



# TOWN OF HALTON HILLS **2022** CORE INFRASTRUCTURE ASSET MANAGEMENT PLAN



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# EXECUTIVE SUMMARY

In 2018, the Province came forward with Ontario Regulation 588/17 (O.Reg 588/17) under the Infrastructure for Jobs and Prosperity Act. The Act defines the steps required to achieve standardization and consistency in the management of municipal assets. The first step in achieving compliance involved the development of a Corporate Asset Management Policy, which the Town completed in July 2018. The next step in achieving compliance requires the development of an asset management plan for core infrastructure assets. O.Reg 588/17 defines core municipal infrastructure assets as assets that support the provision of the following services: water, wastewater, stormwater, roads, bridges, and culverts. For the Town of Halton Hills, core infrastructure assets include roads, bridges, stormwater, and culvert assets. These asset groups work together to deliver services the Town refers to as Transportation and Stormwater Management.

The Core Infrastructure Asset Management Plan (Core Infrastructure AM Plan) communicates the interconnected relationship between levels of service, risk, lifecycle activities, and the associated costs to establish an open dialogue to inform planning and decision-making in order to realize best value from its core infrastructure assets.

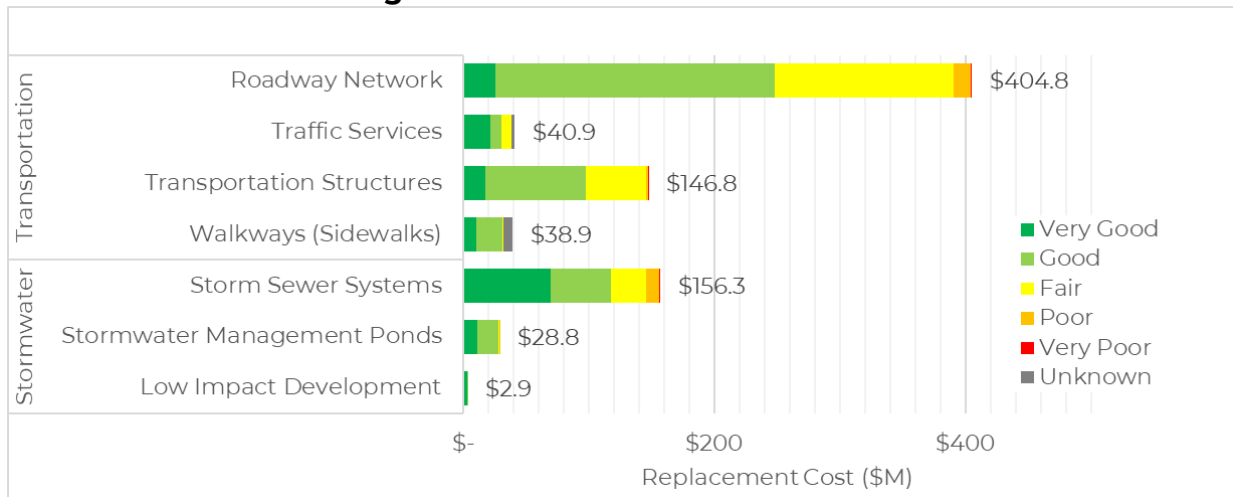
## State of Local Infrastructure

The infrastructure assets included in this plan are listed below:

- Roads
- Curb & Gutter
- Retaining Walls/Guiderails
- Sidewalks
- Signs
- Traffic Signals
- Street Lighting
- Roadway Bridges
- Pedestrian Bridges
- Traffic Culverts
- Stormwater Management Ponds
- Stormwater Mains
- Maintenance Holes
- Catch Basins
- Drainage Culverts
- Outfalls
- Infiltration Galleries

The total replacement value of these assets is **\$819.4 M**. The condition profile of the Town's core infrastructure assets is shown in Figure E-1.

**Figure E-1 Asset Condition Profile**



**Levels of Service**

Levels of Service (LOS) are statements that describe the outputs and objectives the Town intends to deliver to its residents, businesses and other stakeholders. Developing, monitoring and reporting on LOS are all integral parts of an overall performance management program that is aimed at improving service delivery and demonstrating accountability to the Town’s stakeholders.

Table E.1 below provides a summary of the Town’s current performance for the mandated Technical LOS within O.Reg 588/17.

**Table E.1 Mandated Technical Levels of Service**

Asset Group	Technical Performance Measure	Technical LOS Performance
<b>Bridges &amp; Culverts</b>	Percentage of bridges in the municipality with loading or dimensional restrictions	8%*
	The average BCI for bridges	72.2
	The average BCI for culverts	66.5
<b>Roads</b>	# of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the municipality	0.31
	# of lane-kilometres of collector roads as a proportion of square kilometres of land area of the municipality	0.12
	# of lane-kilometres of local roads as a proportion of square kilometres of land area of the municipality	1.19

Asset Group	Technical Performance Measure	Technical LOS Performance
	Average pavement condition index value for paved roads in the municipality.	70.7
	Average surface condition for unpaved roads in the municipality.	67.7
<b>Stormwater</b>	Percentage of properties in municipality resilient to a 100-year storm.	Future**
	Percentage of stormwater assets resilient to a 5-year storm	Future

\*Calculated using roadway bridges only.

\*\*Stormwater services across the Town are provided by various levels of government. To report on this metric for the areas covered by Town-owned stormwater infrastructure would be a misrepresentation of actual resilience across the Town.

Current performance is based on existing resource provision and work processes. Levels of service are expected to change over time due to shifts in customer priorities and technology used to complete work. Updating customer and technical levels of service metrics and their associated performance is an ongoing process.

### Future Demand

Factors influencing the future demand of core infrastructure assets include:

- Population increases
- Economic Factors
- Change in Demographics
- Transportation Preferences
- Climate Change
- Environmental Factors

Future demands will be managed using a combination of interventions used to address capacity and use, and function discrepancies. These interventions include:

- Management of existing assets
- Upgrade or expansion of existing assets
- Acquisition of new assets
- Policy and design changes
- Operation and maintenance changes

### Risk Management

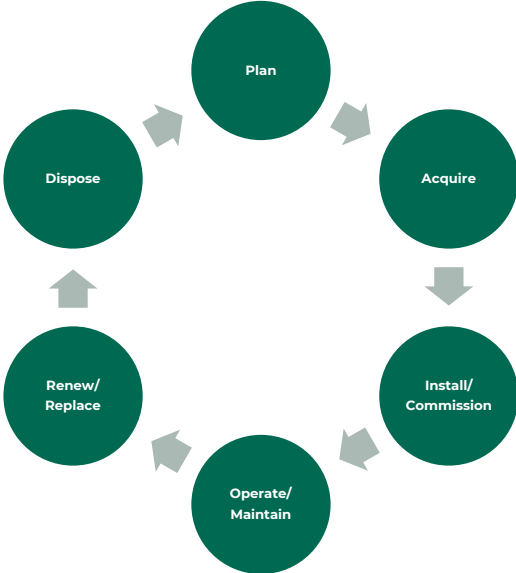
The Town's key asset management principle is to meet service levels and manage risk, while minimizing lifecycle costs. The Town's risk strategy develops the framework for quantifying the risk exposure of the Town's assets to enable prioritization of projects across asset classes and service areas. The relative importance of the assets to support service delivery, referred to as asset criticality, is a key driver in selection of the most appropriate asset management strategy for

each asset. Criticality is evaluated on an asset's impact upon failure to service delivery, health and safety, the environment, financial position, and reputation. Risk exposure is the multiplication of the criticality or consequence of failure (CoF) by the probability of failure (PoF), which is the likelihood or chance that an asset failure may occur.

**Lifecycle Management Planning**

Maintaining levels of service, meeting future demand, and managing risk inform the whole lifecycle management activities that the Town performs on its core infrastructure assets. These activities include planning, acquisition, installation/commissioning, operations/maintenance, renewal/replacement, and disposal. Asset lifecycle management activities have a financial impact and require short and long term financial planning. The whole lifecycle needs of assets are forecasted and planned for in the Town's Operational and Capital budgets and are reflected in the Long Range Financial Plan.

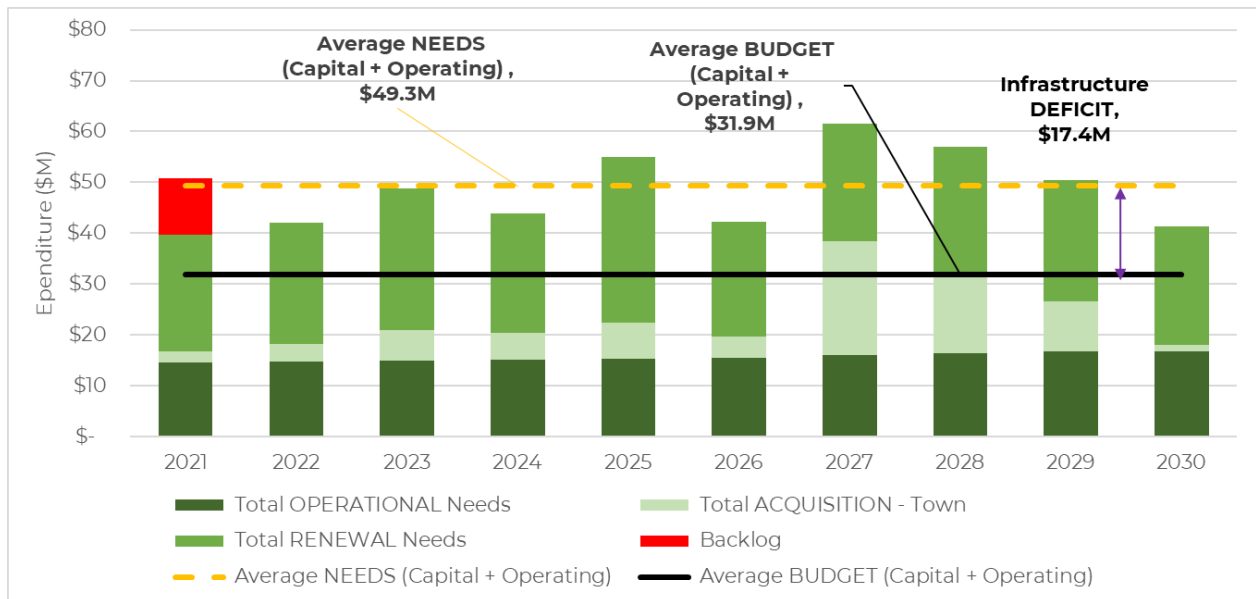
**Figure E-2 Whole Asset Lifecycle**



**Financial Summary**

The Core Infrastructure AM Plan defines the infrastructure deficit as the difference between the planned budget and the whole lifecycle needs of the assets. When comparing the forecasted whole lifecycle needs to the planned Capital and Operating budgets, the Core Infrastructure AM Plan identified an infrastructure deficit of \$14.5 million per annum. Changes or enhancements to lifecycle management activities will impact this figure and will need to be considered in short and long term financial planning. Figure E-3 shows a summary of the operational and capital needs compared to the planned budget for the Town's core infrastructure assets over the next 10 years.

**Figure E-3 Whole Lifecycle Summary**



### What will we do?

The infrastructure deficit indicates inadequate capital and operational spending on the lifecycle activities required to maintain service levels, meet future demand, and minimize risk. Inadequate capital and operational spending pose a risk to services provided by core infrastructure assets in terms of capacity and use, function, and quality. To address this, the Town has developed a lifecycle management program for core infrastructure assets that will optimize the lifecycle activities that are currently in place, prioritizing high risk assets first.

To address the infrastructure deficit, the Town prioritizes the needs of existing assets over the addition of new assets. This approach targets funding towards maintaining current infrastructure in a state of good repair. The Town also prioritizes its existing assets based on asset criticality, which is described in more detail in the 'Risk Management' section of the AM Plan.

### Assumptions

Data gaps are inevitable when developing asset management plans, therefore key assumptions were made in the development of the Core Infrastructure AM Plan. These include:

- The capital projects that are funded by development charges in the 2021-2030 10-year Capital forecast, as well as future development plans were used to represent new asset value to be acquired for 2021-2030.
- The planned budget for operations and maintenance was based on the 2021 Operational planned budget.
- Forecasted operations and maintenance were derived based on new asset growth at the Town over the next 10 years.
- The 2021 Operational shortfall was calculated by input from Town staff to determine current estimated needs.



- The planned budget for renewal and replacement was determined by designating renewal amounts each Capital project in the 2021-2030 Capital Plan
- Carry over budgets previously funded capital projects (but not yet completed) were included in estimating the 10-year average budgets.
- Where no engineering-based needs assessments were conducted - forecasted renewal year for assets were calculated by adding the useful life to the installation year of the asset.
- Unknown installation dates were estimated based on condition ratings.
- Age-based condition was used in the absence of formal condition assessment information wherever applicable.
- Inflation factors (Non-Residential Building Consumer Price Index, Construction Price Index) were used to update replacement costing in the absence of formal inventory and condition assessment information.
- Unknown renewal/replacement costs were based on benchmarks and industry best practice.
- Population growth was estimated using data obtained during the development of the Town's 2021-2022 Development Charge Study. Actual population and employment growth will impact demand for the services provided by the Town's core assets.
- Population growth will result in new infrastructure. The extent of new infrastructure assets required, and the subsequent lifecycle costing requirements will become clearer as development plans are finalized.
- Missing information and data gaps were resolved by substituting institutional knowledge from Town stakeholders.

The confidence level in the data regarding accuracy and completeness is considered to be "Moderate". Areas requiring improvement are noted in the Improvement Plan.

### Continuous Improvement

Development of AM Plans is an iterative process that includes improving data, processes, systems, staff skills, and organizational culture over time. This section provides an overview of recommended improvements to the Town's asset management practices. As summarized in Table E.2, this AM Plan is compliant with O.Reg. 588/17 Current Levels of Service requirements for July 1st, 2022.

**Table E.2 O.Reg. 588/17 Compliance for Current Levels of Service**

AM Plan Section	O.Reg. 588/17 Compliance	Comment
<b>State of Local Infrastructure</b>	Compliant	The AM Plan provides a summary of the assets, the replacement cost of the assets, the average age of the assets, the condition of the assets, and the approach to assessing condition of assets.

AM Plan Section	O.Reg. 588/17 Compliance	Comment
<b>Levels of Service</b>	Compliant	The AM Plan provides the qualitative community description and technical metrics as required by O.Reg. 588/17, and the current performance.
<b>Asset Management Strategy</b>	Compliant	The AM Plan provides the population and employment forecasts as set out in Schedule 3 to the 2017 Growth Plan for the Greater Golden Horseshoe. It also provides the lifecycle activities that would need to be undertaken to maintain the current LOS for each of the next 10 years, based on an assessment of lowest lifecycle cost options and risks.
<b>Financing Plan</b>	Compliant	The AM Plan provides the financial forecast for the next 10 years based on the costs of the lifecycle activities to maintain current levels of service.

Asset management is an evolving process that seeks continuous improvement to enable data-driven decisions. The following improvement items have been documented as a result of preparing this plan:

- Track and document current customer and technical levels of service
- Integrate climate change into levels of service
- Determine proposed levels of service and identify performance gaps
- Improve accuracy and completeness of core asset data by addressing inventory and condition data gaps
- Develop Data, Risk, and Lifecycle Management Strategies
- Implement an asset management information software (AMIS) that includes a work management system as well as decision support software
- Develop a Stormwater Master Plan
- Formalize a more robust condition and inspection monitoring program for all assets to help determine true infrastructure needs
- Determine the cost implications of implementing climate change adaptation strategies
- Determine more accurate lifecycle costing that is tracked at the asset level
- Determine operational budget impacts of proposed growth projects
- Bridge the gap between asset management planning processes and executing the capital and operating budgets
- Update condition information for Town Signage based on reflectivity testing
- Proactively update asset unit replacement costs based on latest industry data

## **Conclusion**

The Core Infrastructure AM Plan communicates the interconnected relationship between levels of service, risk, lifecycle activities, and the associated costs to establish to inform planning and decision-making to realize best value from its core infrastructure assets. It is an important planning and communication tool for staff with Council and the community about the sustainable management of its core infrastructure assets to continue deliver required levels of service while optimizing costs and minimizing risks.

Town staff will continue to work collaboratively to address the infrastructure deficit and performance gaps and to achieve sustainable service delivery as part of its continuous improvement process.

# 1.0 INTRODUCTION

## Asset Management at the Town

### What is Asset Management?

Asset management is defined as the combination of management, financial, economic, engineering, and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner at an acceptable level of risk. It involves data-driven decision-making and actions throughout the whole lifecycle of assets.

### Corporate Asset Management Program

The Town's Corporate Asset Management (CAM) Program is the application of asset management practices to maximize consistency among the diverse service areas and create efficiency by harmonizing service levels and business process while considering risks including climate risks as outlined in the Vulnerability Assessments and Climate Change Adaptation Plan.

The Town's Corporate Asset Management program (CAM Program) focuses everyone at the Town on these fundamental goals:

- Providing efficient, effective, and sustainable service to meet the needs of our community,
- Optimizing asset value while minimizing lifecycle costs,
- Managing risks to service delivery,
- Committing to continual improvement of the CAM Program,
- Integrated asset management planning to achieve sustainable funding.

### Corporate Asset Management Policy

In accordance with the requirements laid out in O.Reg 588/17, the Town developed its Corporate Asset Management Policy (CAM Policy) in 2018. It expresses the commitment and guiding principles to apply a whole lifecycle approach to plan, acquire, install/commission, operate/maintain, renew/replace and dispose of the Town's infrastructure assets in a way that ensures sound stewardship of public assets while delivering valued customer services and improving the quality of life.

The CAM Program is committed to the following objectives:

1. Customer Focused  
Provide assurance to our customers through clearly defined levels of service and adhere to optimal asset management processes and practices, including investment, that are supported by continually updated asset data and performance measures.
2. Innovative  
Continually improve our asset management approach, rededicating ourselves to innovation as new tools, techniques and solutions are developed.
3. Fact Based Decision Making

Uses of a formal but flexible, consistent, and repeatable approach to cost effectively manage our infrastructure assets.

4. Optimal  
Make informed decisions between competing factors such as service delivery, asset quality & value, cost and risk by determining which option will deliver the optimal lifecycle value.
5. Whole Lifecycle Perspective  
Consider the full impact of managing assets through their life cycle from acquisition to disposal including level of service, risk, maintenance & operating activities and costs.
6. Integrated System Focused  
Evaluate an asset in terms of its role and value within the context of the greater system, as opposed to examining individual assets in isolation.
7. Forward Looking & Sustainable  
Incorporate social, legislative, environmental and financial considerations into our decisions to adequately address our present and future land use planning framework, customer service commitments, environmental stewardship and regulatory requirements.
8. Regulatory Compliant  
Comply with all relevant legislative, regulatory and statutory requirements.
9. Risk-based  
Direct our resources, expenditures, and priorities in a way that achieves the established levels of service & benefits at an acceptable level of risk.

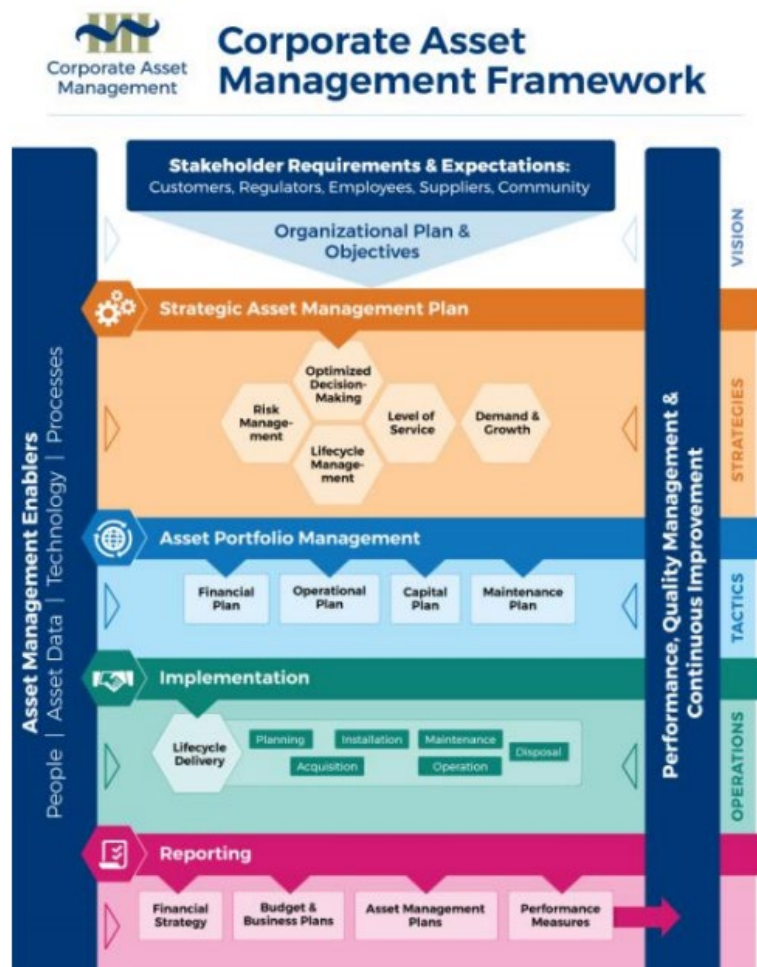
To achieve the fundamental goals, the CAM program applies the guiding principles as per below.

- Take an optimized approach to asset related decisions, including acquisitions, disposals and trade-offs, which considers all revenues and costs (including operation, maintenance, replacement and decommissioning) and strives to minimize the total lifecycle costs of assets.
- Establish organizational accountability and responsibility for asset management, including for asset inventory and data management, asset condition monitoring, asset utilization and maintenance of asset performance levels.
- Define and articulate asset service, maintenance and replacement levels in relation to service delivery objectives and desired Customer Service outcomes
- Implement asset management software solutions in alignment with the Corporate Technology Strategy to document and share asset knowledge and information to provide the essential outputs for effective asset management.
- Minimize risk to asset users, and risk associated with failures.
- Integrate corporate, financial, business, technical and budgetary planning for all asset classes.
- Plan for and provide stable long-term funding based on the financial strategy set out in the Long Range Financial Plan.

