population growth, as illustrated in the figure below. Growth in the water network will place pressure on staff time and resourcing to undertake the necessary lifecycle activities to manage service levels.



5.3.3 Demand Impact on Assets

As a result of growth, additional demand will be placed on the water network. The following table summarizes the demand drivers.

Demand drivers	Description	Impact on services
New Servicing	New development is expected to accommodate growth of the town. This will require new water assets to service new households and businesses, and may increase demand loads on existing water assets	New subdivisions will require watermains, service connections, hydrants, and other water assets to service new households. Acquiring new assets will mean that the Town will have to maintain a larger network, requiring larger operations and maintenance budgets, and requiring more staff resourcing to maintain service levels. Densifying existing areas may require watermains to be upsized to serve demands. However, the Town has not identified any specific locations where this is a considerable risk in the near future.
Climate Change	Changing weather patterns may result in water shortages	If the water supply becomes significantly constrained, the Town may have to consider strategies other than flushing to maintain the

	or lower temperatures during winter.	water quality. This will require more effort, staff resourcing, and training to maintain current service levels. Colder temperatures in the winter will require watermains to be installed at deeper bury depths. This results in increased excavation costs, ultimately increasing watermain lifecycle costs.
Urbanization	Growth of the urban areas will place higher requirements on fire protection.	The Town may be required to increase monitoring of the water system to ensure it can provide fire protection. More frequent monitoring will increase operating costs.
Regional Drivers	York Region may put new drinking water wells online, and/or introduce new groundwater treatment	Addition of new drinking water wells or enhance a groundwater treatment strategy may create disturbances in the water distribution system related to hydraulics and change in water chemistry, potentially requiring additional maintenance to maintain current service levels.

5.3.4 Impact on Staffing

Staffing needs are expected to scale with population growth, as demonstrated in Section 3.4.1. Staff have identified limited capacity in the Water Operations and Engineering departments to deal with current infrastructure needs, therefore, limited capacity to deal with projected growth and new acquisition. The Town may need to consider contracting out work if staff resources do not scale appropriately with growth. A focus on project prioritization can reduce the impact on staffing.

5.4 Lifecycle Management Plan

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

5.4.1 Background Data

Asset condition

There are no assessed condition scores available for the water network, rather, age-based condition is used as an approximation. Staff monitor and record breaks, hydrant issues, and valve issues, but these are not translated into an overall condition rating.

The condition of an asset is calculated by prorating the age of the asset over its useful life. These condition ratings are transformed to a 0 – 100 condition rating scale, spread across five condition increments: very poor, poor, fair, good, very good. This scale conforms with the 1- 5 grading system specified in the Canadian Infrastructure Report Card – Rating Scale for Asset Condition. Appendix C outlines these condition ranges.

Asset capacity and performance

Annually, the Town completes a review of hazardous events and their risks which may occur in the system. Every three years the Town undertakes a full risk assessment and an emergency preparedness field exercise. Additionally, the Town assesses the functioning of the water system through inspections and operational activities, such as valve turning, water meter repairs, and hydrant maintenance. Auto-flushers are inspected monthly as part of a new program to monitor water loss within the system. Operations and maintenance activities are summarized in section 5.2.4.

Water distribution capacity was assessed as part of the 2009 Water and Wastewater Master Plan, and deemed sufficient for current growth scenarios at that time. The upcoming Water and Wastewater Master Plan will provide an updated assessment of pressure flows for consumption and fire protection.

5.4.2 Acquisition

The following table identifies expected asset acquisition based on the current asset inventory, projected population growth, and the development charges background study.

Asset Type	Source	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046 -2050	2051+
Mains (meters)	DC Bylaw	0	2,100	8,801	3,300	0	2,300	0
	Developer Contributed	5,163	59,272	68,130	47,822	19,403	2,310	3,661
	Total	**5,163**	**61,372**	**76,931**	**51,122**	**19,403**	**4,610**	**3,661**
Service Connections (meters)	DC Bylaw	0	0	0	0	0	0	0
	Developer Contributed	394	5,173	5,678	3,939	1,720	11	251
	Total	**394**	**5,173**	**5,678**	**3,939**	**1,720**	**11**	**251**

See Section 3.3 for growth projections. Acquiring new assets will require additional operating and maintenance requirements in addition to capital costs.

5.4.3 Operations and Maintenance Plan

The following table identifies actual operations and maintenance spending for the water network within the last three years. A summary of these activities, including their frequency, is provided in section 5.2.4.

Year	Operations and Maintenance Actuals & Budget ($)
2019 (actual)	$5,303,963
2020 (actual)	$5,369,550
2021 (actual)	$5,875,162

5.4.4 Renewal & Replacement Prioritization

Renewal and replacement for the water network is a combination of reactive and proactive approaches. Due to the DWQMS regulations the network is highly monitored and maintained, therefore the increased oversight allows staff to fix upcoming problem proactively. However, projects such as the high-risk asbestos cement watermain replacements remain in the queue, providing a reactive approach if a break were to occur. There are currently no mid-life rehabilitation events proactively scheduled, rather, water assets are replaced at the end of their useful life.

5.4.5 Disposal Plan

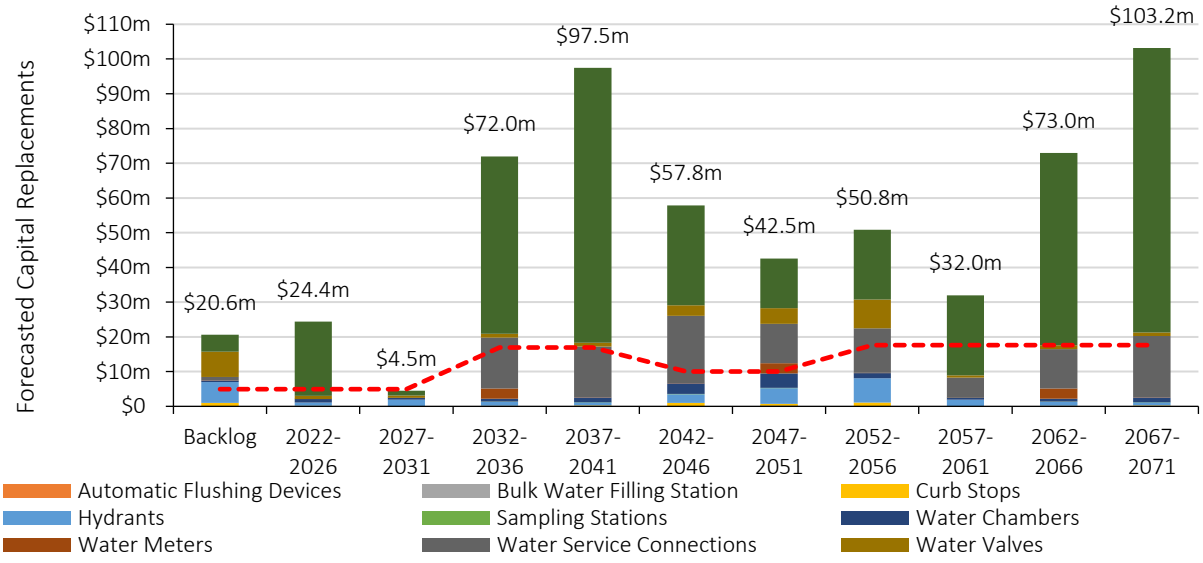
Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition, or relocation. In the case of the water network, disposal is typically completed along with replacement of the assets, and the costs are included within the renewal costs.

5.5 Average Annual Requirements

The annual capital renewal requirement represents the average amount per year that the Town should allocate towards rehabilitation and replacement needs. The following table identifies the average annual capital requirements for each asset segments for the next 10 years.

Category	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Automatic Flushing Devices	$53k	$0	$0	$0	$0	$0	$0	$7k	$0	$0	$7k	$0
Bulk Water Filling Station	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Curb Stops	$928k	$63k	$534	$801	$65k	$25k	$45k	$10k	$2k	$3k	$4k	$63k
Hydrants	$6.0m	$146k	$146k	$73k	$524k	$87k	$320k	$146k	$204k	$1.0m	$116k	$146k
Sampling Stations	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Chambers	$473k	$294k	$0	$0	$537k	$115k	$115k	$77k	$38k	$230k	$102k	$294k
Water Meters	$96k	$963	$7k	$2k	$3k	$642	$321	$4k	$2k	$321	$15k	$963
Water Service Connections	$891k	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water Valves	$7.3m	$317k	$0	$0	$532k	$124k	$128k	$84k	$45k	$225k	$158k	$317k
Watermains	$4.8m	$0	$83k	$0	$21.2m	$0	$18k	$120k	$1.3m	$0	$0	$0
TOTAL	**$20.6m**	**$821k**	**$236k**	**$75k**	**$22.9m**	**$352k**	**$626k**	**$447k**	**$1.6m**	**$1.5m**	**$402k**	**$70.0m**

The graph below identifies capital requirements over the next 50 years for each asset segment. The forecasted requirements are aggregated into 5-year bins.



5.6 Risk

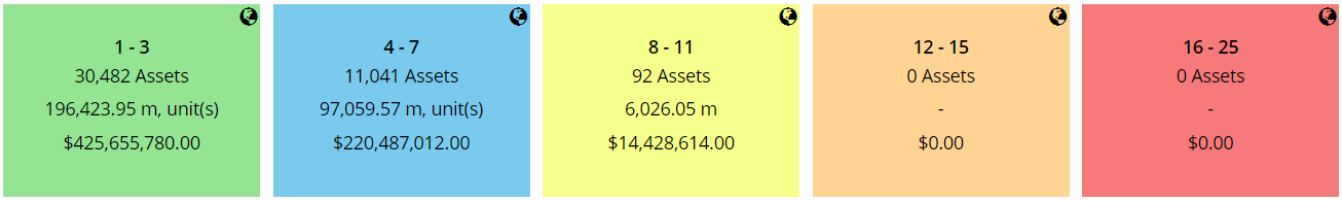
5.6.1 Corporate Risk Assessment

The following table identifies corporate level risks the Town faces given the current state of the infrastructure and asset management strategies. The table also includes a high-level risk treatment plan for the identified risks.

What can Happen	Risk Rating	Risk Treatment Plan
Reactive lifecycle management	Very High	Complete formal condition assessments of watermains and appurtenances, to support proactive lifecycle management
Water Loss	High	Leverage annual water loss audits to investigate and address problem areas. Optimize flushing through enhanced water quality, monitoring
Water Ownership	High	Water is sourced from York Region, which is supplied by the City of Toronto and Peel Region, as well as Region owned and operated groundwater wells. Without ownership of water sources the Town is not in control of water capacity, water treatment, source water, and pricing. The Town should continue to monitor demand and ensure adequate water storage is available
Fiscal Capacity Constraints	High	Optimize risk ratings to improve short- and long-term capital planning
Municipal Staff Capacity Constraints	Very High	Align staff functions and maintenance contracts with appropriate business unit
Information Management Constraints	High	Operationalize Citywide for effective use of SR's and Work Orders and improve metrics

5.6.2 Asset Level Risks

The following figure summarizes the extent and value of assets at each level of risk for the Water Network, based on the 2021 inventory:



This is a high-level model developed for the purposes of this asset management plan and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure. See Appendix D for a summary of the model metrics. The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

The following table identifies the five assets with the highest risk ratings.

		Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	A	Local - 200mm Thinwall PVC: Yonge Street	5	2.28	11.4 – Moderate
	B	150mm Thinwall PVC: Yonge Street	5	2.04	10.2 – Moderate
2	A	200mm Thinwall PVC: Thompson Drive	5	2.28	11.4 – Moderate
	B	150mm Thinwall PVC: Thompson Drive	5	2.04	10.2 – Moderate

3	150mm Thinwall PVC: Tyson Drive	5	2.04	10.2 – Moderate
4	350mm Ductile Iron: Centre Street	3.75	2.52	9.45 – Moderate
5	350mm Ductile Iron: Main Street	3.75	2.52	9.45 – Moderate

6 Wastewater Network

The water services provided by the Town are overseen by Wastewater Operations and Engineering branches within the Community Infrastructure & Environmental Services department. The department is responsible for both the underground and above ground infrastructure.

6.1 Summary of the Assets

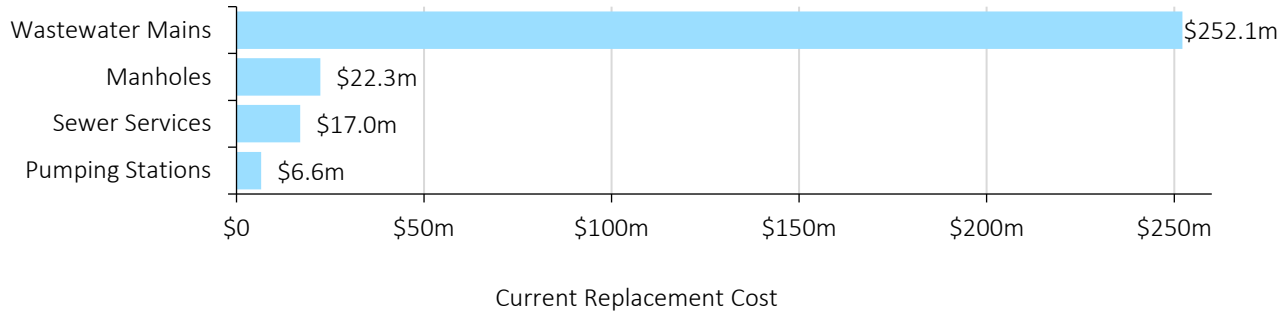
6.1.1 Asset Inventory & Costs

The following table identifies the quantity, total replacement cost, and replacement cost method of each asset segment in the Town's wastewater network inventory.

Asset Segment	Quantity	Replacement Value	Replacement Cost Method
Manholes	1,638 Assets	$22,343,958	2018 unit cost inflated by CPI
Pumping Stations	5 Assets	$6,603,520	2018 unit cost inflated by CPI
Sewer Services	81,727.55 Meters	$17,004,608	2018 unit cost inflated by CPI

Wastewater Mains	104,221.20 Meters	$252,128,357	2018 unit cost inflated by CPI
TOTAL		**$298,080,443**	**CPI**

The graph below visually illustrates the total replacement cost for each asset segment.

