MUNICIPALITY OF PORT HOPE
RESOLUTION

Date: 21 Jun 2022

36/2022

MOVED BY: _____

SECONDED BY: _____

WHEREAS Committee of the Whole at their meeting held on June 7, 2022 considered Staff Report WE-19-22 regarding 2022-2024 Asset Management Plan;

NOW THEREFORE BE IT RESOLVED THAT Council approve the following:

1. Drinking Water Asset Management Plan, consistent with Provincial regulations, included as Attachment 1;

2. Wastewater Asset Management Plan, consistent with Provincial regulations, included as Attachment 2;

3. Stormwater Asset Management Plan, consistent with Provincial regulations, included as Attachment 3;

4. Transportation Asset Management Plan, consistent with the Provincial regulations, included as Attachment 4;

AND BE IT FURTHER RESOLVED THAT staff be directed to update the Strategic Asset Management Policy to add the CAO, Asset Management & GIS Coordinator to the Executive Lead.

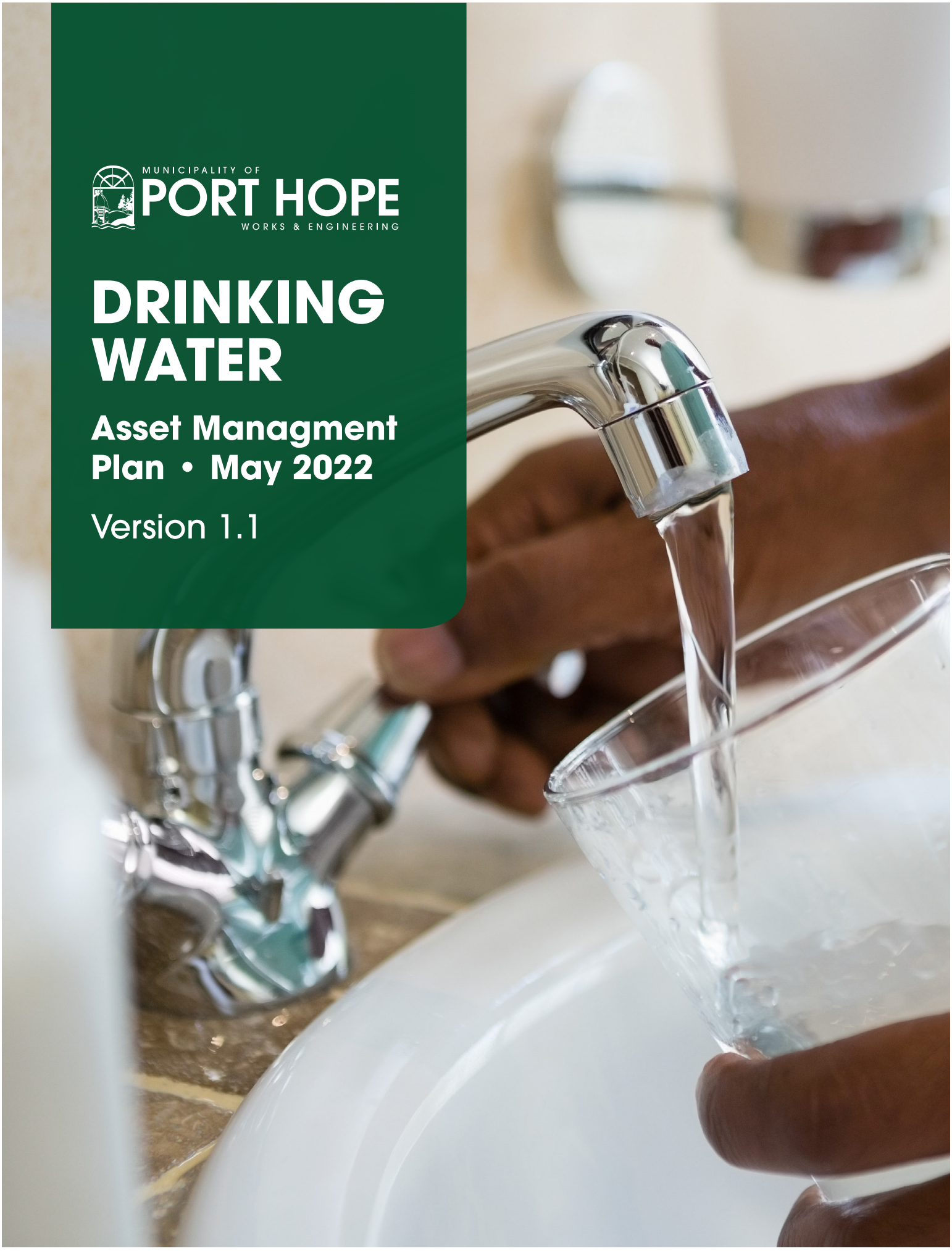
_____
Mayor Bob Sanderson

MUNICIPALITY OF
PORT HOPE
WORKS & ENGINEERING

DRINKING WATER

Asset Managment Plan • May 2022

Version 1.1



Contents

Introduction

Background

Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure requires all municipalities to prepare baseline asset management plans for their core municipal infrastructure assets supporting the delivery of drinking water, wastewater, stormwater and transportation. The Municipality of Port Hope has a developing Asset Management program that is advancing and refining a clear picture of its infrastructure assets and maintaining them responsibly, balancing affordability, risk, and service levels. The Provincial regulation requires the Municipality to shift its reporting slightly to present the cost of maintaining all core assets in their present state, with no changes to the service level, for the next 10 years.

To meet the Provincial requirements, the Municipality of Port Hope has created this first version of its **Drinking Water Asset Management Plan (Drinking Water AMP)**. It reports the current state of the assets, levels of service provided, strategies and activities applied by the Municipality, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making.

Asset Categories and Types

The Drinking Water AMP satisfies the Provincial requirements for water assets that relate to the collection, production, treatment, storage, supply or distribution of water. This includes the water treatment plant, watermains, pumping stations, and reservoirs. These assets support the treatment, distribution, and provision of safe drinking water to residents, businesses and visitors within the Municipality.

Drinking Water Asset Categories and Types

Distribution Water Main

A **water main** is the pipe that delivers clean water to your home from your municipal water utility. The water main connects to your private water service line, which is typically located below ground on your private property

Transmission Main

Transmission mains are larger pipes (16” in diameter and larger) which are designed to move large quantities of water from the source of supply, and provide water to the smaller distribution mains

Main Valve

A **main valve** controls the flow of water passage throughout the water distribution system and can be used to isolate areas for maintenance or replacement.

Sample Station

sampling stations give operators unrestricted access to sample sites, provide a dedicated tap for sample retrieval with no outside cross-contamination, and allow for samples to be taken directly from the water main.

Hydrant

A **hydrant** is a visible fixture placed outside a building, parking area, industrial area, or roadside that is connected to the municipal or a private water service network. They are used for flushing the mainline; creating a scouring action to clean the line. Fire hydrants are designed to instantly provide the water required by fire fighters to extinguish a fire.

Street Box

A **street box** is a totally enclosed structure, located on the property line below ground containing a service valve meant for controlling or regulating the flow of water to the building located within the property.

Water Treatment Plant

Port Hope Drinking Water System is classified as Large Municipal Residential System and consists of the **Water Treatment Plant** (WTP) and the Distribution System. The WTP provides ultrafiltration water treatment for the water system. The WTP is located at 35 Marsh St in the Municipality of Port Hope. The Municipality is the Owner and Operator of the Port Hope Drinking Water System that serves the community of Port Hope

Victoria Street Booster Pumping Station

The **Victoria Street Booster Pumping Station** (BPS), located at 66 Victoria Street North, is part of the infrastructure necessary to maintain pressure in Zone 2 in the Port Hope distribution system. Zone 2 encompasses the higher elevation areas west of the Ganaraska River valley.

Jocelyn Street Booster Station & Reservoir

The **Jocelyn Street Booster Station and Reservoir (BPS)** is located at 45 Jocelyn Street, Port Hope. is a key component of the Port Hope DWS by providing pressure and storage in Pressure Zone 2. The reservoir provides an in-ground reservoir with a rated capacity of 2,270 m^3

Fox Road Elevated Tower

The **Fox Road elevated Tower** provides off-site storage tank that can hold up to 3,000 m3 of water.

Dorset Street Standpipe

The **Dorset Street Standpipe** provides off-site storage facility in Zone 1 includes a standpipe with a rated capacity of 1,080 m^3.

Water Meter

When water comes into your home or building, it enters through a water lateral and then goes through the **water meter**. The water that enters the building is measured. The water that passes through the water meter spins a built-in device. Each full spin of the device measures a specific amount of water; that amount is instantly shown on the display on top of the water meter in cubic meters. These meter reading may be ready manually from the exterior of the home or in more recent years Automatic Meter Reading solutions let staff automatically collect consumption, diagnostic and status data from your water meter and then transfer that data to a central database for billing and analysis.

State of Local Infrastructure

Inventory and Valuation

The assets covered in the Drinking Water AMP have a replacement value of approximately **$190 million.** This includes an inventory of over 96 kilometres of watermains, 1 water treatment plant, 1 elevated storage tank, 1 standpipe, 1 booster pumping station, and 1 pumping station combined with a storage reservoir.

	Watermains	Water Facilities
Inventory	96 kilometers 76 Cathodic Protection Anode stations 581 Hydrants 1,116 Valves 4856 Water meters	1 water treatment plant 1 booster pumping station 1 elevated storage tanks 1 standpipe 1 reservoir/pumping station
Replacement Costs	**$141,875,493**	**$48,270,250**

Replacement costs for watermains are based on benchmark costs for watermain projects, as identified in Table 3-3 of the 2020 Water and Wastewater Rate Study. Costs were adjusted to 2022 using Non-Residential Building Construction Price Index (NRBCPI).

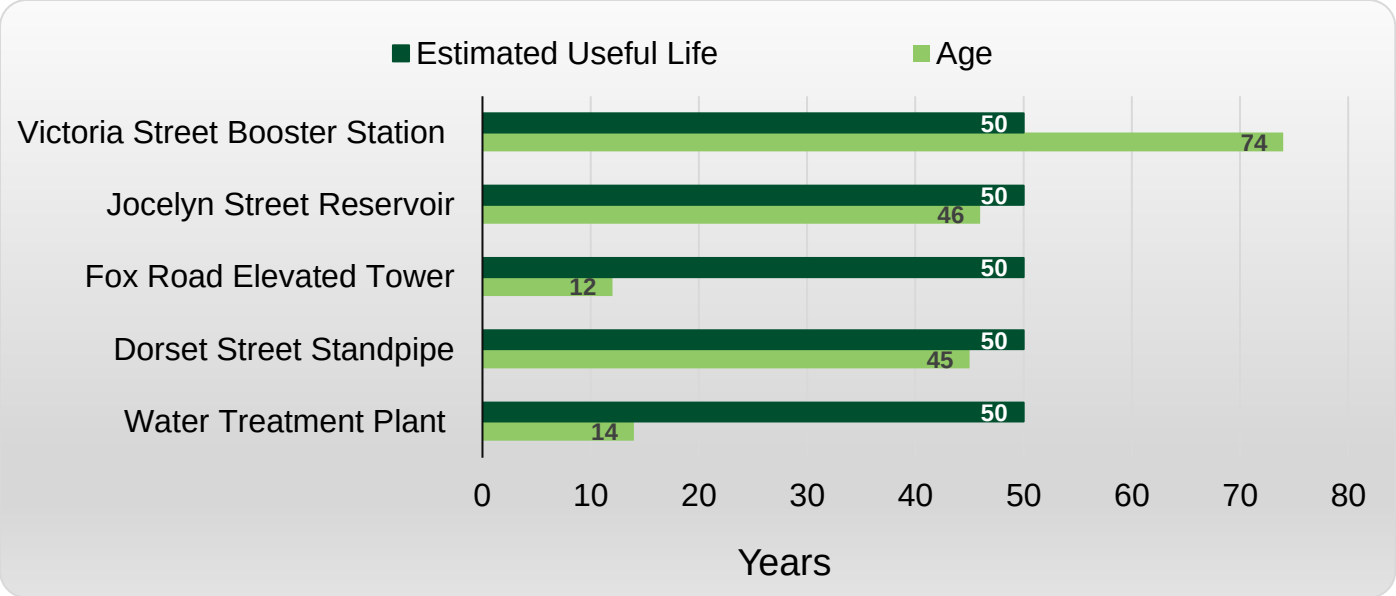
The water facilities were developed using the 2016 AMP values and adjusted for inflation. Dorset Street Standpipe is the exception, as updated costs are available based on recent ICIP grant application. Replacement values for all facilities will be reviewed and updated as the condition assessments are completed over time. In correlation to the other asset classes the Drinking Water AMP replacement costs can be related to the table below.

Asset Class	Quantity	Unit	Historical Cost	Replacement Value	Historical (3 year) average of actual annual replacement	Required Annual Lifecycle Cost	Average annual Lifecycle Cost as % of Replacement Cost
Bridges & Culverts	20	each	$7.23 million	$55.68 million	0	$1.13 million	2%
Water Facilities	**5**	**each**	**$24.40 million**	**$48.27 million**	**$0.41 million**	**$1.61 million**	**3%**
Wastewater Facilities	6	each	$40.22 million	$65.14 million	$0.13 million	$1.87 million	3%
Other Facilities	35	each	$29.62 million	$58.98 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Water Linear	**96**	**km**	**$30.56 million**	**$139.16 million**	**$1.79 million**	**$1.86 million**	**2%**
Wastewater Linear	83	km	$17.86 million	$123.60 million	$1.36 million	$2.36 million	2%
Transportation Services	690	km	$49.27 million	$321.73 million	$1.14 million	$8.04 million	2%
Storm Sewer Linear	66	km	$17.53 million	$92.32 million	$0.34 million	$1.89 million	2.7% for SWMP & 2.0% for linear
Equipment	140	each	$2.59 million	$3.19 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Land Improvements	208	each	$9.21 million	$14.90 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Technology	29	each	$2.52 million	$2.93 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Vehicles	158	each	$11.68 million	$14.26 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Totals			**$242.68 million**	**$940.17 million**	**$5.18 million**	**$18.74 million**	

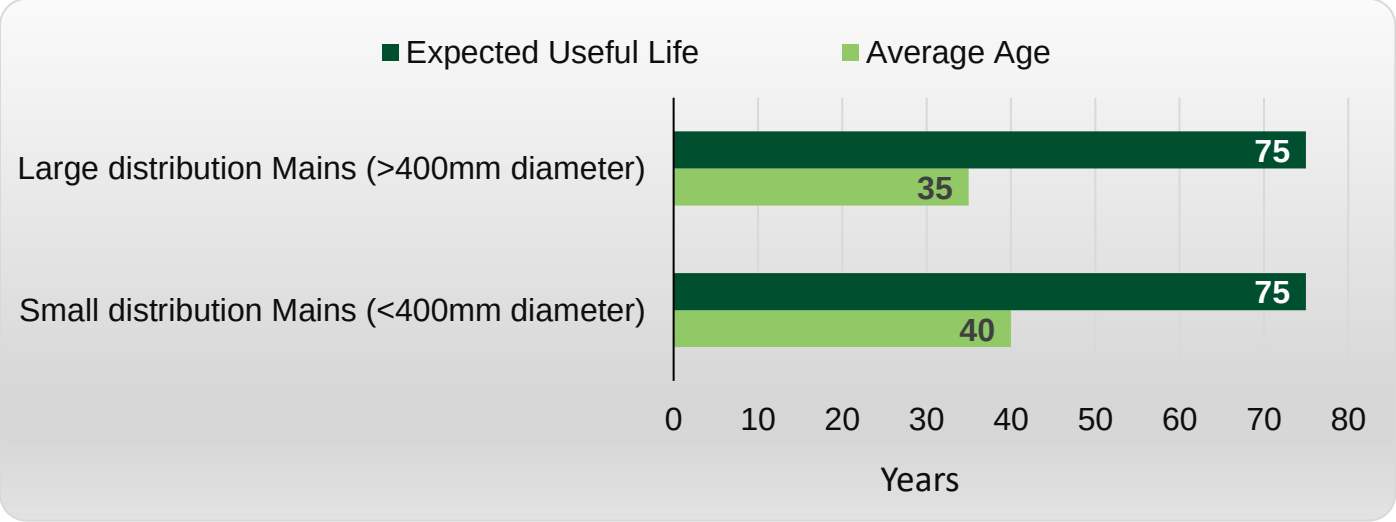
Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age of the Municipality's water mains and water facilities are shown in the figures below, however since construction, various assets within the facilities have been renewed, replaced, or otherwise maintained to ensure reliable operation. Where construction dates were unavailable in our inventories and GIS mapping, construction dates have been assumed to correspond with other proximate buried linear infrastructure.