- Ensure that the Town’s asset management planning process is aligned with the provincial policy statements contained in the Growth Plan for the Greater Golden Horseshoe and Planning Act.
- Ensure coordination with the Region of Halton, area municipalities and other agencies for an integrated asset management system.
- Manage assets to be sustainable through the best user of available resources and the implementation of best practices.
- Integrate stakeholder input, climate change impact, environmental goals and social and sustainability objectives into a comprehensive asset management strategy.
- Utilize the Town’s Public Engagement charter to fully involve/engage the public in the CAM process.
- Report on the performance of the CAM program for review and approval by Council.

The successful implementation of the CAM program relies on collaboration and coordination between many key stakeholders and processes across the Town. The Corporate Asset Management Framework in Figure 1-2 shows the overarching approach the Town is taking to promote collaboration and alignment between stakeholders.

**Figure 1-2 Corporate Asset Management Framework**



Key stakeholders in the preparation and implementation of this Core Infrastructure AM Plan are shown in Table 1.1.

**Table 1.1 Key Stakeholders in the Core Infrastructure AM Plan**

Key Stakeholder	Role in Asset Management Plan
Council, CAO, and Senior Management Team	<ul style="list-style-type: none"> <li>▪ Represent needs of community/shareholders</li> <li>▪ Allocate resources to meet planning objectives in providing services while managing risks</li> <li>▪ Support and endorse initiatives that support the goals and vision of the Town of Halton Hills</li> <li>▪ Provide strategic direction, integration, and alignment</li> </ul>
Climate Change and Asset Management	<ul style="list-style-type: none"> <li>▪ Ensure a collaborative and integrated approach is maintained between all stakeholders</li> <li>▪ Implement the strategic asset management practices across all asset groups</li> <li>▪ Present documentation to senior management and Council</li> </ul>
Finance	<ul style="list-style-type: none"> <li>▪ Supports the financial needs of the various stakeholders to ensure sustained service delivery</li> <li>▪ Supports the Capital and Operating budgeting process</li> </ul>
Public Works	<ul style="list-style-type: none"> <li>▪ Lead and manage key lifecycle activities including planning, acquisition, maintenance, operations, and disposal of assets</li> <li>▪ Supports the daily decisions related to assets</li> </ul>

### **Ontario Regulation 588/17**

Implementing consistent asset management practices is a Town wide priority and integrating the planning phase of asset management through a coordinated effort is an important step towards ensuring value from the Town's assets. This report is produced in alignment with and to meet the requirements of Ontario Regulation 588/17 (O. Reg. 588/17) requirements. (See Figure 1-3 below) The regulation was put in place to address the challenges of underfunded municipal infrastructure needs.

**Figure 1-3 Ontario Regulation 588/17 Requirements**

	<b>Current Levels of Service AMP</b> July 2022 (core), 2024 (non-core)	<b>Proposed Levels of Service AMP</b> July 2025 (core, non-core)
<b>State of Infrastructure (asset register)</b>	<ul style="list-style-type: none"> <li>• Inventory of assets, by category</li> <li>• Replacement cost of assets</li> <li>• Average age of assets</li> <li>• Condition of assets</li> <li>• Approach to assessing condition</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory of assets, by category</li> <li>• Replacement cost of assets</li> <li>• Average age of assets</li> <li>• Condition of assets</li> <li>• Approach to assessing condition</li> </ul>
<b>Levels of Service (performance)</b>	<ul style="list-style-type: none"> <li>• Current LOS (performance) provided:                             <ul style="list-style-type: none"> <li>- To community (qualitative metrics)</li> <li>- By assets (quantitative metrics)</li> </ul> </li> <li>• For core assets as per Tables 1 to 5 in O.Reg. 588/17 (as minimum), and as established by City for other assets</li> </ul>	<ul style="list-style-type: none"> <li>• Proposed LOS (performance) for the next 10 years                             <ul style="list-style-type: none"> <li>- For community (qualitative metrics)</li> <li>- By assets (quantitative metrics)</li> </ul> </li> <li>• And why appropriate based on risk and affordability assessment</li> </ul>
<b>Lifecycle Management Strategy</b>	<ul style="list-style-type: none"> <li>• Population and employment forecasts per 2019 Growth Plan</li> <li>• Lifecycle activities needed for each of the next 10 years to:                             <ul style="list-style-type: none"> <li>- Meet demand caused by growth or upgrade of existing assets</li> <li>- Maintain the current LOS at least cost and acceptable level of risk</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Population and employment forecasts per 2019 Growth Plan</li> <li>• Lifecycle activities needed for each of the next 10 years to:                             <ul style="list-style-type: none"> <li>- Meet demand caused by growth or upgrade of existing assets</li> <li>- Provide proposed LOS at least cost and acceptable level of risk</li> </ul> </li> </ul>
<b>Financing Strategy</b>	<ul style="list-style-type: none"> <li>• Cost of lifecycle activities needed for each of the next 10 years to:                             <ul style="list-style-type: none"> <li>- Meet demand caused by growth or upgrade of existing assets</li> <li>- Maintain the current LOS</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Cost of lifecycle activities needed for each of the next 10 years to:                             <ul style="list-style-type: none"> <li>- Meet demand caused by growth or upgrade of existing assets</li> <li>- Provide proposed LOS</li> </ul> </li> <li>• Funding projected to be available to undertake needed lifecycle activities</li> <li>• For funding shortfalls which activities will not be funded and associated risks</li> </ul>
<b>Implementation and Key Assumptions</b>	<ul style="list-style-type: none"> <li>• Statement on how all State of Infrastructure background information and reports will be made available to the public</li> </ul>	<ul style="list-style-type: none"> <li>• The risks and mitigation strategies associated with implementing the AM Plan</li> <li>• Explanation of key assumptions underlying the AM Plan that have not previously been explained</li> </ul>

In summary, the July 1, 2022 requirements for the asset portfolio captured within this plan (core assets in the regulation) include reporting on:

- Performance on current community (i.e., customer) and technical levels of service
- The state of infrastructure summarized by asset category, including replacement cost, average age and condition
- The lifecycle activities, estimated capital costs, and any significant operating costs, to service growth forecasted for the next ten years
- The lifecycle management activities, estimated capital costs, and any significant operating costs, to sustain current levels of service for the next ten years.



## Organization of the Document

The Core Infrastructure AM Plan is organized to meet the requirements of Ontario Regulation 588/17 (Current Levels of Service) and the Province’s “Guide for Municipal Asset Management Plans”. The contents of this plan follow the recommended elements of a detailed asset management Plan:

- **Executive Summary:** Summary of AM Plan
- **1 - Introduction:** Outlines scope, background information, relationship to other Municipal documents and plans, and applicable legislation
- **2 – State of the Infrastructure:** Summarizes the inventory, valuation, condition and remaining life of the assets in the inventory by service and asset type
- **3 - Levels of Service:** Defines levels of service through performance indicators and targets, and outlines current performance
- **4 – Future Demand:** Looks at the Town’s ability to meet the changing needs of the industry and their customers over time.
- **5 – Risk Management Strategy:** Defines the framework for identifying critical assets and quantifying risk to enable prioritization of lifecycle activities
- **6 – Lifecycle Management Strategy:** Summarizes the asset management strategies (i.e., planned actions) that will enable the assets to provide the required levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost
- **7 – Financial Projection:** Summarizes the infrastructure gap based on the determined infrastructure needs and associated budget.
- **8 – AM Plan Monitoring and Improvement:** Summarizes the next steps including monitoring of AM Plan implementation progress and improving future iterations of the AM Plan.

The Core Infrastructure AM Plan has been reviewed by staff from the related service areas, the Town’s Asset Management Network Team approved by the CAM Steering Committee and Senior Management Team and endorsed by Council.

## Background

The Core Infrastructure AM Plan communicates the activities undertaken by the Town to ensure the sustainable delivery of services that support the quality of life of its residents and in compliance with regulatory requirements.

The Town of Halton Hills is located within the broader Halton Region. The sustainable delivery of services through the management of Town assets adheres to the overall planning vision for Halton Region and the policies within its Official Plan.

The Core Infrastructure AM Plan is to be read with the Town of Halton Hills’ planning documents. This should include the Corporate Asset Management Policy along with other key strategic documents:

- Town of Halton Hills Strategic Plan

- Town of Halton Hills Official Plan
- State of Infrastructure Report 2018
- 2015 Citizen Satisfaction Survey
- Climate Change Adaptation Plan
- Reference Scenarios for Low-Carbon Transition Strategy
- Infrastructure Vulnerability Assessment
- Transportation Master Plan, 2011
- 2020 & 2021 Town of Halton Hills Business Plans and Budgets
- Active Transportation Master Plan
- Cycling Master Plan
- Active Living Strategy
- Stormwater Management Strategy
- Halton Region Official Plan
- Halton Region Transportation Master Plan
- Halton Region Active Transportation Master Plan

### Scope of Work

The infrastructure assets covered by this Core Infrastructure AM Plan include the Transportation and Stormwater Management assets listed in Table 1.2. For a detailed summary of the assets covered in this Core Infrastructure AM Plan refer to Table 2.1 in Section 2.

**Table 1.2 Summary of Service Assets**

Services	Asset Class	Replacement Value (M\$)
<b>Transportation</b>	Roadway Network	\$404.8
	Traffic Services	\$40.9
	Transportation Structures	\$146.8
	Walkways (Sidewalks)	\$38.9
<b>Stormwater Management</b>	Low Impact Development	\$2.9
	Storm Sewer Systems	\$156.3
	Stormwater Management Ponds	\$28.8
	<b>TOTAL</b>	<b>\$819.4</b>

The core infrastructure assets included in this plan have a total replacement value of **\$819.4 million dollars**.

#### Transportation Services

Transportation Services assets enhance connectivity through the safe and efficient movement of people, goods, and services on well-maintained transportation infrastructure. The assets that support Transportation Services

enable the Town to provide a transportation system that is sustainable, integrated and encourages a healthy and active lifestyle. The Transportation Services assets included within this plan are:

**Table 1.3 Summary of Transportation Assets**

Asset Class	Asset Type
Roadway Network	<ul style="list-style-type: none"> <li>Roadways (Arterial, Collector, Local)</li> <li>Curb and Gutter</li> </ul>
Traffic Services	<ul style="list-style-type: none"> <li>Streetlights</li> <li>Signage</li> <li>Signals</li> </ul>
Transportation Structures	<ul style="list-style-type: none"> <li>Bridges (Roadway and Pedestrian)</li> <li>Culverts (Major and Traffic Culvert Structures)</li> <li>Guiderails</li> <li>Retaining Walls</li> </ul>
Walkways (Sidewalks)	<ul style="list-style-type: none"> <li>Sidewalks</li> </ul>

**Stormwater Management**

Stormwater Management assets provide drainage of excess rain and ground water from impervious surfaces such as paved streets, parking lots, walking paths, sidewalks, and roofs. These assets play a key role in the treatment of water runoff and provide protection from flooding and unwanted water in unwanted places. The Stormwater Management assets included within this plan are:

**Table 1.4 Summary of Environmental Assets**

Asset Class	Asset Type
Low Impact Development	<ul style="list-style-type: none"> <li>Infiltration Galleries</li> </ul>
Storm Sewer System	<ul style="list-style-type: none"> <li>Stormwater Mains</li> <li>Catchbasins</li> <li>Drainage Culverts</li> <li>Manholes</li> <li>Outfalls</li> </ul>
Stormwater Management Ponds	<ul style="list-style-type: none"> <li>Stormwater Management Ponds</li> </ul>

This plan relies on the replacement value as its basis for the funding requirements discussed in Section 7. The replacement value is the cost that would be incurred

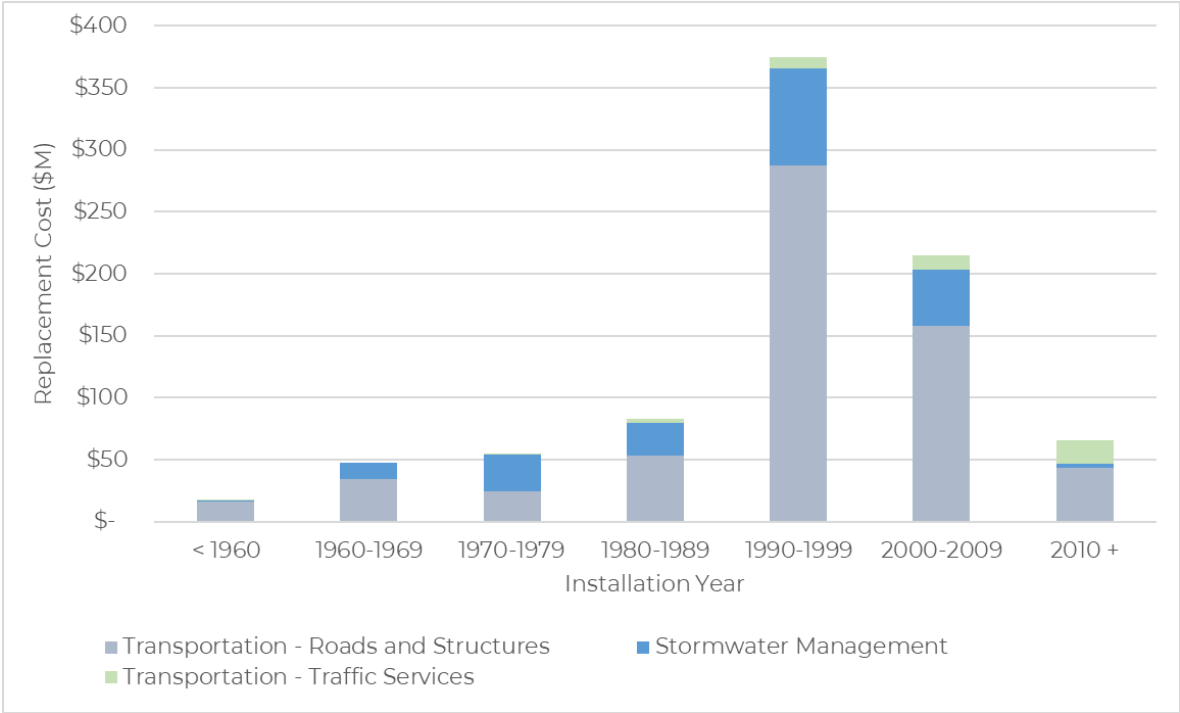
to replace the asset in its current state. The replacement value is based on industry pricing and is adjusted on annual basis to incorporate inflationary factors.

# 2.0 STATE OF LOCAL INFRASTRUCTURE

The State of Local Infrastructure section of the AM Plan describes the Town’s asset inventory, and provides a snapshot of the valuation, age, distribution and condition of it’s assets. Recommendations for the sustainment of data collection and reporting are provided in the Plan Improvement and Monitoring section.

The age profile of the assets included in this Core Infrastructure AM Plan are shown in Figure 2-1. The bars in the graph represent the amount of total replacement value of assets installed each year.

**Figure 2-1 Asset Age Distribution**



This graph shows that many of the Town’s core infrastructure assets were installed between 1990 and 2009.

**Asset Age**

Table 2.1 shows the average age of assets per asset type. In cases where installation year was unknown, condition score was used to estimate the age of the assets.

**Table 2.1 Average Age of Assets**

Asset Category	Asset Type	Average Age
Walkways (Sidewalks)	Sidewalks	26

Asset Category	Asset Type	Average Age
Transportation Structures	Roadway Bridges	53
	Pedestrian Bridges	14
	Traffic Culverts	45
	Retaining Walls/Guiderrails	20
Traffic Services	Signs	23
	Traffic Signals	10
	Street Lighting	11
Roadway Network	Roads	22
	Curb & Gutter	23
Stormwater Management Ponds	Stormwater Management Ponds	21
Storm Sewer Systems	Stormwater Mains	33
	Maintenance Holes	33
	Catch Basins	34
	Drainage Culverts	23
	Outfalls	31
Low Impact Development	Infiltration Galleries	19

### Asset Condition

Condition is measured using a 1 – 5 rating system as detailed in Table 2.2. This condition rating framework is used consistently across all asset types.

**Table 2.2 Condition Rating Framework**

Condition Grading	Description of Condition
1	<b>Very Good:</b> Fit for the future. Well maintained, good condition. Newly or recently rehabilitated.
2	<b>Good:</b> Good working condition. Generally approaching mid-stage of expected service life.
3	<b>Fair:</b> Signs of deterioration, some elements exhibit deficiencies. Mid-stage of expected service life.
4	<b>Poor:</b> Condition below standard, large portion of system exhibits significant deterioration. Approaching end of service life.

Condition Grading	Description of Condition
<b>5</b>	<b>Very Poor:</b> Widespread signs of advanced deterioration, asset may be unusable. Near or beyond expected service life.

For this Core Infrastructure AM plan, condition assessment data was incorporated where available, specifically for:

- Roads based on PQI assigned to pavement segments, Roads Needs Study, 2017
- Bridges and culverts, both span ( $\geq 3.0$  m) and municipal ( $< 3.0$  m), OSIM Bridge Condition Inspection, 2020

For the remaining assets, condition was calculated from remaining life based on age.

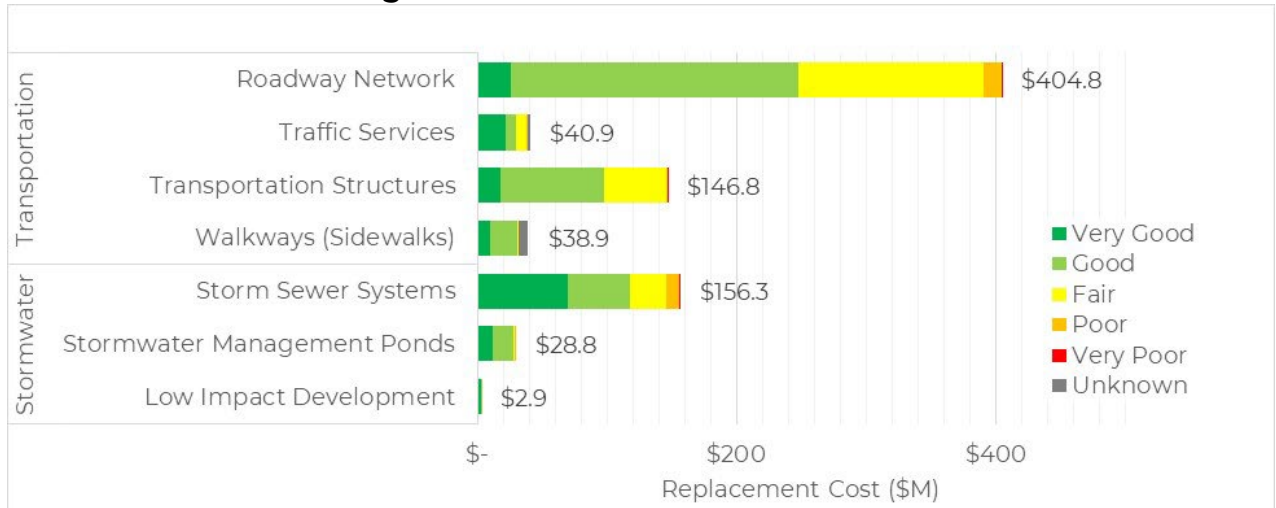
Table 2.3 shows how the five-point scores from Very Good to Very Poor were determined from the asset data available, including remaining useful life and other condition scoring systems, such as Pavement Quality Index (PQI) and Bridge Condition Index (BCI).

**Table 2.3 Conversion Table for Condition Grades**

Condition Grade	Remaining Useful Life (all asset types)	Bridge Condition Index (BCI)	Pavement Quality Index (PQI)
<b>Very Good</b>	>75 – 100%	90 – 100	90 – 100
<b>Good</b>	>50 – 75%	70 – 90	70 – 90
<b>Fair</b>	>25 – 50%	60 – 70	40 – 70
<b>Poor</b>	>0 – 25%	40 – 60	20 – 40
<b>Very Poor</b>	$\leq 0\%$	0 – 40	0 – 20

The condition profile of the Town’s core infrastructure assets is shown in Figure 2-2.

**Figure 2-2 Asset Condition Profile**



Most of the Town's core infrastructure assets are in good or very good condition which translates to approximately \$554 million of total replacement value. Conversely, \$27 million of total replacement value for these assets is in poor or very poor condition. For some asset groups, age-based condition was used in the absence of formal condition assessment information.



# 3.0 LEVELS OF SERVICE

Levels of Service (LOS) are statements that describe the outputs and objectives the Town intends to deliver to its residents, businesses and other stakeholders. Developing, monitoring and reporting on LOS are integral parts of an overall performance management program that is aimed at maintaining/improving service delivery and demonstrating accountability to the Town’s stakeholders.

LOS are guided by a combination of customer expectations, legislative requirements, and internal guidelines, policies and procedures. In many cases, LOS are also implied based on past service delivery, community expectations, and infrastructure system design. Effective asset management planning requires that LOS be formalized and supported through a framework of performance measures, targets, and timeframes to achieve targets, and that the costs to deliver the documented LOS be understood and communicated.