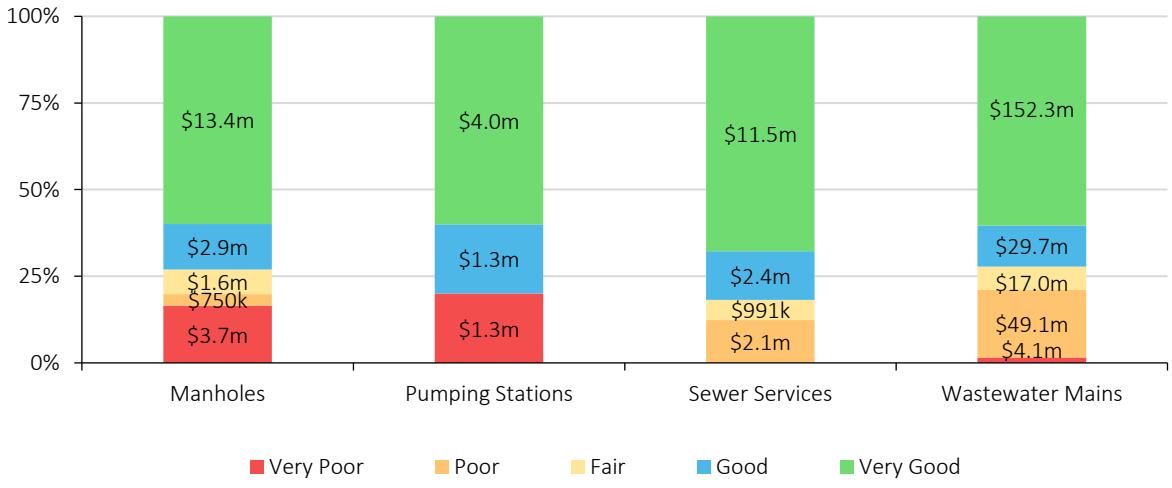


6.1.2 Asset Condition & Age

The following table identifies the average condition, condition assessment method, average age, and estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition	Condition Assessment Method	Estimated Useful Life (Years)	Average Age (Years)
Manholes	69%	Age-Based	50	14.9
Pumping Stations	68%	Age-Based	40	13.2
Sewer Services	79%	Age-Based	60	12.1
Wastewater Mains	71%	Age-Based	52	15.1
TOTAL	**72%**	**Age-Based**		

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale. Of the assets in very poor condition $1.3m are currently backlog, representing 0.4% of the Wastewater Network



Note: Holland River Boulevard Pumping Station rehabilitated and upgraded in 2022.

6.2 Levels of Service

The following tables identify the Town'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 Ontario Regulation 588/17 as well as additional performance measures that the Town has selected in accordance with best practices defined by the International Infrastructure Management Manual (IIMM).

6.2.1 Customer Research and Expectations

The following table provides a high-level summary of the customer values and customer satisfaction measures that will guide future assessments of the customer levels of service through a public forum.

Customer Values	Customer Satisfaction Measure
The Wastewater Network is Convenient to Use	Wastewater is collected in the municipal system as expected
Quality Experience	The wastewater does not cause unexpected odors
	The wastewater does not adversely affect the environment
Affordability	Rates are affordable
Accessibility	Wastewater servicing is available

6.2.2 Legislative Requirements

There are several legislative requirements relating to the management of the wastewater network. The table below summarizes some of the key requirements that apply specifically to the wastewater network. Legislative requirements that apply to all assets are summarized in Section 2.6.

Legislation	Requirement	Significance
Ontario Water Resources Act	The Ontario Water Resources Act regulates sewage disposal and sewage works and regulates permits to take more than 50,000 liters per day of surface water and ground water. The Act also requires approvals for water works, sewage works, regulates the drilling and construction of wells, and designates the protection of sources of public water supply. There are a set of regulations under the Act that can be enacted on water and wastewater related matters. These include: • Water taking and transfers • Exempting minor watermain, sewer or stormwater management projects from approval • Classifying water works and sewage works, licensing of facility operators and operating standards • Licensing of well contractors and technicians and requirements for well construction, operation, and abandonment • Contraventions by secured creditors, receivers, and trustees in bankruptcy.	The Act is quite large is scope, but generally affects the acquisition, operation, and disposal of wastewater treatment assets. The Town is responsible for collection of wastewater. Treatment and discharge is under responsibility of the Region.
Sustainable Water and Sewage Systems Act, 2002	The Act has passed its third reading in 2002 and is still awaiting Royal Assent. The Act outlines requirements for the full cost accounting and long-term sustainability of water supply and sewage treatment systems. The municipality must assess costs of treating wastewater and develop plans to charge rates sufficient to cover the capital and operating costs of the water and sewer systems. The plan must be reviewed and approved by an auditor, and then submitted by the municipality to the Minister.	A cost recovery plan will require a detailed understanding of the capital and operating requirements of a water and wastewater system. However, the Region is responsible for treating and discharging wastewater.
Environmental Protection Act, R.S.O. 1990	The Act prohibits discharge of contaminants into the environment that can cause or are likely to cause adverse effects. The Act prescribes approved limits for contaminants that the municipality must adhere to before discharging. Additionally, all spills containing contaminants must be reported and cleaned up as prescribed by the Act. The Act has authority to establish liability on the part at fault.	The Town must operate, maintain, and construct the wastewater system to a level of care as to avoid spills of contaminants. Failure to do so will result in the Town having to expend staff resourcing on cleaning and reporting. Further, non-compliance events may place liabilities on the Town.

6.2.3 Customer Levels of Service

The following table identifies the current performance of the wastewater network within three overarching measures of the customer experience: quality, function, and capacity.

Type of Measure	Level of Service	Performance Measure	Current Performance
Condition	Condition of wastewater mains and pumping stations	% of wastewater system in very poor condition	2%
		% of wastewater system in poor condition	19%
		% of wastewater system in fair condition	7%
		% of wastewater system in good condition	12%
		% of wastewater system in very good condition	60%
		Average condition of pump stations	68%
	Service Interruptions	Number of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
		Description of how stormwater can get into wastewater mains in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	No known cross-connections by design. Infiltration of groundwater to pipes occurs through pipe defects.
		I&I reduction across the system	0.52 ML/day from 2011 levels
		Number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	N/A
		Description of how wastewater mains in the municipal wastewater system are designed to be resilient to avoid stormwater infiltration	Modern wastewater system is built at a standard to seal it from infiltration. I&I is no present in new areas, and mostly an issue with older areas.
Function	Scope of the municipal wastewater system	Percentage of properties connected to the municipal wastewater system across the entire Town	54%
		Percentage of properties connected to the municipal wastewater system within the urban boundary	64%
		Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater systems	See Appendix B
	Scope of combined sewers	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	N/A
		Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	N/A
		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	N/A

Type of Measure	Level of Service	Performance Measure	Current Performance
Capacity	System capacity to support wastewater flow	Number of residential units that can be accommodated by the wastewater system	2,875 single detached equivalent
		Total ICI flow that can be accommodated by the wastewater system	1,027.9 ML

6.2.4 Technical Levels of Service

The following table identifies the current level of service of the wastewater network within two overarching measures of the technical asset performance: lifecycle activities and service quality.

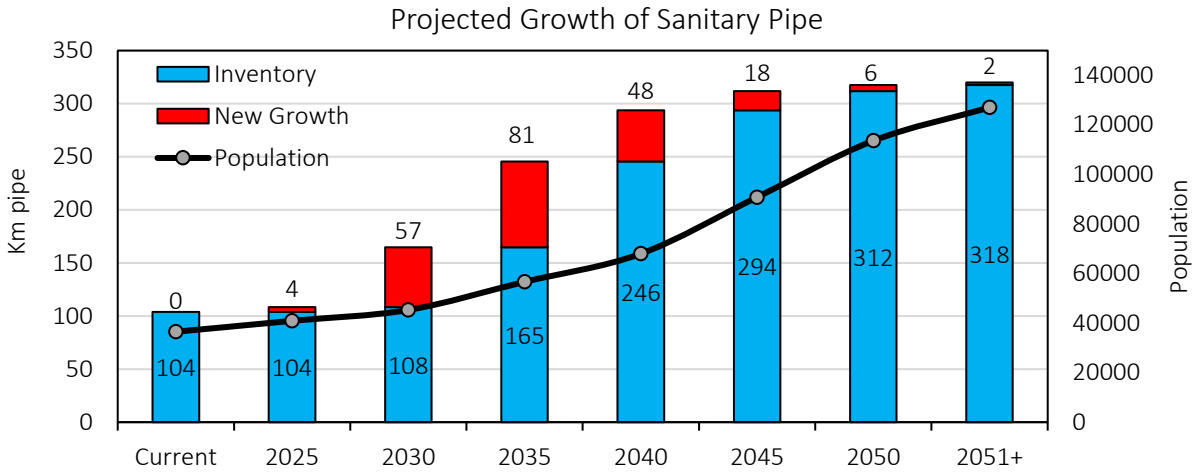
Type of Measure	Level of Service	Performance Measure	Current Performance
Lifecycle Activities	Acquisition	Frequency	As identified in plans and studies
		Budget	See Section 8.7
	Operation	Proactive CCTV inspections	25% - 30% of network annually
		Lift Station Inspection/Monitoring	2 – 3 times per week
		Wastewater charges	Continuous
		O&M Budget	$4,033,055
	Maintenance	Wastewater Pumping Station Maintenance	As Needed
		Sewer Flushing	25% - 30% of network annually
		Lateral Inspection and Cleaning	25% - 30% of network annually
		Sewer main hydroject (>300mm)	Annually
		O&M Budget	$4,033,055
	Renewal	Frequency	Budgeted and prioritized as per W&WW Master Plan and staff assessments
		Budget	$5.77 million average annual requirement
	Disposal	Frequency	Disposed assets are accounted for within the renewal process
		Budget	Part of renewal costs
Service Quality	Staff Capacity	Full-time staff members divided by number of serviced households	36 / 7593 = 0.0047
		Full-time staff members divided by kilometers of wastewater mains	36 / 104.2 = 0.35
	Service requests	Number of service requests divided by total number of serviced households	16 / 7593 = 0.0021

6.3 Growth Management Plan

6.3.1 Trends

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

6.3.2 Population and Economic Growth Forecasts



Growth of population within the Town results in a need to acquire new wastewater infrastructure. Between DC bylaw and developer contributed assets, the wastewater network is expected to increase three times by 2051, with significant growth occurring between years 2025 and 2040. This growth generally follows the expected population growth, as illustrated in the figure below. Growth in the wastewater network will place pressure on staff time and resourcing to undertake the necessary lifecycle activities to manage service levels.

6.3.3 Demand Impact on Assets

As a result of growth, additional demand will be placed on the transportation network. The following table summarizes the demand drivers.

Demand drivers	Description	Impact on services
New Servicing	New development is expected to accommodate growth of the town. This will require new wastewater assets to service new households and businesses, and may increase demand loads on existing wastewater assets	New subdivisions will require wastewater mains, service connections, pumping stations, and other wastewater assets to service new households. Acquiring new assets will mean that the Town will have to maintain a larger network, requiring larger operations and maintenance budgets, and requiring more staff resourcing to maintain service levels. Densifying existing areas may require wastewater to be upsized to serve demands. However, the Town has not identified any specific locations where this is a considerable risk in the near future.
Climate Change	Changing weather patterns may result in lower temperatures during the winter	Colder temperatures in the winter will require wastewater mains to be installed a deeper bury depths. This results in increased excavation costs, ultimately increasing wastewater main lifecycle costs.
Urbanization	Growth of the urban system will increase demands on the wastewater collection system.	Urbanization is not expected to create unique challenges, beyond having to accommodate more wastewater flow.
Other	Capacity limits at the York Region wastewater treatment system may constrain growth	The Town will be unable to service wastewater to new development if the treatment capacity of the York Region wastewater system (UYSS) is not expanded. This will slow down future growth significantly.

6.3.4 Impact on Staffing

Staffing needs are expected to scale with population growth, as demonstrated in Section 3.4.1*. Staff have identified limited capacity in the Wastewater Operations and Engineering departments to deal with current infrastructure needs, therefore, limited capacity to deal with projected growth and new acquisition. Staff must balance responsibilities between both wastewater and water infrastructure which are projected to expand at similar rates. The Town may need to consider alternative means to deliver work if staff resources do not scale appropriately with growth. A focus on project prioritization, can assist to reduce the impact on staffing.

6.4 Lifecycle Management Plan

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

6.4.1 Background Data

Asset condition

Although inspection results for wastewater gravity mains exist, they have not been analyzed and translated to a numerical condition rating. Currently, the wastewater network utilizes age-based condition only, where a condition score is determined based on prorating an asset's age over its useful life.

The condition of an asset is calculated by prorating the age of the asset over its useful life. These condition ratings are transformed to a 0 – 100 condition rating scale, spread across five condition increments: very poor, poor, fair, good, very good. This scale conforms with the 1- 5 grading system specified in the Canadian Infrastructure Report Card – Rating Scale for Asset Condition. Appendix C outlines these condition ranges.

Asset capacity and performance

Historically, the Town has inspected 50% of the wastewater network per year using a closed-circuit television (CCTV). This work includes the gravity mains and manholes, but not the laterals. The Town is currently reviewing its sewer inspection program to determine the appropriate inspection frequency going forward. In addition to the network-wide inspection, sewer mains are inspected prior to capital work, and those that are contributing to inflow and infiltration are inspected. Wastewater pumping stations are inspected regularly by staff, and during proactive maintenance activities.

Wastewater collection capacity was assessed as part of the 2009 Water and Wastewater Master Plan and deemed sufficient for current growth scenarios at that time. The upcoming Water and Wastewater Master Plan will provide an updated assessment of capacity.

6.4.2 Acquisition

The following table identifies expected asset acquisition based on the current asset inventory, projected population growth, and the development charges background study.

Asset Type	Source	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046 -2050	2051+
Mains (meters)	DC Bylaw	0	2,066	20,150	5,940	0	5,063	0
	Developer Contributed	4,332	54,452	60,634	42,222	18,019	730	2,860
	Total	**4,332**	**56,518**	**80,784**	**48,162**	**18,019**	**5,793**	**2,860**
Service Connections (meters)	DC Bylaw	0	0	0	0	0	0	0
	Developer Contributed	3,673	48,579	53,180	36,868	16,166	0	2,316
	Total	**3,673**	**48,579**	**53,180**	**36,868**	**16,166**	**0**	**2,316**
Pump Stations (count)	DC Bylaw	0	0	2	3	0	2	0
	Developer Contributed	0	0	0	0	0	0	0
	Total	**0**	**0**	**2**	**3**	**0**	**2**	**0**

See section 3.3 for growth projections. Acquiring new assets will require additional operating and maintenance requirements in addition to capital costs.

6.4.3 Operations and Maintenance Plan

The following table identifies actual operations and maintenance spending for the water network within the last three years. A summary of these activities, including their frequency, is provided in section 6.2.4.

Year	Operations and Maintenance Budget ($)
2019 (actual)	$3,235,142
2020 (actual)	$3,552,983
2021 (actual)	$4,033,055

6.4.4 Renewal/Replacement Plan

The lifecycle program for the water network is summarized in the following tables and figures.

Event Name	Event Class	Event Trigger
Trenchless Relining	Rehabilitation	I&I issues identified through CCTV inspection
End of Life Replacement	Replacement	End of life

Renewal/Replacement Prioritization

Generally, renewal and replacement of the piped system is done reactively. However, if there are opportunities to coordinate proactive replaced along with renewing the road. Wastewater pumping stations receive regular maintenance as per manufacturer recommendations. Findings from inspections are used to proactively replace components of pumping stations, however, pumping stations are relatively new and have not had significant renewal activities.