Age of Drinking Water Facilities



Average Age of Watermain



Condition Collection

The Municipality assesses the condition of its drinking water assets on a regular basis using a variety of techniques, as summarized in the table below.

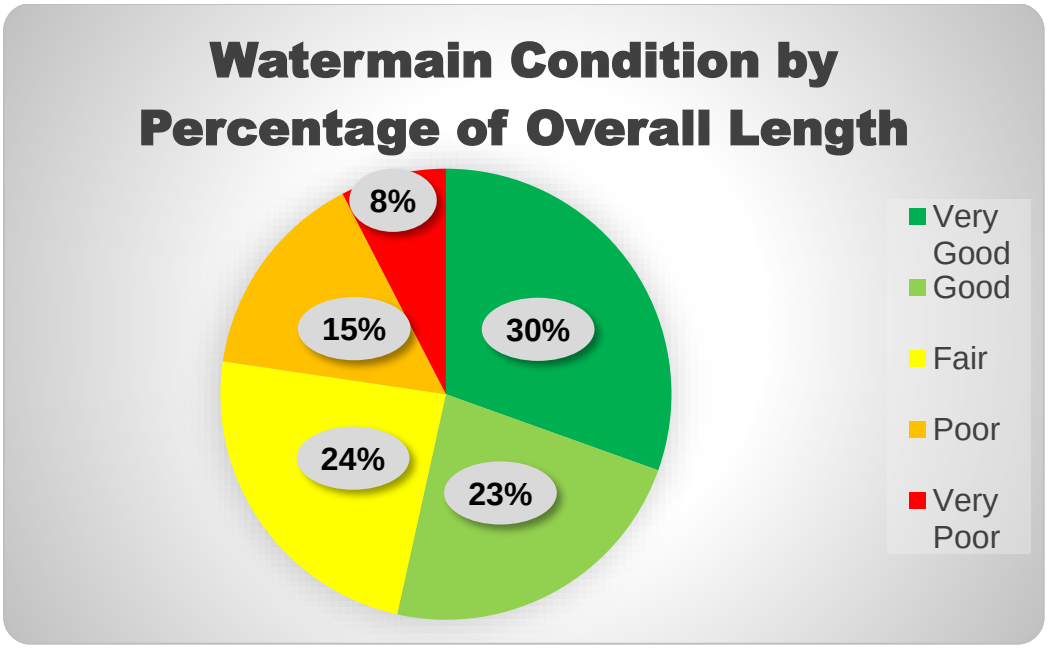
Asset Category	Condition Data collection techniques	Frequency
Watermains	• Leak detection program • Break data • Valve Turning Program • Hydrant Flushing Program	Varies depending on the condition assessment program type
Water Facilities	Various condition assessment programs: • Vibration Program • Lubrication Program • Piping Inspection Program • Electrical Low Voltage Condition • Electrical Transformer Oil Condition • Electrical Infrared Thermography Program • Structural Inspection Program	• Vibrations Program quarterly with exception of the Jocelyn St Reservoir pumps • All other programs as per manufacturers recommendations • Structural inspection every 5 years during condition assessments

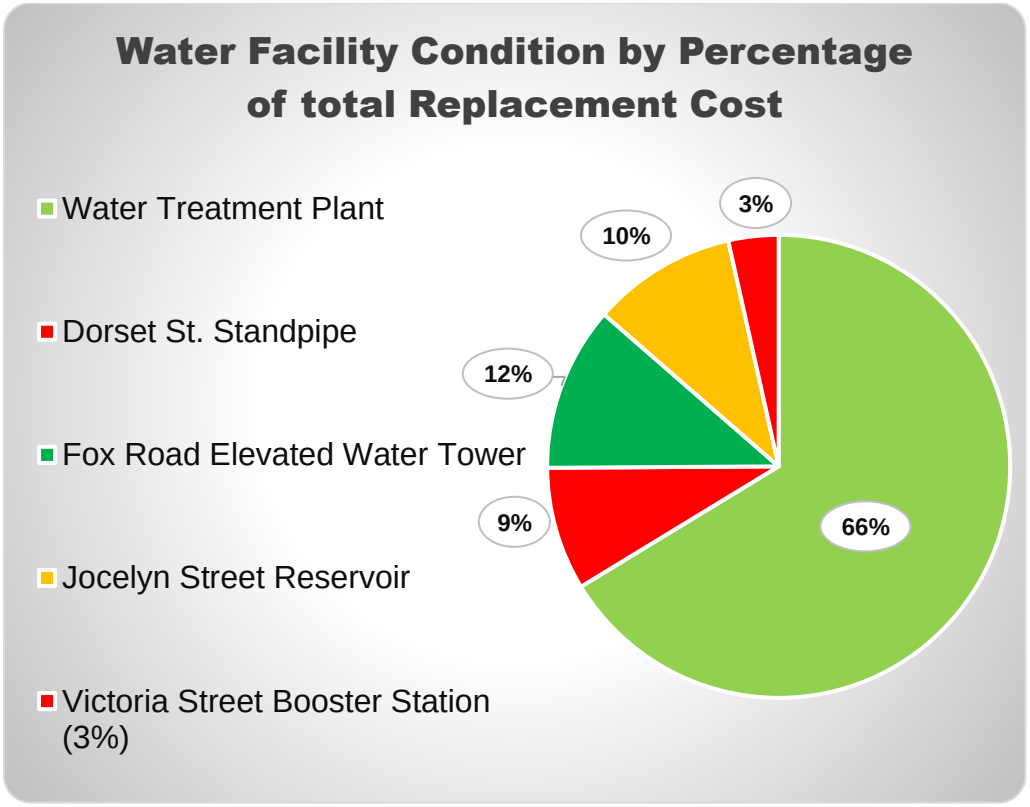
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from “Very Good” to “Very Poor” as shown in the table below. The update to the AMP in 2025 will summarize condition as weighted inclusive of break history for watermain and inspection reports records more facilities. Condition data for Meters is currently being consolidated and will be included in the next update.

Water Condition Indices

Rating	Rating Description	Remaining Useful Life	Condition Index Watermains (probability of failure)	Condition Index Water Facilities
Very Good	**Very Good – Fit for Future** Well maintained, good condition, new or recently rehabilitated	80 to 100%	>4 to ≤5	5
Good	**Good – Adequate for Now** Acceptable, generally in mid stage of expected service life	60 to 79%	>3 to ≤4	4
Fair	**Fair – Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies	40 to 59%	>2 to ≤3	3
Poor	**Poor – Increasing potential of affecting service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20 to 39%	>1 to ≤2	2
Very Poor	**Very Poor – Unfit for Sustained Service** Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.	0 to 19%	1	1

The overall condition of drinking water assets is Good and a breakdown for the various asset types is shown in the figures below.


Watermain Condition by Percentage of Overall Length
8%
30%
15%
24%
23%
Very Good
Good
Fair
Poor
Very Poor


Water Facility Condition by Percentage of total Replacement Cost
Water Treatment Plant
Dorset St. Standpipe
Fox Road Elevated Water Tower
Jocelyn Street Reservoir
Victoria Street Booster Station (3%)
3%
10%
12%
9%
66%

Levels of Service

The State of the Infrastructure section of the asset management plan provides an overview of the capital assets that support provision of the Municipality's services. The information presented in that section includes asset quantities, replacement cost valuation, age, and condition.

Physical condition of the assets is not sufficient to comprehensively capture the levels of service provided by the Municipality. To cover aspects of services not directly linked to asset condition, a broader levels of service framework has been developed. The levels of service framework presented in this section of the asset management plan contains the following elements:

- Service attributes which identify relevant aspects or characteristics of a service.
- Level of service statements which describe service attributes from a non-technical point of view.
- Performance measures which enable quantitative measurement to support the level-of-service statements.

For each performance measure, the current performance is reported. The Municipality will track and report on the current performance on an annual basis. In the future, targets for each performance measure will be chosen that balance regulatory requirements, the needs/expectations of service users, and various external trends and pressures, with the cost of delivering the service.

Two sets of tables are provided in each of the following subsections. The first table identifies relevant service attributes and defines the community levels of service for each of those attributes. The service attributes are intended to capture all major aspects that are of interest to the users of a service. The community levels of service include qualitative information such as images of assets providing different levels of service and maps, as well as statements describing what the Municipality intends to deliver, generally described from the user's perspective. The second table describes the performance measure(s) connected to each of the service attributes and identifies the current performance for each performance measure.

The Drinking Water AMP establishes preliminary level of service measures and the current level of service being provided. The measures align with both Municipal goals and Provincial requirements and recognize that drinking water assets should:

- Provide reliable water services for community use and fire fighting
- Maintain consistent and high-quality water supply
- Ensure water is safe for domestic purposes and for consumption
- Provide and use potable water in a sustainable manner.

A future version of the Drinking Water AMP will go a step further and include Council's target service levels for each measure.

Community Qualitative Descriptions

Service Attribute	Community Levels of Service	Qualitative Description
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.*(1)	The water system provides potable water within the Municipality for residential and business consumption, as well as for recreational uses and maintenance operations. All properties within the Municipality's urban boundary have water servicing available. The scope of the Municipality's water system is illustrated by the map in Appendix 1.
Scope	Description, which may include maps, of the user groups or areas of the municipality that have fire flow.*	The water system provides water flows within the Municipality for fire protection. All properties within the urban boundary, have fire flow available. The Welcome community hydrants in the rural area are for main flushing only. The scope of the Municipality's water system is illustrated by the map in Appendix 1.
Reliability	Description of boil water advisories and service interruptions*	The water system is managed with the goal of providing a safe and reliable water supply, minimizing service interruptions and occurrences of adverse water quality events (measured by occurrences of boil water advisories).

* Required by Ontario Regulation 588/17.

(1) See Appendix 1 for a map of the areas of the municipality that are connected to the municipal Drinking Water System.

Technical Metrics

Service Attribute	Performance Measure	2020-2021 Performance
Scope	Percentage of properties connected to the municipal water system. *	Of the total properties in the municipality 66% are connected to municipal drinking water. 100% of urban properties have access to municipal drinking water
Scope	Percentage of properties where fire flow is available. *	99% of urban properties and 56% of total properties.
Scope	Percentage of fire hydrants with fire flow greater than 500 gallons per minute	94.9%
Reliability	The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system. *	0 events affecting 0 properties
Reliability	The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system. *	0 connection days / 4856 connections
Reliability	Percentage of water mains beyond expected useful life (percentage by network length).	23%
Reliability	Percentage of water facilities beyond expected useful life. (Percentage by network value)	3.5%
Reliability	Number (or length) of water mains that have had breaks and have yet to be replaced.	15.71km or 16.42%
Reliability	Number of pressure complaints received during reporting period, as a result of municipal infrastructure during the previous reporting period.	No pressure complaints have been received
Reliability	Percentage of water meters beyond expected useful life of 18 years	19.5%
Safety	Incidents of non-compliance per reporting year	0
Sustainability	Residential Water consumption (litres per customer per day)	5,086,000 liters average per day and approx. 1,047 liters per customer

* Required by Ontario Regulation 588/17.

Asset Management Strategy

Practices, Procedures and Tools

- The Municipality has well-established overall principles, framework, and decision-making approaches for asset management, and these are presented in the 2016 Asset Management Plan. They provide a holistic approach to asset management as demonstrated by the capital investment prioritization process that drives the decision-making towards meeting the desired levels of service at the lowest lifecycle cost.

Future Demand and Service Enhancement

Port Hope's population is expected to increase to 20,850 people by 2029, an increase of 17.31% over the next 7 years. The Municipality's Official Plan provides the vision for the future growth of the Municipality including areas identified for intensification. Further Projections for the urban area are referenced in Northumberland County's Municipal Comprehensive Review – Long-Term Growth Forecast and Urban Land Needs Analysis which projects growth for the urban area up to 2051. The Official Plan is supported by the Development Charges Study and the Water Rate Study to ensure that drinking water services will be available to support future growth.

In addition to the growth and enhancement objectives of the Municipality's master plans, asset management planning also needs to consider the Climate Action Plan goals for both resiliencies to changing climate and reduction of greenhouse gas emissions. Existing assets must be maintained, and new assets brought into service to meet these various growth and service enhancement objectives.

Lifecycle Management and Risk

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

In developing the Drinking Water AMP, a preliminary estimate of future costs was generated based on the Municipality's budgeted 10-year capital forecast which, at this time, provides the best available information for generating this estimate. It was developed through a collaborative effort of Watson & Associates Economists Ltd. combined with staff input that aligns with the Municipality's current decision-making and asset capital expenditure processes. The lifecycle activities that will be required over the 10-year period are based on the asset management strategies that are currently captured in the Annual Capital and Operating Budget process. For drinking water assets, this includes operational and maintenance strategies, asset management decision making, lifecycle cost and value optimisation, options analysis, ageing assets strategy, non-infrastructure solutions, capital investment planning, condition assessment programs, as well as consideration of water service impacts and impacts to other services.

The Municipality applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets but are generally based on the importance of each asset in terms of service delivery/ continuity, and the number of users who could be impacted.