In alignment with O. Reg. 588/17, this Core Infrastructure AM Plan discusses LOS under community (i.e. customer) and technical LOS categories, defined as:

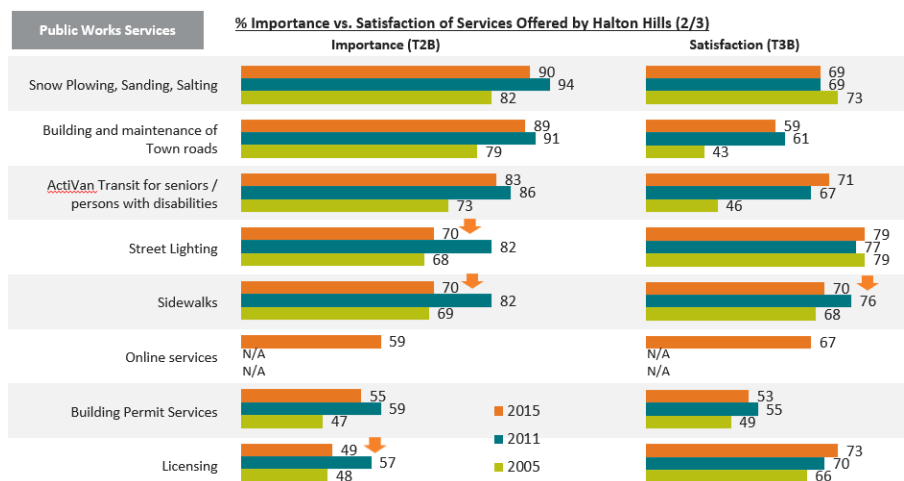
- **Customer LOS:** Qualitative descriptions that demonstrate customer and other stakeholder expectations of services provided from the Collection Yards.
- **Technical LOS:** Technical metrics that translate customer expectations into technical objectives and performance measures.

## Customer Research and Expectations

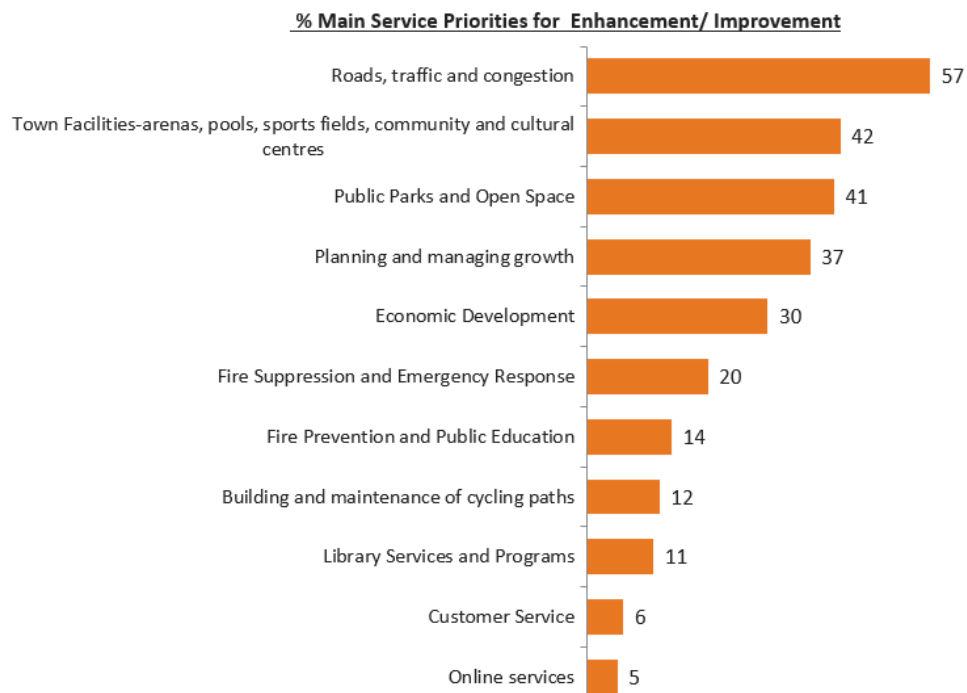
In 2015, the Town undertook a Citizen Satisfaction Survey with the goal of measuring the level of satisfaction and the level of importance related to a multitude of services provided by the Town of Halton Hills. The survey also sought to provide insight into citizens’ needs and perceptions related to areas of improvement.

The building and maintenance of Town roads is consistently one of the highest rated services in importance in 2015 and remains a focus area for the Town.

**Figure 3-1 2015 Citizen Satisfaction Survey Report**



## Priority Services for Enhancement or Improvement



The Town is investigating new ways to capture customer feedback and expectations on a regular basis. One way is to formally document customer feedback through a work management system that is in the beginning stages of implementation. Future updates of the Core Infrastructure AM Plan will include more details around customer expectations through feedback provided during the day-to-day operation of the Town's core infrastructure assets.

### Strategic and Corporate Goals

This Core Infrastructure AM Plan is prepared under the direction of the Town of Halton Hills vision, mission, goals and objectives.

Our vision is:

Small town Living at its best is: Characterized by spectacular countryside, natural heritage, cultural heritage and small town feel; enriched by a unique blend of urban and rural interconnected communities and neighbourhoods; and supported by prosperous employment areas

Our mission is:

To plan for a vibrant urban and rural community, the Town of Halton Hills will deliver a broad range of public service while providing leadership on issues of concern in line with our stated values:

- Foster a Healthy Community
- Preserve, Protect and Enhance our Environment
- Protect and Enhance our Agriculture
- Foster a Prosperous Economy
- Preserve, Protect and Promote our Distinctive History

- Preserve, Protect and Enhance our Countryside
- Achieve Sustainable Growth
- Provide Responsive, Effective Municipal Government

## Legislative Requirements

There are many legislative requirements relating to the management of assets. Legislative requirements that impact the delivery of transportation and Stormwater Management are outlined in Table 3.1.

**Table 3.1 Legislative Requirements**

Legislation	Requirement
Ontario Regulation 588/17 The Infrastructure for Jobs and Prosperity Act, 2015	The Act sets out the principles for the provincial government to regulate that asset management planning for municipalities.
Municipal Act, 2001	The Act sets out the authority for a municipality to establish, operate, and maintain a transportation system.
Accessibility for Ontarians with Disabilities Act (AODA)	Developing, implementing, and enforcing accessibility standards in order to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures and premises on or before January 1, 2025
Public Section Accounting Board Standard 3150	Standards on how to account for and report on tangible capital assets in government financial statements.
Ontario Regulation 472/10 Public Transportation and Highway Improvements Act	This legislation require the design, evaluation, construction, or rehabilitation of a bridge to conform to: (a) the standards set out in the Canadian Highway bridge Design Code; and (b) the most current accepted engineering standards guidelines, procedures, and practices. The structural integrity, safety and condition of every bridge is determined through the performance of one inspection every second calendar year under the direction of a professional engineer and in accordance with the <i>Ontario Structure Inspection Manual</i> .
Minimum Maintenance Standards for Municipal Highways (MMS) Regulation 239/02 Routine Patrol	The Regulation sets out the standard for the frequency of patrolling of highways to check for conditions described such as snow, ice, potholes, cracks, etc.

Legislation	Requirement
Highway Traffic Act R.R.O. 1990, Reg. 615: Signs	The Act sets out the standard for the erection and maintenance of signs.
Highway Traffic Act R.R.O. 1990, Reg. 626: Traffic Control Signal Systems	The Act sets out the standard for the erection and maintenance of traffic control signal systems.
Ontario Traffic Manual Book 18: Cycling Facilities	Provides guidelines for developing municipal cycling facilities.
Ministry of Transportation: Transit- Supportive Guidelines	Provides processes for planning Complete Streets.
Ontario Water Resources Act R.S.O. 1990, c.O.40	The purpose of this Act is to provide for the conservation, protection and management of Ontario's waters for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social and economic well-being.
Canadian Environmental Protection Act (CEPA)	An Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development.
Clean Water Act, 2006, S.O.2006, c.22	The purpose of this act is to protect existing and future sources of drinking water and outlines the Municipality's role in this process.
MOECC Reg 347: General – Waste Management (hazardous material transport)	Designation of hazardous waste material as it pertains to stormwater and the requirements of its safe removal and transport.
Environmental Assessment Act, R.S.O. 1990 c.E.18	The purpose of this Act is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment.
Environmental Protection Act, R.S.O. 1990, c.E.19	The purpose of this Act is to provide for the protection and conservation of the natural environment.

## Customer Levels of Service

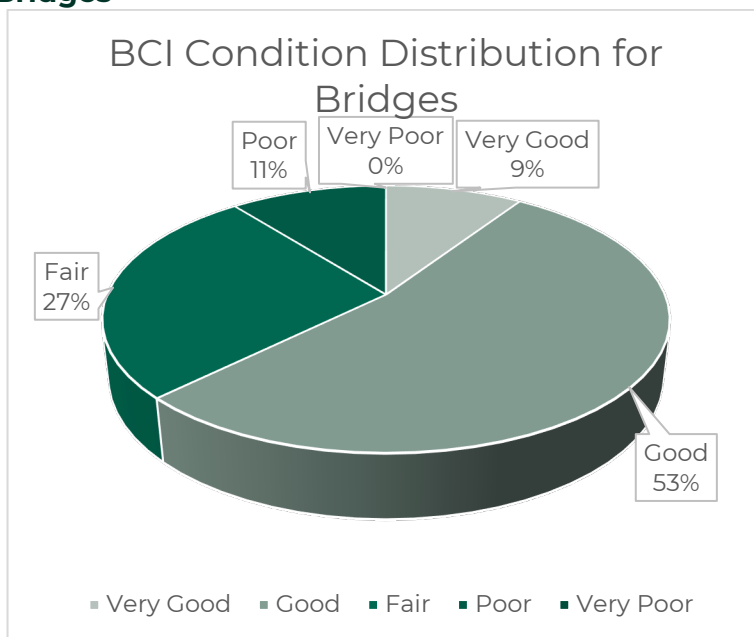
Customer levels of service are centered around customer experience of all stakeholders. Customer levels of service are a measure of the actual service received by customers. The focus is on maintaining the service that the asset or assets together provide.

## O.Reg Requirements - Customer Levels of Service

O.Reg 588/17 outlines mandated Levels of Service metrics which must be reported on by July 1, 2022. The following section reports on these mandated metrics.

In addition to the mandated O.Reg 588/17 Level of Service metrics, municipalities have been encouraged to develop their own metrics that support and reflect their goals and vision. The Town has undergone a review of its Levels of Service Framework developed in 2018 to realign metrics more closely with the Town's Strategic Goals and Vision. These metrics have not yet been finalized and are not mature enough to complete the LOS Review. This will be done at a later date and is part of the continuous improvement plan (Section 8).

### Bridges





The Town of Halton Hills owns and maintains 61 roadway bridges and 14 pedestrian bridges. These bridges support the transportation of people, goods, and services throughout the municipality. The pedestrian bridges are designed to support and enhance connectivity and movement for pedestrians and cyclists within the Town.



Most of the Town's bridges are in good to very good condition. The Condition Rating Framework is shown in Appendix A.

**Table 3.2 Mandated Customer Level of Service Measures – Bridges & Culverts**

Key Service Attribute	Level of Service Statement	Customer Level of Service	Current Performance
<b>Capacity &amp; Use</b>	Providing accessible bridges, culverts, and tunnels	Description of the traffic that is supported by municipal bridges.	The Town of Halton Hills bridges have been designed in accordance with the standards and requirements of the Bridge Design Code at the time of construction. The bridges have been designed to carry heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, and cyclists.
<b>Quality</b>	Providing bridges, culverts and tunnels at the appropriate material quality	Description or images of the condition of bridges and how this would affect use of the bridges.	Images included in Table 3.2.1
		Description or images of the condition of culverts and how this would affect use of the culverts.	Images included in Table 3.2.2

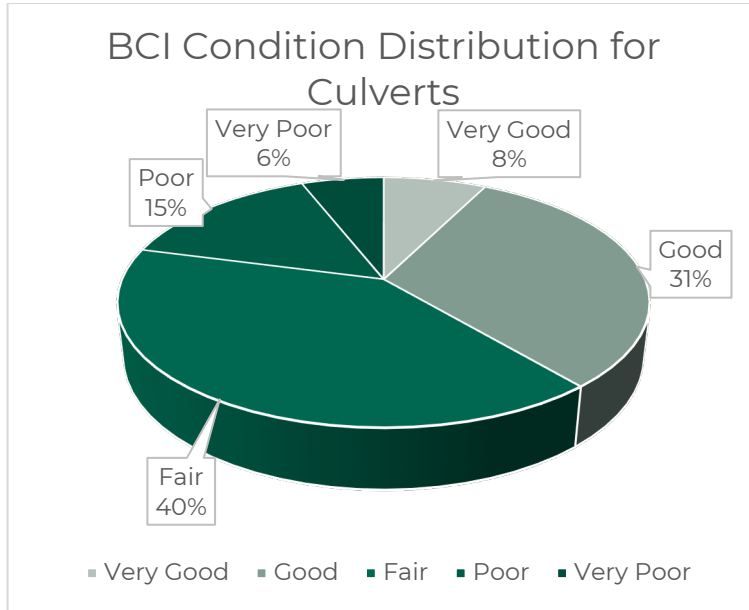
**Table 3.2.1 Customer Level of Service – Bridges**

Condition	Images that illustrate the different Bridge Condition Index Levels for Bridges	How condition impacts use of the bridges
<p><b>Very Good</b> <b>(BCI 90-100)</b></p>		<p>Almost new condition, functionality not affected.</p> <p>Bridge No. 1, Sixth Line - OSIM Inspection 2020</p>
<p><b>Good</b> <b>(BCI 70-89)</b></p>		<p>No repairs required for the foreseeable future.</p> <p>Bridge No. 34, Mill Street, Acton – OSIM Inspections 2020</p>

Condition	Images that illustrate the different Bridge Condition Index Levels for Bridges	How condition impacts use of the bridges
<p><b>Fair</b> <b>(BCI 60-69)</b></p>		<p>Acceptable condition and components generally functioning as intended.</p> <p>Bridge No. 31, Ontario St, Georgetown – OSIM Inspections 2020</p>
<p><b>Poor (BCI 40-59)</b></p>		<p>Presence of distresses or significant deterioration with components not functioning as intended.</p> <p>Bridge No. 33, Third Line, Lot 24 – OSIM Inspections 2020</p>
<p><b>Very Poor (BCI &lt; 40)</b></p>	<p>N/A</p>	



## Culverts





The Town owns and maintains 67 major structural culverts. These culverts support the safe and smooth travel of people, goods, and services throughout the Town, and to and from adjacent municipalities.

Most of the Town's culverts are in fair to good condition. The Condition Rating Framework is shown in Appendix A.

**Table 3.2.2 Customer Level of Service – Culverts**

Condition	Images that illustrate the different Bridge Condition Index Levels for Culverts	How condition impacts use of the culverts
<p><b>Very Good</b> <b>(BCI 90-100)</b></p>		<p>Almost new condition, functionality not affected.</p> <p>17 Sideroad Culvert - OSIM Inspection 2020</p>

Condition	Images that illustrate the different Bridge Condition Index Levels for Culverts	How condition impacts use of the culverts
<p><b>Good (BCI 70-89)</b></p>		<p>No repairs required for the foreseeable future.</p> <p>Fourth Line, Lot 13 - OSIM Inspection 2020</p>
<p><b>Fair (BCI 60-69)</b></p>		<p>Acceptable condition and components generally functioning as intended.</p> <p>Culvert No. 15, McDonald Blvd, Acton – OSIM Inspections 2020</p>

Condition	Images that illustrate the different Bridge Condition Index Levels for Culverts	How condition impacts use of the culverts
<p><b>Poor (BCI 40-59)</b></p>		<p>Presence of distresses or significant deterioration with components not functioning as intended.</p> <p>Third Line – 21/C – OSIM Inspections 2020</p>
<p><b>Very Poor (BCI &lt; 40)</b></p>		<p>Replacement or repairs required as soon as possible.</p> <p>Crewson's Line – 1/C, OSIM Inspections 2020</p>

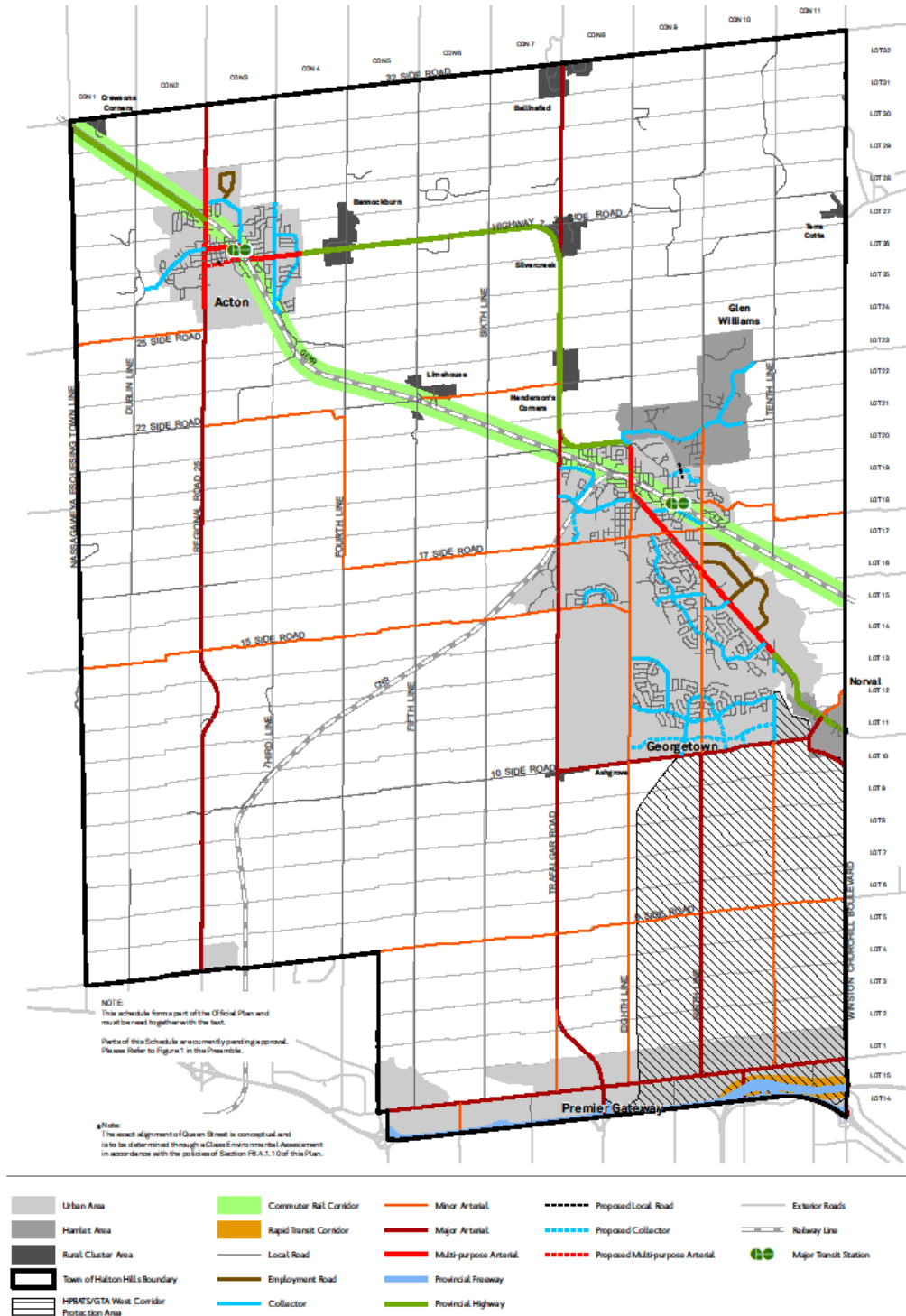
## Roads

**Table 3.3 Mandated Customer Level of Service Measures – Roads**

Key Service Attribute	Level of Service Statement	Customer Level of Service	Current Performance
<b>Capacity &amp; Use</b>  <b>Function</b>	Providing an accessible transportation network	Description, which may include maps, of the road network in the municipality and its level of connectivity	The Town of Halton Hills owns and operates a variety of urban and rural, arterial, collector, and local roads across the municipality providing connectivity between the two urban centres of Acton and Georgetown, and surrounding hamlets and adjacent municipalities. See Figure 9.
<b>Quality</b>	Providing a transportation network at the appropriate material quality with smooth and safe surfaces	Description or images* that illustrate the different levels of road class pavement condition	Road class pavement quality is updated on an annual basis in accordance with capital improvement projects. These conditions are mapped in Figure 10. The Condition Rating Framework is shown in Appendix A.