6.5 Disposal Plan

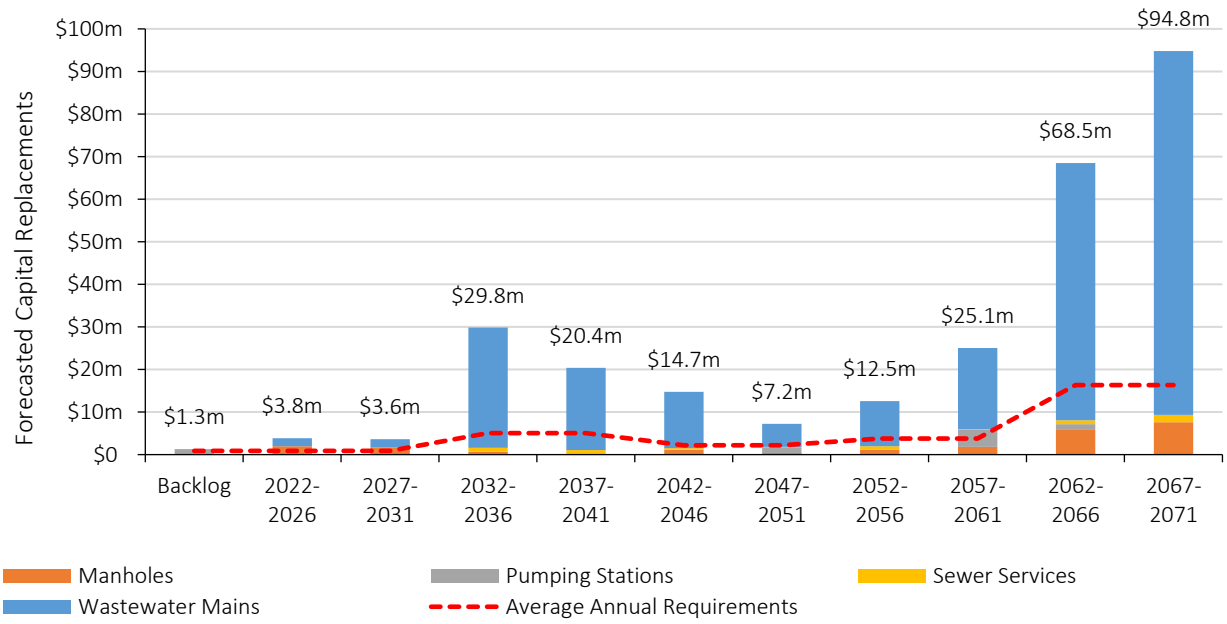
Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition, or relocation. In the case of the wastewater network, disposal is typically completed along with replacement of the assets, and the costs are included within the renewal costs.

6.6 Average Annual Requirements

The annual capital renewal requirement represents the average amount per year that the Town should allocate towards rehabilitation and replacement needs. The following table identifies the average annual capital requirements for each asset segments for the next 10 years.

Category	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Manholes	$0	$0	$27k	$0	$2.0m	$0	$1.1m	$82k	$0	$0	$477k	$3.6m
Pumping Stations	$1.3m	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1.3m
Sewer Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Wastewater Mains	$0	$0	$0	$0	$1.8m	$0	$297k	$0	$0	$0	$1.7m	$3.8m
TOTAL	**$1.3m**	**$0**	**$27k**	**$0**	**$3.8m**	**$0**	**$1.4m**	**$82k**	**$0**	**$0**	**$2.2m**	**$8.8m**

The graph below identifies capital requirements over the next 50 years for each asset segment. The forecasted requirements are aggregated into 5-year bins. Over half of the wastewater mains were installed between year 2000 and 2020, leading to a spike seen from 2057 onwards.



6.7 Risk

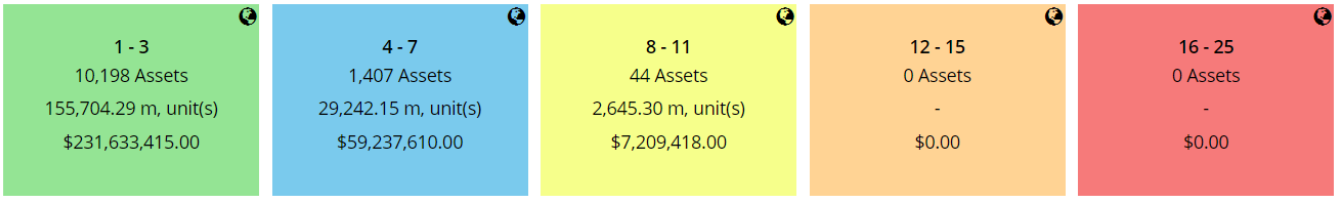
6.7.1 Corporate Risk Assessment

The following table identifies corporate level risks the Town faces given the current state of the infrastructure and asset management strategies. The table also includes a high-level risk treatment plan for the identified risks.

What can Happen	Risk Rating	Risk Treatment Plan
Reactive lifecycle management	Very High	Complete formal condition assessments of mains, pumping stations, and manholes to support proactive lifecycle management
Inflow & Infiltration	High	Adopt a flow monitoring program to support the development of an effective inflow and infiltration reduction program
System Capacity Limits	Very High	Service allocation is limited due to Regional (UYSS) wastewater treatment capacity constraints
Fiscal Capacity Constraints	High	Optimize risk ratings to improve short- and long-term capital planning
Municipal Staff Capacity Constraints	High	Align staff functions and maintenance contracts with appropriate business unit
Information Management Constraints	High	Operationalize Citywide for effective use of SR's and Work Orders and improved metrics

6.7.2 Asset Level Risks

The following figure summarizes the extent and value of assets at each level of risk for the Wastewater Network, based on the 2021 inventory:



This is a high-level model developed for the purposes of this asset management plan and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure. See Appendix D for a summary of the model metrics. The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

The following table identifies the five assets with the highest risk ratings.

	Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	250mm AC Gravity Line: Centre Street	4	2.83	11.3 – Moderate
2	Holland River Boulevard Pumping Station[11]	5	2.2	11 – Moderate
3	Industrial Commercial Institutional Service Connection: Yonge Street	4	2.5	10 – Moderate
4	250mm AC Gravity Line: Alice Street	4	2.23	8.9 – Moderate
5	350mm AC Gravity Line: Peter Street	4	2.23	8.9 – Moderate

[11] Holland River Boulevard Pumping Station rehabilitated and upgraded in 2022

7 Stormwater Network

The water services provided by the Town are overseen by the Road Operations and Engineering branches within the Community Infrastructure & Environmental Services department. The department is responsible for both the underground and above ground infrastructure.

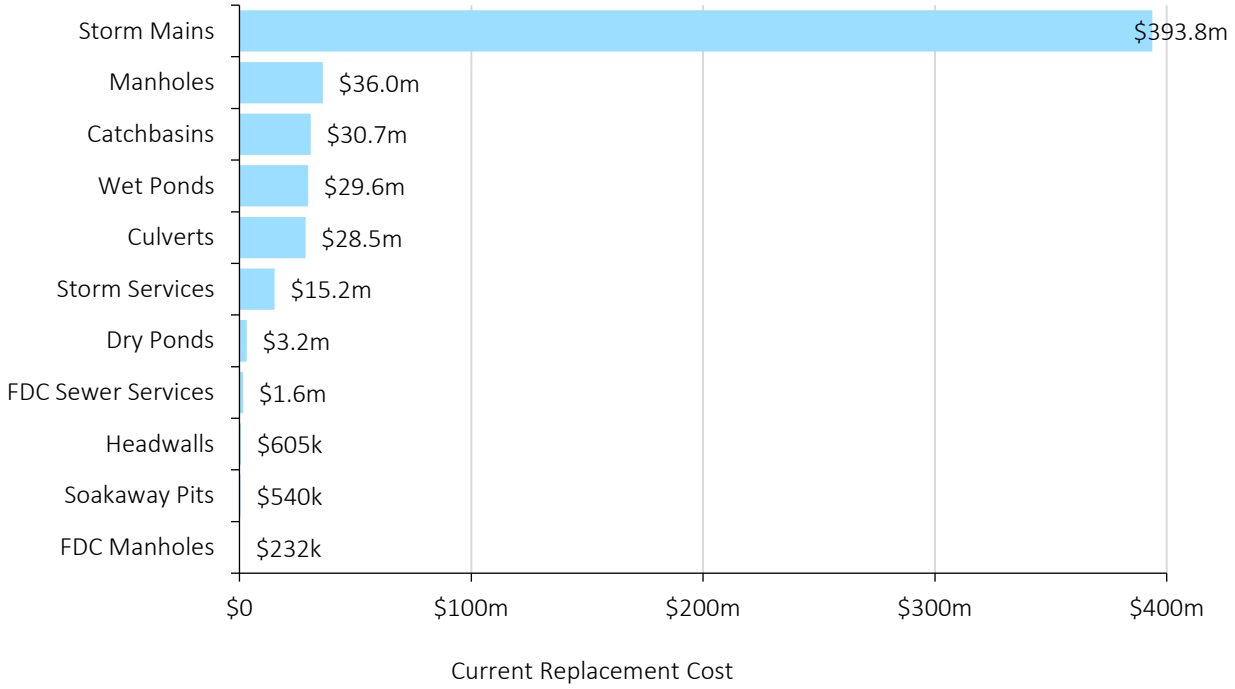
7.1 Summary of the Assets

7.1.1 Asset Inventory & Costs

The following table identifies the quantity, total replacement cost, and replacement cost method of each asset segment in the Town's stormwater network inventory.

Asset Segment	Quantity	Replacement Value	Replacement Cost Method
Catchbasins	3,917 Assets	$30,686,682	2018 unit cost inflated by CPI
Culverts	15,960 Meters	$28,477,972	2018 unit cost inflated by CPI
Dry Ponds	12 Assets (42,344 M2)	$3,188,922	Cost/Unit
FDC Manholes	17 Assets	$231,897	2018 unit cost inflated by CPI
FDC Sewer Services	765.34 Meters	$1,573,781	2018 unit cost inflated by CPI
Headwalls	232 Assets	$604,592	2018 unit cost inflated by CPI
Manholes	2316 Assets	$35,951,000	2018 unit cost inflated by CPI
Soakaway Pits	45 Assets	$540,000	2018 unit cost inflated by CPI
Storm Mains	142,452.55 Meters	$393,804,602	2018 unit cost inflated by CPI
Storm Services	73,001.09 Meters	$15,188,909	2018 unit cost inflated by CPI
Wet Ponds	50 (393,430.78 M2)	$29,629,272	Cost/Unit
TOTAL		$539,877,630	

The graph below visually illustrates the total replacement cost for each asset segment.



7.1.2 Asset Condition & Age

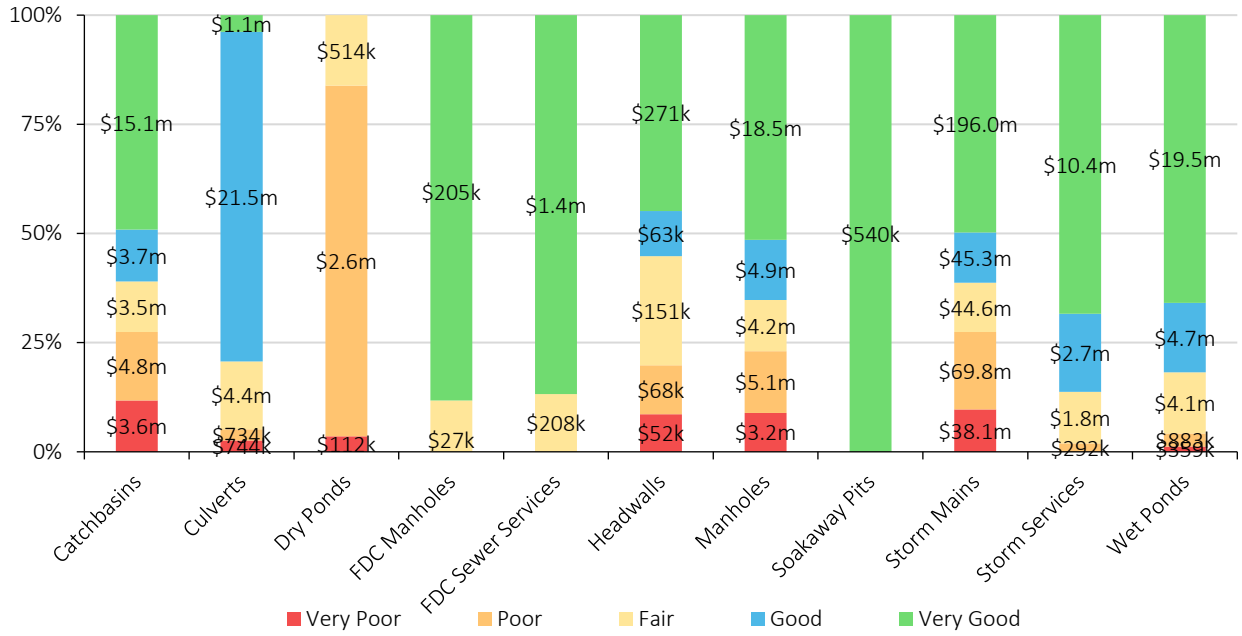
The following table identifies the average condition, condition assessment method, average age, and estimated useful life for each asset segment. The average condition (%) is a weighted value based on replacement cost.

Asset Segment	Average Condition	Condition Assessment Method	Estimated Useful Life (Years)	Average Age (Years)
Catchbasins	64%	Age-Based	50	17.3
Culverts	67%	95% Assessed	50	18.1
Dry Ponds[12]	37%	100% Assessed	50	30.8
FDC Manholes	86%	Age-Based	50	6.6
FDC Sewer Services	86%	Age-Based	50	6.4
Headwalls	65%	Age-Based	50	17.1
Manholes	67%	Age-Based	50	15.8
Soakaway Pits	95%	Age-Based	50	1.9
Storm Mains	65%	Age-Based	50	16.8
Storm Services	83%	Age-Based	60	9.9
Wet Ponds[13]	81%	100% Assessed	50	10.0
TOTAL	**67%**	**5% Assessed**		

[12] Condition based on % sediment fill capacity

[13] Condition based on % sediment fill capacity

The graph below visually illustrates the average condition for each asset segment on a very good to very poor scale. Of the assets in very poor condition $0.146m are currently backlog, representing 0.03% of the Stormwater Network.



7.2 Levels of Service

Technical and community level of service metrics that are required as part of Ontario Regulation 588/17 as well as additional performance measures that the Town has selected in accordance with best practices defined by the International Infrastructure Management Manual (IIMM).

7.2.1 Customer Research and Expectations

The following table provides a high-level summary of the customer values and customer satisfaction measures that will guide future assessments of the customer levels of service through a public forum.

Customer Values	Customer Satisfaction Measure
The Stormwater Network is safe and reliable	No occurrences of ponding, flooding, and icing
Aesthetic Quality	Stormwater infrastructure is aesthetically integrated in the surrounding environment
Quality	The storm system does not adversely affect the environment
	The storm system does not promote growth in the mosquito population and transmission of the West Nile virus

7.2.2 Legislative Requirements

There are several legislative requirements relating to the management of the stormwater network. The table below summarizes some of the key requirements that apply specifically to the stormwater network. Legislative requirements that apply to all assets are summarized in Section 2.5.

Legislation	Requirement	Significance
Environmental Protection Act, R.S.O. 1990; and accompanying Ontario Regulation 406/19: On-site and excess soil management	In addition to the requirements stated in the Environmental Protection Act, additional requirements from Ontario Regulation 406/19 relate to the management of soil. The regulation requires sampling and analysis requirements for the development and operation of storm water management facilities. Characterization of SWM facilities soil characteristics will identify sediment loading and presence of contaminants that is a concern.	Operational resources will be required to undertake the sampling, testing and analysis requirements. These results can also determine the condition or performance of a stormwater management facility, and ultimately, it's suitability to provide service.