Water Mains

Category	Frequency
Inspection and Condition Assessment	Beyond using estimated useful life to determine the approximate condition, staff also gauge the material type, utilize leak detection technology, and analyze watermain break data.
Major Lifecycle Activities - Operating	**Flushing** – Each year, Municipal staff flush fire hydrants as part of a standard maintenance program. This important upkeep ensures that adequate water flow for fire fighters, residents, and businesses. It also helps maintain the Municipality's water quality by clearing iron and mineral deposits from the water mains. **Cathodic Protection** – the Municipality purchases and installs anodes as needed. Furthermore, the Municipality is planning to undertake two major installations throughout the water system in the next ten years, to preserve the life of ductile iron and cast iron watermains that aren't part of the 10-year capital replacement plan. These major installations were included in the Municipality's 2020 Water and Wastewater Rate Study. **Valve turning** – This is a preventive maintenance program funded from the operating budget. Valve turning ensures that valves are operating properly so that when watermain breaks occur, an individual section can be isolated effectively. If valves are not operating properly, there may be a need to isolate larger areas and disrupt more customers. The program is typically completed throughout the summer, following the completion of the flushing program around May/June. The Municipality's goal is to turn every valve approximately every 3-4 years. The number of valves turned in any given year is influenced by the number of capital projects that are underway. **Flow testing (fire hydrants)** – In 2020 the Municipality started a small-scale program (through contractor) to perform flow testing of fire hydrants that haven't been tested recently. The program will address targeted areas and will help ensure that any changes to flows are documented. The condition of watermains in an area and the completion of watermain upgrades/replacements can have an impact on hydrant flow rates. Hydrants will be flow tested after the completion of linear capital projects. **Water shut-off street box inspection program** – municipal staff locate the shut-off/curb box on the property line, operate it a few times to make sure it is in good working condition, and document any that need work or replacement. This ensures that in the event of an emergency the water can be shut off if needed.
Major Lifecycle Activities - Capital	Watermain replacements are completed as needed and, where possible, are aligned with other asset replacements through a coordinated reconstruction program. Replacement of watermains typically include replacement of valves, hydrants, and water services to the property line. For long-term capital planning purposes and budgeting, watermains are assumed to have a useful life of 75 years.

Category	Frequency
Identification of Short-term Priorities	The Municipality developed a 10-year forecast of lifecycle activities as part of the 2020 Water & Wastewater Rate Study. The forecast contained in the Water & Wastewater Rate Study is the basis for developing annual capital budgets and is supplemented with priorities that are identified through ongoing operations.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service. The growth-related capital investments related to water mains include watermain replacements and oversizing projects and installation of pressure reducing valves. These growth-related needs are summarized in the Municipality's development charges background study which is updated every five years.
	Various condition assessment programs: • Vibration Program • Lubrication Program • Piping Inspection Program • Electrical Low Voltage Condition • Electrical Transformer Oil Condition • Electrical Infrared Thermography Program

Water Facilities

Lifecycle Activities	Frequency
Inspections and Condition Assessment	Condition assessments are completed to review the condition of the various assets and systems at each facility and identify current and longer-term needs based on asset lifecycles. Recently completed assessments include: • Dorset Street Standpipe Condition Assessment (August 2019) • Victoria Street Booster Pumping Station Condition Assessment (January 2018) • Port Hope Water Treatment Plant Condition Assessment (2021) • Jocelyn St. Reservoir Condition Assessment (2021)
Major Lifecycle Activities - Operating	Preventative maintenance activities for equipment are scheduled and completed routinely along with other lifecycle replacement needs. The annual drinking water system reports provide a summary of the lifecycle activities completed during the reporting period.
Major Lifecycle Activities - Capital	Lifecycle replacements and rehabilitations of facility components are completed as needed. For long-term capital planning purposes and budgeting, the water treatment plant has been broken down into major components (e.g., envelope, structure, mechanical, electrical, and membrane modules) and the components are assigned useful lives ranging from 8 years for membrane modules to 50 years

	for structural elements.[1] For long-term capital planning purposes and budgeting for other water facilities, the facilities are assigned a useful life of 50 years. The Municipality will further refine the lifecycle cost estimates in future years by breaking down the other facilities into component parts and capturing replacement costs and useful lives at the component level.
Identification of Short-term Priorities	The Municipality maintains a 10-year capital plan for water facilities that was developed and is updated with input from the following sources: • Input from Municipal staff with respect to projects that are required to address operational-level items or provide continuity of ongoing maintenance programs • Condition assessment reports Long-term asset planning for facilities that may require major lifecycle rehabilitation within a 10-year planning period.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service. The growth-related capital investments related to water facilities include pumping upgrades and are summarized in the Municipality's development charges background study which is updated every five years.

Water Meters

Lifecycle Activities	Frequency
Inspections and Condition Assessment	The Municipality does not perform routine inspections nor condition assessments of water meters. A concept is being developed for water use that will speak to an inspection program.
Major Lifecycle Activities - Operating	There are no preventative maintenance activities related to water meters.
Major Lifecycle Activities - Capital	Lifecycle replacements of water meters are completed as needed. For long-term capital planning purposes and budgeting, water meters are assumed to have a useful life of 18 years.
Identification of Short-term Priorities	The Municipality replaces water meters as needed and maintains an inventory of all water meters. While a comprehensive meter replacement program is currently not in place, the Municipality is seeking to coordinate replacement of water meters with watermain replacement projects. This creates efficiencies because water main replacement projects often require a temporary water supply to be provided to the service connections, which is a good opportunity to also replace the water meter.

[1] The Municipality also maintains a more detailed inventory of the equipment that is inside of the water treatment plant. This more detailed equipment inventory is maintained in the CMMS (Computerized Maintenance Management System) however, replacement costs are currently not tracked at this level. In future years, once replacement costs are assigned to individual equipment items, the CMMS inventory can be used to perform the lifecycle costing analysis at a more detailed level.

Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental demands for water meters as new customers connect to the system. The Municipality supplies and installs new water meters as requested and recovers the associated costs through user fees imposed under the Fees and Charges By-law. Furthermore, the Municipality has implemented a remote radio meter reading system to create operational efficiencies as the Municipality grows. The planned investment into the remote radio meter reading system is included in the Municipality's development charges background study which is updated every five years.

The Municipality continues to invest in maintaining infrastructure and has been increasing its capital investments to align with long-range forecasts available in the 2016 AMP, Development Charges Study and Water & Wastewater Rate Study. The Municipality's existing funding model incurs an annual shortfall to maintain critical infrastructure in a state of good repair. There are annual contributions to the Asset Management Reserve to increase the current funding model. Changes will again impact the financing strategy when the new service levels are defined in the next version of the asset management plans, which are due in 2025.

Annual Reinvestment required based on Lifecycle Management Strategy costs

Asset Category	Quantity	Unit of Measure	Replacement Cost	Average Annual Lifecycle Cost (Capital)	Average Annual Lifecycle Cost as % of Replacement Cost	2016 Canadian Infrastructure Report Card Reinvestment Rate – Low Target	2016 Canadian Infrastructure Report Card Reinvestment Rate – High Target	Annual Reinvestment Rate based on Useful Life Analysis
Water Linear	96	km	$139,164,095	$1,855,521	1.3%	1.0%	1.5%	
Water Facilities	5	each	$48,270,250	$1,606,961	3.3%	1.7%	2.5%	3.3%
Water Meters	4,691	each	$2,711,398	$135,570	5.0%			

Improvement and Monitoring Plan

Based on the snapshot of current conditions and existing plans presented in the Drinking Water AMP, areas of potential improvement include:

- Asset information and data quality
- Condition data tracking and asset valuation
- Lifecycle renewal needs forecasting
- Climate change resiliency
- Equity and inclusion

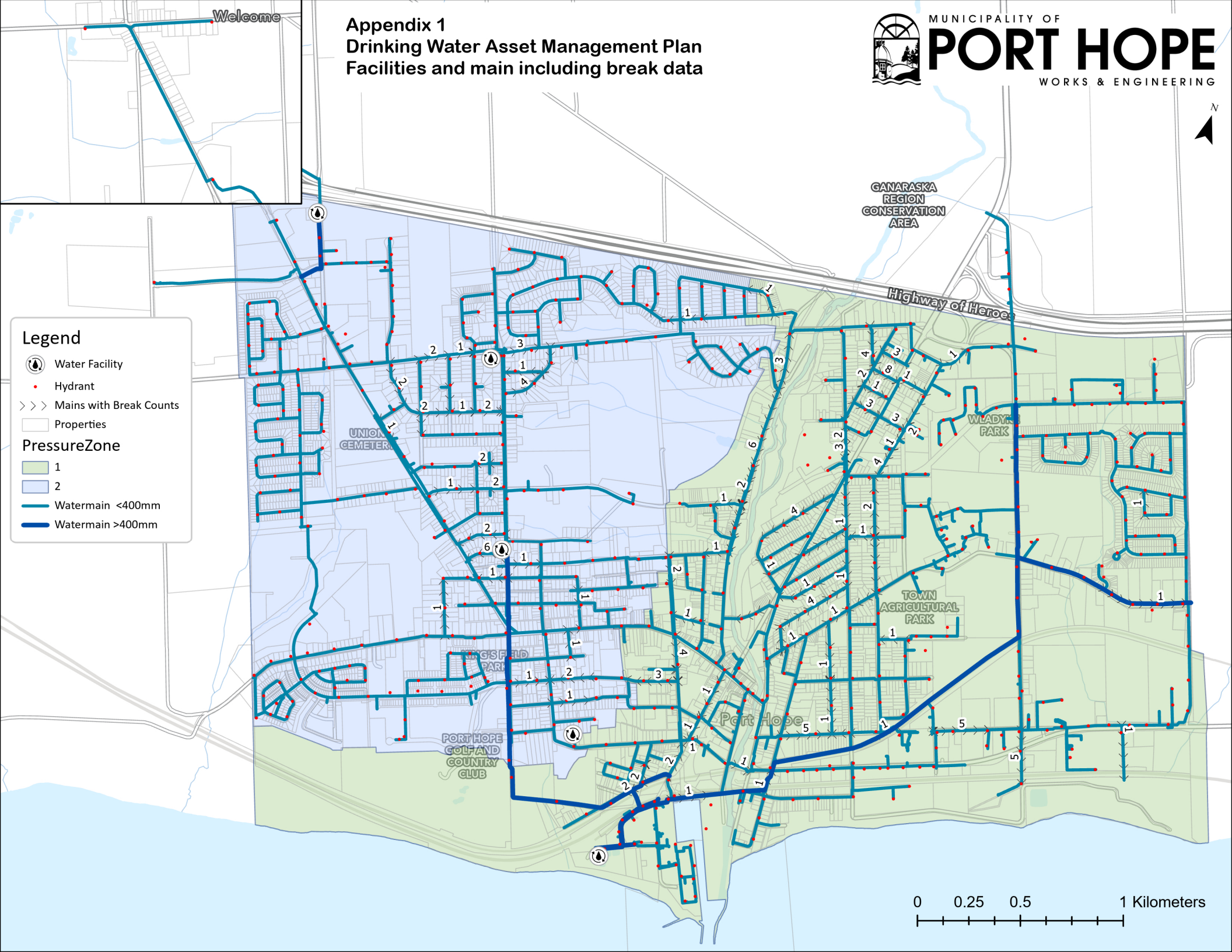
The Drinking Water AMP will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the plan.

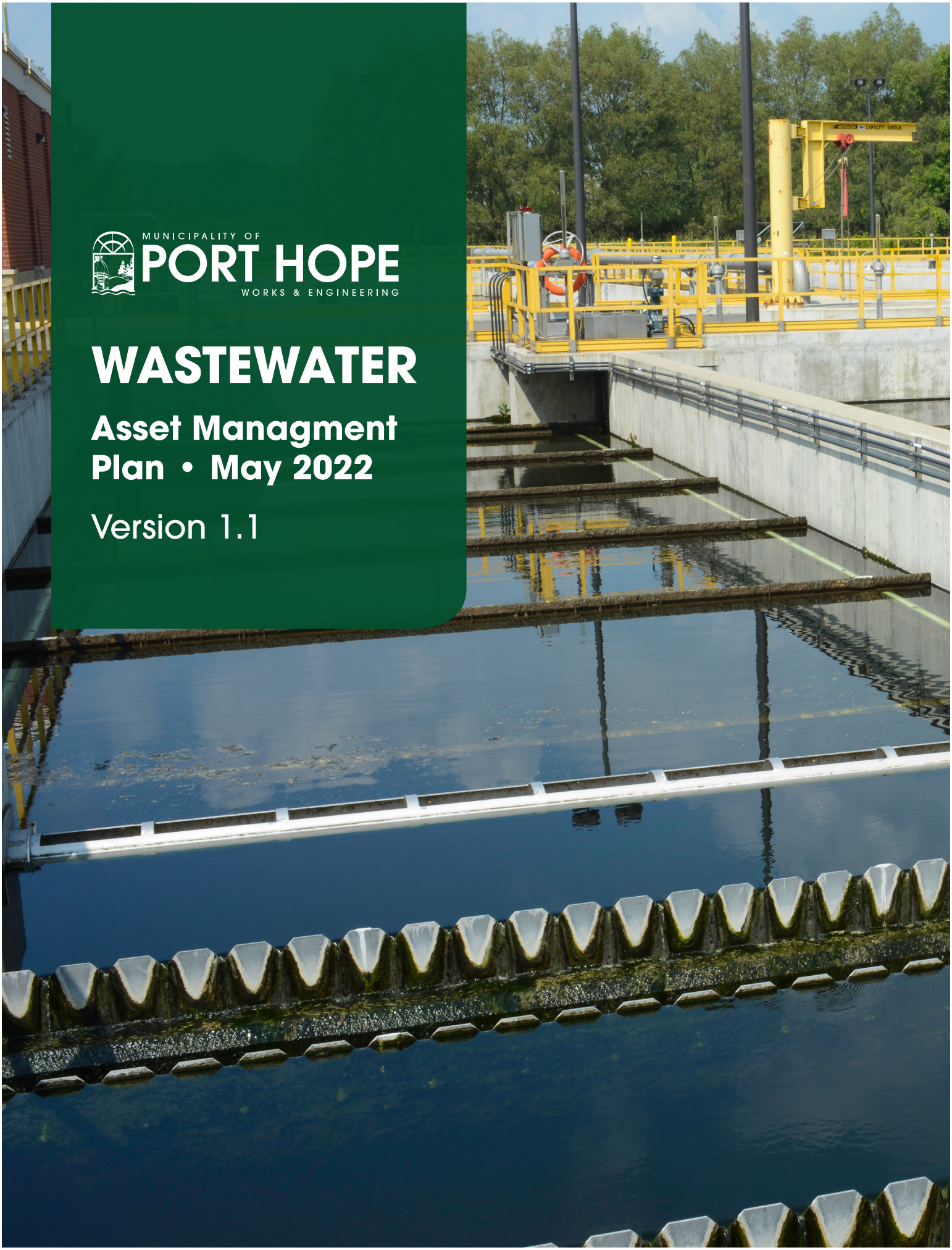
More Information

For more information about asset management, or to learn more about the Municipality's Asset Management Program, please visit porthope.ca.

Appendix 1
Drinking Water Asset Management Plan
Facilities and main including break data

MUNICIPALITY OF PORT HOPE
WORKS & ENGINEERING





MUNICIPALITY OF
PORT HOPE
WORKS & ENGINEERING

WASTEWATER

Asset Managment Plan • May 2022

Version 1.1

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To meet the Provincial requirements, the Municipality of Port Hope has created this first version of its **Wastewater Asset Management Plan (Wastewater AMP)**. It reports the current state of the assets, levels of service provided, strategies, and activities applied by the Municipality, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making.

Asset Categories and Types

The Wastewater AMP satisfies the Provincial requirements for wastewater assets that relate to the treatment or collection of wastewater. This includes the wastewater treatment plant, pump stations, sewer mains (inclusive of sewer services). These assets support the treatment and provision of a safe environment to residents, businesses and visitors within the Municipality.

Wastewater Asset Categories and Segments

Gravity Sewer

A **gravity sewer** is a conduit utilizing the energy resulting from a difference in elevation to remove unwanted water.

Forcemain

A **force main** is a pressurized sewer pipe that conveys wastewater under pressure from the discharge side of the pump. Force mains are used where gravity is not enough to move sewage or stormwater runoff through a sewer line

Maintenance Hole

The purpose of a **Wastewater Maintenance Hole** is to allow for a human access point at certain intervals of a wastewater drainage system for inspection and maintenance purposes.