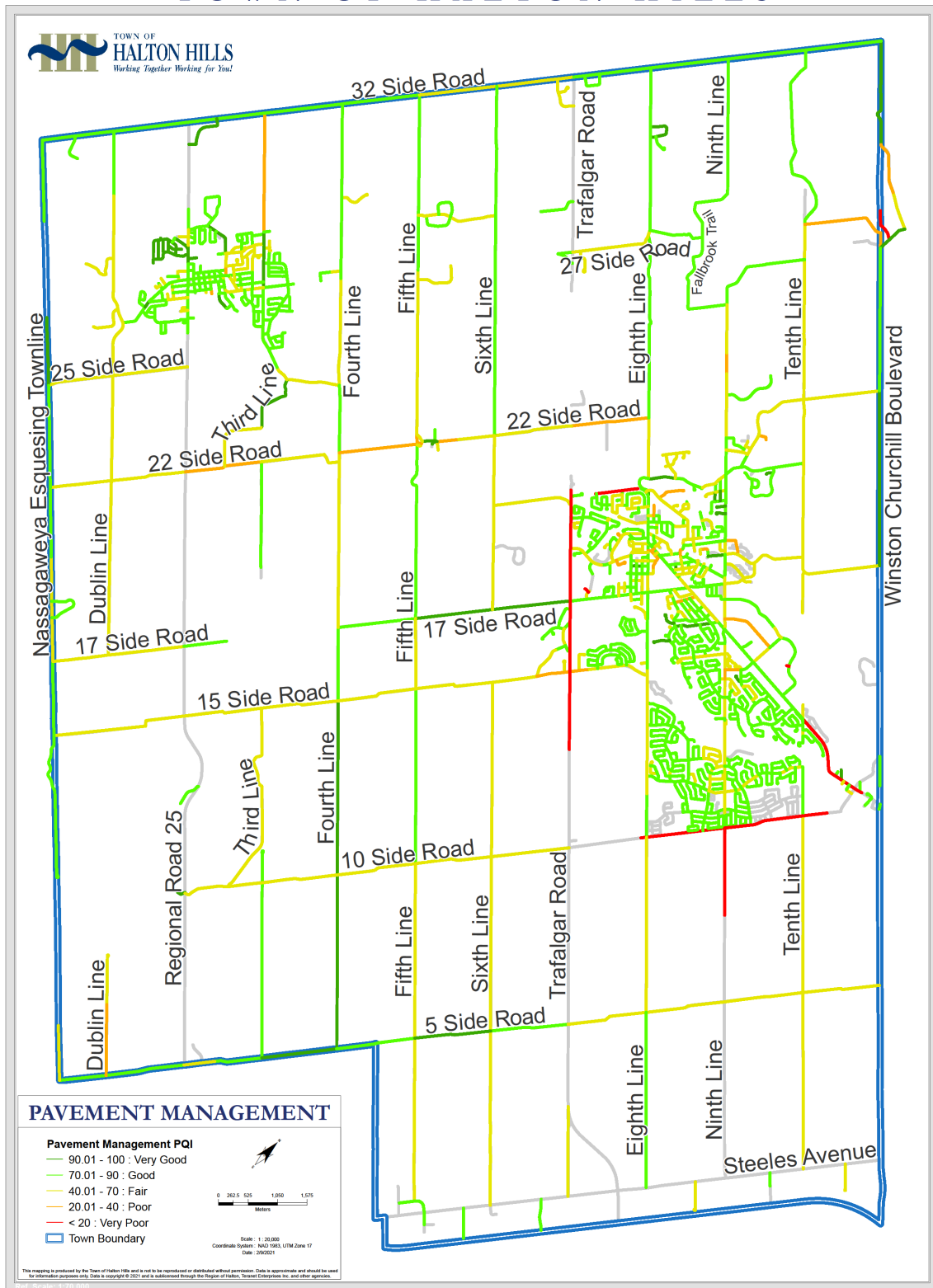
*\*The Town of Halton Hills completes a Pavement Management Study every 5 years. The latest study was completed in 2017. The O.Reg 588/17 requires images from, at most, two years prior to the completion of the plan. These images are not eligible for inclusion in the asset management plan at this time.*

Figure 3-2 Road Network by Functional Class



**Figure 3-3 Pavement Quality Index**

**TOWN OF HALTON HILLS**



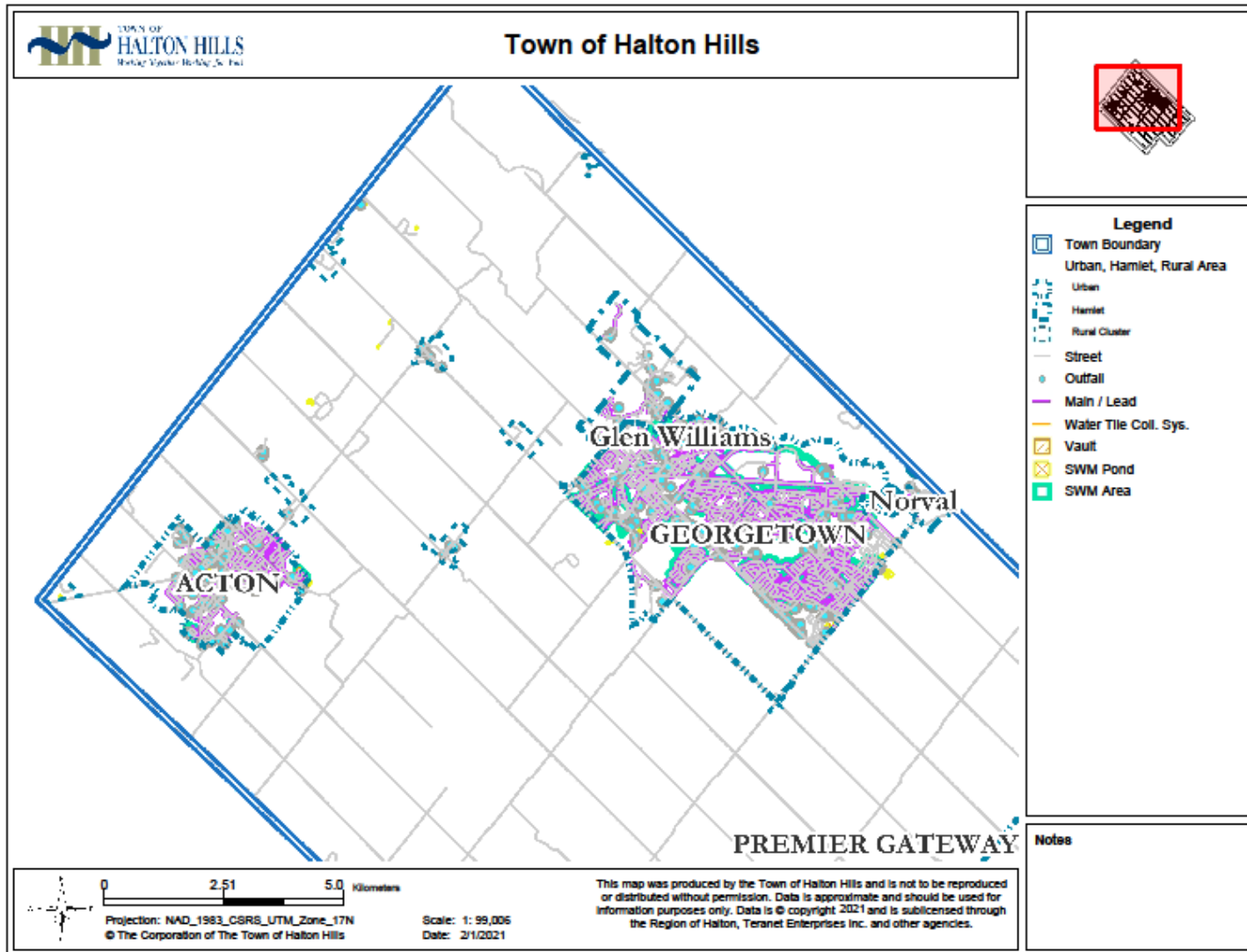
*Note: This image was produced utilizing data/information from the Town's latest Pavement Management Study in 2017. It does not reflect any changes (i.e. completed projects) since the development of that study.*

**Stormwater**

**Table 3.4 Mandated Customer Level of Service Measures – Stormwater**

Key Service Attribute	Level of Service Statement	Customer Level of Service	Current Performance
<p><b>Capacity &amp; Use</b></p>	<p>Providing stormwater services that protect the community</p>	<p>Description which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.</p>	<p>The majority of the Town’s stormwater management system is concentrated in the urban areas of Acton and Georgetown. These areas are serviced by mains, water tile collection systems, outfalls, vaults, and stormwater management ponds. See Figure 11.</p>

Figure 3-4 Town of Halton Hills Stormwater Management System





### Technical Levels of Service

Technical levels of service are centered around maintaining the physical asset or assets together to ensure continuity of service. The metrics are leading indicators and can provide insight on potential future asset failure.

#### O.Reg Requirements – Technical Levels of Service

O.Reg 588/17 outlines mandated levels of service metrics which must be reported on by July 1, 2022. Table 3.5 reports on these mandated metrics.

In addition to the mandated O.Reg 588/17 Level of Service metrics, municipalities have been encouraged to develop their own metrics that support and reflect their goals and vision. The Town has undergone a review of its Levels of Service Framework developed in 2018 to realign metrics more closely with the Town’s Strategic Goals and Vision. These metrics have not yet been finalized and are not mature enough to complete the LOS Review. This will be done at a later date.

**Table 3.5 Mandated Technical Levels of Service**

Asset Group	Key Service Attribute	Level of Service Statement	Technical Performance Measure	Technical LOS Performance
Bridges & Culverts	Capacity & Use	Providing accessible bridges, culverts and tunnels.	Percentage of bridges in the municipality with loading or dimensional restrictions	8%*
	Quality	Providing bridges, culverts, and tunnels at the appropriate material quality.	The average BCI for bridges	72.2
			The average BCI for culverts	66.5
Roads	Capacity & Use	Providing an accessible transportation network.	# of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the municipality	0.31

Asset Group	Key Service Attribute	Level of Service Statement	Technical Performance Measure	Technical LOS Performance
			# of lane-kilometres of collector roads as a proportion of square kilometres of land area of the municipality	0.12
			# of lane-kilometres of local roads as a proportion of square kilometres of land area of the municipality	1.19
	<b>Quality</b>	Providing a transportation network at the appropriate material quality with smooth and safe surfaces.	Average pavement condition index value for paved roads in the municipality.	70.7
			Average surface condition for unpaved roads in the municipality.	67.7
<b>Stormwater</b>	<b>Capacity &amp; Use</b>	Providing stormwater services that protect the community.	Percentage of properties in municipality resilient to a 100-year storm.	Future**
			Percentage of the municipal stormwater management system resilient to a 5-year storm.	98.5%

\*Calculated using roadway bridges only.

\*\*Stormwater services across the Town are provided by various levels of government. To report on this metric for the areas covered by Town-owned stormwater infrastructure would be a misrepresentation of actual resilience across the Town.

Current performance is based on existing resource provision and work processes. Levels of service are expected to change over time due to shifts in customer priorities and technology used to complete work. Updating customer and technical levels of service metrics and their associated performance is an ongoing process.

## 4.0 FUTURE DEMAND

Future demand looks at the Town's ability to meet the changing needs of the industry and their customers over time. Drivers affecting demand include technological changes, regulatory changes, population change, environmental awareness, changes in demographics, seasonal factors, consumer preferences and expectations, economic factors, etc. These external trends and drivers may affect LOS or the Town's ability to meet the proposed LOS in the future.

### **Demand Drivers**

Demand drivers can affect the future services required from a group of assets. They can change how frequently or how much we use current existing assets, as well as how we use and interact with the assets and plan for future needs.

### **Demand Forecasts**

Demand forecasting takes into consideration the demand drivers to ensure that continuity of service is maintained now and in the future.

The present position and forecasted demand drivers that may impact future service delivery and use of assets have been documented.

### **Demand Impact**

The demand drivers affecting the assets covered by this plan are documented below along with their potential impact.

### **Population and Employment Increase**

The Town of Halton Hills has a current population of approximately 64,000 and growing. According to information extracted from the Town's Development Charge Study, the net population is expected to increase to 83,823 people by mid-2032, and 91,885 by mid-2026. This will result in increased demand of the services provided by roads, bridges, culverts, and stormwater assets may result in faster deterioration of these assets and possible capacity issues.

The Town of Halton Hills has a moderate local economy but is growing. Employment is expected to rise to 29,289 by mid-2032 and 32,873 by mid-2036 through growth in the local economy and in the 401 corridor. Increased economy increases the impacts of moving people, goods, and services across the Town.

**Figure 4-1 Residential and Non Residential Growth Summary**




Time Horizon	Residential		Non-Residential <sup>1</sup>	
	Net Population	Residential Units	Employment	Gross Floor Area (Square Feet)
Mid 2022	64,001	22,564	21,096	
Mid 2032	83,823	30,353	29,289	
Mid 2036	91,885	33,401	32,873	
Incremental Growth				
10-year (2022-2032)	19,822	7,789	8,193	8,780,300
14-year (2022-3036)	27,884	10,837	11,777	12,714,700

1. Excludes Work at Home (W.A.H) and No Fixed Place of Work (N.F.P.O.W.)

### Change in Demographics

The demographics of the Town’s population is expected to change. According to the Economic Development and Tourism Strategy, the proportion of the population aged 55 or older is expected to increase over the next 5 years.

**Figure 4-2 Change in Demographics**

	Halton Hills	5 yr. change
 Median age	40.9	+4%
 Population >55	27%	+14%
 Population <20	25%	-8%

This will result in increased demand for accessibility and access to multi-use transportation routes.

### Transportation Preferences

Current travel patterns for the Town of Halton hills indicate:

- 84% use automobiles
- 7% use school bus, walking, cycling
- 2% use transit

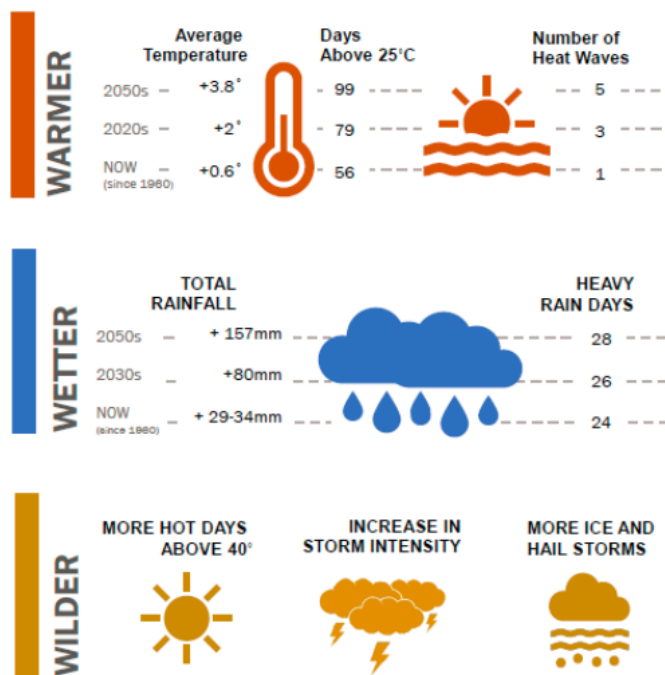
Travel pattern projections for 2031 indicate:

- 82% use automobiles
- 7% will walk and cycle
- 7% will use school buses
- 4% use transit

Currently, transportation users account for 41% of total emissions in the Town. In future, even higher emissions due to increased population and increased personal vehicle use are predicted. This will result in demand for infrastructure that supports low-carbon transportation. Increased congestion and sharing of roadways and sidewalks by active transportation users will impact the quality of life and safety concerns.

## Climate Change

Figure 4-3 Climate Change Trends



Climate change is another key demand driver. Figure 4-3 depicts the current position as well as the expected future state of the climate in Halton Hills. In short, the climate will become warmer, wetter, and wilder. Changing climate patterns will put pressure on the roads, bridges, culverts, and stormwater assets' ability to handle increased temperatures, precipitation, and intense weather events.

## Environmental Factors

The Town of Halton Hills is made up of protected countryside and escarpment areas, urban and hamlet areas. Installation of new infrastructure cannot negatively impact the natural environmental resources. This could cause conflicts when proposing the upgrade or expansion of assets.

## Demand Management Plan

Demand for new services will be managed through a variety of different interventions which can include:

- Management of existing assets
- Upgrade of existing assets
- Acquisition of new assets
- Policy and design changes
- Operation and maintenance changes

To manage the demand drivers outlined above, the demand management plan outlined in Table 4.1 are options for the Town to explore. Further opportunities will be developed in future revisions of this Core Infrastructure AM Plan.

**Table 4.1 Demand Management Plan**

Demand Driver	Demand Management Plan
Population Increase	<ul style="list-style-type: none"> <li>• Ensure design of new assets accounts for the increased demand due to population increase.</li> <li>• Shorten the time between rehabilitation.</li> <li>• Consider expansion opportunities during renewal/rehabilitation projects.</li> </ul>
Economic Factors	<ul style="list-style-type: none"> <li>• Economic growth is expected to be driven primarily on the 401 corridor area so upgrades and new assets required can focus on this area as a priority. Load limits may be put in place on certain routes through urban areas. Design specifications set by the Town are reviewed to ensure new and assumed assets will meet the requirements of residents of the Town.</li> </ul>
Change in demographics	<ul style="list-style-type: none"> <li>• The Transit Service Strategy is exploring a customized public transit system to meet the service requirements of Town of Halton Hills residents. New/replacement transportation assets are designed and constructed to meet accessibility requirements. The Transportation Master Plan considers active transportation and multi-use transportation routes to ensure future service levels can meet demands.</li> </ul>
Transportation Preferences	<ul style="list-style-type: none"> <li>• The Transportation Master Plan considers active transportation and multi-use transportation routes to ensure future service levels can meet demands.</li> <li>• Promote the use of low-carbon transportation options.</li> <li>• Offer electric vehicle charging stations and other facilities to promote low-carbon transportation within the right-of-way.</li> </ul>
Climate Change	<ul style="list-style-type: none"> <li>• Ensure that new projects and rehabilitations consider future climate conditions by updating material standards and design parameters, increasing the resilience of electrical systems, and encourage Low Impact Development.</li> <li>• Update and enhance operations and maintenance procedures and provide training programs for climate event response.</li> </ul>
Environmental Factors	<ul style="list-style-type: none"> <li>• Future projects must identify existing environmental features that may be impacted by transportation and stormwater assets. Conservation area authorities are included in asset construction planning, and their permission is required for the acquisition, upgrade or enhancement of new assets in designated areas.</li> </ul>

## Climate Change Adaptation

As noted above, climate change is a significant demand driver. In the context of the Asset Management Planning process climate change can be considered as both a future demand and a risk.

In 2020, the Town completed an Infrastructure Vulnerability assessment on core infrastructure assets. This assessment outlined how climate change affects core infrastructure assets now and in the future. Figures 4-4 and 4-5 outline the Town’s approach to addressing climate change.

**Figure 4-4 Adaptation, Mitigation, and Resilience**



To address the impacts of climate change, the Town takes a holistic approach, considering adaptation, mitigation, and resilience. See Figure 4-4..

The approach to address climate change for core assets focuses mainly on adaptation opportunities that can be organized into three categories: policy, design, and operations and maintenance. When implemented, these opportunities will drive the Town’s ability to achieve the five goals of the Town’s Climate Change Adaptation Plan. See Figure 4-5.

**Figure 4-5 Climate Change Adaptation Plan Five Main Goals**

1. Halton Hills can Withstand Extreme Weather Events
2. Halton Hills is Resilient to the Impacts of Higher Temperatures and More Frequent Heat Waves
3. Halton Hills is Resilient to Increased Precipitation and Flooding
4. Halton Hills is Prepared for the Socio-Economic Impacts of Climate Change
5. Halton Hills Can Protect Residents from the Health and Safety Impacts of Climate Change

The opportunities identified to date are shown in Table 4.2 along with the corresponding Climate Change Adaptation Plan (CCAP) goals.

**Table 4.2 Managing the Impact of Climate Change on Assets and Services**

Action	Asset Groups	Management & Opportunities	CCAP Goals
Policy Recommendations	Transportation & Stormwater Management	Increase community engagement and education	2,3,5



Action	Asset Groups	Management & Opportunities	CCAP Goals
		Ensure that new projects and retrofits consider future climate conditions	1,3,4
		Expand climate policies and procedures	1,2,3,5
Design Recommendations	Transportation & Stormwater Management	Update material standards and design parameters	1,2,5
		Continue to encourage Low-Impact Development (LID)	1,3
	Transportation	Increase resilience of electrical systems	1,2,3,5
Operations & Maintenance	Transportation & Stormwater Management	Establish procedures and training programs for climate event response	2,3,5
		Update inspection and maintenance procedures	1,2,3,5
		Explore digital solutions to track and inform maintenance and operations activities	1,2,3,5
		Formalize a tree and vegetation management program	1,2,3,5

Constructing new assets involves recognizing the opportunity to simultaneously meet service level demands as well as resilience needs.

Table 4.3 summarizes some asset climate change resilience opportunities for newly constructed assets.

**Table 4.3 Building Asset Resilience to Climate Change**

New Asset Description	Climate Change impact These assets?	Build Resilience in New Works
Traffic Signals	Increased wind and ice events causing damage and/or asset failure	Increase the resilience of electrical systems through the installation of Uninterruptable Power Supply units. Increase wind loading design capacity.

New Asset Description	Climate Change impact These assets?	Build Resilience in New Works
Stormwater Management System	Increased precipitation volume and rain events will put strain on the system	Increase material and design standards for new stormwater asset installations to account for increased precipitation in the future.
Roads	Increased precipitation volume and rain events will cause potential flooding on roads	Encourage Low Impact Development techniques to reduce risk and/or mitigate stormwater run off.
Bridges & Culverts	Insufficient capacity and erosion around culverts.	Elevate built structure to account for changing climate and water levels.

The impact of climate change on assets is a relatively new discussion. Future revisions of the Core Infrastructure AM Plan will discuss climate change as a demand driver in more detail.

**Financial Impact**

The financial impact of implementing adaptation actions to build resilience to climate change is not known at this time. Future updates to the Core Infrastructure AM Plan will include these costs, thus informing the forecasted lifecycle activities and costing needs.

# 5.0 RISK MANAGEMENT

In 2021, the Town developed a Risk Management Strategy aimed at providing a consistent approach to identifying, assessing, and managing risks for all Town assets. An enterprise approach to Risk management will help the Town better understand and manage the probability of various threat events impacting its ability to deliver levels of services that customers need.

Risk events, such as an asset’s failure to have sufficient capacity, function, or quality, are events that may compromise the delivery of the Town's strategic objectives. Lifecycle management activities are used to manage the risk of failure by reducing the chance of asset failure to acceptable levels. The impact of asset failure on the Town’s ability to meet its strategic objectives dictates the type and timing of lifecycle management activities.

## Risk Assessment

The Town used the Risk Rating Matrices shown in Table 5.1 and 5.2 to assess risk for all Town assets. Risk is assessed in terms of Capacity & Use, Function, and Quality as aligned with the key service attributes outlined in O.Reg 588/17.

**Table 5.1 Probability of Failure**

Probability of Failure (PoF)	Rating	Capacity & Use	Function	Quality
Rare	1	Demand corresponds well with actual capacity and no operational problems experienced. Meets current and future capacity needs within planning horizon.	The infrastructure in the system or network meets all program/service delivery needs in a fully efficient and effective manner. (Health, safety, security, legislative etc.)	Asset is physically sound and is performing its function as originally intended. Asset is new or at the beginning of its service life.
Unlikely	2	Demand is within actual capacity and occasional operational problems experienced.	The infrastructure in the system or network meets program/service delivery needs in an acceptable manner. (Health, safety, security, legislative etc.)	Asset is physically sound and is performing its function as originally intended. Typically, asset is within mid-stage of its expected life.