7.2.3 Customer Levels of Service

The following table identifies the current performance of the stormwater network within three overarching measures of the customer experience: quality, function, and capacity.

Type of Measure	Level of Service	Performance Measure	Current Performance
Condition	Condition of Roads, bridges, and structural culverts	Average condition of storm sewer mains	65%
		Average condition of storm ponds	75%
		% of network in poor or very poor condition	24%
	Service Interruptions	Number of service requests related to flooding per household	Service requests currently not configured to capture this information
Function	Level of Connectivity	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	See Appendix B
Capacity	Measure of whether the service is adequate to meet traffic needs	Percentage of properties in the municipality that are resilient to a 100-year storm.	99.35%
		Percentage of the municipal stormwater management system resilient to a 5-year storm.	100%

7.2.4 Technical Levels of Service

The following table identifies the current level of service of the stormwater network within two overarching measures of the technical asset performance: lifecycle activities and service quality.

Type of Measure	Level of Service	Performance Measure	Current Performance
Lifecycle Activities	Acquisition	Frequency	Assets acquired as per plans and studies
		Budget	See Section 8.7
	Operation	Stormwater Pond Inspections	Annual
		Culvert blockage program	Annual
		Oil grit separator inspection program	Clear 50% annually
		Winter operations program	Seasonally
		Inspection of Nelson Drain	Ad hoc and ongoing
		Dyke Operations	Ad hoc and ongoing
		O&M Budget	$98,050
	Maintenance[14]	Culvert inspection, inventory, and replacement program	Annual
		Catch basin cleaning program	50% of catch basins annually
		Catch basin lid cleaning	Daily
		CCTV inspection & flushing	Ad hoc and ongoing
		O&M Budget	$98,050
	Renewal	Frequency	Budgeted and prioritized as per Stormwater Master Plan and staff assessments
		Budget	$10.75 million average annual requirement
	Disposal	Frequency	Disposed assets are accounted for within the renewal process
		Budget	Part of renewal costs
Asset Quality	Main Longevity	Percentage of pipes in each material	See Appendix A
		Percentage of pipes in each diameter	See Appendix A
Service Quality	Staff Capacity	Full-time staff members divided by kilometers of storm mains	36 / 142.5 = 0.25
		Full-time staff members divided by serviced households	36 / 13993 = 0.0026
	Service requests	Number of service requests divided by total households	75 / 13993 = 0.0054

[14] Storm sewer Inspections performed in coordination with roads renewal planned in the current and next year out. Inspections are also performed ad hoc on components on the system that are experiencing operational performance issues (e.g. if surface flooding occurs and not draining in a sewer). Funding is paid for under roads renewal.

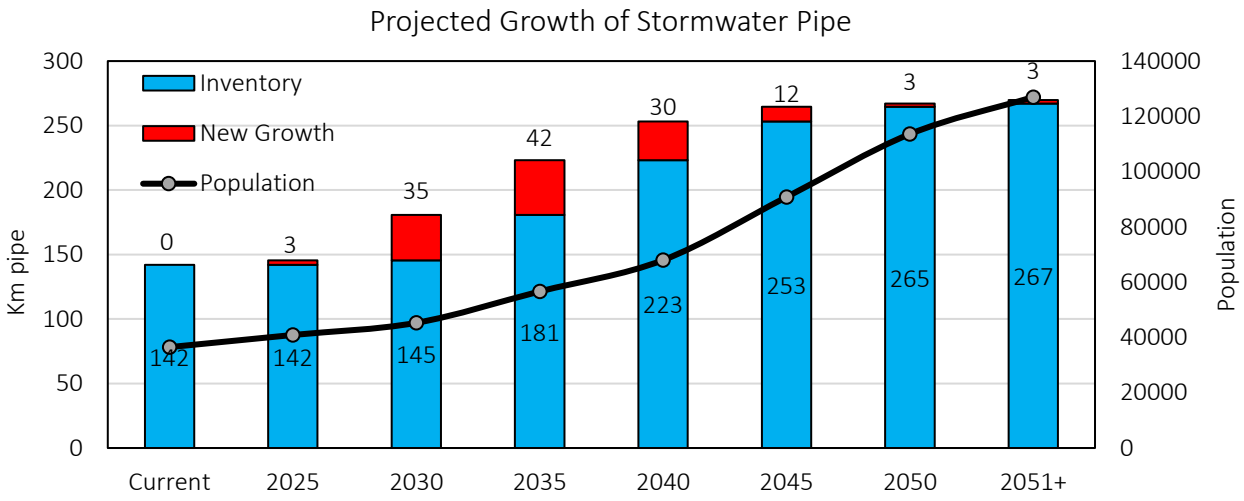
7.3 Growth Management Plan

7.3.1 Trends

Drivers affecting demand include things such as population change, regulations, changes in demographics, seasonal factors, vehicle ownership rates, consumer preferences and expectations, technological changes, economic factors, agricultural practices, environmental awareness, etc.

7.3.2 Population and Economic Growth Forecasts

Growth of population within the Town results in a need to acquire new stormwater infrastructure. Between DC bylaw and developer contributed assets, the stormwater network is expected to nearly double by 2051, with significant growth occurring between years 2026 and 2040. This growth generally follows the expected population growth, as illustrated in the figure below. Growth in the stormwater network will place pressure on staff time and resourcing to undertake the necessary lifecycle activities to manage service levels.



7.3.3 Demand Impact on Assets

As a result of growth, additional demand will be placed on the transportation network. The following table summarizes the demand drivers.

Demand drivers	Description	Impact on services
New Servicing	New development is expected to accommodate growth of the town. This will require new stormwater assets to service new households and businesses, and may increase demand loads on existing stormwater assets	New subdivisions will require storm mains, service connections, stormwater management facilities, and other stormwater assets to service new households. Acquiring new assets will mean that the Town will have to maintain a larger network, requiring larger operations and maintenance budgets, and requiring more staff resourcing to maintain service levels. Densifying existing areas may require stormwater to be upsized to serve demands. However, the Town has not identified any specific locations where this is a considerable risk in the near future.

Demand drivers	Description	Impact on services
Climate Change	Changing weather patterns may result in increased rainfall and snowmelt.	The full effects of climate change on the stormwater system is not yet understood. However, if rainfall and snowmelt volumes increase, it is likely that more flooding and washout events will occur. The Town may expect to increase catch basin cleaning and pond sediment removal programs, and possibly increase capacity in the collection system
Urbanization	Growth in the urban areas requires more grey infrastructure than rural areas	Urban areas are less suitable to accommodate green infrastructure, such as ditches and channels. Instead, catch basins and pipes are required to collect stormwater. Typically, catch basins and pipes have more operating requirements than ditches and channels. Engineered surfaces, such as roads, sidewalks, and buildings, are typically less permeable than vegetated areas. As urban areas become more developed, the Town can expect to receive more runoff during snowmelt and rain events, contributing to a higher drainage demand.

7.3.4 Impact on Staffing

Staffing needs are expected to scale with population growth, as demonstrated in Section 3.4.2. Staff have identified limited capacity in the Wastewater Operations and Engineering departments to deal with current infrastructure needs, therefore, limited capacity to deal with projected growth and new acquisition. The Town may need to consider contracting out work if staff resources do not scale appropriately with growth. A focus on project prioritization, can reduce the impact on staffing.

7.4 Lifecycle Management Plan

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

7.4.1 Background Data

Asset condition

Results from culvert inspections have been transformed to a 1 – 5 condition rating scale. Stormwater mains are assessed for defects, and a condition score can be developed if a rating criteria is determined. Some storm ponds have been assessed for sediment loads, in which case assessed ponds have a condition score equal to the % sediment fill. Storm ponds and other assets that have not been assessed rely on age-based condition.

Age-based condition is calculated by prorating the age of the asset over its useful life. These condition ratings are transformed to a 0 – 100 condition rating scale, spread across five condition increments: very poor, poor, fair, good, very good. This scale conforms with the 1- 5 grading system specified in the Canadian Infrastructure Report Card – Rating Scale for Asset Condition. Appendix C outlines these condition ranges.

Asset capacity and performance

Historically, the Town has inspected 10% of the piped storm sewer network per year using a closed-circuit television (CCTV). This work includes the gravity mains and manholes, but not the laterals. However, this work has not commenced in 2021, and the Town is currently considering a suitable inspection frequency going forward. In addition to the network-wide inspection, sewer mains are inspected prior to capital work, and those that are contributing to inflow and infiltration are inspected.

Approximately 30% of catch basins and oil grit separators are inspected and cleaned each year. Culverts are inspected annually for blockages and other defects. A bathymetric survey of the storm ponds was conducted by an external consultant in 2017/2018 to determine sediment levels – the Town intends to repeat this assessment on an 8-year cycle.

The capacity of the stormwater system was assessed in the 2012 Stormwater Master Plan, where sub catchments were modelled under 2 to 100-year storm events. The current stormwater system was found to adequately respond to storm events, and the receiving bodies had capacity to collect runoff from a 100-year storm. Based on developments proposed at that time in the Official Plan, it is anticipated that developments will increase peak flow runoff and future studies may need to examine retrofits and upgrades to the stormwater system.

7.4.2 Acquisition

The following table identifies expected asset acquisition based on the current asset inventory, projected population growth, and the development charges background study.

Asset Type	Source	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046 -2050	2051+
Mains (meters)	DC Bylaw	0	0	0	0	0	0	0
	Developer Contributed	3,407	35,495	42,300	29,951	11,471	2,451	2,578
	Total	**3,407**	**35,495**	**42,300**	**29,951**	**11,471**	**2,451**	**2,578**
Service Connections (meters)	DC Bylaw	0	0	0	0	0	0	0
	Developer Contributed	3,302	43,619	47,770	33,122	14,514	14	2,085
	Total	**3,302**	**43,619**	**47,770**	**33,122**	**14,514**	**14**	**2,085**
SWM Facilities (count)	DC Bylaw	0	0	0	0	0	0	0
	Developer Contributed	3	24	31	22	7	4	2
	Total	**3**	**24**	**31**	**22**	**7**	**4**	**2**

See section 3.3 for growth projections. Acquiring new assets will require additional operating and maintenance requirements in addition to capital costs.

7.4.3 Operations and Maintenance Plan

The following table identifies actual operations and maintenance spending for the stormwater network within the last three years. A summary of these activities, including their frequency, is provided in section 7.2.4.

Year	Operations and Maintenance Actuals & Budget $
2019 (actual)	$60,435
2020 (actual)	$35,113
2021 (actual)	$98,050

7.4.4 Renewal/Replacement Plan

The lifecycle program for the water network is summarized in the following tables and figures.

Event Name	Event Class	Event Trigger
Storm pond dredging	Rehabilitation	As per bathymetric findings[15]
Asset replacement	replacement	End of life

[15] Historically the Town would dredge ponds at 50% sediment capacity, which is the basis for this plan.

Renewal/Replacement Prioritization

Generally, renewal and replacement of the piped system is done reactively. However, if there are opportunities to coordinate work, such as renewing the road surface above, then stormwater mains may be proactively replaced. Storm ponds are dredged as per findings of the bathymetric surveys to ensure they can receive runoff adequately.

7.4.5 Disposal Plan

Disposal includes any activity associated with the disposal of a decommissioned asset including sale, demolition, or relocation. In the case of the water network, disposal is typically completed along with replacement of the assets, and the costs are included within the renewal costs.

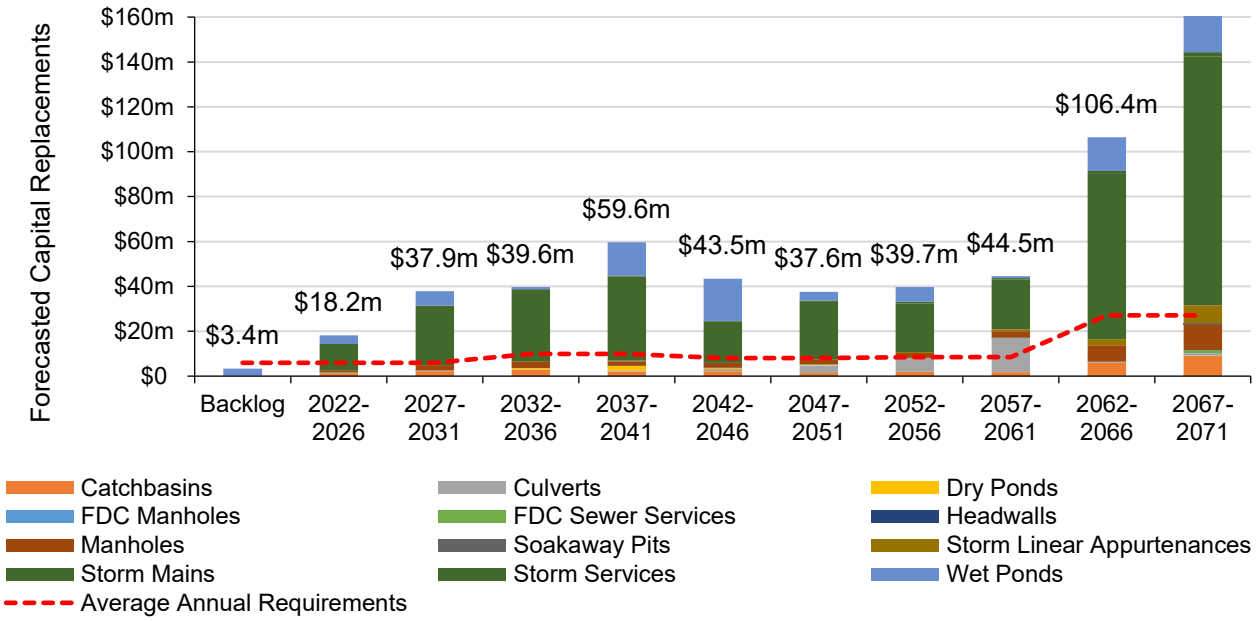
7.5 Average Annual Requirements

The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The following table identifies the average annual capital requirements for each asset segments for the next 10 years.

Category	Backlog	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Catchbasins	$0	$0	$0	$226k	$993k	$178k	$743k	$331k	$840k	$40k	$259k	$0
Culverts	$146k	$48k	$0	$129k	$102k	$57k	$35k	$21k	$133k	$77k	$8k	$48k
Dry Ponds	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$112k	$0
FDC Manholes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FDC Sewer Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Headwalls	$0	$0	$0	$5k	$3k	$0	$16k	$5k	$10k	$10k	$3k	$0
Manholes	$0	$0	$8k	$125k	$756k	$11k	$829k	$477k	$181k	$163k	$661k	$0
Soakaway Pits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storm Linear Appurtenances	$0	$0	$0	$0	$6k	$0	$0	$0	$7k	$0	$0	$0
Storm Mains	$0	$0	$0	$1.9m	$9.6m	$65k	$12.7m	$1.4m	$6.8m	$1.9m	$3.7m	$0
Storm Services	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Wet Ponds	$3.3m [16]	$0	$0	$282k	$3.1m	$541k	$540k	$577k	$0	$983k	$4.4m	$0
TOTAL	**$3.4m**	**$48k**	**$8k**	**$2.7m**	**$14.6m**	**$851k**	**$14.8m**	**$2.8m**	**$8.0m**	**$3.2m**	**$9.1m**	**$48k**

The graph below identifies capital requirements over the next 50 years for each asset segment. The forecasted requirements are aggregated into 5-year bins.