Wastewater Treatment Plant

Port Hope Wastewater System can collect and treat an impressive 11,300 cubic meters of wastewater per day. The system consists of the **Wastewater Treatment Plant** (WWTP), the Collection System and also receives Septage hauling from residents that are not connected to the system. The WWTP provides mechanical screening and grit removal, preliminary treatment through 3 aeration tanks, secondary treatment through clarifiers and effluent disinfection prior to outfall into Lake Ontario. The WWTP is located at 100 Lake St in the Municipality of Port Hope. The Municipality is the Owner and Operator of the Port Hope Wastewater System that serves the community of Port Hope

Sludge Storage

Sludge holding tanks provide **sludge storage** of biosolids and can serve as a location for thickening before further processing or disposal. Mixing in sludge holding tanks provides uniform sludge concentration, prevents sludge stratification, and ensures a homogeneous feed to dewatering equipment.

Mill Street Pumping Station

The **Mill Street Wastewater Pumping Station** (WWPS) is the largest of the Municipality's three (3) pumping stations located in the collection system. Originally constructed in 1956 and upgraded in 2000/2001 the Mill Street WWPS is a wet well/dry well style station, located at 90 Mill Street South, ±60 m south of Shuter Street on the east shore of the Ganaraska River. The Mill Street WWPS's catchment is area encompasses approximately 80% of the Port Hope wastewater (sanitary sewage) collection system including the discharge from the AON WWPS, historic downtown and other areas with older infrastructure as well as the majority of industrial/commercial lands.

Hope Street Pumping Station

The **Hope Street Wastewater Pumping Station** (WWPS) is the smallest of the Municipality's three (3) pumping stations. Constructed in 1987/1988 the Hope Street WWPS is a submersible (wet well) style station located at 305 Hope Street North

AON Pumping Station

The **AON Wastewater Pumping Station (WWPS)** is a wet well/dry well style station constructed in 2005/2006 and located at 435 Lakeshore Road ±200 m south of Lakeshore Road. The catchment area serviced by the AON WWPS generally encompasses most lands west of Toronto Road

State of Local Infrastructure

Inventory and Valuation

The assets covered in the Wastewater AMP have a replacement value of approximately **$188.78 million.** This includes an inventory of over 78 kilometres of gravity sewer, 4 kilometers of forcemain and 1,163 maintenance hole structures, 1 wastewater treatment plant, 3 pumping stations and 1 sludge storage facility.

	Wastewater Linear Collection	Wastewater Facilities
Inventory	78 km of gravity sewer 4 km of forcemain 1,163 maintenance hole structures	1 wastewater treatment plant 3 pumping stations 1 sludge storage facility
Replacement Costs	**$123,605,787**	**$65,143,000**

Replacement costs for wastewater linear collection are based on benchmark costs for wastewater sewer main projects, as identified in Table 3-3 of the 2020 Water and Wastewater Rate Study. Costs were adjusted to 2022 using Non-Residential Building Construction Price Index (NRBCPI).

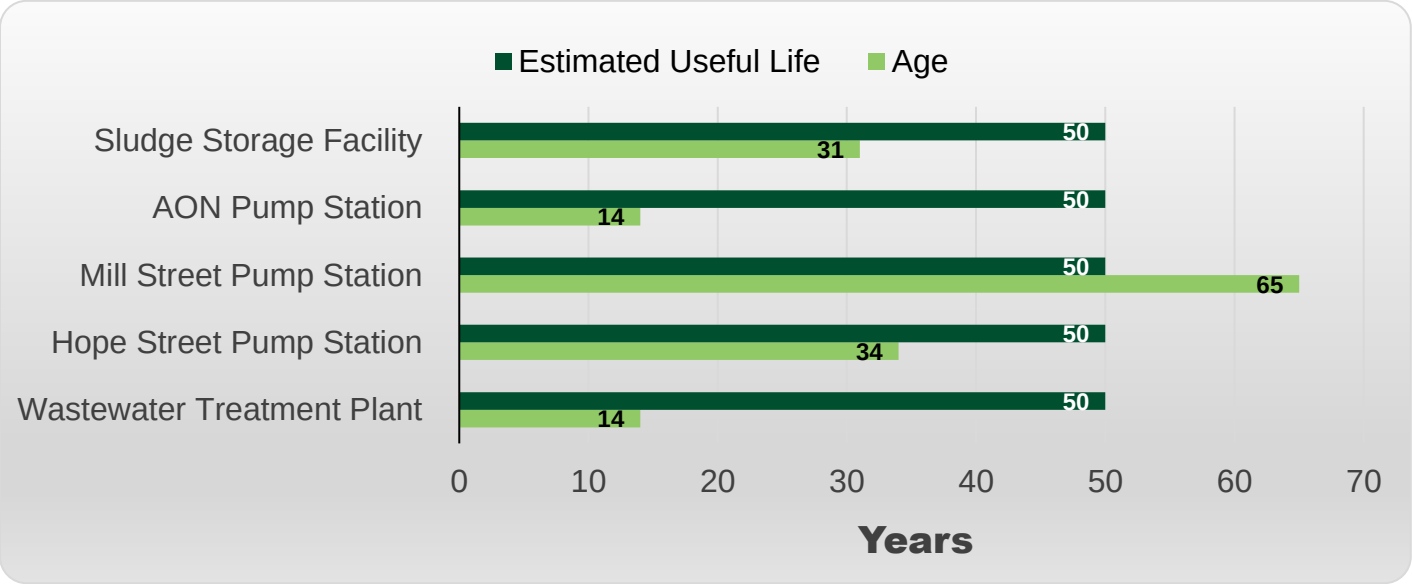
The wastewater facilities were developed using the 2016 AMP values and adjusted for inflation. Replacement values for all facilities will be reviewed and updated as the condition assessments are completed over time. In correlation to the other asset classes the Wastewater AMP replacement costs can be related to the table below.

Asset Class	Quantity	Unit	Historical Cost	Replacement Value	Historical (3 year) average of actual annual replacement	Required Annual Lifecycle Cost	Average annual Lifecycle Cost as % of Replacement Cost
Bridges & Culverts	20	each	$7.23 million	$55.68 million	0	$1.13 million	2%
Water Facilities	5	each	$24.40 million	$48.27 million	$0.41 million	$1.61 million	3%
Wastewater Facilities	**6**	**each**	**$40.22 million**	**$65.14 million**	**$0.13 million**	**$1.87 million**	**3%**
Other Facilities	35	each	$29.62 million	$58.98 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Water Linear	96	km	$30.56 million	$139.16 million	$1.79 million	$1.86 million	2%
Wastewater Linear	**83**	**km**	**$17.86 million**	**$123.60 million**	**$1.36 million**	**$2.36 million**	**2%**
Transportation Services	690	km	$49.27 million	$321.73 million	$1.14 million	$8.04 million	2%
Storm Sewer Linear	66	km	$17.53 million	$92.32 million	$0.34 million	$1.89 million	2.7% for SWMP & 2.0% for linear
Equipment	140	each	$2.59 million	$3.19 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Land Improvements	208	each	$9.21 million	$14.90 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Technology	29	each	$2.52 million	$2.93 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Vehicles	158	each	$11.68 million	$14.26 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Totals			**$242.68 million**	**$940.17 million**	**$5.18 million**	**$18.74 million**	

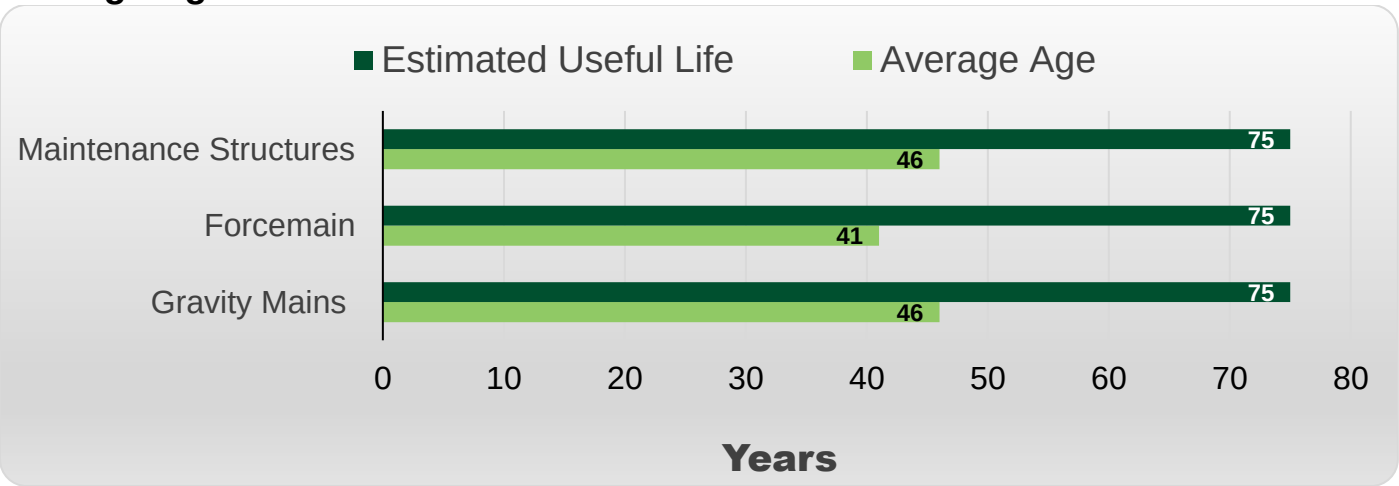
Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age of the Municipality's linear collection system and wastewater facilities are shown in the figures below, however since construction, various assets within the facilities have been renewed, replaced or otherwise maintained to ensure reliable operation. Where construction dates were unavailable in our inventories and GIS mapping, construction dates have been assumed to correspond with other proximate buried linear infrastructure.

Age of Wastewater Facilities



Average Age of Linear Collection



Condition Collection

The Municipality assesses the condition of its Wastewater assets on a regular basis using a variety of techniques, as summarized in the table below.

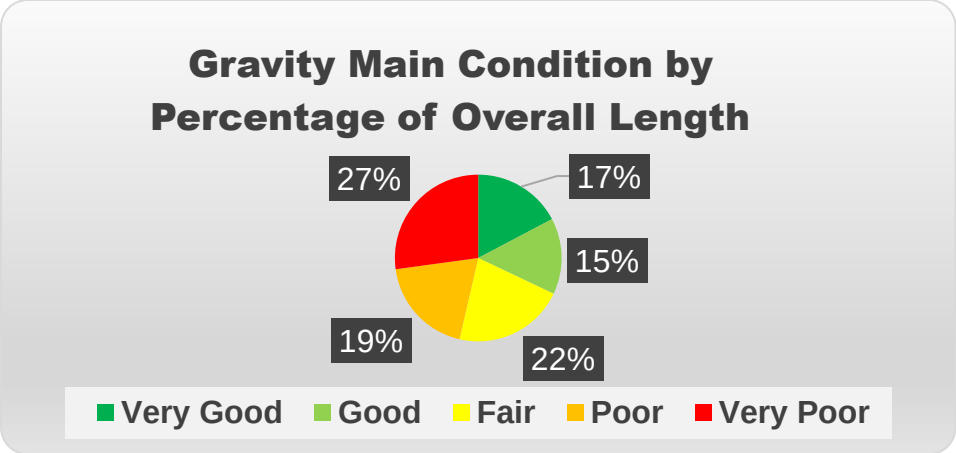
Asset Category	Condition Data Collection Techniques	Frequency
Gravity Mains	Closed Circuit TV Inspections (CCTV)	The system is broken into four quadrants. One quadrant is inspected annually. Additional inspections occur dependent on level of risk; some sewers have more frequent inspection requirements
Forcemains	Do not currently assess (Hydraulic analysis may be included in 2025 AMP)	
Maintenance Structures	Expert grading by physical assessment and scoring during CCTV inspections	The system is broken into four quadrants. One quadrant is inspected annually. Additional inspections occur dependent on level of risk; some sewers have more frequent inspection requirements
Wastewater Facilities	Condition Assessments (facility, electrical, process piping, HVAC, etc.); work order records from maintenance activities	Condition assessments vary but are typically performed within a 5-year cycle; work order records are ongoing

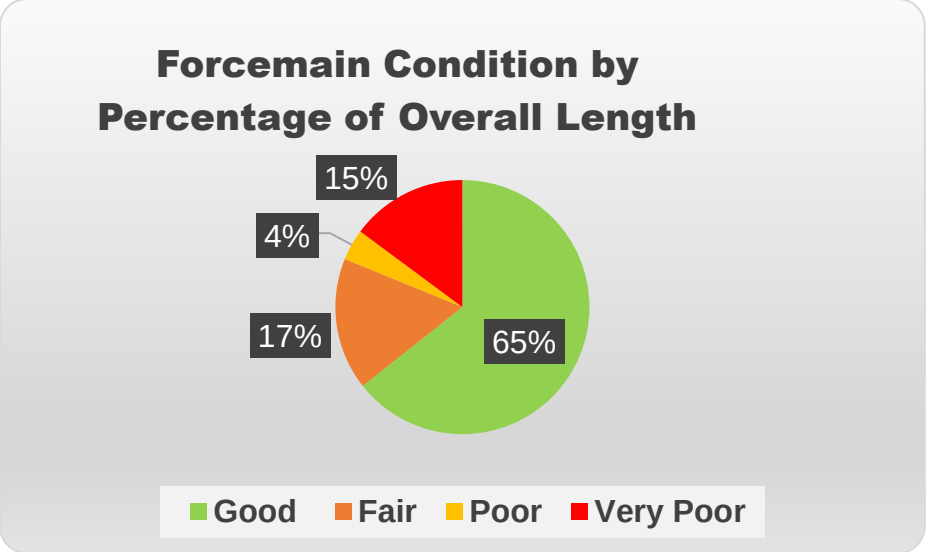
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from “Very Good” to “Very Poor” as shown in the table below. The update to the AMP in 2025 will summarize condition as weighted inclusive of CCTV and inspection reports records for facilities. Condition data for maintenance structures is currently being consolidated and will be included in the next update.