Probability of Failure (PoF)	Rating	Capacity & Use	Function	Quality
Possible	3	Demand is approaching actual capacity and/or operational problems occur frequently. Meets current capacity needs but not future without modifications.	The infrastructure in the system or network meets program/service delivery needs with some inefficiencies and ineffectiveness present. (Health, safety, security, legislative etc.)	Asset is showing signs of deterioration and is performing at a lower level than originally intended.
Likely	4	Demand exceeds actual capacity and/or significant operational problems are evident.	The infrastructure in the system or network has a limited ability to meet program/service delivery needs. (Health, safety, security, legislative etc.)	Asset is showing significant signs of deterioration and is performing to a much lower level than originally intended.
Certain	5	Demand exceeds actual capacity and/or operational problems are serious and ongoing. Does not meet Current capacity Requirements.	The infrastructure in the system or network is seriously deficient and does not meet program/service delivery needs and is neither efficient nor effective. (Health, safety, security, legislative etc.)	Asset is physically unsound and/or not performing as originally intended. Asset has reached end of life and failure is imminent.

**Table 5.2 Consequence of Failure**

Consequence Categories	(Triple Bottom Line)	C1	C2	C3	C4	C5
		Insignificant	Minor	Moderate	Major	Catastrophic
Economic	Financial	Damages, losses (including 3rd party) or fines from \$1k to \$10k	Damages, losses (including 3rd party) or fines \$10k to \$100k	Damages, losses (including 3rd party) or fines \$100k to \$1M	Damages, losses (including 3rd party) or fines \$1M to \$10M	Damages, losses (including 3rd party) or fines > \$10M
Social	Health & Safety	No obvious potential for injury or affects to health.	Potential for minor injury or affects to health of an individual. Full recovery is expected; or minor medical attention may be required	Potential for serious injury or affects to health. May affect many individuals and / or result in short term disability; or Hospitalization may be required for a short period of time.	Potential for serious injury or affects to health of one or more individuals with a possibility of loss of a life and the certainty of long-term disability; or Emergency hospitalization required for one or more individuals.	Potential for death or multiple deaths with probable permanent damage; or Emergency and long-term hospitalization required for several individuals.

Consequence Categories	(Triple Bottom Line)	C1	C2	C3	C4	C5
		Insignificant	Minor	Moderate	Major	Catastrophic
	Availability/	Small number of customer experiencing disruption / impact (less than 100 people or up to a few hours)	Localized service disruption / impact (100 to 1000 people or up to 1 day)	Significant localized disruption / impact (1,000 to 10,000 people or less than 1 week)	Major service disruption / impact 15,000 to 50,000 people or for more than a week)	Town wide service disruption / impact (greater than 50,000 people or permanent loss of services)
Environmental	Environment	Very negligible impact or can be restored within 1 week	Minor (within 1 month) very isolated damage / impact to the environment, local importance	Significant short-term impact (up to 2 months), local importance	Significant long-term impact (up to 1 year), Provincial importance.	Major long-term impact (greater than 1 year), Federal importance.

The risk ratings can be prioritised into the following categories below and on the 5 x 5 grid shown in Figure 5-1:

-  **Low Risk:** Status Quo no formal response. Risk is documented and will be reviewed periodically.
-  **Low-Medium:** Status Quo. Identify assets that are candidates for “run to failure”. Continue with current maintenance and performance / condition monitoring.
-  **Medium Risk:** Extend life & monitor threat events. Review maintenance strategies & plans (e.g., predictive, time based). Continue to maintain & monitor performance / condition.
-  **Medium-High:** Extend life & monitor / respond to threat events. Review maintenance strategies & plans (e.g., proactive). Review renewal strategies (NPV options analysis), spares strategy, available redundancy & monitoring programs.
-  **High Risk:** Respond to threat events. Identify capital renewal options, confirm spares strategy & available redundancy, & review monitoring programs.

**Figure 5-1 Proposed Risk Thresholds**

			Consequence of Failure				
			Insignificant	Minor	Moderate	Major	Catastrophic
			1	2	3	4	5
Probability of Failure	Improbable	1	1	2	3	4	5
	Unlikely	2	2	4	6	8	10
	Possible	3	3	6	9	12	15
	Likely	4	4	8	12	16	20
	Highly Probable	5	5	10	15	20	25

A risk assessment has been completed for Transportation and Stormwater Management assets, which are shown in Figures 5-2 & 5-3.

**Figure 5-2 Risk Assessment – Transportation Services**

		Capacity and Use				Function				Quality			
		PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value
Transportation & Transit													
Roadway Network	Arterial	3	4	12	Medium-High	2	4	8	Medium	3	4	12	Medium-High
Roadway Network	Collector	2	3	6	Low-Medium	2	3	6	Low-Medium	3	3	9	Medium
Roadway Network	Local	1	2	2	Low	2	2	4	Low-Medium	2	2	4	Low-Medium
Roadway Network	Rural (Residential)	1	3	3	Low	4	3	12	Medium-High	5	3	15	Medium-High
Transportation Structures	Roadway Bridges	3	4	12	Medium-High	3	4	12	Medium-High	2	4	8	Medium
Transportation Structures	Pedestrian Bridges	1	2	2	Low	1	2	2	Low	2	2	4	Low-Medium
Transportation Structures	Roadway Culverts	4	4	16	Medium-High	3	4	12	Medium-High	4	4	16	Medium-High
Transportation Structures	Drainage Culverts	4	3	12	Medium-High	3	3	9	Medium	4	3	12	Medium-High
Transportation Structures	Retaining Walls	1	3	3	Low	4	3	12	Medium-High	4	3	12	Medium-High
Transportation Structures	Guiderrails	3	3	9	Medium	2	3	6	Low-Medium	3	3	9	Medium
Traffic Services	Signals	2	4	8	Medium	2	4	8	Medium	2	4	8	Medium
Traffic Services	Street Lighting	3	3	9	Medium	3	3	9	Medium	2	3	6	Low-Medium
Traffic Services	Pavement Markings	1	4	4	Low-Medium	1	4	4	Low-Medium	2	4	8	Medium
Traffic Services	Traffic Signage	1	4	4	Low-Medium	2	4	8	Medium	3	4	12	Medium-High
Walkways and Pathways													
Walkways and Pathways	Multi-use Pathways (within Road corridor)	2	2	4	Low-Medium	1	2	2	Low	3	3	9	Medium
Walkways and Pathways	Sidewalks	2	3	6	Low-Medium	2	3	6	Low-Medium	4	4	16	Medium-High



**Figure 5-3 Risk Assessment – Stormwater Management**

		Capacity and Use				Function				Quality			
		PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value
Environmental Services													
Stormwater Ponds	Stormwater Management Ponds	3	3	9	Medium	1	3	3	Low	4	3	12	Medium-High
Storm Sewer System	Stormwater Mains	1	2	2	Low	1	2	2	Low	3	2	6	Low-Medium
Storm Sewer System	Maintenance holes	1	2	2	Low	1	2	2	Low	4	2	8	Medium
Storm Sewer System	Drainage Culverts	2	2	4	Low-Medium	1	2	2	Low	4	2	8	Medium
Storm Sewer System	Catch basins	1	2	2	Low	1	2	2	Low	4	2	8	Medium
Storm Sewer System	Outfalls (Engineered Outfall & Inlets)	3	2	6	Low-Medium	1	2	2	Low	4	2	8	Medium
Low Impact Development	Infiltration Galleries	1	2	2	Low	1	2	2	Low	2	2	4	Low-Medium

## Critical Assets

Completing the risk assessment results in the identification of critical assets. Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction of service. Specifically, critical assets at the Town have been identified as having a high consequence of failure score. The most critical core infrastructure assets (consequence of failure of 4 or higher) are:

- Arterial Roadways
- Roadway Bridges
- Traffic Culverts
- Traffic Signals
- Traffic Signage

Critical assets receive priority risk management planning to minimize the risk exposure for the Town. Addressing these risks can include condition inspection programs and maintenance management programs. The Town has taken steps to address the risks posed by its critical assets through the risk treatment plans shown in Table 5.3.

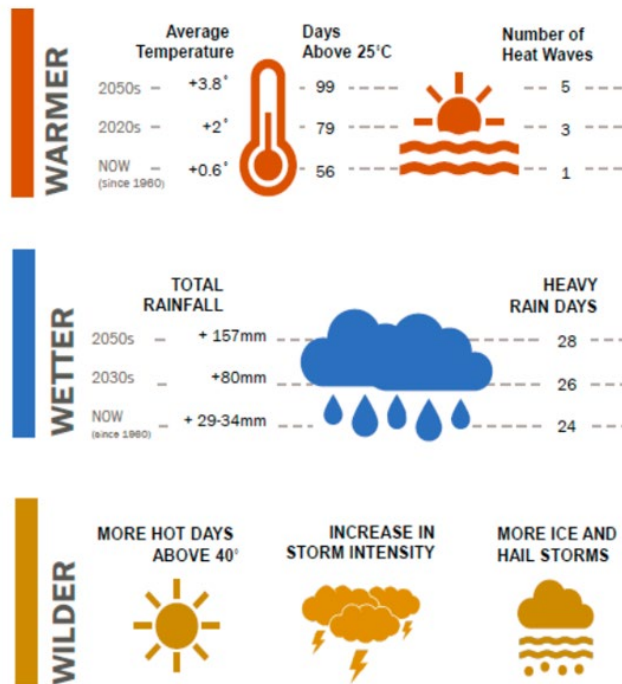
**Table 5.3 Risks and Treatment Plans**

Service or Asset at Risk	Risk Rating	Risk Treatment Plan
Roads	Medium-High	Pavement Management Study that includes inspections of all roads within the Town on a 5-year cycle.  Regular inspections by Town staff according to Ontario Regulation 239/02 – Minimum Maintenance Standards for Highways of the Ontario Municipal Act.
Roadway Bridges & Traffic Culverts	Medium-High	Biennial OSIM inspections.  Additional inspections where staff note accelerated deterioration.
Roads, Bridges, Culverts, Traffic Signals, Traffic Signage	Medium-High	Lifecycle/Maintenance Management Program (In progress)

## Climate Change Risks

As discussed in the previous Section, climate change can be considered both a demand driver and a risk to the Town’s core infrastructure assets. The resilience of our core infrastructure assets is vital to maintaining service levels. The impact of climate change on the Town of Halton Hills can be summarized into three key themes shown in Figure 5-4.

**Figure 5-4 Climate Change Impacts**



The Infrastructure Vulnerability Assessment analyzed the adaptive capacity and vulnerability of the Town’s core infrastructure assets. The key hazards assessed for each asset type include higher temperatures, increased precipitation, ice storms, and high winds.

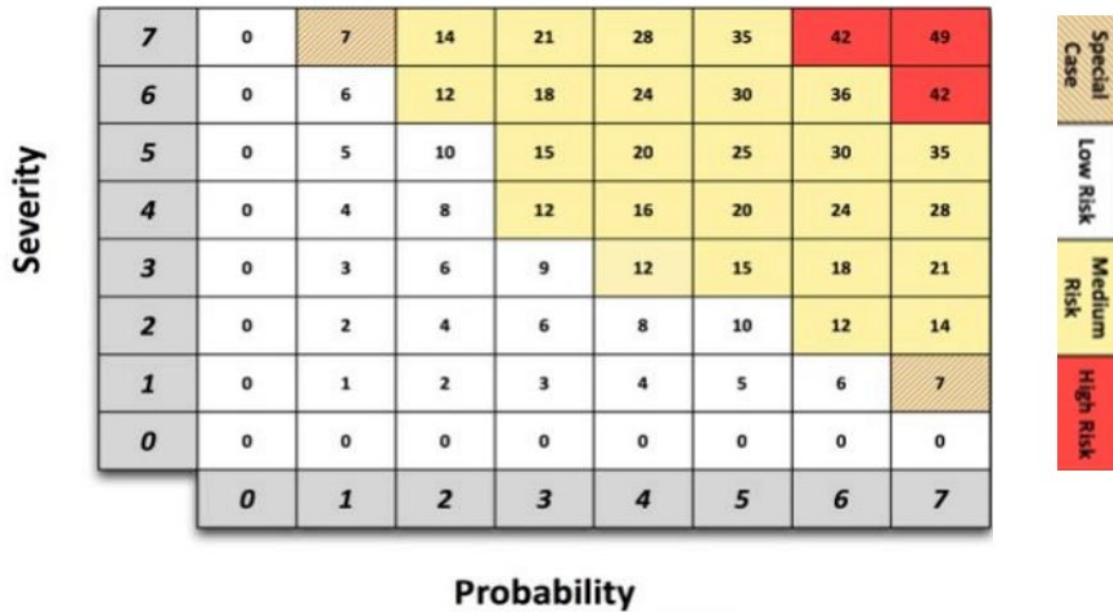
The risks were scored using *Probability of Occurrence* x *Severity* shown in Figure 5-5 to end up with an overall risk score shown in Figure 5-6.

**Figure 5-5 Probability of Occurrence and Severity Scales**

Probability of Occurrence			Severity	
Score	Probability		Scale	Description
0	<0.1%	< 1 in 1,000	0	Negligible or Not Applicable
1	1%	1 in 100	1	Very Low/Unlikely/Rare/Measurable Change
2	5%	1 in 20	2	Low/Seldom/Marginal/Change in Serviceability
3	10%	1 in 10	3	Occasional Loss of Some Capacity
4	20%	1 in 5	4	Moderate Loss of Some Capacity
5	40%	1 in 2.5	5	Likely Regular/Loss of Capacity and Loss of Some Function
6	70%	1 in 1.4	6	Major/Likely/Critical Loss of Function
7	>99%	> 1 in 1.01	7	Extreme/Frequent/Continuous/Loss of Asset



**Figure 5-6 Risk Scoring Matrix**



The results of the assessment are summarized in Table 5.4, providing the threat/hazard and the adaptation options to address medium-high risks. The adaptation options consider adjustments to policy, design, and operations and maintenance.

**Table 5.4 Vulnerability Assessment**

Asset Group	Threat / Hazard	Adaptation Options
Traffic Signals and Street Lighting	Ice Storms & High Winds	Document and actively manage trees around intersections.
		Bury utility supply to intersections.
		Ensure wind and ice load design cases are adequately addressed by suppliers
Traffic Culverts	Increased Precipitation	Conduct inspections and provide appropriate level of maintenance and protection to mitigate damage, blockages and increased degradation from weathering.
Infiltration Galleries	Higher temperatures	Natural or built shade features to provide protection from the weather.
		Use of native and adaptive plant species to reduce water consumption.

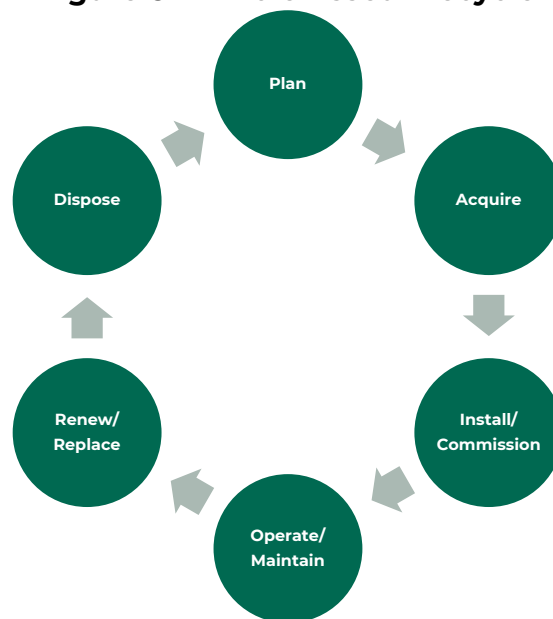
Asset Group	Threat / Hazard	Adaptation Options
		Use of drought tolerant plants.
Stormwater Assets	Increased Precipitation	Design capacity increased to account for climate change.
		Upgrade existing assets that are in critical flood prone areas.

By working to implement these recommendations, the Town will maintain its ability to deliver critical Transportation and Stormwater Management to the community within our changing climate. At this time, the cost of implementing these climate change adaptation options is unknown. As the Town gains more clarity around the cost of these initiatives, financial forecasting will be updated.

## 6.0 WHOLE LIFECYCLE MANAGEMENT

Whole lifecycle management details how the Town manages assets through all phases of an asset's life. These activities are undertaken to ensure that the Town's core infrastructure assets can sustain service levels while minimizing costs. In 2021, the Town developed a Lifecycle Management Strategy that formalized how the Town is managing their assets in accordance with the key activities in Figure 6-1. The following section details the lifecycle activities that the Town uses to manage their core infrastructure assets.

**Figure 6-1 Whole Asset Lifecycle**



### Plan

Planning involves determining the needs, funding, and timing of lifecycle management activities to achieve best outcomes that maintain service levels while also encouraging cost savings. Planning can be informed by policies, procedures, design standards, master plans, studies, new regulations, etc. The Town has adopted several strategic and operational solutions to support its asset lifecycle activities including:

- Consultation and coordination with the Region of Halton, Ministry of Transportation and other Municipalities on matters which will have a direct impact on the Town. For example, studies and related plans.
- Project coordination with the Region of Halton to reduce the impact of construction activities on residents and benefit from cost savings.
- Joint contracts with the Region and other Municipalities to conduct inspections/assessments and procure winter control materials to achieve economies of scale
- Development of Master Plans for strategic oversight of programs

- Boundary Agreements with adjacent Municipalities which defined the responsibilities of both parties and facilitate shared costs associated with managing roadway assets.
- Board Agreements with the Canadian Transportation Agency which defined the responsibilities of both parties and facilitate shared costs associated with managing bridge assets.
- Improvements in operations as well as employee capabilities, communications training, etc.

These solutions are used to inform lifecycle management activities and financial planning for core infrastructure assets.

## **Acquire**

Recommendations in strategic or master plans as well as increased need for assets due to changing demands can result in the acquisition of new assets. The portion of an upgraded existing asset used to increase capacity can also be considered a new asset. Assets may also be donated to the Town. New core infrastructure assets are acquired as discussed below.

## **Procurement**

Acquired core infrastructure assets are often required to go through the Town's Procurement process. Potential upgrade of or installation of new assets are reviewed to verify that they are essential to the Town's needs, and meet design specifications. The priority ranking of new assets is focused on the service and corporate risks associated with the proposed project. Service and corporate risks are discussed in detail later under Renewal & Replacement Ranking.

## **Asset Donations**

Assets can also be acquired by the Town through donations. Donated assets are acquired through the assumption of assets constructed in new developments. Other methods can include the donation of assets to the Town from higher levels of government. An example of this is the Regional Road Rationalization.

## **Regional Road Rationalization**

Periodically the Region will conduct a Road Rationalization. The process can result in the reallocation of asset ownership and responsibility between the Region and the Town. When core asset ownership is transferred to the Town, the assets can be considered donated assets and their associated lifecycle costs need to be incorporated into financial planning and ultimately the Long Range Financial Plan (LRFP). In 2015, ownership of three signalized intersections was transferred to the Town.

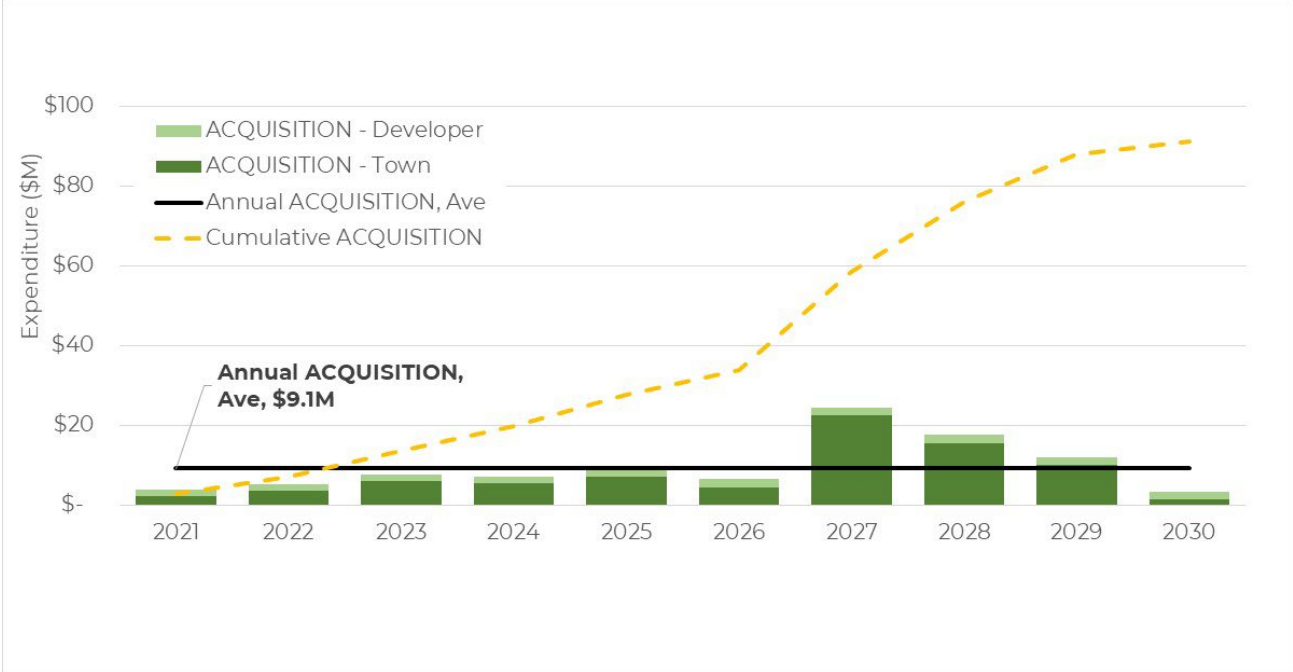
## **Install & Commission**

Installation and commissioning of core infrastructure assets involves the building, constructing, and installation of new assets according to the desired design specifications outlined by the Town.

**Asset Acquisition**

Proposed new assets include both assets assumed from developers, and assets owned by the Town. Figure 6-2 and Table 6.1 below provide a summary of the combined growth expected at the Town over the next 10 years.