[16] Wet ponds are considered backlog when the condition drops below 50%, coinciding with the ponds being 50% full of sediment. The backlog cost of wet ponds is determined as the cost of dredging.



7.6 Risk

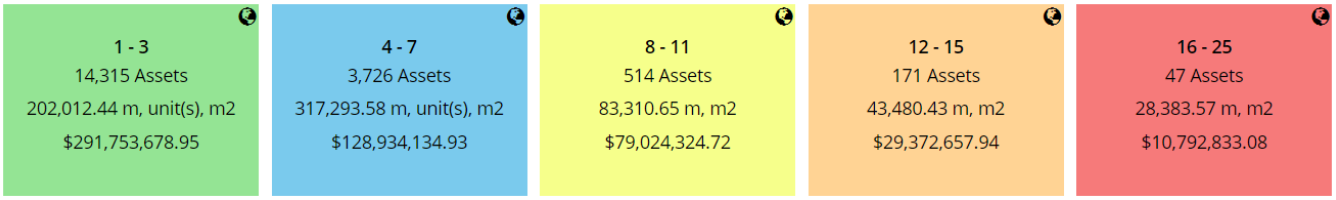
7.6.1 Corporate Risk Assessment

The following table identifies corporate level risks the Town faces given the current state of the infrastructure and asset management strategies. The table also includes a high-level risk treatment plan for the identified risks.

What can Happen	Risk Rating	Risk Treatment Plan
Reactive lifecycle management	Very High	Complete formal condition assessments of mains, pumping stations, and manholes to support proactive lifecycle management
Sediment Build-Up	High	Develop a formal flushing program to reduce sediment build-up and improve system flow
Fiscal Capacity Constraints	Very High	Transition from a rural to urban community puts additional stress on the stormwater system and requires notable funding for operation, maintenance as well as system upgrades Optimize risk ratings and growth projections to improve short- and long-term capital planning.
Low Confidence in Asset Data & Information	High	Allocate time and funding to improve asset inventory information through CCTV program
Municipal Staff Capacity Constraints	High	Align staff functions and maintenance contracts with appropriate business unit
Information Management Constraints	High	Operationalize Citywide for effective use of SR's and Work Orders and improve metrics

7.6.2 Asset Level Risks

The following figure summarizes the extent and value of assets at each level of risk for the Stormwater Network, based on the 2021 inventory:



This is a high-level model developed for the purposes of this asset management plan and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure. See Appendix D for a summary of the model metrics. The identification of critical assets allows the Town to determine appropriate risk mitigation strategies and treatment options. Risk mitigation may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

The following table identifies the five assets with the highest risk ratings.

	Asset	Probability of Failure	Consequence of Failure	Risk Rating
1	1050mm Concrete Gravity Sewer: Grist Mill Road	5	4.4	22 – Very High
2	1200mm Concrete Gravity Sewer: Veronica Crescent	5	4.1	20.5 – Very High
3	Green Lane East Storm Water Detention Facility (8)	4	5	20 – Very High
4	1350mm Concrete Gravity Sewer: King Street	5	3.95	19.75 – Very High
5	1200mm Concrete Gravity Sewer: Donlands Avenue	5	3.5	17.5 – Very High

8 FINANCIAL SUMMARY

8.1 Financial Strategy Requirements

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 Town of East Gwillimbury to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and address increasing pressures brought on by growth. The Town will be developing a Financial Strategy as part of the regulation's 2025 requirements.

Funding for the costs to maintain current service levels typically comes from the following sources:

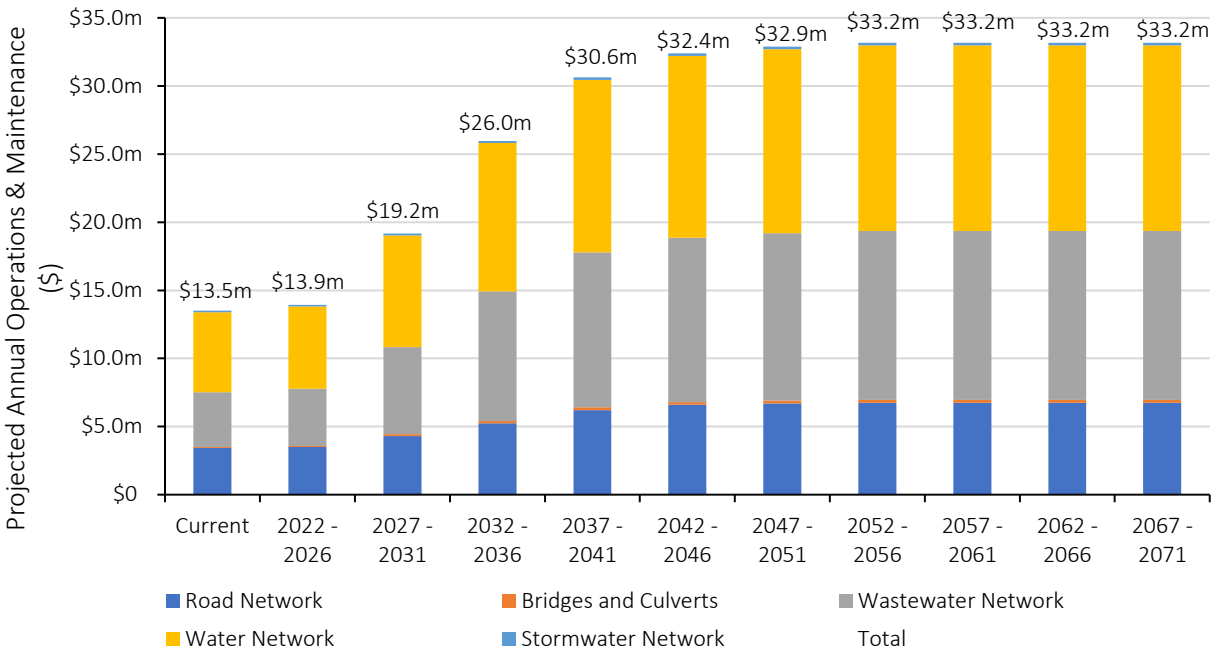
1. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves
    d. Debt
    e. Development charges
2. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods
3. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants

8.2 Financial Requirements

The following sections outline the costs required to maintain current service levels. These projected costs account for the operating, maintenance, and renewal requirements for assets that the Town manages today, as well as the acquisition, operating, maintenance and renewal costs for assets that the Town anticipates acquiring through growth.

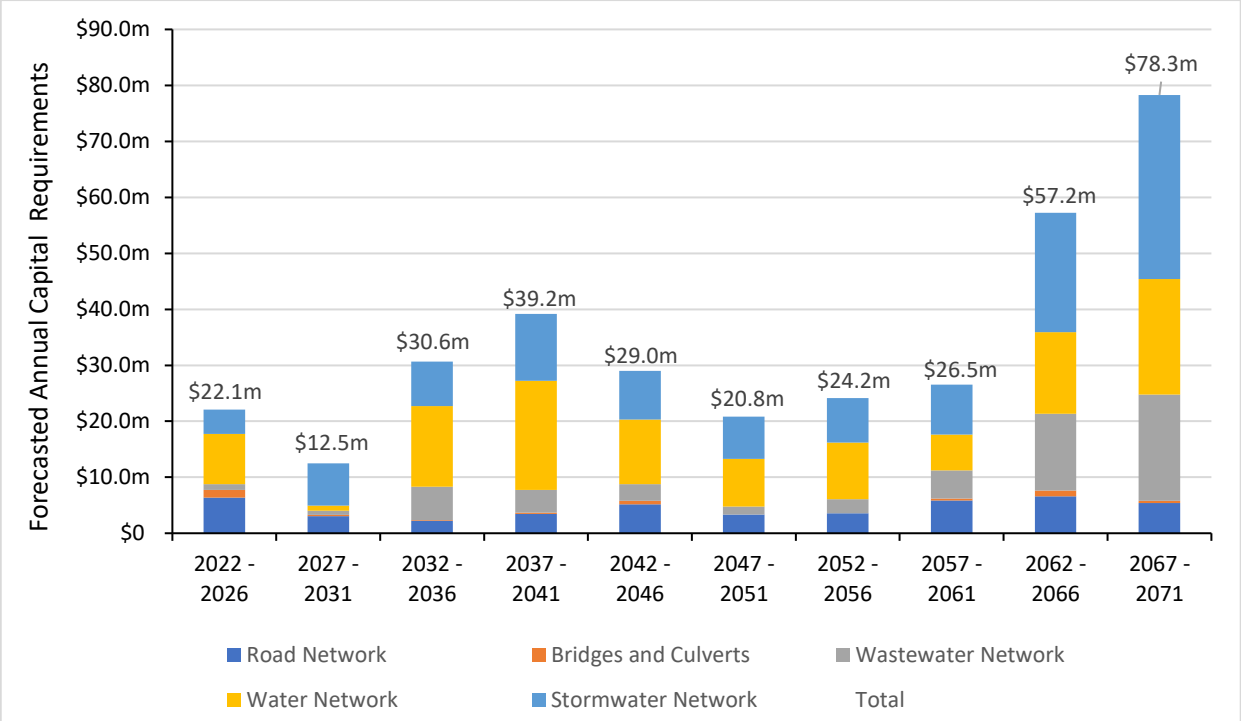
8.2.1 Average Annual Operating and Maintenance Requirements

The following graph outlines the projected annual operating and maintenance costs. The Town projected the operation and maintenance costs for existing assets as well as for the projected increases due to growth.



8.2.2 Average Annual Capital Renewal Requirements

The following graph outlines the average annual capital requirements for each asset category, in five-year increments. Generally, the capital requirements of existing infrastructure will increase over time, peaking at $78.3m by 2067. An appropriate funding strategy should be developed, gradually increasing at the pace capital requirements increase. It is assumed that the $42.8m backlog will be managed in the first five years, meaning that the $22.1m/year in 2022-2026 is made up of $8.6m/year for the backlog and $13.5m/year for existing needs.

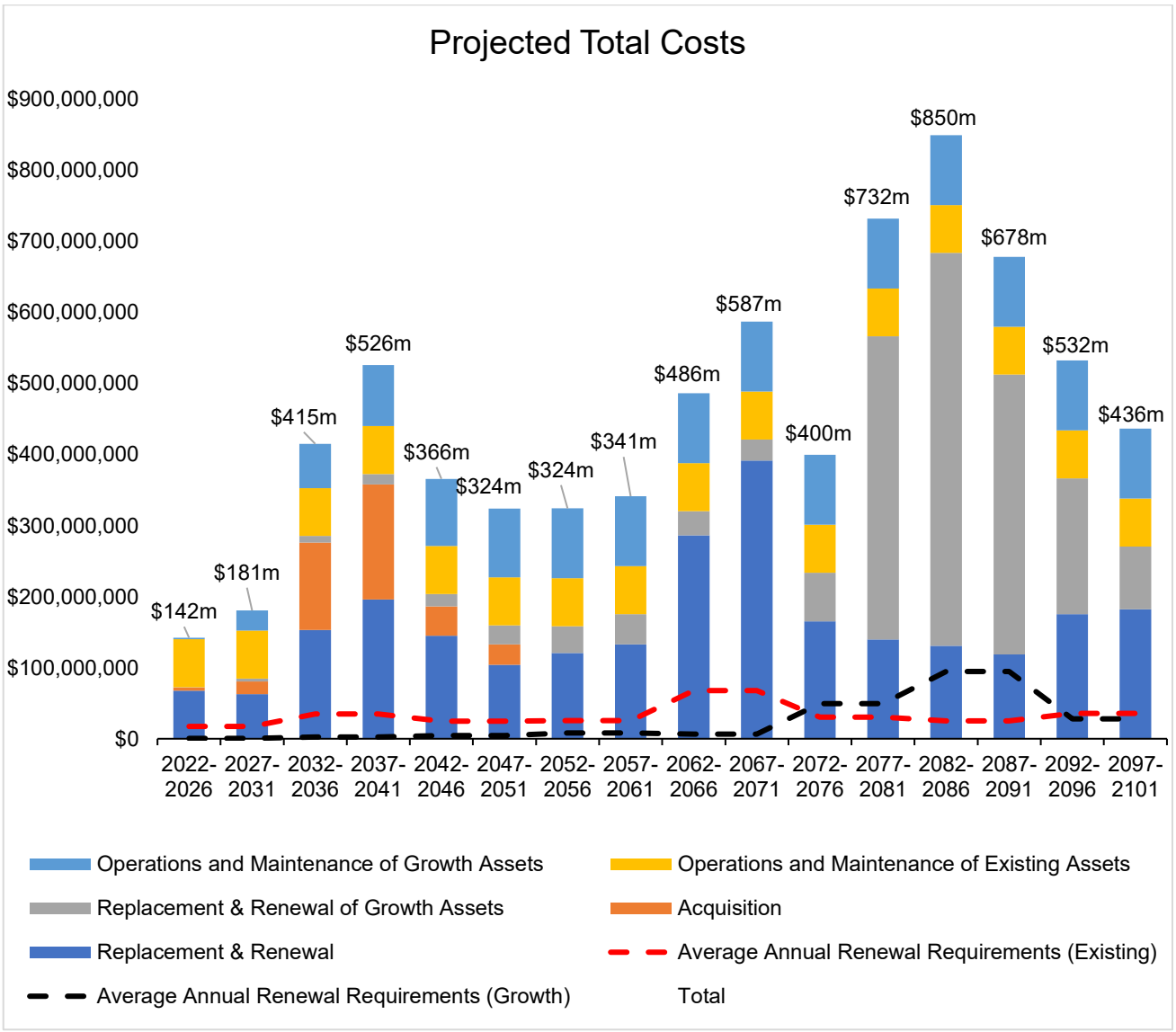


For the water network, wastewater network and the storm network asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

However, for the Road Network and Bridges and Culverts, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Town's assets. The development of these strategies allows for a more accurate representation of the true costs of renewing roads, under the current strategy.

8.3 Impacts of Growth on the Financial Strategy

The financial requirements presented in the previous sections identifies the funding needs to operate, maintain, and renew assets that the Town manages today. As the Town grows, new assets will be acquired, which will create additional requirements. Using the growth projections provided within the asset category chapters, an approximation of financial requirements was developed for a full build-out scenario based upon the Town's recently updated Official Plan and the inclusion of 70% of the Whitebelt lands into the urban boundary. The following figure compiles and summarizes all of these financial requirements together.



Growth costs were determined by calculating the unit capital and operating & maintenance requirements for existing assets and multiplying it by the units of growth assets acquired. However, projections for growth asset acquisition only extends to 2051. These projected requirements will increase should the remaining 30% of Whitebelt lands be brought into the urban boundary through a future Official Plan update.

Using the assumptions of applying unit costs from existing assets to growth assets, it becomes apparent that growth will increase overall capital and operational costs significantly. Years 2077 and beyond see a spike in renewal of growth assets, as at this point growth assets are approaching failure. The average annual renewal requirements for growth assets exceeds that of the existing network, meaning by the end of this century renewal efforts may need to double.