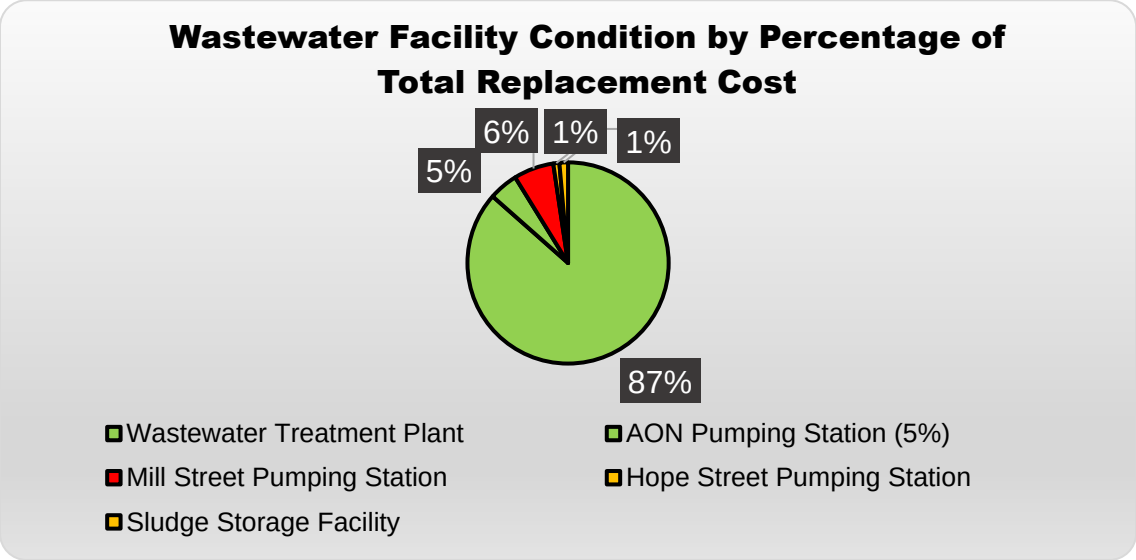
Wastewater Condition Indices

Rating	Rating Description	Remaining Useful Life	Condition Index Linear (probability of failure)	Condition Index Wastewater Facilities
Very Good	**Very Good – Fit for Future** Well maintained, good condition, new or recently rehabilitated	80 to 100%	1	5
Good	**Good – Adequate for Now** Acceptable, generally in mid stage of expected service life	60 to 79%	>1 to ≤2	4
Fair	**Fair – Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies	40 to 59%	>2 to ≤3	3
Poor	**Poor – Increasing potential of affecting service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20 to 39%	>3 to ≤4	2
Very Poor	**Very Poor – Unfit for Sustained Service** Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.	0 to 19%	>4 to ≤5	1

The overall condition of Wastewater assets is Good and a breakdown for the various asset types is shown in the figures below.


Gravity Main Condition by Percentage of Overall Length
27%
17%
15%
19%
22%
Very Good
Good
Fair
Poor
Very Poor


Forcemain Condition by Percentage of Overall Length
15%
4%
17%
65%
Good
Fair
Poor
Very Poor


Wastewater Facility Condition by Percentage of Total Replacement Cost
6%
1%
1%
5%
87%
Wastewater Treatment Plant
AON Pumping Station (5%)
Mill Street Pumping Station
Hope Street Pumping Station
Sludge Storage Facility

Levels of Service

The State of the Infrastructure section of the asset management plan provides an overview of the capital assets that support provision of the Municipality's services. The information presented in that section includes asset quantities, replacement cost valuation, age, and condition.

Physical condition of the assets is not sufficient to comprehensively capture the levels of service provided by the Municipality. To cover aspects of services not directly linked to asset condition, a broader levels of service framework has been developed. The levels of service framework presented in this section of the asset management plan contains the following elements:

- Service attributes which identify relevant aspects or characteristics of a service.
- Level of service statements which describe service attributes from a non-technical point of view.
- Performance measures which enable quantitative measurement to support the level-of-service statements.

For each performance measure, the current performance is reported. The Municipality will track and report on the current performance on an annual basis. In the future, targets for each performance measure will be chosen that balance regulatory requirements, the needs/expectations of service users, and various external trends and pressures, with the cost of delivering the service.

Two sets of tables are provided in each of the following subsections. The first table identifies relevant service attributes and defines the community levels of service for each of those attributes. The service attributes are intended to capture all major aspects that are of interest to the users of a service. The community levels of service include qualitative information such as images of assets providing different levels of service and maps, as well as statements describing what the Municipality intends to deliver, generally described from the user's perspective. The second table describes the performance measure(s) connected to each of the service attributes and identifies the current performance for each performance measure.

The Wastewater AMP establishes preliminary level of service measures and the current level of service being provided. The measures align with both Municipal goals and Provincial requirements and recognize that wastewater assets should:

- Reliably capture, convey and treat wastewater while minimizing overflows and backups
- Treat sewage before discharge to the lake
- Recycle biosolids into the environment

A future version of the Wastewater AMP will go a step further and include Council's target service levels for each measure.

Community Qualitative Descriptions

Service Attribute	Community Levels of Service	Qualitative Description
Scope	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system. *	The wastewater system provides for the collection and treatment of wastewater generated by residential and non-residential properties within the Municipality's urban boundary. Except for two streets (approximately 20 properties), all properties within the Municipality's urban boundary have wastewater servicing. The Municipality's Wastewater Treatment Plant also receives imported sewage and septic waste to service rural residents through the hauled sewage/septic receiving station. The scope of the Municipality's wastewater collection system is illustrated by the map in Appendix 1. The map shows the geographical distribution of municipal wastewater mains and forcemains within the Urban Area.
Reliability	Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes. *	The Municipality's wastewater collection systems are nominally separate, meaning that sanitary and stormwater flows are carried in different pipes with different destinations, however stormwater inflows and infiltrates into the sanitary system from numerous sources.
	Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.*	The Municipality does not have a combined system. By managing separate systems for wastewater and stormwater the Municipality dramatically reduces the risk of any overflow to the river or lake during wet weather flows.
	Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. *	Stormwater can enter sanitary sewers via extraneous flow. Extraneous flow has two distinct components: inflow and infiltration. Infiltration is water entering the sanitary system through sources such as rainfall river water, groundwater, snowmelt, or infiltrated rainfall. The pathways for infiltration include defects and damage, such as cracks in sewers, maintenance hole

Service Attribute	Community Levels of Service	Qualitative Description
		and laterals. Infiltration typically enters the system slowly over time with gradual changes in flow rates. Inflow is typically water entering the sanitary system through sources such as rainfall, runoff, river water and groundwater. Inflow enters sanitary systems via illegal direct connections to sewers through floor drains, foundation drains, roof drains, cross-connections, internal overflows (although these occurrences are rare they are occasionally observed through CCTV inspections and corrected), maintenance hole covers, building catchbasins and unsealed openings in a construction site. Inflow typically enters the system with a fast response and can cause fast and extreme changes in flow rates. Infiltration uses baseline sewer capacity but rarely causes flooding or overflows by itself. Inflow is the primary cause for sewer capacity to be exceeded for short periods of time, causing flooding and overflows to occur. Note that the Municipality has made significant investments to reduce risk of overflow and to reduce the impacts on receiving watercourses.
	Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described above *	The Municipality has several programs in place to avoid and minimize occurrences of stormwater getting into sanitary sewers. These programs include maintenance hole grouting/repair/replacement and inflow and infiltration analysis during storm events.
	Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. *	The Municipality's Wastewater Treatment Plant discharges effluent into Lake Ontario. Municipal staff put forth all efforts to operate the plant at maximum removal efficiencies and within the rated capacity of the facility. The final effluent design objectives are identified in the facility's Environmental Compliance Approval (8519-BKNN7C).

* Required by Ontario Regulation 588/17.

(1) See Appendix 1 for a map of the areas of the municipality that are connected to the municipal Wastewater System.

Technical Metrics

Service Attribute	Performance Measure	2020-2021 Performance
Scope	Percentage of properties connected to the municipal wastewater system. *	56% of all properties within the municipality are connected to the Wastewater System and 75% of properties within the Urban boundary (and system limits) are connected to the Wastewater System.
Reliability	The number of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system. *	0 days exceeding capacity compared to 4,454 wastewater system customer connections. 0%
Reliability	The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. *	93 connection days compared to 4,454 wastewater system customer connections. 2% total.
Reliability	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system. *	There were 3 violations per year compared to 4,454 wastewater system customer connections. 0.07%
Reliability	Percentage of gravity sewers flushed and inspected within the past four years. [1]	100%
Reliability	Ratio of wet weather to dry weather flows.	15:04
Reliability	The number of odour complaints received during reporting period.	Staff have received 5 reports of odour complaints
Safety	Incidents of a bypass or overflow at the treatment plant	0
Sustainability	Annual Average Daily Influent Flow vs. Max Day Influent Flow	4,850 m3/day vs 12,744 m3/day 43% of total capacity in 2021 vs. 48% of total capacity in 2020

		As reported in the 2021 Annual Performance Report - WWTP

[1] Percentage of sewer length.

* Required by Ontario Regulation 588/17.

Asset Management Strategy

Practices, Procedures and Tools

The Municipality has well-established overall principles, framework and decision-making approaches for asset management, and these are presented in the 2016 Asset Management Plan. They provide a holistic approach to asset management as demonstrated by the capital investment prioritization process that drives the decision-making towards meeting the desired levels of service at the lowest lifecycle cost.

Future Demand and Service Enhancement

Port Hope's population is expected to increase to 20,850 people by 2029, an increase of 17.31% over the next 7 years. The Municipality's Official Plan provides the vision for the future growth of the Municipality including areas identified for intensification. Further Projections for the urban area are referenced in Northumberland County's Municipal Comprehensive Review – Long-Term Growth Forecast and Urban Land Needs Analysis which projects growth for the urban area up to 2051. The Official Plan is supported by the Development Charges Study and Wastewater Rate Study to ensure that wastewater services will be available to support future growth.

In addition to the growth and enhancement objectives of the Municipality's master plans, asset management planning also needs to consider the Climate Action Plan goals for both resiliencies to changing climate and reduction of greenhouse gas emissions. Existing assets must be maintained, and new assets brought into service, to meet these various growth and service enhancement objectives.

Lifecycle Management and Risk

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

In developing the Wastewater AMP, a preliminary estimate of future costs was generated based on the Municipality's budgeted 10-year capital forecast which, at this time, provides the best available information for generating this estimate. It was developed through a collaborative effort of Watson & Associates Economists Ltd. Combined with staff input that aligns with the Municipality's current decision-making and asset capital expenditure processes. The lifecycle activities that will be required over the 10-year period are based on the asset management strategies that currently captured in the Annual Capital and Operating Budget processes. For wastewater assets, this includes operational and maintenance strategies, asset management decision making, lifecycle cost and value optimisation, options analysis, ageing assets strategy, non-infrastructure solutions, capital investment planning, condition assessment programs, as well as consideration of water service impacts and impacts to other services.

The Municipality applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets but are generally based on the

importance of each asset in terms of service delivery/ continuity and the number of users who could be impacted.

Wastewater Collection Linear

Category	Frequency
Inspection and Condition Assessment	The Municipality uses its CCTV equipment to inspect the wastewater collection system (including wastewater mains and maintenance holes) and assign a Quick Score Rating (Q.S.R.) to each sewer segment based on the NASSCO Pipeline Assessment Certification Program. This methodology assigns each segment of sewer a Q.S.R. based on defects, with a Q.S.R. of 1 being the least severe and a Q.S.R. of 5 being the most severe representing sewers with major structural defects and failures.
Major Lifecycle Activities - Operating	**Flushing program** – Municipal staff perform regular flushing of wastewater mains using a rented vacuum truck (rented for approximately 4 months per year and shared with the Roads department). Wastewater mains get flushed on a 4–5-year cycle, aligned with the CCTV inspection program noted above. **Lateral repairs** – the Municipality performs inspections of service laterals in response to service requests received from the public. Furthermore, the Municipality maintains a list of properties that are known trouble spots and inspects the respective laterals semi-annually. Where it is determined that maintenance is not an option, a replacement would be undertaken. Lateral repairs that are not addressed through broader capital projects are funded out of the operating budget. Historically, the Municipality has performed on average approximately 12 lateral repairs annually. **Lateral inspection ports** – The Municipality has been installing clean-out inspection ports at the property line to facilitate above-ground maintenance (e.g., if there is ever need for inspection, flushing or rodding). Approximately 6 to 12 cleanout inspection ports are installed on an annual basis. **Maintenance hole adjustments** – Municipal staff perform adjustments on an as-needed basis (i.e., if the maintenance hole cover has significantly raised or sunk).
Major Lifecycle Activities - Capital	Wastewater main replacements are completed as needed and, where possible, are aligned with other asset replacements through a coordinated reconstruction program. Replacements of wastewater mains typically include replacement of maintenance holes and wastewater services to the property line. For long-term capital planning purposes and budgeting, wastewater mains are assumed to have a useful life of 75 years, with a relining taking place part-way through the lifecycle, around age 40-50.
Identification of Short-term Priorities	The Municipality developed a 10-year forecast of lifecycle activities as part of the 2020 Water & Wastewater Rate Study. The forecast contained in the Water & Wastewater Rate Study is the basis for developing annual capital budgets and is supplemented with priorities that are identified through ongoing operations.
Growth-related	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service. The

Category	Frequency
Lifecycle Needs	growth-related capital investments related to wastewater mains include various main upgrades and new inspection equipment which are summarized in the Municipality's development charges background study.

Wastewater Facilities

Lifecycle Activities	Frequency
Inspections and Condition Assessment	Condition assessments completed to review the condition of the various existing assets and systems at each facility and identify current and longer-term needs based on asset lifecycles. Recently completed assessments include: • Port Hope Wastewater Treatment Plant Condition Assessment and Needs Study (January 2020) • Mill Street Wastewater Pumping Station Condition Assessment and Needs Study (December 2019) • AON Wastewater Pumping Station Condition Assessment and Needs Study (December 2019) • Hope Street Wastewater Pumping Station Condition Assessment and Needs Study (August 2019)
Major Lifecycle Activities - Operating	Preventative maintenance activities for equipment are scheduled and completed routinely along with other lifecycle replacement needs.
Major Lifecycle Activities - Capital	Lifecycle replacements and rehabilitations of facility components are completed as needed. For long-term capital planning purposes and budgeting, some facilities have been broken down into major facility components that are assigned useful lives ranging from 20 years for mechanical and electrical elements to 50 years for structural elements. Other facilities have not yet been broken down into major components and are planned for using an overall useful life of 50 years.
Identification of Short-term Priorities	The Municipality maintains a 10-year capital plan for wastewater facilities that was developed and is updated with input from the following sources: • Input from Municipal staff with respect to projects that are required to address operational-level items or provide continuity of ongoing maintenance programs • Condition assessment reports • Long-term asset planning for facilities that may require major lifecycle rehabilitation within a 10-year planning period.
Growth-related	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service. The growth-related capital investments related to wastewater facilities include pumping

Lifecycle Activities	Frequency
Lifecycle Needs	station upgrades and are summarized in the Municipality's development charges background study which is updated every five years.

The Municipality continues to invest in maintaining infrastructure and has been increasing its capital investments to align with long-range forecasts available in the 2016 AMP, Development Charges Study and Water & Wastewater Rate Study. The Municipality's existing funding model incurs an annual shortfall to maintain critical infrastructure in a state of good repair. There are annual contributions to the Asset Management Reserve to increase the current funding model. Changes will again impact the financing strategy when the new service levels are defined in the next version of the asset management plans, which are due in 2025.

Annual Reinvestment required based on Lifecycle Management Strategy costs

Asset Category	Quantity	Unit of Measure	Replacement Cost	Average Annual Lifecycle Cost (Capital)	Average Annual Lifecycle Cost as % of Replacement Cost	2016 Canadian Infrastructure Report Card Reinvestment Rate – Low Target	2016 Canadian Infrastructure Report Card Reinvestment Rate – High Target	Annual Reinvestment Rate based on Useful Life Analysis
Wastewater Linear	82	km	$123,605,787	$2,359,119	1.9%	1.0%	1.3%	
Wastewater Facilities	5	each	$65,143,000	$1,872,151	2.9%	1.7%	2.5%	2.9%
Wastewater Maintenance Structures	1,163	each	Incl. with linear	Incl. with linear				

Improvement and Monitoring Plan

Based on the snapshot of current conditions and existing plans presented in the Wastewater AMP, areas of potential improvement include:

- Asset information and data quality
- Condition data tracking and asset valuation
- Lifecycle renewal needs forecasting
- Climate change resiliency
- Equity and inclusion

The Wastewater AMP will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the plan.