**Figure 6-2 Acquired Assets**



**Table 6.1 Acquired Assets Summary**

Year	Acquired Assets (\$M) – Town and Developers	Cumulative Acquisition (\$M) – Town and Developers
2021	\$2.83	\$2.83
2022	\$4.20	\$7.03
2023	\$6.62	\$13.65
2024	\$6.04	\$19.69
2025	\$7.87	\$27.56
2026	\$6.39	\$33.94
2027	\$24.45	\$58.39
2028	\$17.51	\$75.90
2029	\$11.97	\$87.87
2030	\$3.32	\$91.18

The projected new construction and acquisition of new assets from the Town is based on the projects identified in the 2021 Capital Budget and 2022-2030 Capital Forecast project with development charge funding. Expenditure on new assets and services in the 2022 Capital Budget will be accommodated as approved through the 2022 budget process. The estimated expenditures identified in the forecast will be funded to the extent that there is available funding as assess



through the LRFP process. The projected new construction of developer assets is derived from the Town's future development projects with an anticipated build within the next 10 years. Constructing or acquisition of new assets will commit the funding of ongoing operations, maintenance, and renewal costs for the period that the service provided from the assets is required.

## **Operate & Maintain**

Operations & maintenance activities help to ensure that assets are kept in working service condition. These activities decrease the likelihood of asset failure and the subsequent need for significant and often costly repairs. The Town currently practices the following maintenance activities for its core infrastructure assets:

- Scheduled preventive maintenance programs
- Corrective maintenance as required
- Reactive maintenance and repairs as required

As discussed in Section 5, critical assets are prioritized and have preventive maintenance programs. For the Town's less critical assets, assessment and priority of corrective and reactive maintenance is undertaken by staff using experience and judgement.

### **Roads**

The Town performs preventive maintenance on its road assets. Routine maintenance for roads consists of the following activities that are designed to extend the useful life and maintain the level of service provided by the asset.

- Crack Sealing
- Asphalt Cold/Hot Patch
- Surface Treatment
- Gravel Resurfacing/Patching/Grading
- Erosion Control

### **Bridges**

The Town performs preventive maintenance on its bridge assets which includes bridge washing each spring and removal of debris from key structural elements. This is done to minimize corrosion which ensures the useful life of the assets is not prematurely shortened.

### **Sidewalks**

To address condition or deficiencies in sidewalks, the Town's Public Works department will perform maintenance activities such as mud jacking or grinding. This will ensure that sidewalks continue to provide services as intended until it is time for their replacement.

### **Traffic Signals and Street Lighting**

The Town of Halton Hills has an agreement with Southwestern Energy Inc. for the preventive maintenance activities for street lighting and traffic signals. The Town has an agreement with the Town of Oakville for reactive maintenance of Town traffic signals.

**Stormwater**

The Town’s Public Works department maintains a list of areas vulnerable to the effects of severe weather, including flooding. To maintain current levels of service, stormwater assets such as mains, outfalls, and catch basins are inspected and cleaned before and after severe weather events.

**Historical Operational Budget**

Maintenance activity costs are covered under the Town’s Operating Budget. The trend in operational budgets are shown in Table 6.2.

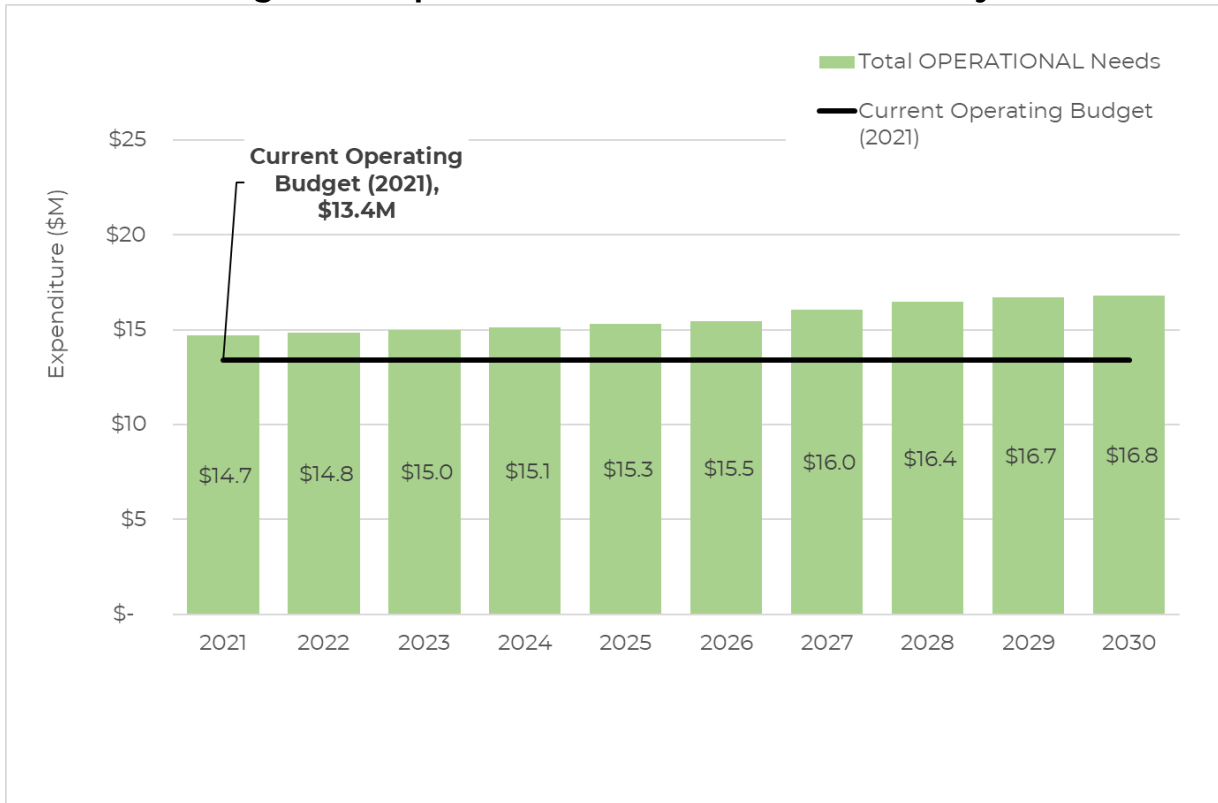
**Table 6.2 Operational Budget Trends**

Year	Operational Budget (M\$)
2019	\$7.49
2020	\$8.81
2021	\$8.97

Operational budget levels are planned to maintain current service levels as outlined in Section 3 as well as accommodate growth. As the Corporate Asset Management program at the Town matures, operational budget planning will be linked to achieving proposed levels of service.

Summary of forecast operations and maintenance costs  
Forecasted operational budget needs are based on the current core infrastructure asset stock. As new assets are acquired by the Town, the forecasted operational budget needs will increase. Similarly, if assets are disposed of, the forecasted operational budget need will decrease. Figure 6-3 and Table 6.3 show the forecasted operations and maintenance costs relative to the planned Operational Budget.

**Figure 6-3 Operations and Maintenance Summary**



**Table 6.3 Operational Forecast Summary**

Year	Operational Need (\$M)	Operational Budget (\$M)	Shortfall (\$M)
2021	\$14.7	\$13.4	(\$1.3)
2022	\$14.9	\$13.4	(\$1.5)
2023	\$15.0	\$13.4	(\$1.6)
2024	\$15.2	\$13.4	(\$1.8)
2025	\$15.4	\$13.4	(\$2.0)
2026	\$15.6	\$13.4	(\$2.2)
2027	\$16.2	\$13.4	(\$2.8)
2028	\$16.7	\$13.4	(\$3.3)
2029	\$17.0	\$13.4	(\$3.6)
2030	\$17.1	\$13.4	(\$3.7)
<b>TOTAL</b>	<b>\$157.7</b>	<b>\$133.9</b>	<b>(\$23.8)</b>

The forecasted operations and maintenance costs are based on current needs as well as assumptions around new asset value to be acquired. Forecasted operations and maintenance for new assets are estimated based on a percentage

of the new asset value to be acquired. As the Town gains more clarity around the quantity and extent of new assets to be acquired, operational budget planning will be better informed and more accurately reflect operations and maintenance needs for core infrastructure assets.

**Asset Condition Monitoring**

Condition monitoring is an important step in assessing an asset’s maintenance and renewal needs. Inspections provide insight on the timing and magnitude of the interventions required. This information is then used to inform maintenance and investment planning. Table 6.4 outlines the various condition monitoring approaches used by the Town.

**Table 6.4 Asset Condition Monitoring**

Asset Category	Condition Monitoring Frequency	Methodology
Roads	5 years	Pavement Management Study
Roadway Bridges & Traffic Culverts	Biennial	Bridge Rehab Study - OSIM Inspection methodology
Pedestrian Bridges	4 years	Bridge Rehab Study - OSIM Inspection methodology
Roads, Sidewalks, Signs, Streetlighting	Annual	Routine inspections consistent with Ontario Regulation 239/02 – Minimum Maintenance Standards for Highways of the Ontario Municipal Act.
Traffic Signals	Bi-Annual	Routine inspections consistent with Ontario Regulation 239/02 – Minimum Maintenance Standards for Highways of the Ontario Municipal Act.
Stormwater Management Ponds	Annual	Inspections based on design recommendations.
Stormwater Mains	Capital Works Program	Inspections of mains occur in conjunction with capital projects to determine renewal/rehabilitation needs.
Maintenance Holes	Ongoing	Visual inspections occur along with routine roadway inspections
Catch Basins	3-year cycle	Inspection and cleaning are completed simultaneously.

Asset Category	Condition Monitoring Frequency	Methodology
Drainage Culverts	Annual	Inspections based on design recommendations.

## Renew & Replace

Renewal is major capital work which does not significantly alter the original service provided by the asset but restores or renews an existing asset to its original useful life potential. Assets requiring renewal are identified using the Town's Asset Register data to project the renewal costs and renewal timing (acquisition year plus useful life to determine the renewal/rehabilitation year).

The typical useful lives of core infrastructure assets used to develop projected asset renewal forecasts are shown in Table 6.5.

**Table 6.5 Useful Lives of Assets**

Asset (Sub)Category	Useful life
Arterial Roadways	40
Collector Roadways	60
Local Roadways	80
Surface Treated	8
Curb & Gutter	50
Sidewalks	50
Retaining Walls	75
Guiderails	30
Signs	Sign Structure - 20 years
Street Lighting	Poles – 30 years Fixtures – 15 years
Traffic Signals	Poles – 30 years Beacons, Highway Heads, Pedestrian Heads – 10 years Communications and Controls, Uninterruptible Power Supply – 10 years Pushbuttons – 7 years
Roadway Bridges	75
Pedestrian Bridges	40
Traffic Culverts	75

Asset (Sub)Category	Useful life
Stormwater Management Ponds	50
Stormwater Mains	75
Maintenance Holes	75
Catch Basins	75
Drainage Culverts	25
Outfalls	75
Infiltration Galleries	75

### Renewal Activities

Renewal activities are interventions that are completed at different points in an assets' useful life. Completing these activities provides the benefit of an extended useful life. The Town performs the activities outlined in Table 6.6 to extend the useful life of its core infrastructure assets. The timing of these interventions is flexible based on asset condition data and staff professional judgement (with the exception of engineering based studies such as the Pavement Management Study and OSIM Reporting). An example of this type of work is the Main Street Bridge Rehabilitation project that saw the renewal of the Main Street Bridge in Georgetown.

**Table 6.6 Renewal Activities**

Asset	Activity
Arterial Roads	Activities identified as per the Pavement Management Study
Collector Roads	
Local Roads	
Bridges	Activities identified as per the OSIM Inspection Reports
Stormwater Ponds	Dredging of ponds every 25 years (halfway through asset lifecycle)

### Replacement

Asset replacement occurs once the asset has reached the end of its useful life and renewal activities are no longer an option. Replacement of assets involves a review

of required service levels to ensure capacity and function can support service levels now, and in the future.

Major upcoming replacement projects include the replacement of the Sixth Line Culvert #23 in 2022.

### Renewal & Replacement Ranking

Renewal and replacement activities often have a large impact on the Town’s Capital Budget and are subject to project prioritization or ranking. There are a variety of factors that influence renewal and replacement ranking. When ranking renewal and replacement projects, the Town focuses on asset, service, and corporate risks, which are discussed below. For each proposed renewal project, these three risk scores are calculated. All risk scores are combined into a single score that is compared against the scoring of other projects.

1. Asset Risk refers to the asset management approach that considers:
  - a. The overall consequences that would result from an asset deteriorating to a point where it no longer provides an acceptable level of service; and
  - b. The current condition of an asset compared to the condition state that would result in the asset being deemed in a ‘below its acceptable condition’ state.

Assets with a higher consequence of failure score will be prioritized for renewal or replacement at an earlier point in their asset lifecycle versus assets with a low consequence of failure.

2. Service Risk refers to the consequences of a group of assets failing to provide an attribute of a service at the expected level to the community, as well as the likelihood of the asset group not providing an attribute of a service. The consequence of a service delivery failure is established for each Service Attribute by evaluating the degree to which the Service Attribute aligns with the Principles and Commitments in the Town’s Corporate Asset Management Policy. Figure 6-4 demonstrates the risk scoring compared to the alignment with the Principles and Commitments in the Policy.

**Figure 6-4 Service Attribute Consequence of Failure Scoring**

Consequence of Failure Score	Definition
5	Service Attribute Aligns with Most Principles and Commitments
4	Service Attribute Aligns with Most Principles and Some Commitments
3	Service Attribute Aligns with Some Principles and Commitments
2	Service Attribute Aligns with Some Principles and Few Commitments
1	Service Attribute Aligns with Few Principles and Commitments

3. Corporate Risk intends to quantify risks for the broad spectrum of risk categories that are considered in municipalities, including:
  - a. Service Delivery
  - b. Employees
  - c. Public
  - d. Physical Environment & Climate Change
  - e. Reputation
  - f. Financial
  - g. Regulatory

The rating framework for these risks are shown in Figure 6-5.

**Figure 6-5 Corporate Risk Rating Framework**

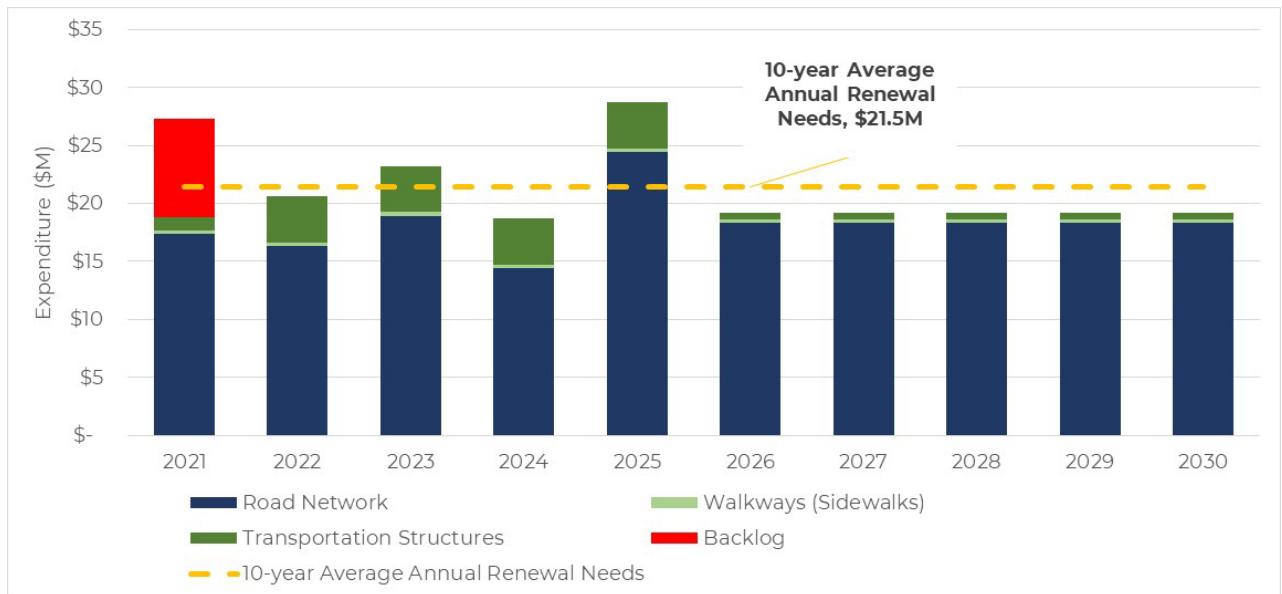
<u>Impact is quantified as:</u>		<u>Likelihood is quantified as:</u>	
Scale 4:	Catastrophic	Scale 5:	Almost Certain
Scale 3:	Major	Scale 4:	Likely
Scale 2:	Moderate	Scale 3:	Somewhat likely
Scale 1:	Minor	Scale 2:	Unlikely
		Scale 1:	Rare

External agencies can also influence renewal ranking. The Town coordinates with the Region as well as neighbouring municipalities on some projects. These projects can receive priority ranking due to the cost savings achieved through project coordination.

**Summary of Future Renewal & Replacement Costs**

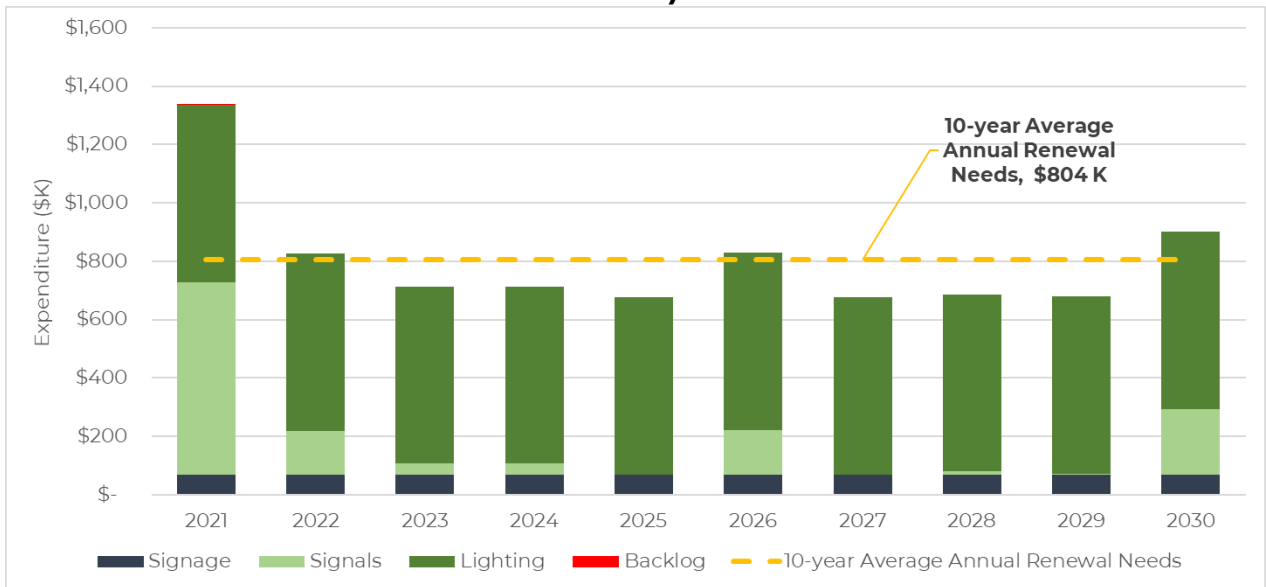
Forecast renewal and replacement costs are projected to increase over time if the asset inventory increases. The forecast costs associated with renewals and replacements are shown relative to the planned budget in Figure 6-6 to Figure 6-8.