As described above, several assumptions were made to determine growth requirements. These results are intended as a starting point for further review. It is recommended that a detailed financial analysis examines the funding and staffing requirements to meet service level needs for these rapidly growing asset portfolios.

8.4 Recommendations

1. The 2025 requirements of O. Reg. 588/17 will require the Town to develop a financial strategy that states the funding requirements to achieve the desired or "proposed" levels of service, funding available from sustainable funding sources, and identifies the gap between the funding need and funding available. To this end:
    a. The Town should identify all available sustainable funding sources. Sustainable sources are those that have historically been received at least three years in a row, and are expected to continue to be received for the next 10 years; and
    b. The Town should allocate the available funding to each asset category, considering historical budgets and service level needs, for all asset portfolios that will be studied as part of the regulation's 2024 Asset Management Plan for all assets at current levels of service; and
    c. The Town should calculate a funding shortfall, defined as the difference between funding needs and sustainable funding available; and
    d. Finally, if a funding shortfall exists, the Town should consider several options to close the gap. These options can consider changes to tax and rate increases, multiple funding horizons, reallocating budgets between asset categories, alternative asset lifecycle, holding and management strategies and acceptable residual levels of risk.

2. This plan considered historical operations and maintenance service levels and spending to approximate future operating and maintenance needs. A more detailed study should be conducted to understand, more accurately, the future operating, maintenance and renewal pressures.

3. Consider the impact of changing technology, staffing levels, and standard operating processes on capital, maintenance, and operating requirements.

4. Consider the impacts of deferring the Upper York Sewage Solution on future asset acquisitions. Forecasted needs should better reflect these impacts once timing of the UYSS is known.

9 Recommendations Plan, Improvement and Monitoring

9.1 Strategic Recommendations

In November 2021, East Gwillimbury engaged PSD Citywide to develop an asset management roadmap. This report summarizes the Town's current state of the asset management program, identifies gaps, and provides recommendations for program improvement spanning years 2021 to 2025. Asset management maturity was assessed through a survey and staff correspondences, considering the maturity of data, asset management strategies, and information systems.

Strategic recommendations identified in general include, further inventory data refinement, documentation and revisions to asset management strategies, and improvements to the inventory systems are crucial for the Town to mature its asset management program. Future requirements of Ontario Regulation 588/17 will require the Town to develop an inventory of non-core assets, develop levels of service measures, a risk management plan, and document lifecycle activities for non-core assets, and determine a suitable, "proposed" levels of service.

The proposed levels of service may require the Town to develop new lifecycle strategies and determine impacts on financial requirements and resulting strategy. Recommendations to meet these future Ontario Regulation 588/17 requirements are documented in the Town's Asset Management Roadmap 2021-2025.

Refer to Appendix E for the roadmap summary, timelines and resources of the improvement plan.

9.2 Asset Portfolio Level Recommendations

9.2.1 Transportation Network

1. Develop assessed condition scores for sidewalks, barriers, and streetlights, as these asset segments rely on age.
2. Continue to refine lifecycle strategies, comparing the projected workplan against the actual work that was delivered.
3. Develop capacity key performance indicators, as identified in the Customer Levels of Service
4. Risk model weightings should be reviewed and refined to ensure prioritized listing of critical assets aligns with staff priorities
5. Operating and maintenance costs should consider the expenditure need to maintain current levels of service, rather than what was historically spent. The Town may consider a detailed study to understand these needs.

9.2.2 Water Network

1. Currently the replacement cost relies on inflated unit rates developed in 2018. The Town should update cost estimates using current construction rates, considering full project costs, for future iterations of the asset management plan.
2. Consider developing a proxy condition score for watermains and appurtenances, considering factors such as historical breaks, age, and material. Currently, all segments rely on age.
3. Develop fire flow / fire protection key performance indicators, as identified in the Customer Levels of Service
4. Risk model weightings should be reviewed and refined to ensure prioritized listing of critical assets aligns with staff priorities
5. Operating and maintenance costs should consider the expenditure need to maintain current levels of service, rather than what was historically spent. The Town may consider a detailed study to understand these needs

9.2.3 Wastewater Network

1. Currently the replacement cost relies on inflated unit rates developed in 2018. The Town should update cost estimates using current construction rates, considering full project costs, for future iterations of the asset management plan.
2. Develop an overall condition score for sewer mains, laterals, and manholes, utilizing results from CCTV inspections as per the Pipeline Assessment and Certification Program (PACP).
3. Risk model weightings should be reviewed and refined to ensure prioritized listing of critical assets aligns with staff priorities

4. Operating and maintenance costs should consider the expenditure need to maintain current levels of service, rather than what was historically spent. The Town may consider a detailed study to understand these needs.

9.2.4 Stormwater Network

1. Currently the replacement cost relies on inflated unit rates developed in 2018. The Town should update cost estimates using current construction rates, considering full project costs, for future iterations of the asset management plan.
2. Develop an overall condition score for storm sewer mains, laterals, and manholes, utilizing results from CCTV inspections as per the Pipeline Assessment and Certification Program (PACP).
3. Utilize bathymetric survey results to estimate the remaining useful life of stormwater ponds, and to determine a suitable inspection/cleaning frequency
4. Risk model weightings should be reviewed and refined to ensure prioritized listing of critical assets aligns with staff priorities
5. Operating and maintenance costs should consider the expenditure need to maintain current levels of service, rather than what was historically spent. The Town may consider a detailed study to understand these needs.

9.3 Performance Measures

The effectiveness of the asset management plan can be measured in the following ways:

1. The accuracy of the forecasted costs identified in this plan as compared to those costs identified in the long-term financial plan
2. The degree to which the existing and projected service levels and service consequences, risks and residual risks are incorporated into the Strategic Plan and business plans
3. The number of infrastructure project business cases that utilize levels of service reporting and risk to identify and justify the business need of the infrastructure project.

10 References

Climatedata.ca

Federation of Canadian Municipalities. “Canadian Infrastructure Report Card.” 2019.

Government of Canada. “Canada’s Changing Climate Report.” 2019.

IPWEA. “International Infrastructure Management Manual (IIMM).” 2020.

ISO 55000. “Asset Management – Overview, Principles and Terminology.” 2014.

ISO 55001. “Asset Management – Management Systems – Requirements.” 2014.

ISO 33000. “Risk Management.” 2018.

Lake Simcoe Region Conservation Authority. LSRCA. https://www.lsrca.on.ca/

Ontario Regulation 588/17. “Asset Management Planning for Municipal Infrastructure.”

The Institute of Asset Management. “Asset Management – An Anatomy.” December 2015.

Town of East Gwillimbury. “Cultural Mapping Project.” 2012.

Town of East Gwillimbury. “Official Plan.” June 2022.

Town of East Gwillimbury. “Water & Wastewater Master Plan.” 2009.

Town of East Gwillimbury. “Stormwater Management Master Plan.” 2009.

Town of East Gwillimbury. “Transportation Master Plan.” 2010.

York Region. “Official Plan.” April 2019.

11 Appendix A: Ontario Regulation 588/17 Current Levels of Service

Table 1- Roads Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity	See Appendix B
Quality	Description or images that illustrate the different levels of road class pavement condition	See Appendix B

Table 2- Roads Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2020)
Scope	Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km^2)	0
	Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km^2)	0.472
	Lane-km of local roads (MMS classes 5 and 6) per land area (km/km^2)	1.488
Quality	Average pavement condition index for paved roads in the municipality	50%
	Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor)	N/A

Table 3- Bridges and Culverts Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists)	The Town's bridges support a range of traffic types, including heavy and light vehicles, pedestrians and cyclists. They are used as part of major transportation routes that accommodate all types of travel including emergency response, transportation of goods/services, and personal travel.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges	See Appendix B
	Description or images of the condition of culverts and how this would affect use of the culverts	See Appendix B

Table 4 - Bridges and Culverts Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of bridges and structural culverts in the municipality with loading or dimensional restrictions	17%
Quality	Average bridge condition index value for bridges in the municipality	67

	Average bridge condition index value for structural culverts in the municipality	72

Table 5- Water Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2020)
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 B
	Description, which may include maps, of the user groups or areas of the municipality that have fire flow	Currently being assessed in the upcoming Water Master Plan
Reliability	Description of boil water advisories and service interruptions	N/A

Table 6- Water Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal water system	71%
	% of properties where fire flow is available	Currently being assessed in the upcoming Water Master Plan
Reliability	# of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0
	# of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system	2

Table 7- Wastewater Community Levels of Service

Service Attribute	Qualitative Description	Current LOS (2020)
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 B
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	N/A
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches	N/A
	Description of how stormwater can get into wastewater mains in the municipal wastewater system, causing sewage to overflow into streets or backup into homes	No known cross-connections by design. Infiltration of groundwater to pipes occurs through pipe defects.
	Description of how wastewater mains in the municipal wastewater system are designed to be resilient to stormwater infiltration	Modern wastewater system is built at a standard to seal it from infiltration. I&I is no present in new areas, and mostly an issue with older areas.

Service Attribute	Qualitative Description	Current LOS (2020)
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Sewage Treatment is managed by York Region

Table 8 - Wastewater Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties connected to the municipal wastewater system	54%
Reliability	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system	N/A
	# of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system	0
	# of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	N/A

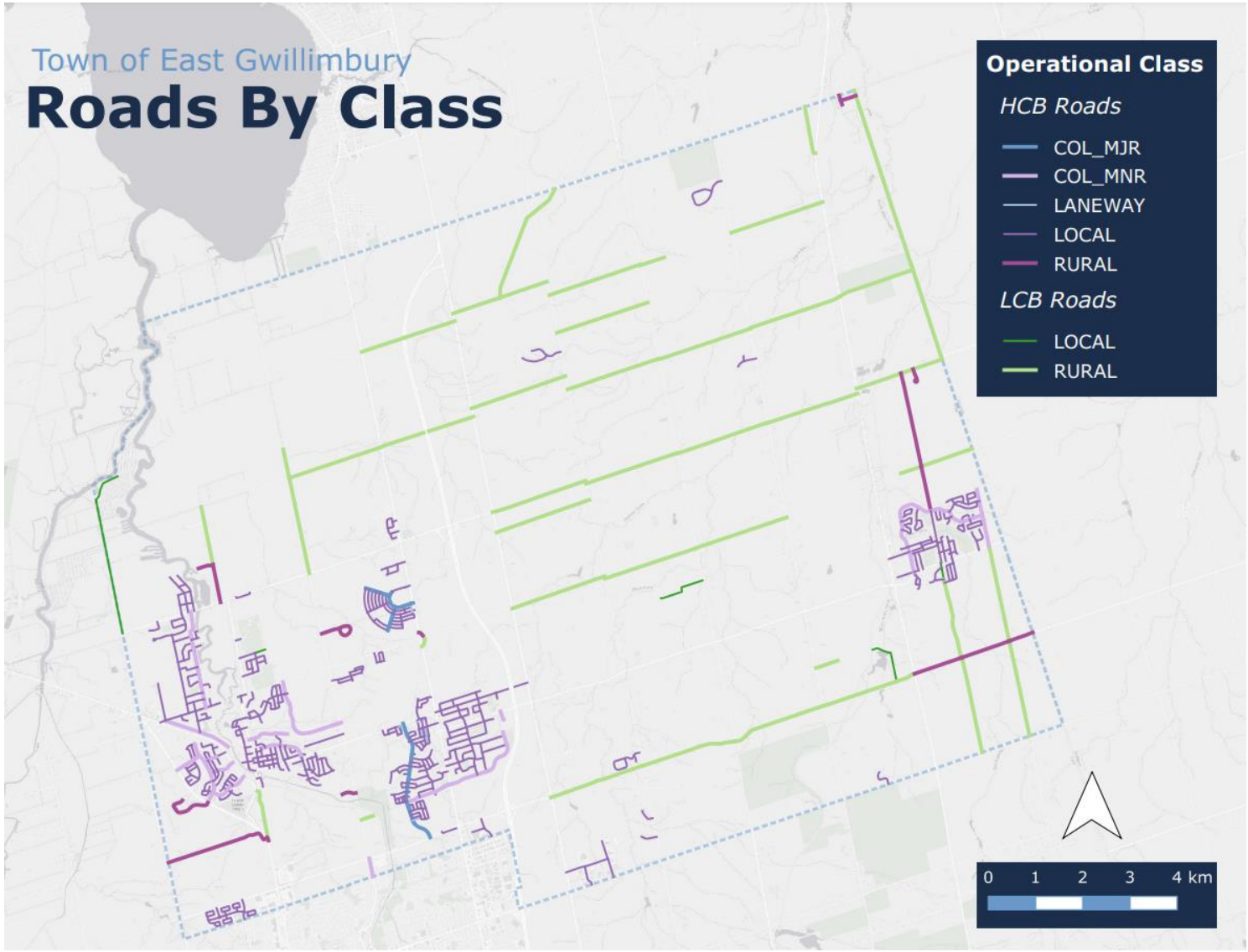
Table 9- Stormwater Community Levels of Service

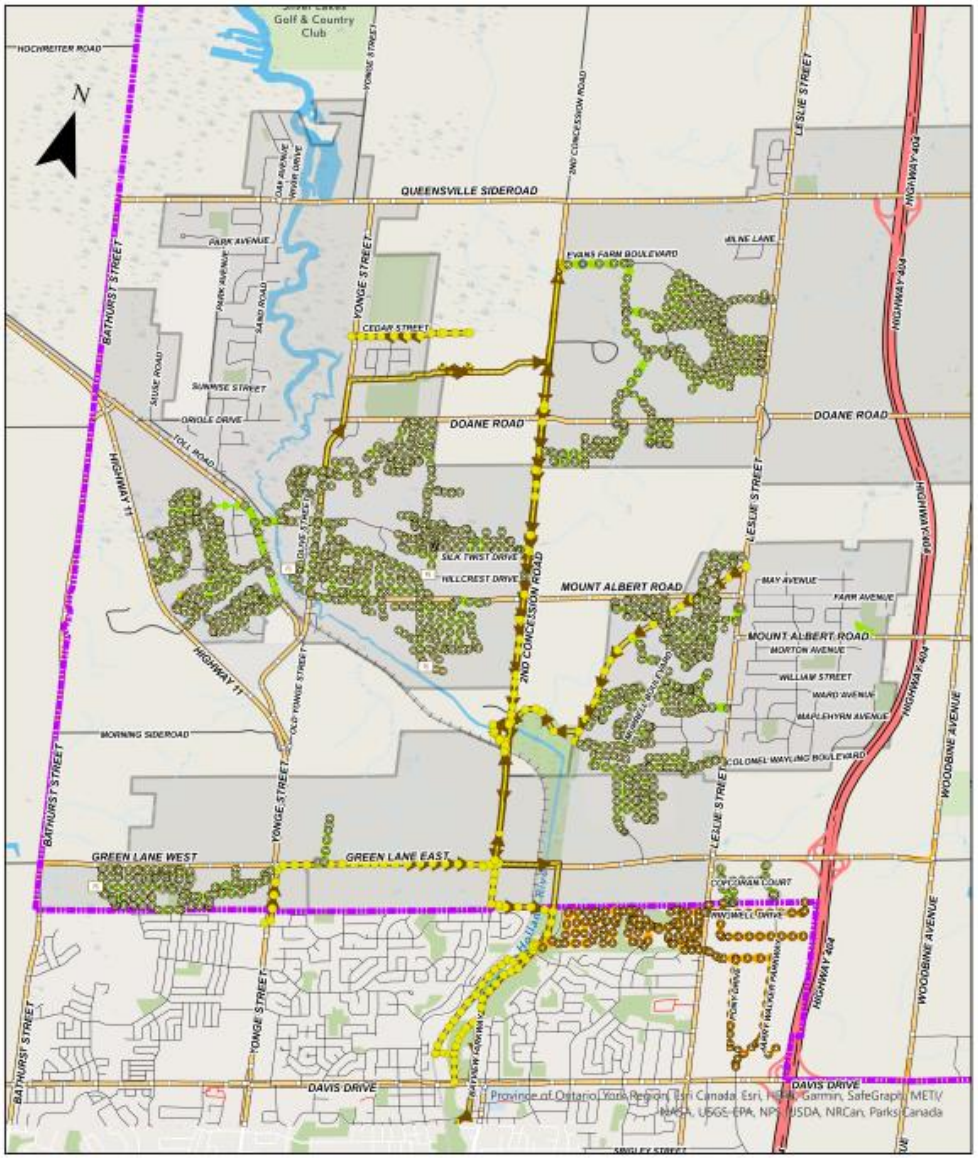
Service Attribute	Qualitative Description	Current LOS (2020)
Scope	Description, which may include map, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system	See Appendix B