More Information

For more information about asset management, or to learn more about the Municipality's Asset Management Program, please visit porthope.ca.

Appendix 1
Wastewater Asset Management Plan
Facilities and Collection System

MUNICIPALITY OF
PORT HOPE
WORKS & ENGINEERING

N

Highway of Heroes
Toronto Rd
Jocelyn St
UNION CEMETERY
GANARASKA REGION CONSERVATION AREA
WLADYKE PARK
TOWN AGRICULTURAL PARK
KING'S FIELD PARK
PORT HOPE GOLF AND COUNTRY CLUB
Fort Hope
Peter St

Legend

- Wastewater Facilities
- Maintenance Structure
- Gravity Main
- Forcemain

Quadrant

- 1
- 2
- 3
- 4

0 0.25 0.5 1 Kilometers

MUNICIPALITY OF
PORT HOPE
WORKS & ENGINEERING

STORM WATER

Asset Managment Plan • May 2022

Version 1.1

Contents

Introduction

Background

Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure requires all municipalities to prepare baseline asset management plans for their core municipal infrastructure assets supporting the delivery of drinking water, wastewater, stormwater, and transportation. The Municipality of Port Hope has a developing Asset Management program that is advancing and refining a clear picture of its infrastructure assets and maintaining them responsibly, balancing affordability, risk, and service levels. The Provincial regulation requires the Municipality shift its reporting slightly to present the cost of maintaining all core assets in their present state, with no changes to the service level, for the next 10 years.

To meet the Provincial requirements, the Municipality of Port Hope has created this first version of its **Stormwater Asset Management Plan (Stormwater AMP)**. It reports the current state of the assets, levels of service provided, strategies, and activities applied by the Municipality, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making.

Asset Categories and Types

The Stormwater AMP satisfies the Provincial requirements for stormwater management assets that relate to the collection, transmission, treatment, retention, infiltration, control or disposal of stormwater. These assets enable and support the collection and conveyance of water to watercourses in all parts of the Municipality whether in the urban or rural area. Snow melt and runoff are contained or controlled to protect properties, roads and local waterways from flooding and erosion and also to mitigate water quality impacts to the natural environment.

Stormwater Asset Categories and Types

Stormwater Main

Storm mains are designed to convey flows during the most frequent rainfall events and are designed for a certain magnitude of storm events and thus make up what is called the “minor” drainage system

Overland Drainage System

Flows that exceed the capacity of the storm sewers are conveyed along the ground surface (i.e. “overland”). The overland system makes up what is called the “major” **drainage system** since it conveys flows in excess of the minor system during larger magnitude, infrequent storm events. This system is made of swales and ditches with minor culverts.

Maintenance Holes

The purpose of a **storm Maintenance Hole** is to allow for a human access point at certain intervals of a storm drainage system for inspection and maintenance purposes.

Catch Basins

A **catch basin** is, in other words, a storm drain. They are used to redirect water to prevent flooding and are common on public streets. Catch basins collect rainwater or melted snow and transport it to an outfall reservoir.

Oil / Grit Separators

An **oil / grit separator** is designed to protect waterways from hazardous material spills and stormwater pollution, including suspended sediment, free oils, and other pollutants that attach to particles.

Stormwater Management Facility

A **stormwater management facility** is a man-made infrastructure built to gather rainfall and surface water runoff. Stormwater runs off of our roads, driveways, sidewalks and throughout our community collecting dirt, litter and other pollutants before draining into the stormwater facility. Sand, dirt, silt and other sediments that pollutants attach themselves to settle to the bottom of the facility. Cleaner water leaves the stormwater facility and flows into our watercourse.

State of Local Infrastructure

Inventory and Valuation

The assets covered in the Stormwater AMP have a replacement value of approximately **$95.93 million**. This includes an inventory of over 66 kilometers of stormwater mains, 639 maintenance holes, 1,820 catch basins, 5 oil/grit separators and 6 stormwater management facilities. The length and condition data contain assumptions based on area infrastructure and will be a focus for data improvement in the coming years. The length of road-side ditches is being collected and will be reported in the 2025 update.

	Stormwater Collection	Stormwater Management Facility
Inventory	• **66 kilometers of stormwater main** • **639 maintenance holes** • **1,820 catch basins** • **5 Oil/Grit Separators** • **Road-side ditches (TDB)**	• 6 Stormwater Management Facility (5 permanent/1 temporary)
Replacement Costs	**$92,824,390**	**$3,108,000**

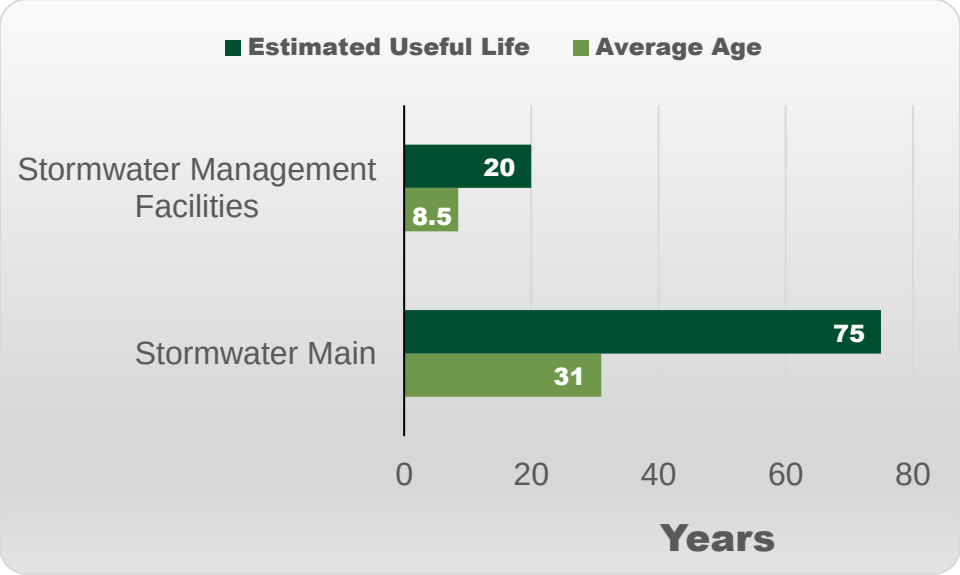
Replacement costs for stormwater collection are based on benchmark project pricing from tenders received for 2022 capital works and are inclusive of administrative costs, removal, materials and labour. These costs are very similar to the wastewater unit costs used in the 2019 Wastewater Rate Study. In correlation to the other asset classes the Stormwater AMP replacement costs can be related to the table below.

Asset Class	Quantity	Unit	Historical Cost	Replacement Value	Historical (3 year) average of actual annual replacement	Required Annual Lifecycle Cost	Average annual Lifecycle Cost as % of Replacement Cost
Bridges & Culverts	20	Each	$7.23 million	$55.68 million	0	$1.13 million	2%
Water Facilities	5	each	$24.40 million	$48.27 million	$0.41 million	$1.61 million	3%
Wastewater Facilities	6	each	$40.22 million	$65.14 million	$0.13 million	$1.87 million	3%
Other Facilities	35	each	$29.62 million	$58.98 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Water Linear	96	km	$30.56 million	$139.16 million	$1.79 million	$1.86 million	2%
Wastewater Linear	83	km	$17.86 million	$123.60 million	$1.36 million	$2.36 million	2%
Transportation Services	690	km	$49.27 million	$321.73 million	$1.14 million	$8.04 million	2%
Storm Sewer Linear	**66**	**km**	**$17.53 million**	**$92.32 million**	**$0.34 million**	**$1.89 million**	**2.7% for SWMF & 2.0% for linear**
Equipment	140	each	$2.59 million	$3.19 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Land Improvements	208	each	$9.21 million	$14.90 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Technology	29	each	$2.52 million	$2.93 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Vehicles	158	each	$11.68 million	$14.26 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Totals			**$242.68 million**	**$940.17 million**	**$5.18 million**	**$18.74 million**	

Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age and condition ratings for stormwater management facilities are being calculated from the last major maintenance activity. Where construction dates were unavailable in our inventories and GIS mapping, construction dates have been assumed to correspond with other proximate buried linear infrastructure.

Average Age of Stormwater Management Facilities & Storm Main



Condition Collection

The Municipality has recently begun assessing the condition of its stormwater collection assets on a regular basis using a variety of techniques, as summarized in the table below.

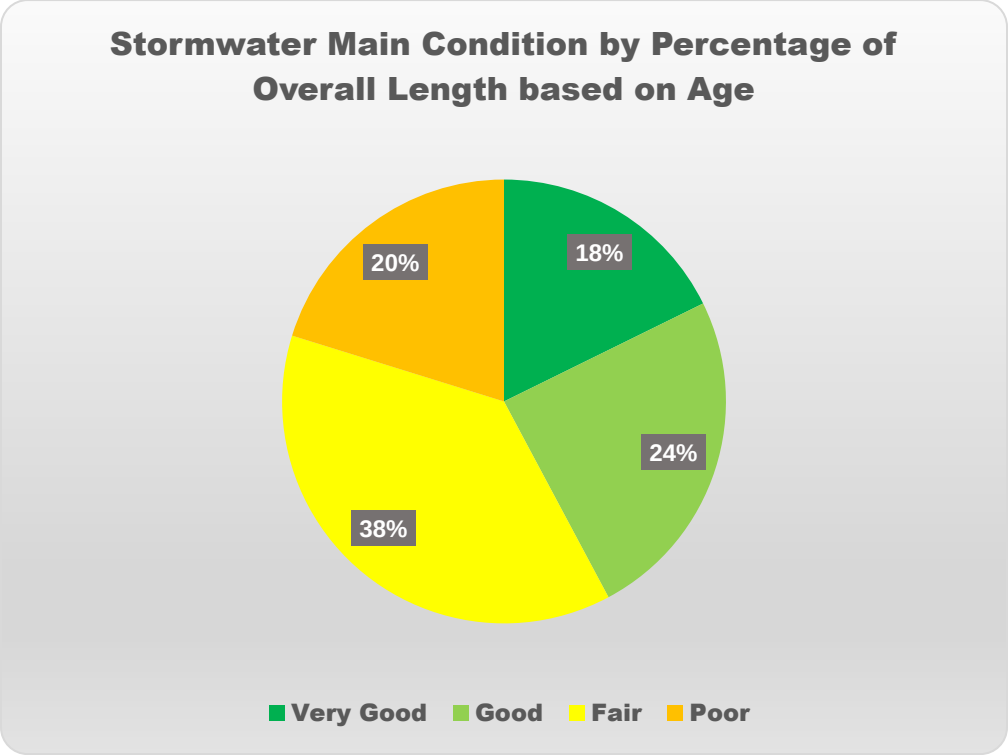
Asset Category	Condition Data Collection Techniques	Frequency
Stormwater Main	Closed Circuit TV inspection (1st in 2022)	The system is broken into four quadrants. One quadrant is inspected annually. Additional inspections occur dependent on level of risk.
Maintenance Holes	Visual inspection and condition assessment of structural components	The system is broken into four quadrants. One quadrant is inspected annually. Additional inspections occur dependent on level of risk.
Catch basins	Visual inspection and condition assessment of structural components	The system is broken into four quadrants. One quadrant is inspected annually. Additional inspections occur dependent on level of risk.
Oil/Grit Separators	Visual inspection and sediment depth measurement	Once per year
Road-side ditches	Inspection is carried out when reactive ditch cleaning work is requested	Varies (typically reactive)
Stormwater Management Facilities	Environmental Compliance Approval compliant major and minor inspections, ongoing infiltration monitoring	Once per year

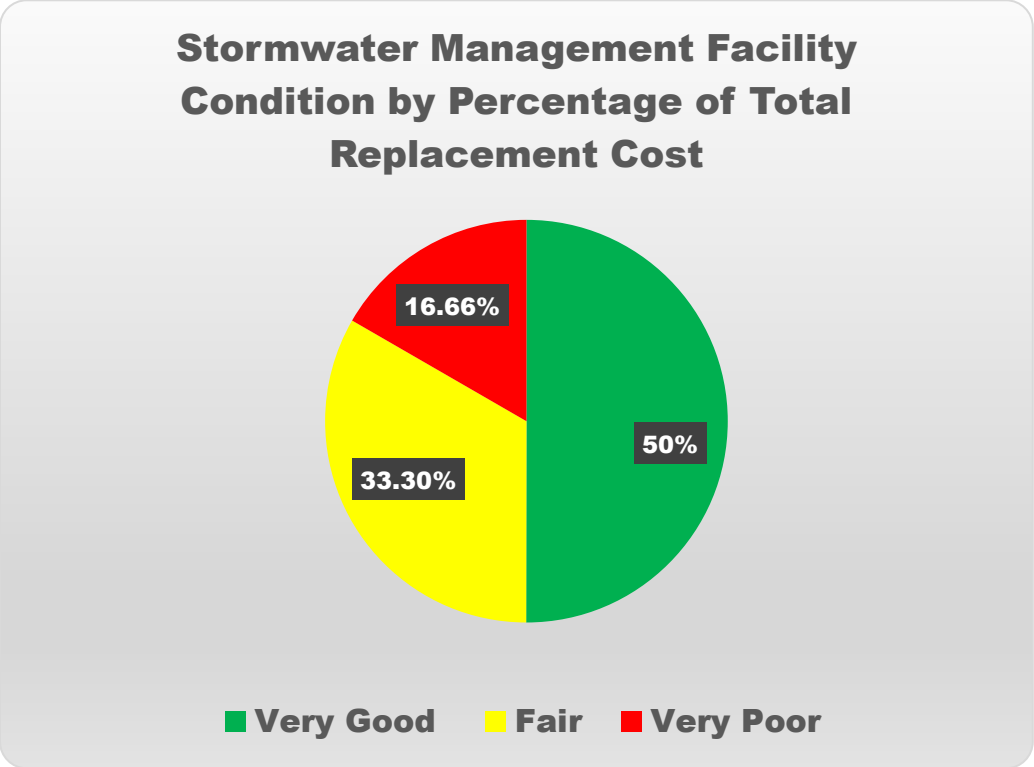
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from “Very Good” to “Very Poor” as shown in the table below.

Stormwater Condition Indices

Rating	Rating Description	Remaining Useful Life	Condition Index for Linear (probability of failure)
Very Good	**Very Good – Fit for Future** Well maintained, good condition, new or recently rehabilitated	80-100%	5
Good	**Good – Adequate for Now** Acceptable, generally in mid stage of expected service life	60-79%	4
Fair	**Fair – Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies	40-59%	3
Poor	**Poor – Increasing potential of affecting service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-39%	2
Very Poor	**Very Poor – Unfit for Sustained Service** Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.	0 to 19%	1

The overall condition of stormwater assets is Good and a breakdown for the various asset types is shown in the figures below.


Stormwater Main Condition by Percentage of Overall Length based on Age
18%
24%
38%
20%
Very Good
Good
Fair
Poor


Stormwater Management Facility Condition by Percentage of Total Replacement Cost
16.66%
50%
33.30%
Very Good
Fair
Very Poor

Levels of Service

The State of the Infrastructure section of the asset management plan provides an overview of the capital assets that support provision of the Municipality's services. The information presented in that section includes asset quantities, replacement cost valuation, age, and condition.