**Figure 6-6 Forecast Renewal & Replacement Costs (Transportation – Roads & Structures)**

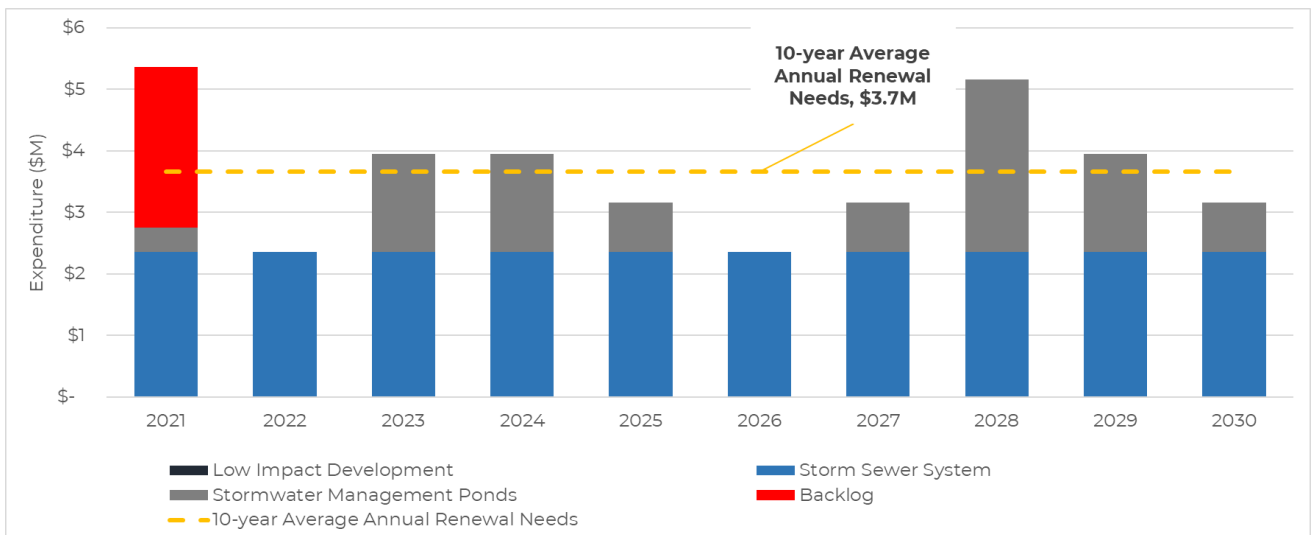




**Figure 6-7 Forecast Renewal & Replacement Costs (Transportation – Traffic Services)**

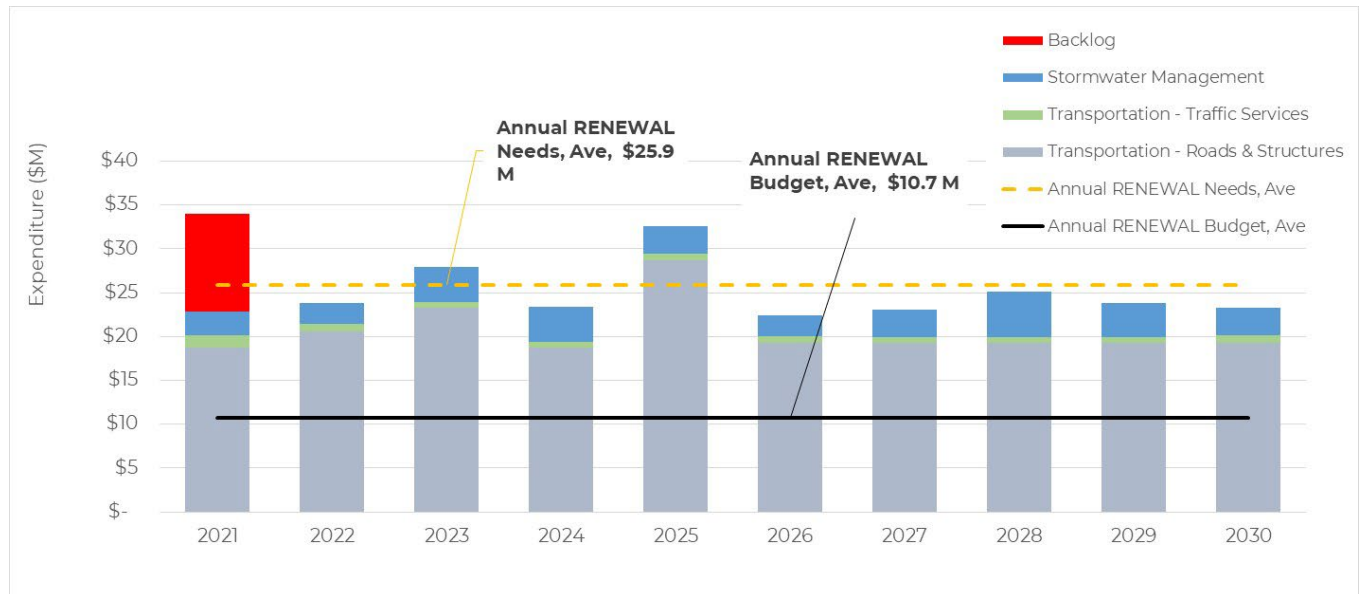


**Figure 6-8 Forecast Renewal & Replacement Costs (Stormwater Management)**



Although renewal and replacement are two different lifecycle activities, they both fall under the Town’s Capital Budget. In years where the renewal/replacement bar is higher than the planned budget line, there is an infrastructure deficit, meaning the forecasted renewal and replacement needs are higher than the planned budget. Unfunded projects are deferred to future years and reviewed to assess needs and criticality. Higher risk or critical assets take priority and will be renewed or replaced earlier than lower risk assets. This approach over time addresses the infrastructure deficit and dollar amount of unfunded projects while managing risks. Figure 6-9 and Table 6.7 below show the renewal and replacement needs compared to the budgeted amount.

**Figure 6-9 Forecast Renewal & Replacement Funding**



**Table 6.7 Renewal Forecast Summary**

Year	Backlog (\$M)	Renewal Need (\$M)	Carry-Over Renewal Budget (\$M)	Renewal Budget (\$M)	Annual Shortfall (\$M)
2021	\$11.1	\$19.2	\$8.2	\$10.2	(\$.8)
2022	\$0.0	\$31.2		\$9.5	(\$21.7)
2023	\$0.0	\$25.1		\$12.3	(\$12.8)
2024	\$0.0	\$20.6		\$6.6	(\$14.0)
2025	\$0.0	\$29.7		\$9.9	(\$19.8)
2026	\$0.0	\$19.7		\$10.9	(\$8.8)
2027	\$0.0	\$20.3		\$14.5	(\$5.8)
2028	\$0.0	\$22.2		\$8.9	(\$13.3)
2029	\$0.0	\$21.1		\$12.4	(\$8.7)
2030	\$0.0	\$20.8		\$3.9	(\$16.9)
	<b>\$10.4</b>	<b>\$229.9</b>	<b>\$8.2</b>	<b>\$99.1</b>	<b>(\$122.6)</b>

## Dispose

### Disposal

Disposal includes any activity associated with the disposal of an asset once it has reached the end of its useful life or is no longer needed. This can include sale, decommissioning or demolition. Any costs or revenue gained from asset disposals is included in the LRFP.

### **Core Infrastructure Asset Disposals**

Core infrastructure assets provide vital Transportation and Stormwater Management to the Town and are more frequently replaced at the end of their lifecycle with a similar asset type to ensure sustained or enhanced service. As part of the replacement process, there could be decommissioning or demolition costs associated with the removal of old assets to make room for the new installation. These costs are included within the replacement cost.

As discussed in the Acquire section, the Town's core infrastructure assets can also be taken over by higher levels of government. Core infrastructure asset ownership can be transferred to higher levels of government, thus removing these assets from the Town's asset inventory, along with their associated lifecycle costs.

# 7.0 FINANCIAL PROJECTION

The financial projection is informed by the preceding sections of the Asset Management Plan: the state or condition of the assets, the proposed levels of service, the risks to service delivery, and the lifecycle management activities needed to reduce the risks to service delivery to acceptable levels. The Financing strategy considers how the Town will fund the planned asset management actions to meet the current service levels. It is expected that the financial projections will improve over time as more accurate data becomes available and discussions on levels of service and asset performance matures.

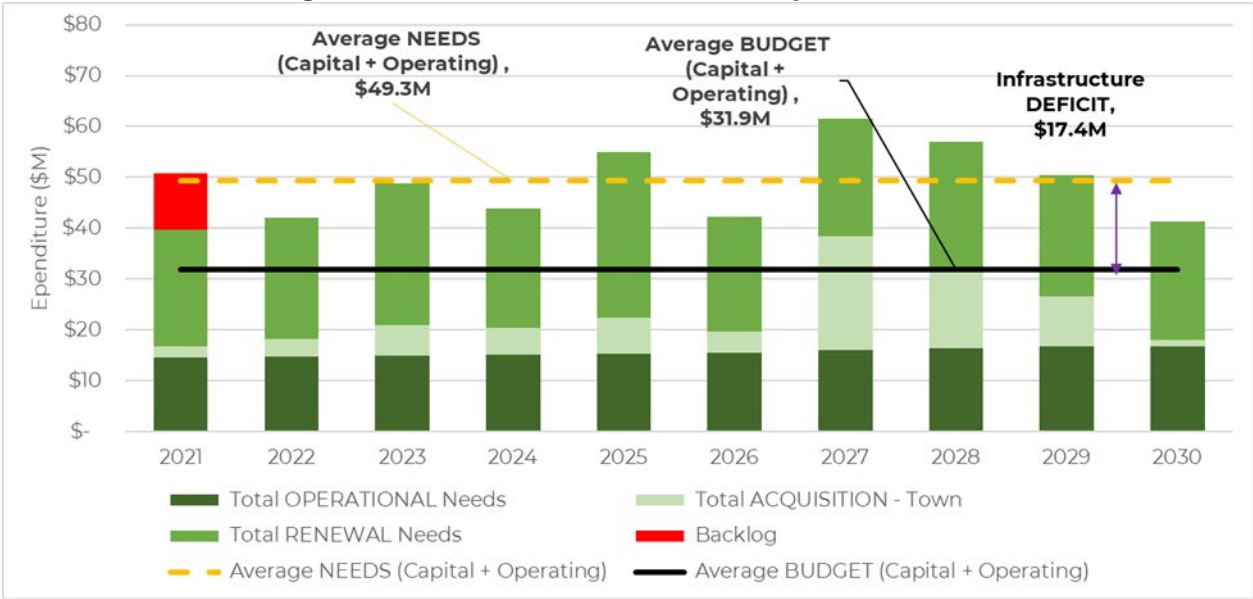
## Financial Sustainability and Projections

### Cost of Whole Lifecycle Activities

The Town’s core infrastructure assets have annual costs associated with all lifecycle management activities. These costs are budgeted annually through the Town’s budget process. These costs include capital and operations & maintenance costs which make up the required budget.

The investment required to maintain the current levels of service and immediate needs of the Town’s core infrastructure assets are shown in Figure 7-1 and Table 7.1.

**Figure 7-1 Current Investment Requirement**



**Table 7.1 Renewal Forecast Summary**

Year	Backlog (\$M)	Acquisition (\$M) - Town	Operating Need (\$M)	Renewal Need (\$M)	Average Needs (\$M)	Average Capital /Operating Budget + Carryover (\$M)
2021	\$10.3	\$2.1	\$14.7	\$19.2	\$44.4	\$31.9
2022		\$3.5	\$14.9	\$31.2	\$44.4	\$31.9
2023		\$5.9	\$15.0	\$25.1	\$44.4	\$31.9
2024		\$5.3	\$15.2	\$20.6	\$44.4	\$31.9
2025		\$7.2	\$15.4	\$29.7	\$44.4	\$31.9
2026		\$4.3	\$15.6	\$19.7	\$44.4	\$31.9
2027		\$22.4	\$16.2	\$20.3	\$44.4	\$31.9
2028		\$15.4	\$16.7	\$22.2	\$44.4	\$31.9
2029		\$9.9	\$17.0	\$21.1	\$44.4	\$31.9
2030		\$1.3	\$17.1	\$20.8	\$44.4	\$31.9
<b>TOTAL</b>	<b>\$11.1</b>	<b>\$77.3</b>	<b>\$157.7</b>	<b>\$229.9</b>	<b>\$444.4</b>	<b>\$318.5</b>

\*For many asset groups within this plan, age is used as a proxy for condition. As updated inventory and condition information is obtained, these figures will likely change.

### Infrastructure Deficit

Providing services in a financially sustainable manner requires a balance between the forecasted whole lifecycle needs required to maintain service levels with the planned budget allocations. Infrastructure deficit is defined as the difference between the planned budget and the whole lifecycle needs of the assets. The forecasted whole lifecycle needs are calculated based on the Town’s Lifecycle Management Strategy which relies on industry best practice and key asset data including expected useful life, installation date and replacement value.

When comparing the forecasted whole lifecycle needs (required budget) to the planned Capital and Operating budgets, the Core Infrastructure AM Plan identified an infrastructure deficit of \$12.5 million dollars per annum. Changes or enhancements to lifecycle management activities will impact this figure and will need to be considered in short and long term financial planning.

Addressing the infrastructure deficit to achieve sustainable service delivery is part of the continuous improvement process and requires further work and adjustments. This work is dependent on the specific challenges of the asset group and can include:

- Updating asset inventory data
- Identification of optimum lifecycle management strategies

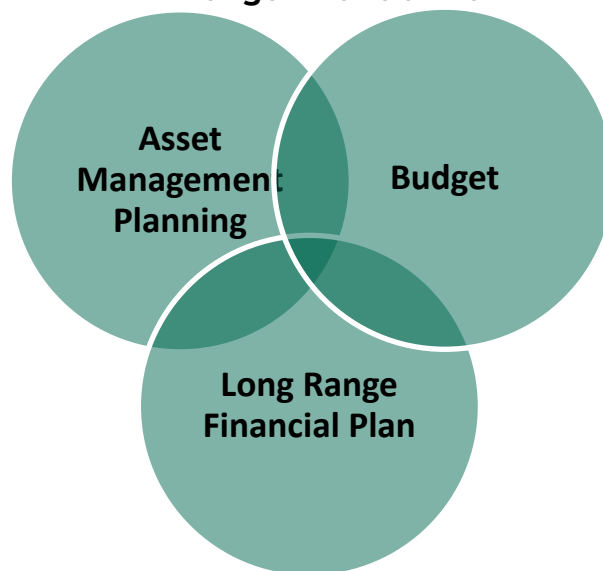
- Refining of estimates and cost information
- Adjustments to service levels
- Adjustments to the Long Range Financial Plan
- Review of prioritization and timing of projects

## Long Range Financial Plan

The Long Range Financial Plan (LRFP) is linked to the Town's budget and asset management planning by taking a holistic, long term view of the Town's infrastructure needs. The Core Infrastructure AM Plan assists the LRFP by anticipating the lifecycle needs of the Town's infrastructure assets, and planning for their financial needs.

As the CAM Program continues to mature at the Town, the integration between asset management and budgeting will strengthen. Evidence-based decision making will drive informed business cases for Town assets resulting in long term financial forecasts that support financial sustainability.

**Figure 7-2 Relationship between Asset Management Planning, Budget, Long Range Financial Plan**



## Funding Strategy

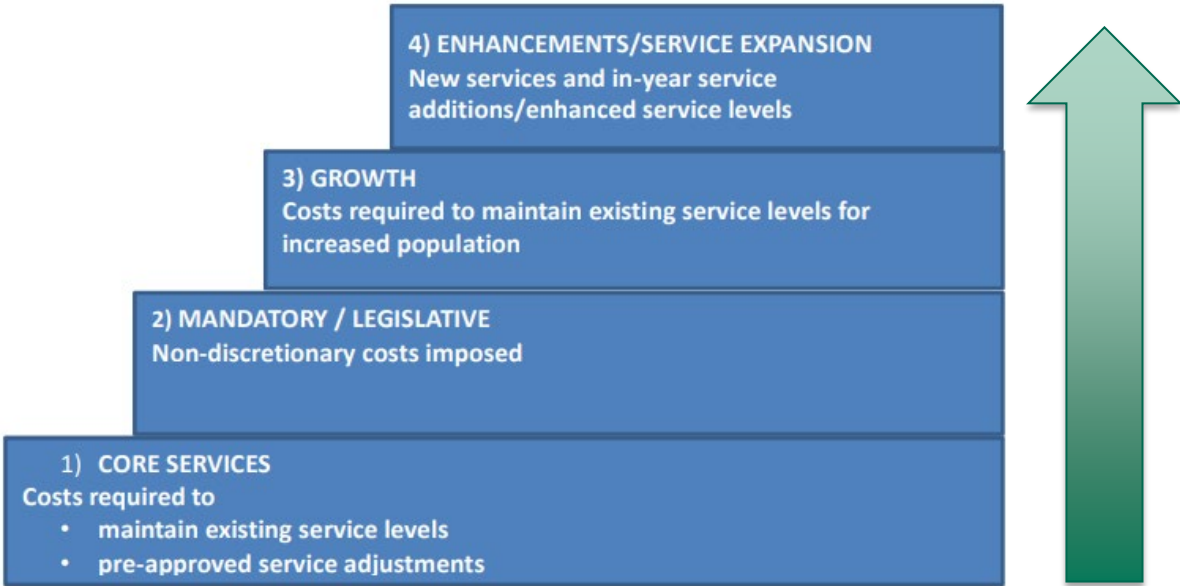
The funding required to support the lifecycle management activities (acquisition, operations, maintenance, renewal) of the core infrastructure assets comes from many sources.

- Tax-based
- Reserves and Reserve Funds
- Development Charges
- Special Infrastructure Gap Levy
- Grants

Funding constraints are always a factor when balancing a municipality's demand for services and the assets' ability to provide them. To manage funding constraints

and address the infrastructure deficit given the Town’s financial position, capital projects that require funding from development charges are often deferred to years when the development charges are received by the Town. Debt financing is also used to bridge timing challenges related to the receipt of revenues. Maintaining current infrastructure in a state-of-good-repair and replacing infrastructure when required is given greater priority over the addition of new infrastructure that does not have external funding. Figure 7-3 depicts the prioritization model that the Town follows for asset financial planning.

**Figure 7-3 Budget Prioritization Model**



The benefit of this approach will allow funds to be directed towards maintaining and renewing assets that the Town currently owns while addressing the infrastructure deficit. The impacts to the operating budget associated with construction and acquisition of new assets will be minimized.

**Financial data sources**

The Core Infrastructure AM Plan utilizes financial data. The source of the data is the Town’s Finance department. The 2021 Capital budget along with the 2022-2030 Capital forecast financial data was used to develop the financial forecasting for acquisition, installation/commission, renewal/replacement, and disposal activities. The planned 2021 Operating budget was used to inform the financial forecasting for maintenance and operating activities. This data is updated annually and is considered up to date.

In compiling this Plan, it was necessary to make some assumptions. The key assumptions made in the development of this Core Infrastructure AM Plan as well as the level of confidence in the data behind the financial forecasts are discussed below.

Key assumptions made in this Core Infrastructure AM Plan are:

- The capital projects that are funded by development charges in the 2021-2030 10-year Capital forecast, as well as future development plans were used to represent new asset value to be acquired for 2021-2030.
- The planned budget for operations and maintenance was based on the 2021 Operational planned budget.
- Forecasted operations and maintenance were derived based on new asset growth at the Town over the next 10 years.
- The 2021 Operational shortfall was calculated by input from Town staff to determine current estimated needs.
- The planned budget for renewal and replacement was determined by designating renewal amounts each Capital project in the 2021-2030 Capital Plan
- Carry over budgets previously funded capital projects (but not yet completed) were included in estimating the 10-year average budgets.
- Where no engineering-based needs assessments were conducted - forecasted renewal year for assets were calculated by adding the useful life to the installation year of the asset.
- Unknown installation dates were estimated based on condition ratings.
- Age-based condition was used in the absence of formal condition assessment information wherever applicable.
- Inflation factors (Non-Residential Building Consumer Price Index, Construction Price Index) were used to update replacement costing in the absence of formal inventory and condition assessment information.
- Unknown renewal/replacement costs were based on benchmarks and industry best practice.
- Population growth was estimated using data obtained during the development of the Town's 2021-2022 Development Charge Study. Actual population and employment growth will impact demand for the services provided by the Town's core assets.
- Population growth will result in new infrastructure. The extent of new infrastructure assets required, and the subsequent lifecycle costing requirements will become clearer as development plans are finalized.
- Missing information and data gaps were resolved by substituting institutional knowledge from Town stakeholders.

## Data Confidence

The forecast costs, planned budgets, and valuation projections in this Core Infrastructure AM Plan are based on the best available data. Information that is current and accurate is an enabler of best-in-class asset management. Data confidence is measured in terms of accuracy and completeness. Table 7.1 outlines the data confidence for each asset class's forecast evaluated in this plan.



**Table 7.1 Data Confidence Scale**

Asset Category	Forecast Assumption	Data Confidence
Walkways (Sidewalks)	Forecasted based on internal institutional knowledge	LOW
Transportation Structures	Forecasted based on the OSIM 2020 Inspection evaluation	HIGH
Traffic Services	Forecasted based on age and internal institutional knowledge	LOW
Roadway Network	Forecasted based on 2017 Roads Needs Study evaluation	MEDIUM (Town currently completing 2022 Roads Needs Study)
Stormwater Management Ponds	Forecasted based on age and internal institutional knowledge	LOW (Condition assessment program currently in place)
Storm Sewer Systems	Forecasted based on age and internal institutional knowledge	LOW (CCTV program currently in place)
Low Impact Development	Forecasted based on age	LOW

Overall confidence is considered to be ‘moderate’.

**Records of Data for Asset Register**

The source of the data for this Core Infrastructure AM Plan is the Town’s Asset Register. The register is updated as new condition assessment information is received to ensure the inventory, condition, and costing data are up to date. Inventory and condition assessment information is received from the departments. Table 7.2 outlines the various data sources.

**Table 7.2 Data for Asset Register**

Services	Asset Type/Group	Data Source	Comments
Transportation	Roads	Pavement Management Study	Formal pavement quality data is collected every 5 years during the pavement management study.
		Road Matrix Program	Road Matrix software is used to manage the pavement quality (PQI) scores on an annual basis. As capital projects are completed, PQI scores for impacted road segments are updated.

Services	Asset Type/Group	Data Source	Comments
	Bridges Culverts	Bridge Rehab Study	Formal OSIM Inspections results are received on a biennial basis. The results are updated in the Asset Register.
	Sidewalks Signs	GIS, Departmental Spreadsheets	
	Traffic Signals Street Lighting	Departmental Spreadsheets	Capital and maintenance works are completed by third parties. Inventory and condition information is received from these third parties and updated in the Asset Register.
	Retaining Walls/Guiderails Curb & Gutter	Departmental Spreadsheets	
Environmental	SWM Ponds Stormwater Mains Maintenance Holes Catch Basins Drainage Culverts Outfalls Infiltration Galleries	GIS, Departmental Spreadsheets	

## 8.0 Continuous Improvement

Development of AM Plans is an iterative process that includes improving data, processes, systems, staff skills, and organizational culture over time. This section provides an overview of recommended improvements to the Town’s asset management practices. As summarized in Table 8.1, this AM Plan is compliant with O.Reg. 588/17 Current Levels of Service requirements for July 1st, 2022. A more detailed assessment of this AM Plan’s compliance with the O.Reg is provided in Appendix C.

**Table 8.1 O.Reg. 588/17 Compliance for Current Levels of Service**

AM Plan Section	O.Reg. 588/17 Compliance	Comment
<b>State of Local Infrastructure</b>	Compliant	The AM Plan provides a summary of the assets, the replacement cost of the assets, the average age of the assets, the condition of the assets, and the approach to assessing condition of assets.
<b>Levels of Service</b>	Compliant	The AM Plan provides the qualitative community description and technical metrics as required by O.Reg. 588/17, and the current performance.
<b>Asset Management Strategy</b>	Compliant	The AM Plan provides the population and employment forecasts as set out in Schedule 3 to the 2017 Growth Plan for the Greater Golden Horseshoe. It also provides the lifecycle activities that would need to be undertaken to maintain the current LOS for each of the next 10 years, based on an assessment of lowest lifecycle cost options and risks.
<b>Financing Plan</b>	Compliant	The AM Plan provides the financial forecast for the next 10 years based on the costs of the lifecycle activities to maintain current levels of service.