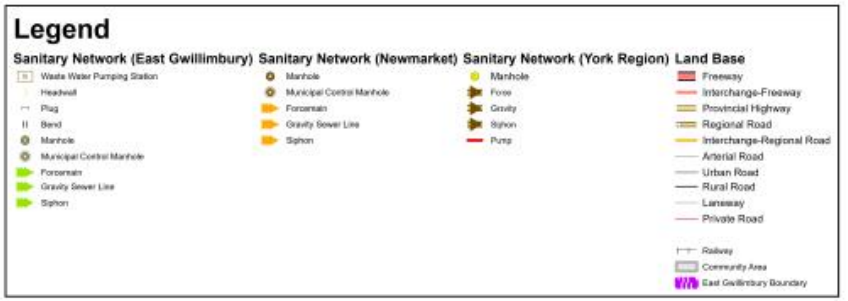
Table 10- Stormwater Technical Levels of Service

Service Attribute	Technical Metric	Current LOS (2020)
Scope	% of properties in municipality resilient to a 100-year storm	99.35%
	% of the municipal stormwater management system resilient to a 5-year storm	100%

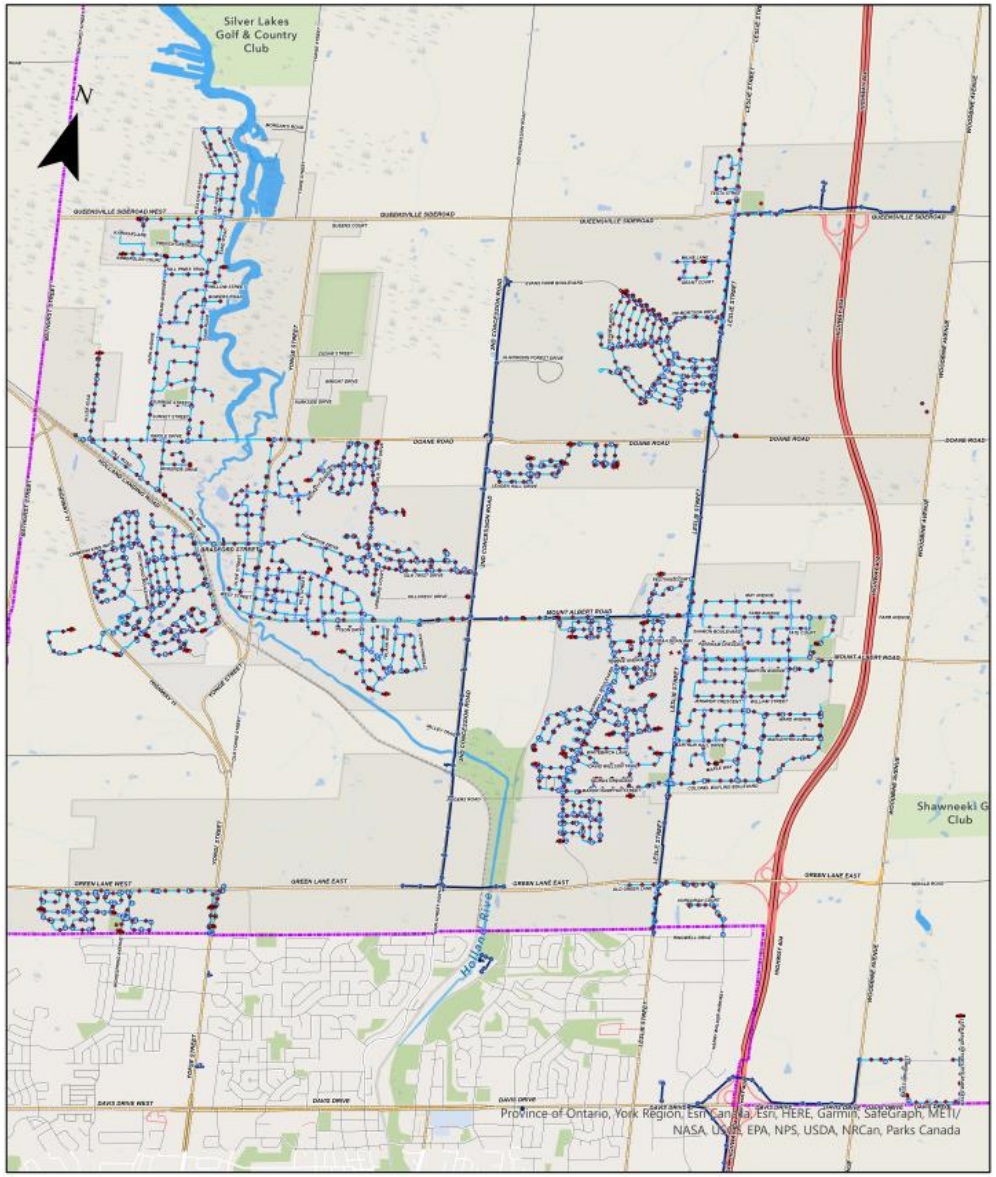
12 Appendix B: LOS Maps and Images

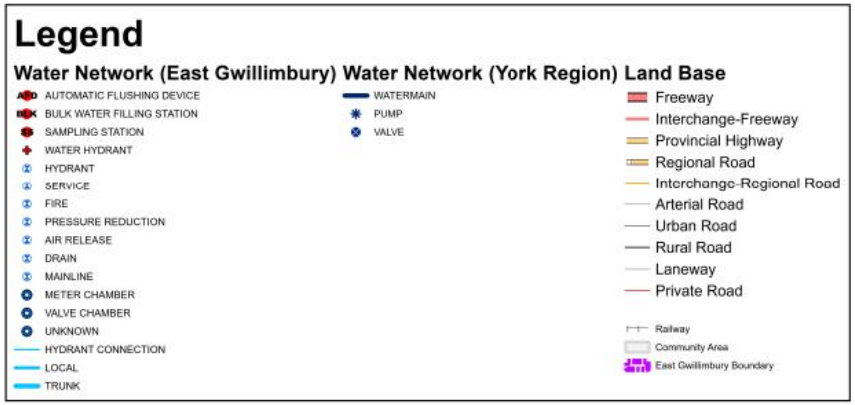



N
QUEENSVILLE SIDEROAD
DOANE ROAD
MOUNT ALBERT ROAD
GREEN LANE WEST
GREEN LANE EAST
DAVIS DRIVE
MORNING SIDEROAD
BATHURST STREET
YONGE STREET
LESLIE STREET
2ND CONCESSION ROAD
HIGHWAY 404
WOODBINE AVENUE
HIGHWAY 11
EVANS FARM BOULEVARD
CEDAR STREET
SILK TWIST DRIVE
HILLCREST DRIVE
MAY AVENUE
FARM AVENUE
MORTON AVENUE
WILLIAM STREET
WARD AVENUE
MAPLEHYRN AVENUE
COLONEL WAYLING BOULEVARD
Province of Ontario, York Region, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/ NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada

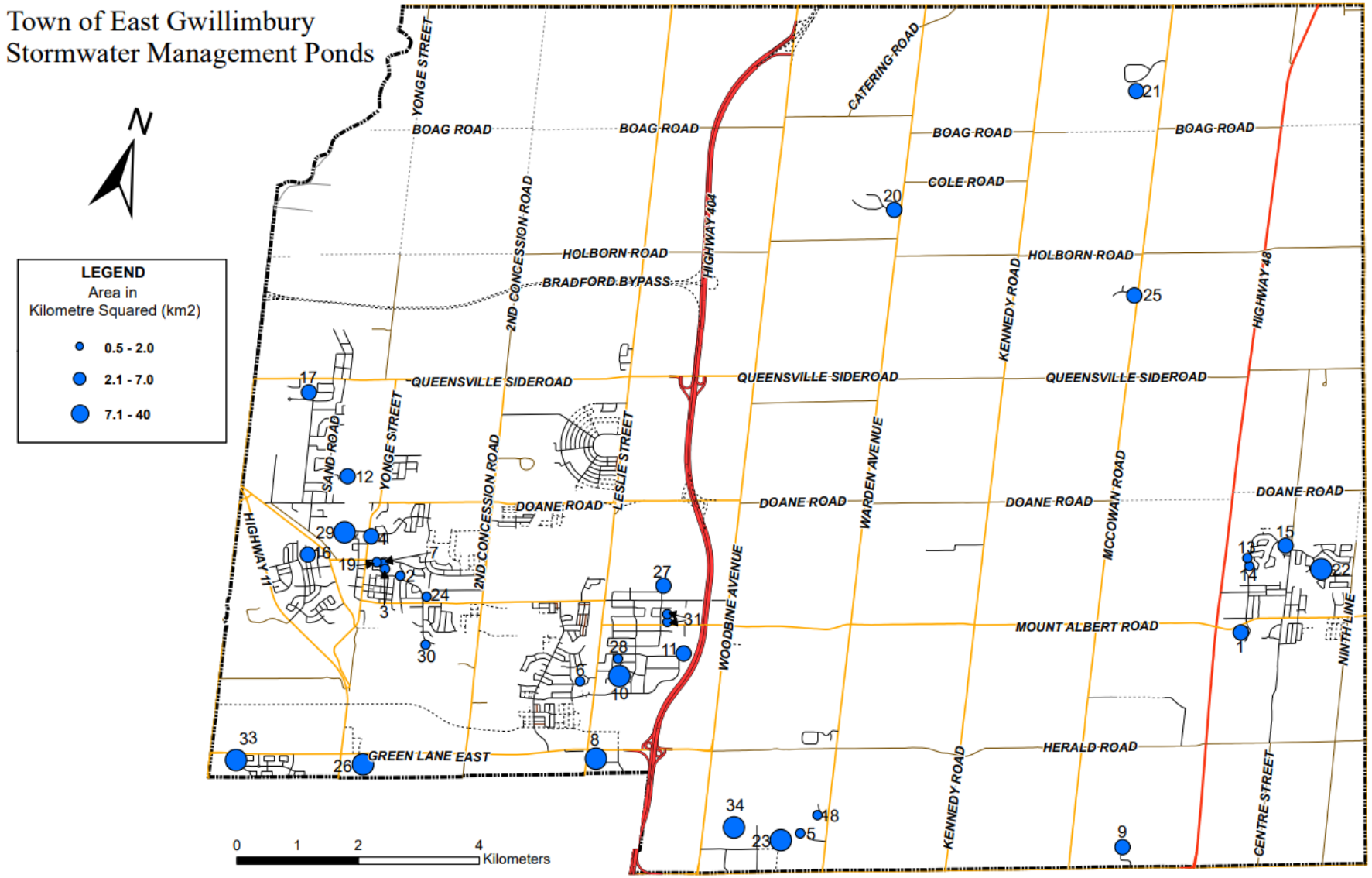

Legend
Sanitary Network (East Gwillimbury)
Sanitary Network (Newmarket)
Sanitary Network (York Region)
Land Base
Freeway
Interchange-Freeway
Provincial Highway
Regional Road
Interchange-Regional Road
Arterial Road
Urban Road
Rural Road
Laneway
Private Road
Railway
Community Area
East Gwillimbury Boundary


N
HIGHWAY 48
DOANE ROAD
MOUNT ALBERT ROAD
ALBERT STREET
YORK/DURHAM LINE
MANOR GLEN CRESCENT
Mount Albert Creek
Canadian National Railway
Vivian Creek Park
Samuel Harper Park
Community Maps Contributors, Province of Ontario, York Region, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/ NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada


Silver Lakes Golf & Country Club
N
Province of Ontario, York Region, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/ NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada

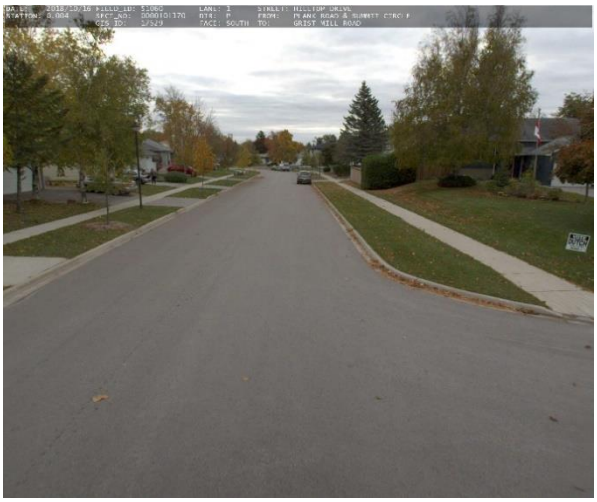

Legend
Water Network (East Gwillimbury)
AUTOMATIC FLUSHING DEVICE
BULK WATER FILLING STATION
SAMPLING STATION
WATER HYDRANT
HYDRANT
SERVICE
FIRE
PRESSURE REDUCTION
AIR RELEASE
DRAIN
MAINLINE
METER CHAMBER
VALVE CHAMBER
UNKNOWN
HYDRANT CONNECTION
LOCAL
TRUNK
WATERMAIN
PUMP
VALVE
Water Network (York Region)
Land Base
Freeway
Interchange-Freeway
Provincial Highway
Regional Road
Interchange-Regional Road
Arterial Road
Urban Road
Rural Road
Laneway
Private Road
Railway
Community Area
East Gwillimbury Boundary