Physical condition of the assets is not sufficient to comprehensively capture the levels of service provided by the Municipality. To cover aspects of services not directly linked to asset condition, a broader levels of service framework has been developed. The levels of service framework presented in this section of the asset management plan contains the following elements:

- Service attributes which identify relevant aspects or characteristics of a service.
- Level of service statements which describe service attributes from a non-technical point of view.
- Performance measures which enable quantitative measurement to support the level-of-service statements.

For each performance measure, the current performance is reported. The Municipality will track and report on the current performance on an annual basis. In the future, targets for each performance measure will be chosen that balance regulatory requirements, the needs/expectations of service users, and various external trends and pressures, with the cost of delivering the service.

Two sets of tables are provided in each of the following subsections. The first table identifies relevant service attributes and defines the community levels of service for each of those attributes. The service attributes are intended to capture all major aspects that are of interest to the users of a service. The community levels of service include qualitative information such as images of assets providing different levels of service and maps, as well as statements describing what the Municipality intends to deliver, generally described from the user's perspective. The second table describes the performance measure(s) connected to each of the service attributes and identifies the current performance for each performance measure.

The Stormwater AMP establishes preliminary level of service measures and the current level of service being provided. The measures align with both Municipal goals and Provincial requirements and recognize that stormwater assets should:

- Protect the public from surface flooding, basement flooding, overland flooding, and river flooding during storm events; and
- Protect receiving body water quality.

A future version of the Stormwater AMP will go a step further and include Municipal Council's target service levels for each measure and may include level of service measures to address other service attributes such as safety, sustainability and reliability.

The Municipality's stormwater management system is utilized in the collection of stormwater from rainfall and snowmelt. The main purposes of the stormwater system is to ensure the safe conveyance of stormwater to avoid the flooding of properties, the safe conveyance of stormwater away from roadways, the mitigation of pollution caused by stormwater runoff, the volume control of stormwater discharge into the environment to lessen the impacts of erosion and sediment deposit, and to mitigate the effects of climate change.

Community Qualitative Descriptions

Service Attribute	Community Levels of Service	Qualitative Description
Scope	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. *	The stormwater management system provides for the collection of stormwater within the Municipality in order to protect properties from flooding. The scope of the Municipality's stormwater system in the urban area is illustrated by the map in Appendix 1. The map (1) shows the geographical distribution of municipal stormwater mains, maintenance holes, catch basins, oil/grit separators, and stormwater management facilities. Road-side ditches will be included in the 2025 update.
Reliability	The Municipality seeks to ensure the reliable operation of its stormwater management system through regular monitoring and maintenance of its stormwater infrastructure.	

* Required by Ontario Regulation 588/17.
(1) See Appendix 1 for the map of the Stormwater Network.

Technical Metrics

Service Attribute	Performance Measure	2020-2021 Performance
Scope	Percentage of properties in the municipality resilient to a 100-year storm. *	0%
Scope	Percentage of the municipal stormwater management system resilient to a 5-year storm. *	32%
Reliability	The number of stormwater facility overflow events.	0
Reliability	Percentage of stormwater facility visually inspected during reporting period.	100%
Reliability	Percentage of stormwater facility inspected comprehensively within the past 5 years.	0% (The last comprehensive inspection was performed in 2016 and reported in 2017)
Reliability	Percentage of stormwater catch basins visually inspected and cleaned within the past 4 years.	100%
Reliability	Percentage of oil/grit separators visually inspected and cleaned annually.	100%
Reliability	Percentage of stormwater mains inspected with CCTV within the past 5 years.	1%

* Required by Ontario Regulation 588/17.

Asset Management Strategy

Practices, Procedures and Tools

The Municipality has well-established overall principles, framework and decision-making approaches for asset management, and these are presented in the 2016 Asset Management Plan. They provide a holistic approach to asset management as demonstrated by the capital investment prioritization process that drives the decision-making towards meeting the desired levels of service at the lowest lifecycle cost.

Future Demand and Service Enhancement

Port Hope's population is expected to increase to 20,850 people by 2029, an increase of 17.31% over the next 7 years. The Municipality's Official Plan provides the vision for the future growth of the Municipality including areas identified for intensification. Further projections for the urban area are referenced in Northumberland County's Municipal Comprehensive Review – Long-Term Growth Forecast and Urban Land Needs Analysis which projects growth for the urban area up to 2051. The Official Plan is supported by the Development Charges Study. These strategic documents assist the Municipality to ensure that stormwater services will be available to support future growth.

In addition to the growth and enhancement objectives of the Municipality's master plans, asset management planning also needs to consider the Climate Action Plan goals for both resiliencies to changing climate and reduction of greenhouse gas emissions. Existing assets must be maintained, and new assets brought into service, to meet these various growth and service enhancement objectives.

Lifecycle Management and Risk

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

In developing the Stormwater AMP, a preliminary estimate of future costs was generated based on the preliminary forecast to support events occurring throughout the lifespan of the asset, at this time, this provides the best available information for generating this estimate. It was developed through a collaborative effort of Watson & Associates Economists Ltd. combined with staff input that aligns with the Municipality's current decision-making and asset capital expenditure processes. The lifecycle activities that will be required over the 10-year period are based on the asset management strategies that are currently captured in the Annual Capital and Operating Budget processes. For stormwater assets, this includes operational and maintenance strategies, asset management decision making, lifecycle cost and value optimisation, options analysis, ageing assets strategy, non-infrastructure solutions, capital investment planning, condition assessment programs, as well as consideration of mobility impacts and impacts to other services.

The Municipality applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets but are generally based on the

importance of each asset in terms of service delivery/ continuity and the number of users who could be impacted.

Stormwater Mains

Category	Frequency
Inspection and Condition Assessment	In 2022, the Municipality began using its CCTV equipment to inspect the stormwater collection system (including stormwater mains and maintenance holes) and assign a Quick Score Rating (Q.S.R.) to each asset based on the NASSCO Pipeline Assessment Certification Program. This methodology assigns each segment of sewer a Q.S.R. based on defects, with a Q.S.R. of 1 being the least severe and a Q.S.R. of 5 being the most severe representing sewers with major structural defects and failures. Once the whole system has been assigned a Q.S.R. the mains will be reported using this method.
Major Lifecycle Activities - Operating	Flushing program – In 2021, Municipal staff started performing regular flushing of stormwater mains using a rented vacuum truck (rented for approximately 4 months per year and shared with the Wastewater division The Municipality is aiming to flush the stormwater mains on a 4–5-year cycle, aligned with the CCTV inspection program noted above. All catch basins were flushed, cleaned and inspected in 2019/20. Moving forward, they will be addressed on a rotating 4–5-year rotating schedule, in alignment with the stormwater main flushing and inspection program. Maintenance hole adjustments – Municipal staff perform adjustments on an as-needed basis (i.e., if the maintenance hole cover has significantly raised or sunk).
Major Lifecycle Activities - Capital	Stormwater main replacements are completed as needed and, where possible, are aligned with other asset replacements through a coordinated reconstruction program. Replacements of stormwater mains typically include replacement of related assets such as maintenance holes and catch basins. For long-term capital planning purposes and budgeting, stormwater mains are assumed to have a useful life of 75 years, with a relining taking place part-way through the lifecycle, around age 40-50.
Identification of Short-term Priorities	Generally, stormwater assets are replaced as they fail. However, the coordinated reconstruction program developed as part of the 2020 Water & Wastewater Rate Study includes a plan for reconstructing roads and replacing stormwater infrastructure. The forecast contained in the Water & Wastewater Rate Study is the basis for developing annual capital budgets and is supplemented with priorities that are identified through ongoing operations.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality may result in incremental service demands that may impact the current level of service for stormwater. The growth-related capital investments related to stormwater mains have not been identified to date, however, stormwater main improvements may be addressed as needed through road reconstruction projects.

Stormwater Management Facilities

Category	Frequency
Inspection and Condition Assessment	The Municipality completed an assessment of the six stormwater management facilities in 2016 and is planning to update the formal condition assessment every 10 years.
Major Lifecycle Activities - Operating	**Visual inspections –** Municipal staff perform visual inspections of the stormwater management facilities annually. The Municipality's roads team inspects the underground storage reservoir approximately every three months. **Vegetation control –** Municipal staff complete maintenance activities related to vegetation control at each facility throughout the year.
Major Lifecycle Activities - Capital	Lifecycle rehabilitation of stormwater facilities is performed as needed, guided by the recommendations identified through condition assessments. For long-term capital planning purposes and budgeting, stormwater facilities were assumed to require dredging every 20 years and the underground storage reservoir is assumed to have a useful life of 75 years.
Identification of Short-term Priorities	The Municipality developed a prioritized list of lifecycle activities for the six stormwater facilities as part of the condition assessment completed in 2016. The list of recommendations developed through the 2016 assessment is the basis for developing annual capital budgets, and is supplemented with priorities that are identified through ongoing operations.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality may result in incremental service demands that may impact the current level of service for stormwater. Stormwater management facilities are typically direct developer responsibility under the Municipality's local service policy. Therefore, the Municipality does not have any known growth-related capital investments related to stormwater management facilities.

The Municipality continues to invest in maintaining infrastructure and has been increasing its capital investments to align with long-range forecasts available in the 2016 AMP, Development Charges Study and Water & Wastewater Rate Study. The Municipality's existing funding model incurs an annual shortfall to maintain critical infrastructure in a state of good repair. There are annual contributions to the Asset Management Reserve to increase the current funding model. Changes will again impact the financing strategy when the new service levels are defined in the next version of the asset management plans, which are due in 2025.

Annual Reinvestment required based on Lifecycle Management Strategy costs

Asset Category	Quantity	Unit of Measure	Replacement Cost	Average Annual Lifecycle Cost (Capital)	Average Annual Lifecycle Cost as % of Replacement Cost	2016 Canadian Infrastructure Report Card Reinvestment Rate – Low Target	2016 Canadian Infrastructure Report Card Reinvestment Rate – High Target
Stormwater Mains	66	Km	$92,324,390	$1,808,615	2.0%	1.0%	1.3%
Stormwater Maintenance Holes	639	each	incl. with mains	incl. with mains			
Catch Basins	1,820	each	incl. with mains	incl. with mains			
Oil/Grit Separators	5	each	$500,000	$6,667	1.3%		
Road-side ditches	Future Update	Future Update	Future Update	Future Update	Future Update	Future Update	Future Update
Stormwater Management Facilities	6	Each	$3,108,000	$ 84,305	2.7%	1.7%	2.0%

Improvement and Monitoring Plan

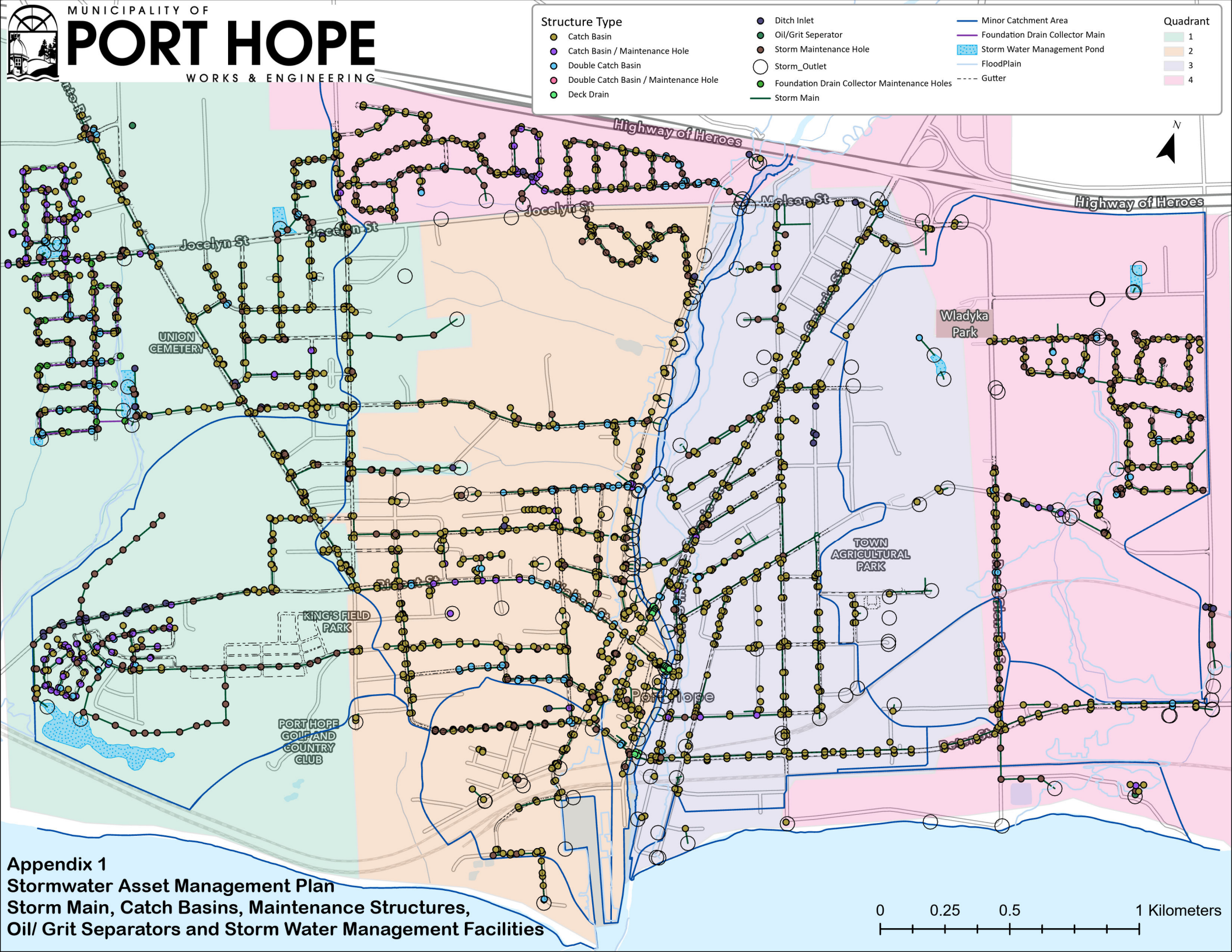
Based on the snapshot of current conditions and existing plans presented in the Stormwater AMP, areas of potential improvement include:

- Asset information, data quality, identify data gaps and record keeping
- Cost estimating
- Level of service measures and targets
- Lifecycle renewal needs forecasting
- Climate change resiliency
- Equity and inclusion

The Stormwater AMP will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the plan.

More Information

For more information about asset management, or to learn more about the Municipality's Asset Management Program, please visit porthope.ca.



Appendix 1
Stormwater Asset Management Plan
Storm Main, Catch Basins, Maintenance Structures,
Oil/ Grit Separators and Storm Water Management Facilities

MUNICIPALITY OF
PORT HOPE
WORKS & ENGINEERING

TRANSPORTATION

Asset Managment Plan • May 2022

Version 1.1

Contents

Introduction

Background

Ontario Regulation 588/17: Asset Management Planning for Municipal Infrastructure requires all municipalities to prepare baseline asset management plans for their core municipal infrastructure assets supporting the delivery of drinking water, wastewater, stormwater, and transportation. The Municipality of Port Hope has a developing Asset Management program that is advancing and refining a clear picture of its infrastructure assets and maintaining them responsibly, balancing affordability, risk, and service levels. The Provincial regulation requires the Municipality shift its reporting slightly to present the cost of maintaining all core assets in their present state, with no changes to the service level, for the next 10 years.