This AM Plan also meets some of the Proposed Levels of Service O.Reg. 588/17 (July 1, 2025) requirements by providing a preliminary funding and shortfall analysis in Section 7.

### Improvement Plan

It is important to recognize areas of the Core Infrastructure AM Plan and planning process that require future improvements to ensure effective asset management and informed decision making. The improvement plan generated from this Core Infrastructure AM Plan is shown in Table 8.2.

**Table 8.2 Improvement Plan**

Task	Task	Timeline	Comments
1	Track and document current customer and technical levels of service	Ongoing	This will be enabled by the Asset Management Information Software (AMIS).
2	Integrate climate change into levels of service for core assets	In Progress	
3	Determine proposed levels of service and identify performance gaps	2021 - 2024	
4	Improve accuracy and completeness of core asset data by addressing inventory and condition data gaps	2021-2024	Specifically for: <ul style="list-style-type: none"> <li>• Retaining walls</li> <li>• Guiderails</li> <li>• Sidewalks</li> <li>• Stormwater assets</li> </ul>
5	Implement Data, Risk, and Lifecycle Management Strategies	In Progress	
6	Implement an asset management information software (AMIS) that includes a work management system as well as decision support software	In Progress	The AMIS will enable the Town to automate business processes and enable more data-driven decision-making.
7	Develop a Stormwater Master Plan	In Progress	The Stormwater Master Plan will provide more insight into the strategic program goals. Recommendations will inform lifecycle activities for stormwater assets.
8	Formalize a more robust condition monitoring program for Stormwater Mains and Outfalls	2022 - 2023	
9	Determine cost implications of implementing climate change adaptation options	Ongoing	

Task	Task	Timeline	Comments
10	Determine more accurate lifecycle costing that is tracked at the asset level	2023	This will be enabled by the Asset Management Information Software.
11	Determine operational budget impacts of proposed growth projects	Ongoing	This will be enabled by the Asset Management Information Software.
12	Bridge the gap between asset management planning processes and executing the capital and operating budgets. This involves: <ul style="list-style-type: none"> <li>Identifying all assets impacted during a project or activity</li> <li>Updating condition, cost, and risk information following the completion of the project or activity</li> </ul>	Ongoing	This will be enabled by the Asset Management Information Software.
13	Update condition information for Town Signage based on reflectivity testing	Ongoing	
14	Proactively update asset unit replacement costs based on latest industry data	Ongoing	

## Monitoring and Review

The Core Infrastructure AM Plan will be reviewed and updated as new budgets, strategies, frameworks, and service area plans are developed to incorporate recommendations and document their impact on lifecycle management activities and financial planning. This Core Infrastructure AM Plan has a maximum life of 5 years and is due for complete revision and updating within the next 3 years to adhere to more advanced O.Reg 588/17 requirements.

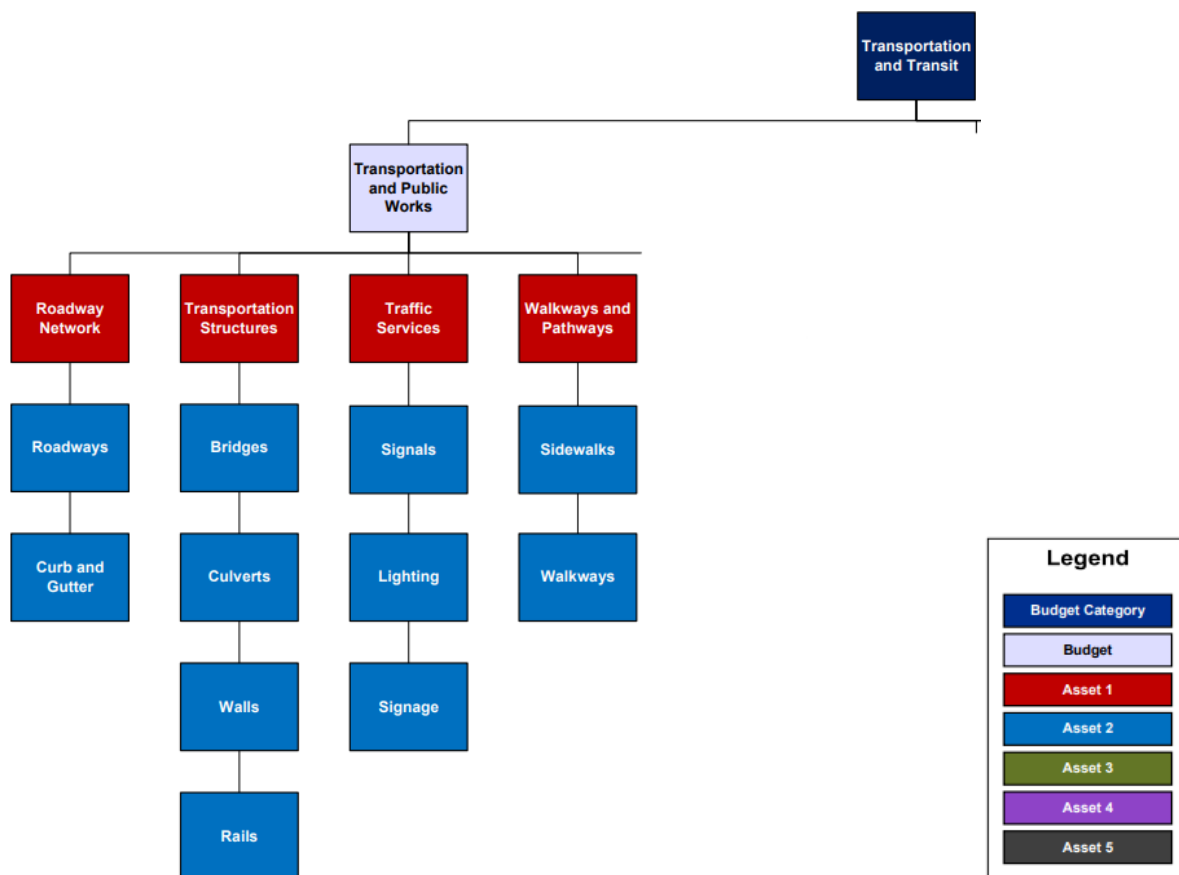
# APPENDICES

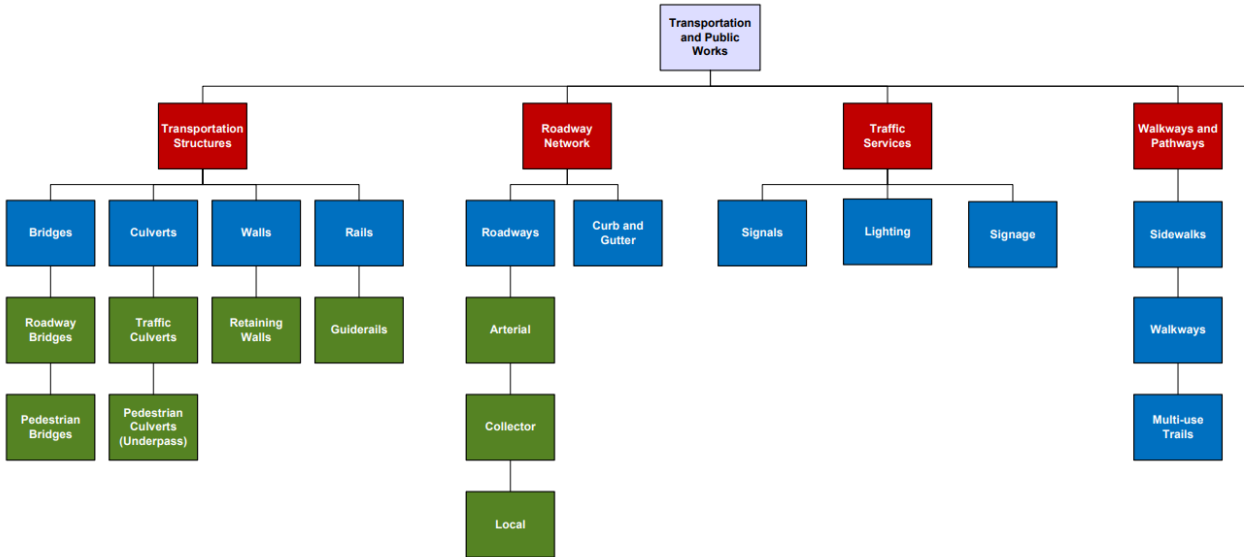
## Appendix A – Condition Rating Translations & Hierarchy

### Condition Rating Translation

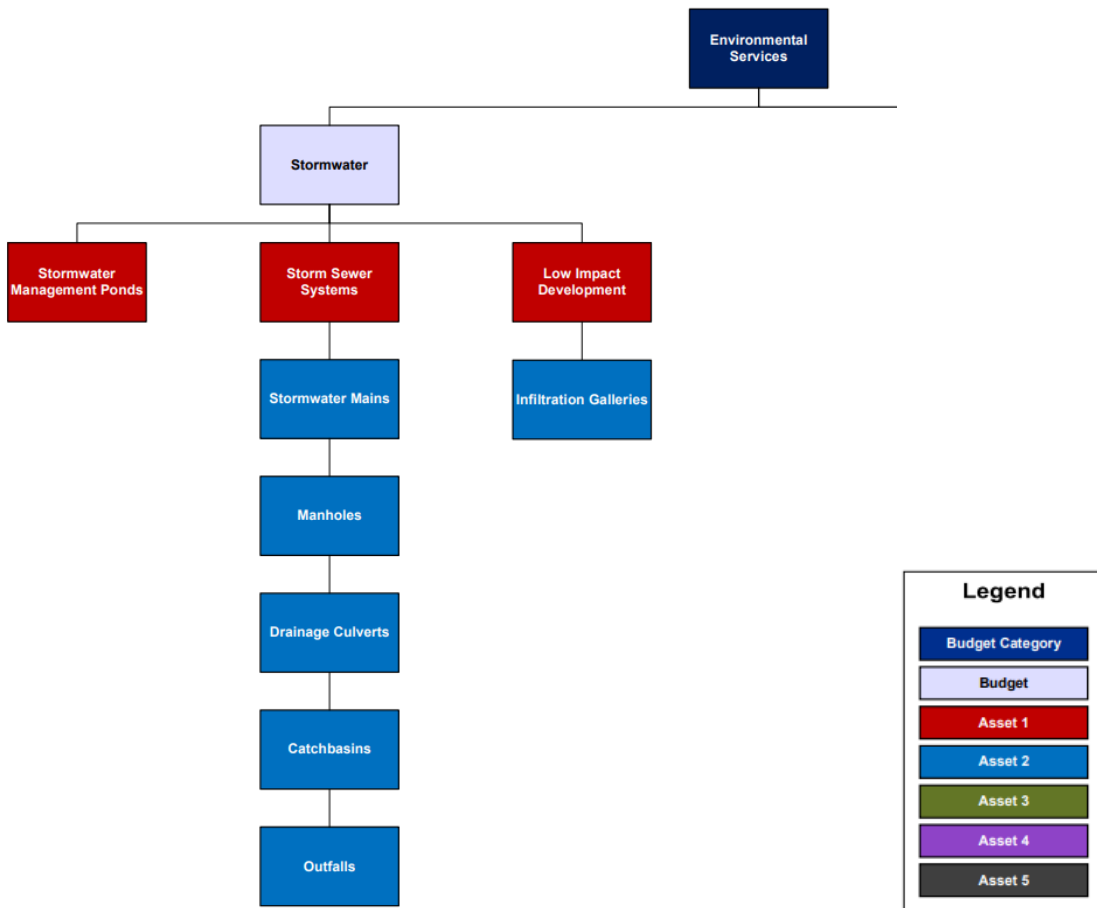
Condition	Bridge Condition Index (BCI)	Pavement Quality Index (PQI)
1 - Very Good	90 - 100	90 - 100
2 - Good	70 - 90	70 - 90
3 - Fair	60 - 70	40 - 70
4 - Poor	40 - 60	20 - 40
5 - Very Poor	0 - 40	0 - 20

### Transportation Asset Hierarchy





### Stormwater Asset Hierarchy



# Appendix B – Risk Matrices & Outputs

## Consequence of Failure Matrix

Consequence Categories (Triple Bottom Line)		C1 Insignificant	C2 Minor	C3 Moderate	C4 Major	C5 Catastrophic
Economic	Financial	Damages, losses (including 3rd party) or fines from <b>\$1k to \$10k</b>	Damages, losses (including 3rd party) or fines <b>\$10k to \$100k</b>	Damages, losses (including 3rd party) or fines <b>\$100k to \$1M</b>	Damages, losses (including 3rd party) or fines <b>\$1M to \$10M</b>	Damages, losses (including 3rd party) or fines <b>&gt; \$10M</b>
Social	Health & Safety	No obvious potential for injury or affects to health.	Potential for minor injury or affects to health of an individual. Full recovery is expected; or minor medical attention may be required	Potential for serious injury or affects to health. May affect many individuals and / or result in short term disability; or Hospitalization may be required for a short period of time.	Potential for serious injury or affects to health of one or more individuals with a possibility of loss of a life and the certainty of long-term disability; or Emergency hospitalization required for one or more individuals.	Potential for death or multiple deaths with probable permanent damage; or Emergency and long-term hospitalization required for several individuals.
	Availability/ Reliability	Small number of customer experiencing disruption / impact ( <b>less than 100 people</b> or up to a few hours)	Localized service disruption / impact ( <b>100 to 1,000 people</b> or up to 1 day)	Significant localized disruption / impact ( <b>1,000 to 10,000 people</b> or less than 1 week)	Major service disruption / impact ( <b>10,000 to 50,000 people</b> or for more than a week)	Region wide service disruption / impact ( <b>greater than 50,000 people</b> or permanent loss of services)
Environmental	Environment	Very negligible impact or can be restored within <b>1 week</b>	Minor ( <b>within 1 month</b> ) very isolated damage / impact to the environment, local importance	Significant short-term impact ( <b>up to 2 months</b> ), local importance	Significant long-term impact ( <b>up to 1 year</b> ), Provincial importance.	Major long-term impact ( <b>greater than 1 year</b> ), Federal importance.

## Probability of Failure Matrix

Probability of Failure	Rating	Description		
		Capacity & Use	Function	Quality
Rare	1	Demand corresponds well with actual capacity and no operational problems experienced. Meets current and future capacity needs within planning horizon.	The infrastructure in the system or network meets all program/service delivery needs in a fully efficient and effective manner. (Health, safety, security, legislative etc.)	Asset is physically sound and is performing its function as originally intended. Asset is new or at the beginning of it's service life.
Unlikely	2	Demand is within actual capacity and occasional operational problems experienced.	The infrastructure in the system or network meets program/service delivery needs in an acceptable manner. (Health, safety, security, legislative etc.)	Asset is physically sound and is performing its function as originally intended. Typically, asset has been used for some time but is within mid-stage of its expected life.
Possible	3	Demand is approaching actual capacity and/or operational problems occur frequently. Meets current capacity needs but not future without modifications.	The infrastructure in the system or network meets program/service delivery needs with some inefficiencies and ineffectiveness present. (Health, safety, security, legislative etc.)	Asset is showing signs of deterioration and is performing at a lower level than originally intended.
Likely	4	Demand exceeds actual capacity and/or significant operational problems are evident.	The infrastructure in the system or network has a limited ability to meet program/service delivery needs. (Health, safety, security, legislative etc.)	Asset is showing significant signs of deterioration and is performing to a much lower level than originally intended.
Certain	5	Demand exceeds actual capacity and/or operational problems are serious and ongoing. Does not meet Current capacity Requirements.	The infrastructure in the system or network is seriously deficient and does not meet program/service delivery needs and is neither efficient nor effective. (Health, safety, security, legislative etc.)	Asset is physically unsound and/or not performing as originally intended. Asset has reached end of life and failure is imminent.



## Risk Assessment – Transportation Services

Asset Hierarchy			Capacity and Use				Function				Quality			
L1	L2	L3	PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value
Transportation & Transit	Roadway Network													
Transportation & Transit	Roadway Network	Arterial	3	4	12	Medium-High	2	4	8	Medium	3	4	12	Medium-High
Transportation & Transit	Roadway Network	Collector	2	3	6	Low-Medium	2	3	6	Low-Medium	3	3	9	Medium
Transportation & Transit	Roadway Network	Local	1	2	2	Low	2	2	4	Low-Medium	2	2	4	Low-Medium
Transportation & Transit	Transportation Structures													
Transportation & Transit	Transportation Structures	Roadway Bridges	3	4	12	Medium-High	3	4	12	Medium-High	2	4	8	Medium
Transportation & Transit	Transportation Structures	Pedestrian Bridges	1	2	2	Low	1	2	2	Low	2	2	4	Low-Medium
Transportation & Transit	Transportation Structures	Roadway Culverts	4	4	16	Medium-High	3	4	12	Medium-High	4	4	16	Medium-High
Transportation & Transit	Transportation Structures	Drainage Culverts	4	3	12	Medium-High	3	3	9	Medium	4	3	12	Medium-High
Transportation & Transit	Transportation Structures	Retaining Walls	1	3	3	Low	4	3	12	Medium-High	4	3	12	Medium-High
Transportation & Transit	Transportation Structures	Guidrails	3	3	9	Medium	2	3	6	Low-Medium	3	3	9	Medium
Transportation & Transit	Traffic Services													
Transportation & Transit	Traffic Services	Signals	2	4	8	Medium	2	4	8	Medium	2	4	8	Medium
Transportation & Transit	Traffic Services	Street Lighting	3	3	9	Medium	3	3	9	Medium	2	3	6	Low-Medium
Transportation & Transit	Traffic Services	Pavement Markings	1	4	4	Low-Medium	1	4	4	Low-Medium	2	4	8	Medium
Transportation & Transit	Traffic Services	Traffic Signage	1	4	4	Low-Medium	2	4	8	Medium	3	4	12	Medium-High
Transportation & Transit	Walkways and Pathways													
Transportation & Transit	Walkways and Pathways	Multi-use Pathways (within Road corridor)	2	2	4	Low-Medium	1	2	2	Low	3	3	9	Medium
Transportation & Transit	Walkways and Pathways	Sidewalks	2	3	6	Low-Medium	2	3	6	Low-Medium	4	4	16	Medium-High

## Risk Assessment – Stormwater Management

Asset Hierarchy			Capacity and Use				Function				Quality			
L1	L2	L3	PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value	PoF	CoF	Risk Rating	Risk Value
Environmental Services	Stormwater													
Environmental Services	Stormwater	Stormwater Management Ponds	3	3	9	Medium	1	3	3	Low	4	3	12	Medium-High
Environmental Services	Stormwater	Pump Station (Bailey's Pond)	4	2	8	Medium	5	2	10	Medium	3	2	6	Low-Medium
Environmental Services	Storm Sewer System													
Environmental Services	Storm Sewer System	Stormwater Mains	1	2	2	Low	1	2	2	Low	3	2	6	Low-Medium
Environmental Services	Storm Sewer System	Maintenance holes	1	2	2	Low	1	2	2	Low	4	2	8	Medium
Environmental Services	Storm Sewer System	Drainage Culverts	2	2	4	Low-Medium	1	2	2	Low	4	2	8	Medium
Environmental Services	Storm Sewer System	Catch basins	1	2	2	Low	1	2	2	Low	4	2	8	Medium
Environmental Services	Storm Sewer System	Outfalls (Engineered Outfall & Inlets)	3	2	6	Low-Medium	1	2	2	Low	4	2	8	Medium
Environmental Services	Storm Sewer System	Stormwater Quality Units (Oil Grit Separators)	1	2	2	Low	1	2	2	Low	1	2	2	Low
Environmental Services	Low Impact Development	Infiltration Galleries	1	2	2	Low	1	2	2	Low	2	2	4	Low-Medium

# Appendix C – Regulatory Compliance

The following chart represents the Municipality’s position with respect to the asset management requirements identified in O.Reg. 588/17 for Core Assets for July 2, 2022. (current Levels of Service).

## Compliance with O.Reg. 588/17 (2022 Deadlines)

Plan Section	O.Reg. 588/17 Compliance Practices (Current LOS)	Transportation Assets	Environmental Service assets
<b>State of Local Infrastructure</b>	<p>For each asset category, the AM Plan provides</p> <ul style="list-style-type: none"> <li>• a summary of the assets,</li> <li>• the replacement cost of the assets,</li> <li>• the average age of the assets,</li> <li>• the condition of the assets,</li> <li>• the approach to assessing condition of assets.</li> </ul>	<p>Section 2</p> <p>Section 2</p> <p>Section 2</p> <p>Section 2</p> <p>Section 2</p>	<p>Section 2</p> <p>Section 2</p> <p>Section 2</p> <p>Section 2</p> <p>Section 2</p>
<b>Levels of Service</b>	<p>For each asset category, the AM Plan reports the current LOS performance. For core assets, the AM Plan provides the qualitative community descriptions and technical metrics as required by O.Reg. 588/17, and the current performance.</p>	<p>Section 3</p>	<p>Section 3</p>
<b>Asset Management Strategy</b>	<p>For each asset category, the AM Plan provides the lifecycle activities that would need to be undertaken to provide the proposed LOS for each of the next 10 years.</p>	<p>Section 6</p>	<p>Section 6</p>
<b>Financial Strategy</b>	<p>A description of assumptions regarding future changes in population or economic activity.</p>	<p>Section 7</p>	<p>Section 7</p>

Plan Section	O.Reg. 588/17 Compliance Practices (Current LOS)	Transportation Assets	Environmental Service assets
	For each asset category, the AM Plan provides the costs of providing the lifecycle activities that would need to be undertaken to maintain the current LOS for each of the next 10 years.		
<b>Background Information</b>	The AM Plan indicates how the background information and reports upon which the state of infrastructure section is based will be made available to the public.	Section 1.2	Section 1.2