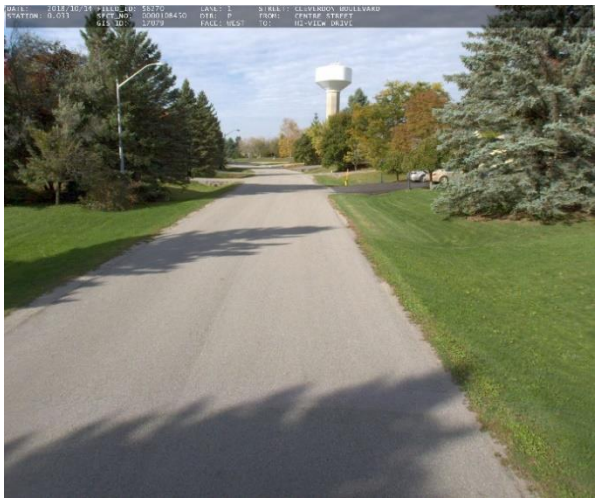

N
HIGHWAY 48
Canadian National Railway
KING STREET
CENTRE STREET
MANOR GLEN CRESCENT
MANOR FOREST ROAD
VIVIAN CREEK ROAD
KING STREET EAST
VISCOUNT WAY
NINTH LINE
YORK/DURHAM LINE
Vivian Creek
Vivian Creek Park
SHANNON ROAD
MILL STREET
PRINCESS STREET
BANK STREET
MAIN STREET
DONALD STEWART CRESCENT
ROYAL OAK ROAD
STOKES ROAD
VICTORY GRIVE
BIRCHARD BOULEVARD
ALICE STREET
SAMUEL HARPER COURT
ALBERT STREET
MOUNT ALBERT ROAD
HI-VIEW DRIVE
ROBB THOMPSON ROAD
FREDERICK TAYLOR WAY
CUPPLES FARM LANE
Esri Community Maps Contributors, Province of Ontario, York Region, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/ NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada


Town of East Gwillimbury
Stormwater Management Ponds
N
LEGEND
Area in
Kilometre Squared (km2)
0.5 - 2.0
2.1 - 7.0
7.1 - 40
BOAG ROAD
COLE ROAD
HOLBORN ROAD
BRADFORD BYPASS
QUEENSVILLE SIDEROAD
DOANE ROAD
MOUNT ALBERT ROAD
HERALD ROAD
GREEN LANE EAST
YONGE STREET
2ND CONCESSION ROAD
HIGHWAY 404
CATERING ROAD
KENNEDY ROAD
HIGHWAY 48
SAND ROAD
LESLIE STREET
WARDEN AVENUE
MCCOWAN ROAD
HIGHWAY 11
WOODBINE AVENUE
NINTH LINE
CENTRE STREET
0 1 2 4
Kilometers

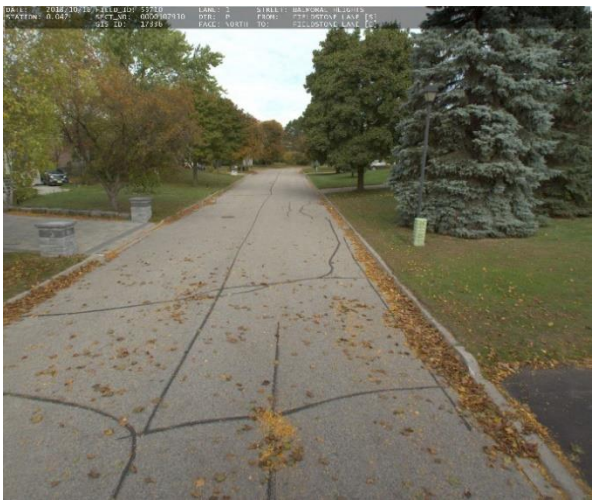
Description or Images that illustrate the different levels of road pavement Condition

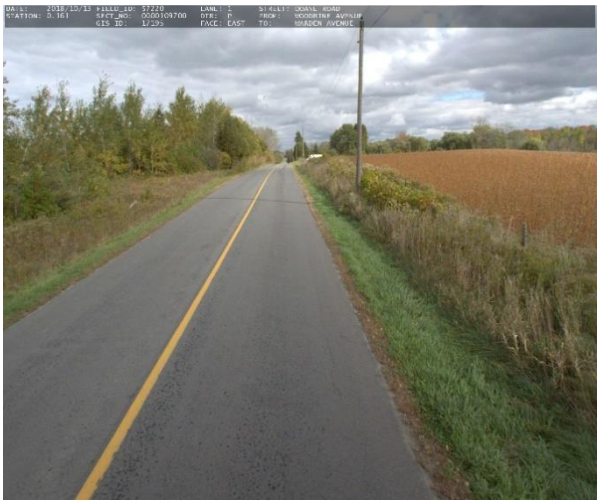
Very Good



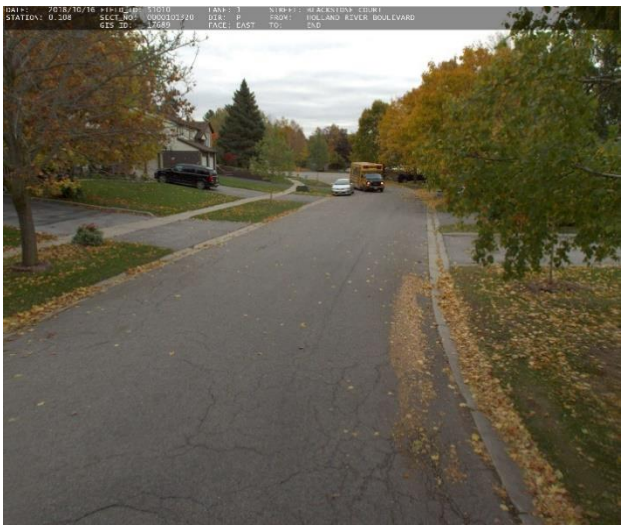


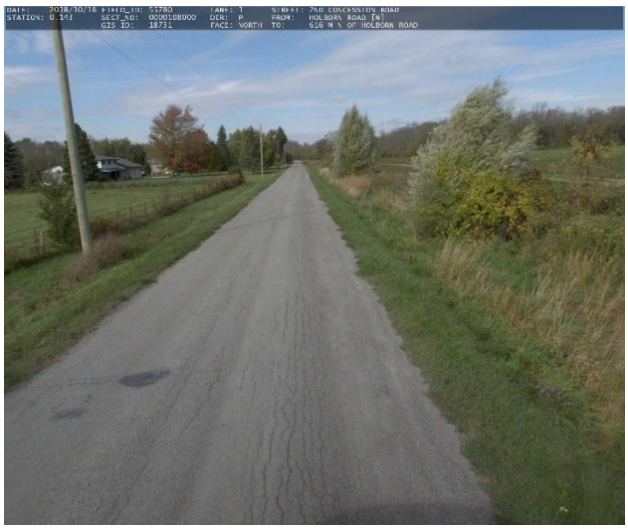
Good



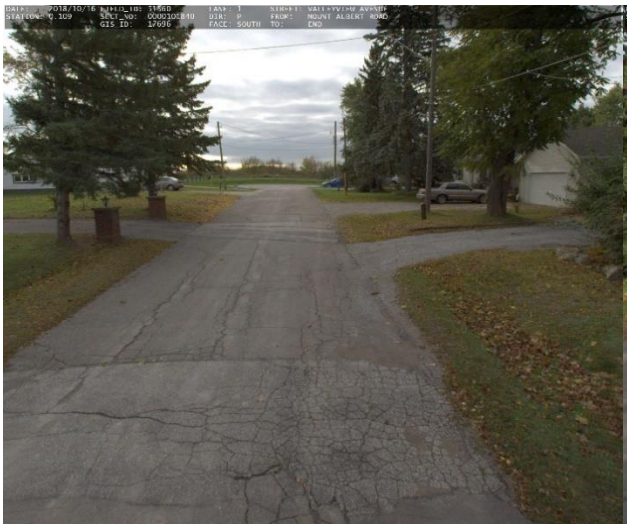


Fair





Poor



Very Poor

13 Appendix C: Condition Scale

Bridge Condition Rating Scale

Condition Category	BCI Range	Description
Very Good	80 - 100	Bridges/culverts in very good condition do not require any corrective maintenance or rehabilitation. Structures are fully operational.
Good	70 - 80	Bridges good condition may require some corrective maintenance. Bridges/culverts are fully operational.
Fair	50 - 70	Bridges in fair condition would have some deficiencies and may require minor to major rehabilitation. These bridges are typically fully operational, but in some cases can have restrictions placed.
Poor	35 - 50	Bridges in poor condition require major rehabilitation or replacement. These bridges may have load or dimensionality restrictions placed on them. In some cases, these structures could be closed.
Very Poor	0 - 35	Bridges in very poor condition require major rehabilitation or replacement. These bridges likely have load or dimensionality restrictions placed on them. In many cases, these structures could be closed.

Road Surface Condition Rating Scale

Condition Category	PCI Range	Description
Very Good	85 - 100	Road is in excellent condition with few visible defects. Rideability is excellent with few areas of slight distortion. Slight distress severity having distress density levels less than 10%
Good	70 - 85	Road is in good condition with accumulating defects. Rideability is good with intermittent rough and uneven sections. Slight severity distress along 10 – 20% of road surface.
Fair	55 - 70	Road is in fair condition with intermittent patterns of slight to moderate defects. Rideability is fair and surface is occasionally rough and uneven. Moderate distress severity with density levels 10% - 20%
Poor	40 - 55	Road is in poor condition with frequent patterns of moderate defects. Rideability is poor and surface is rough and uneven. Presence of severe distresses, distress density 50% - 80% of road
Very Poor	0 - 40	Road is in very poor condition with extensive severe distresses. Rideability is very poor and overall surface is rough and uneven. Sever distresses present, distress density greater than 80%

Canadian Infrastructure Report Card Condition Rating Scale: Road appurtenances, water, wastewater, stormwater

Condition Category	% of service life remaining	Description
Very Good	80 - 100	Well maintained, good condition, new or recently rehabilitated
Good	60 - 80	Acceptable, generally approaching mid stage of expected service life
Fair	40 - 60	Signs of deterioration, some elements exhibit deficiencies
Poor	20 - 40	Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration

Very Poor	0 - 20	Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable

14 Appendix D: Risk Models

Road Surfaces

Probability of Failure	Consequence of Failure
Condition	Replacement Cost
	Roadside Environment
	Drainage
	Adjacent to Bridge
	MMS Class
	Roadside Class
	Road Use (Risk)

Traffic Bridge & Culverts

Probability of Failure	Consequence of Failure
Condition	Replacement Cost
	Health and Safety
	AADT
	Roadside Design Class
	Land Use
	Detour Length

Pedestrian Bridge Structures

Probability of Failure	Consequence of Failure
Condition	Replacement Cost
	Proximity to ESA or Public Recreational Area
	Detour Length
	Health and Safety
	Type of Trail
	Type of Crossing
	Use of Bridge

Watermains

Probability of Failure	Consequence of Failure
Condition	Pipe Size (mm)
	Crossing Type
Material	In Easement (Yes/No)
	Road Use
	Material

Wastewater Mains

Probability of Failure	Consequence of Failure
Condition	Pipe Size (mm)
	Pipe Material
	Proximity to ESA or Public Recreational Area
	Road Use
	In Easement (Yes/No)
	Pressurized

Wastewater Pumping Stations

Probability of Failure	Consequence of Failure
Condition	Replacement Cost
	Proximity to ESA or Public Recreational Area
	Household Serviced

Stormwater Culverts and Service Connections

Probability of Failure	Consequence of Failure
Condition	Pipe Size (mm)
	Road Use
Material	In Easement (Yes/No)
	Pressurized

Storm Mains

Probability of Failure	Consequence of Failure
Condition	Pipe Size (mm)
	Proximity to ESA or Public Recreational Area
	In Easement (Yes/No)
	Pressurized
	Road Use (Risk)

Stormwater Facilities

Probability of Failure	Consequence of Failure
Condition	Replacement Cost
	SWM Facility Type
	SWM Type

Other Assets (E.G. Roadside Appurtenances & Water Metres)

Probability of Failure	Consequence of Failure
Condition	Replacement Cost

15 Appendix E: Roadmap Recommendations

Roadmap Tasks		2021		2022				2023				2024				2025	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1.0 Asset Management Plan (2022 Compliant)																	
1.1: Conduct a data gap analysis (core)	CIES																
1.2 Consolidate data sets	CIES, CS, Finance																
1.3 Update replacement costs (core)	CIES, Finance																
1.4 Update condition data (core)	CIES																
1.5 Develop inventory update SOPs	CIES																
1.6 Document condition assessment strategies (core)	CIES																
1.7 Document current lifecycle strategies (core)	CIES																
1.8 Develop risk models(core)	CIES																
1.9 Document the risks of achieving the current strategy (core)	CIES																
1.10 Configure Maintenance Manager to track KPIs	CIES, CS																
1.11 Document technical and community LOS (core)	CIES, CS, Finance																
1.12 Document the impacts of future demands (core)	CIES																
1.13 Accounting of costs to deliver current LOS (core)	CIES, Finance																
1.14 Document sustainable funding sources (core)	Finance																
1.15 Develop the Financial Strategy	Finance, CIES																
1.16 Develop the asset management plan (core)	CIES																
1.17 Council endorsement of Asset Management Plan (core)	Council																
2.0 Asset Management Plan **(2024 Compliant)**																	
2.0: Asset Management Readiness Assessment	All																
2.1: Conduct a data gap analysis (non-core)	CPRC, CS, EG, ECSS																
2.2: Componentize complex facilities	CPRC																
2.3: Develop condition scores (non-core)	CPRC, CS, EG, ECSS																

Roadmap Tasks		2021		2022				2023				2024				2025	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
2.4: Update replacement costs (core & non-core)	CIES, CPRC, CS, EG, ECSS																
2.5: Document condition assessment strategies (non-core)	CPRC, CS, EG, ECSS																
2.6: Document asset management strategies (non-core)	CPRC, CS, EG, ECSS																
2.7: Develop risk models (non-core)	CPRC, CS, EG, ECSS																
2.8: Document Technical and Community LOS metrics (non-core)	CPRC, CS, EG, ECSS																
2.9: Update the Growth Strategy (non-core)	All																
2.10: Accounting of Costs to Deliver the Current LOS (non-core)	Finance, CIES																
2.11: Document Sustainable Funding Sources (non-core)	Finance																
2.12: Update the financial strategy (non-core)	Finance, CIES																
2.13: Update the Asset Management Plan for 2024 compliance	CIES																
2.14: Council endorsement of the Asset Management Plan (non-core)	Council																
3.0 Asset Management Plan (2025 Compliant)																	
3.0: Asset Management Readiness Assessment	All																
3.1: Update the Asset inventory	All																
3.2: Assess the public's expectations	CIES																
3.3: Determine and document the proposed LOS options	All																
3.4: Document the proposed lifecycle strategy options	All																
3.5: Assess increases in demand caused by growth	All																
3.6: Accounting of Costs to Deliver the Proposed Level of Service	Finance, CIES																
3.7: Document Sustainable Funding Sources	Finance																
3.8: Conduct Scenario Analysis to Revise Proposed Levels of Service	All																
3.9: Review Scenario Analysis with Council	CIES, Finance, Council																
3.9: Update the Financial Strategy	Finance, CIES																

Roadmap Tasks		2021		2022				2023				2024				2025	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
3.11: Review the proposed financial strategy with Council	CIES, Finance, Council																
3.12: Update the Asset Management Plan for 2025 compliance	CIES																
3.13: Council endorsement of the Asset Management Plan	Council																