To meet the Provincial requirements, the Municipality of Port Hope has created this first version of its **Transportation Asset Management Plan (Transportation AMP)**. It reports the current state of the assets, levels of service provided, strategies, and activities applied by the Municipality, historical and forecasted financial details, and potential improvement actions. It is a strategic document that provides a snapshot of current conditions and establishes a basis for future asset management planning and decision making.

Asset Categories and Types

The Transportation AMP satisfies the Provincial requirements for our roads, bridges, and culverts; and also includes other assets that support transportation services. These assets enable and support the movement of people and goods across the municipality in both urban and rural areas. (Assets that support public transit will be covered in a separate, future asset management plan.)

Transportation Asset Categories and Types

Arterial Urban

Arterial Semi-Urban

Arterial Rural

Arterial roads shall have a minimum right-of-way width of 26 metres for 2 lanes and 30 metres for 4 lanes and are designed to facilitate high levels of trip making to and from major trip-generating sectors.

Collector Urban

Collector Semi-Urban

Collector Rural

Collector roads, are existing and proposed roads with a minimum of 2 traffic lanes and a right-of-way width of 23 to 26 metres, which are designed to collect and carry local traffic to, and from the arterial roads and to provide access to land.

Local Urban

Local Semi-Urban

Local Rural

Local roads are either existing or proposed roads with 2 traffic lanes that are designed primarily to provide access to land. The right-of-way width for a local road shall generally be 20 metres. In newer subdivision proposals, consideration shall be given to allowing local roads with rights-of-way less than 20 metres wide. Local roads should be designed to discourage the movement of through traffic and carry low traffic volumes at low speeds such that the quality of life along the road is good. Notwithstanding the above comments, all roads servicing industrial areas shall have a minimum right-of-way width of 26 metres.

Bridges

A **bridge** is classified as an overland structure carrying a road, footpath, or railroad across a river, ravine, road, railroad, or other obstacle

Large Diameter Culverts

Large Diameter Culverts are a buried structure which carries a road or footpath allowing water to traverse it's natural path. Often preferred to bridges for there economy, reduced maintenance and flexibility of alignment approaches, they are however restricted by significant volume or size of floating or other debris is anticipated.

Culverts

Culverts are a buried structure which carries a road or footpath while allowing stormwater to pass through.

Retaining Walls

Retaining walls are relatively rigid walls used for supporting soil laterally so that it can be retained at different levels on the two sides

Guiderails

Intended to steer and "guide" vehicles back onto the road, **guiderails** can be found throughout the Municipality due to the variances in elevation throughout the terrain

Streetlights

Used in areas of higher traffic volume or risk, a **streetlight** is a light usually mounted on a pole and constituting one of a series, spaced at intervals along the transportation system.

Traffic Control Signals

Traffic control signals are electronic devices that are designed to assign the right of way to the various traffic and pedestrian movements at an intersection

Pedestrian Concrete Sidewalks

Being a surfaced walkway, separated from the roadway, usually of concrete and following the existing ground surface (not at permanent grade), **sidewalks** are found in certain areas within the urban boundary.

State of Local Infrastructure

Inventory and Valuation

The assets covered in the Transportation AMP have a replacement value of approximately **$391.43 million**. This includes an inventory of over 59 lane kilometers of arterial roads, 151 lane kilometers of collector roads, 481 kilometres of local roads, 20 Bridges, 4 pedestrian bridges and 41 large diameter culverts, (medium culverts units, 4 retaining walls, 42 areas with guiderail that are being collected and will be reported in the 2025 update), and 69 kilometers of sidewalk.

	Roads	Bridges and Bridge Culverts
Inventory	**Arterial** • 27.8 lane kilometers of 2 lane rural • 7.4 lane kilometers of 2 lane semi-urban • 11.4 lane kilometers of 2 lane urban • 3.9 lane kilometers of 3 lane urban • 8.0 lane kilometers of 4 lane urban **Collector** • 99.8 lane kilometers of 2 lane rural • 16.6 lane kilometers of 2 lane semi-urban • 33.8 lane kilometers of 2 lane urban • 0.4 lane kilometers of 4 lane urban **Local** • 376.0 lane kilometers of 2 lane rural • 54.0 lane kilometers of 2 semi-urban • 50.6 lane kilometers of 2 lane urban	• 20 Bridges • 4 Pedestrian bridges • 41 Bridge Culverts
Replacement Costs	**$321,730,410**	**$55,675,000**

	Other Structures	Sidewalks
Inventory	• Medium Culverts • Retaining Walls • Guiderails • 1822 Streetlights • 8 Traffic Control Signals	• 69 kilometers of sidewalk
Replacement Cost	Units and Replacement costs will be included in the 2025 update for medium culverts, retaining walls and guiderails The 2016 AMP reported a replacement cost of:	**$9,371,182**

	Other Structures	Sidewalks
	$2,964,383 for 1654 streetlights and **$1,687,300** for the traffic control signals These will be reviewed in the 2025 update.	

Replacement costs for arterial and collector roads are based on benchmark costs for roads projects, as identified in Section 5.4.1 of the 2019 Development Charges Study. Local roads were added to complete the inventory analysis. Costs were adjusted to 2022 using Non-Residential Building Construction Price Index (NRBCPI).

Replacement costs for bridges and bridge culverts are based on Appendix A-2: Asset information Summary from the OSIM Inspection Report (HP Engineering, 2019). Replacement cost reflects current geometric standards (i.e., not existing geometry of the structure). Costs were adjusted to 2022 using the NRBCPI.

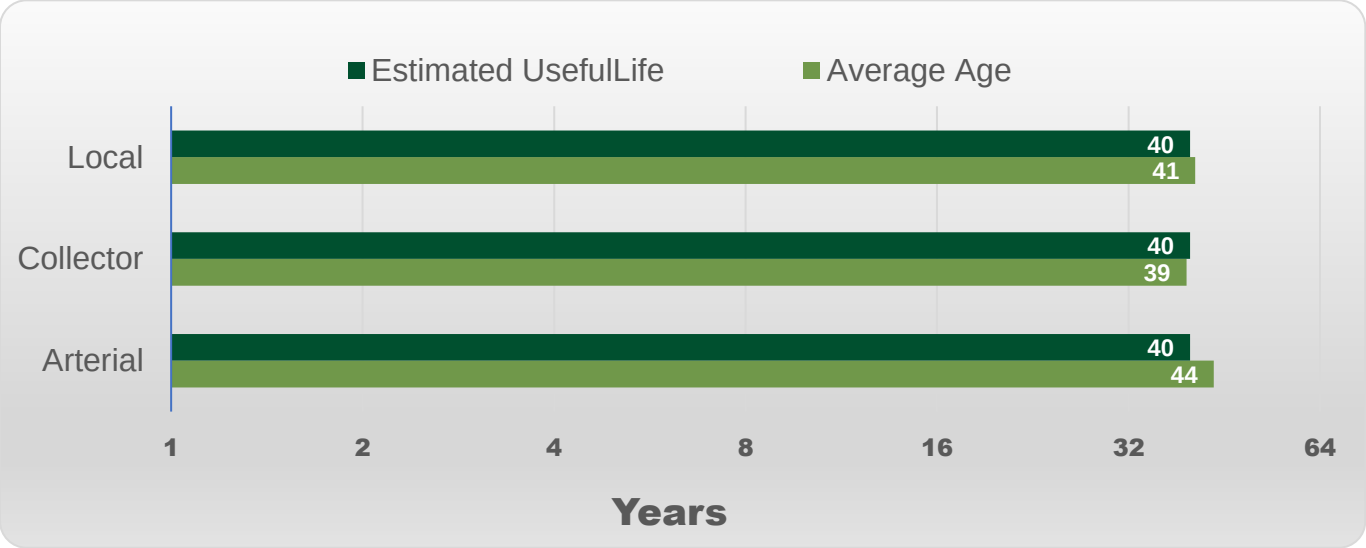
Replacement costs for sidewalks are based on benchmark project pricing from tenders received for 2022 capital works and are inclusive of removal, base aggregate, and concrete. In correlation to the other asset classes The Transportation AMP replacement costs can be related to the table below.

Asset Class	Quantity	Unit	Historical Cost	Replacement Value	Historical (3 year) average of actual annual replacement	Required Annual Lifecycle Cost	Average annual Lifecycle Cost as % of Replacement Cost
Bridges & Culverts	**20**	**each**	**$7.23 million**	**$55.68 million**	**0**	**$1.13 million**	**2%**
Water Facilities	5	each	$24.40 million	$48.27 million	$0.41 million	$1.61 million	3%
Wastewater Facilities	6	each	$40.22 million	$65.14 million	$0.13 million	$1.87 million	3%
Other Facilities	35	each	$29.62 million	$58.98 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Water Linear	96	km	$30.56 million	$139.16 million	$1.79 million	$1.86 million	2%
Wastewater Linear	83	km	$17.86 million	$123.60 million	$1.36 million	$2.36 million	2%
Transportation Services	**690**	**km**	**$49.27 million**	**$321.73 million**	**$1.14 million**	**$8.04 million**	**2%**
Storm Sewer Linear	66	km	$17.53 million	$92.32 million	$0.34 million	$1.89 million	2.7% for SWMP & 2.0% for linear
Equipment	140	each	$2.59 million	$3.19 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Land Improvements	208	each	$9.21 million	$14.90 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Technology	29	each	$2.52 million	$2.93 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Vehicles	158	each	$11.68 million	$14.26 million	TBD in next AMP update	TBD in next AMP update	TBD in next AMP update
Totals			**$242.68 million**	**$940.17 million**	**$5.18 million**	**$18.74 million**	

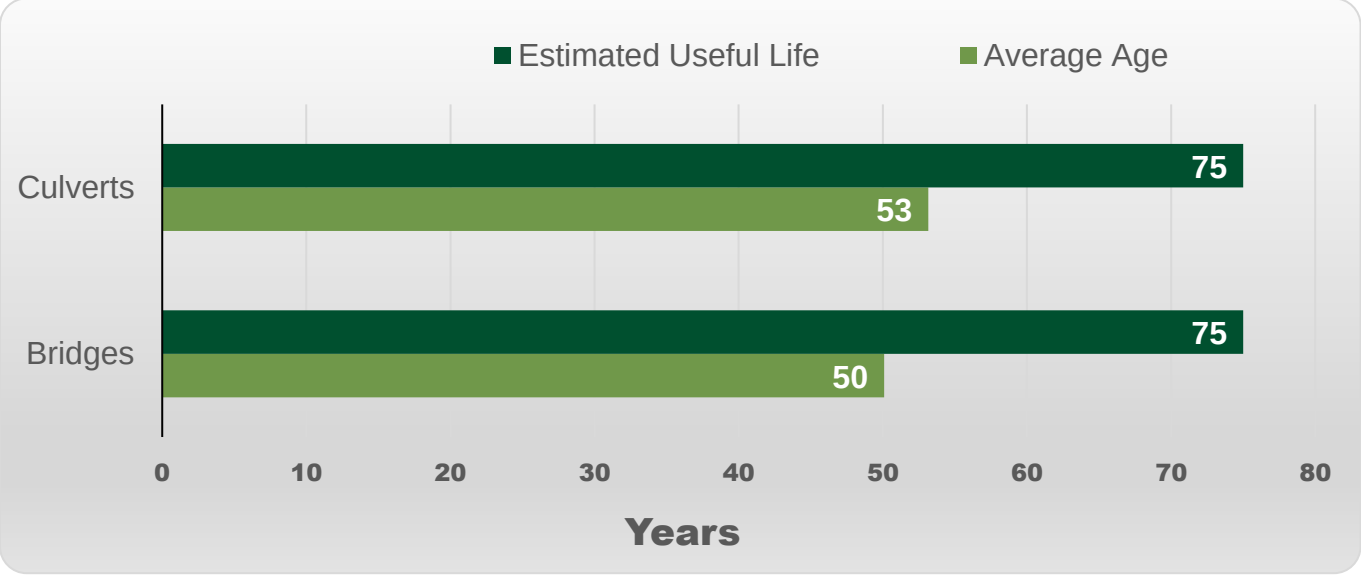
Age and Condition

The age of an asset gives a sense of how close it is to the end of its service life and what renewal interventions may be appropriate. The average age of the Municipality's road network, bridges and major culverts is shown in the figure below, however since construction, various assets have been renewed or otherwise maintained to ensure reliable operation. Where construction dates were unavailable in our inventories and GIS mapping, construction dates have been assumed to correspond with other proximate linear infrastructure.

Average Age of Roads



Average Age of Bridges and Large Diameter Culverts



Condition Collection

The Municipality assesses the condition of its Transportation assets on a regular basis using a variety of techniques, as summarized in the table below.

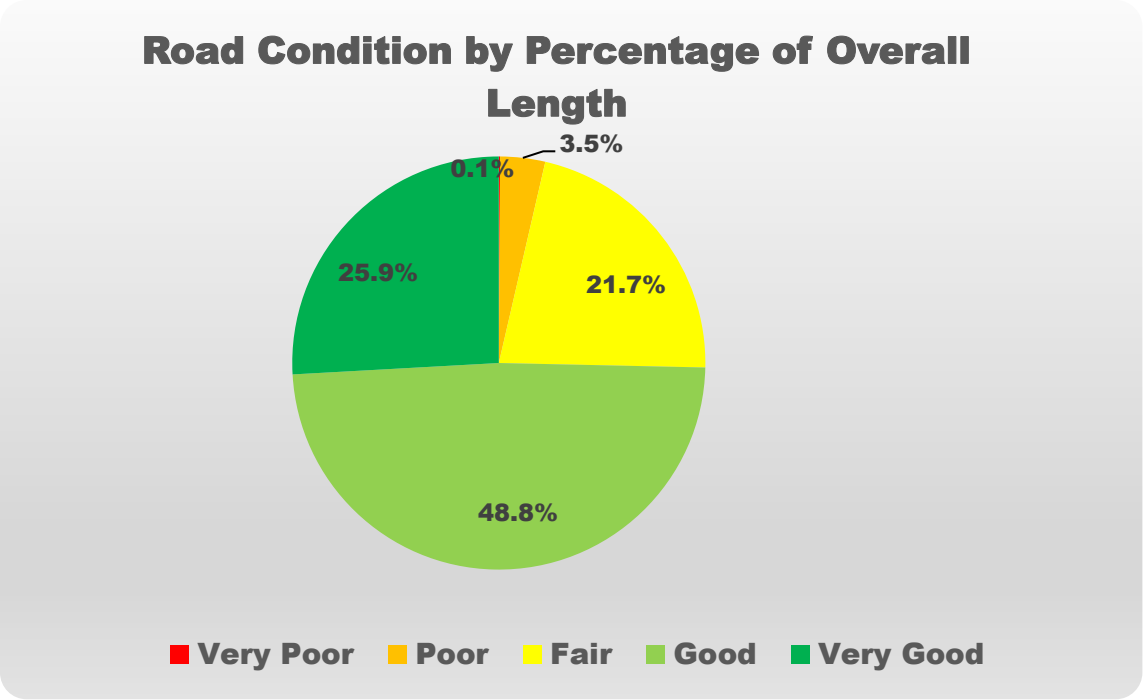
Asset Category	Condition Data Collection Techniques	Frequency
Paved Roads	1. Vehicle-mounted sensing technology is used to assess road conditions in normal traffic flow. The system utilizes its technology to determine the health of each street and to identify road defects including potholes, bumps, and cracking. This data helps the municipality to identify and prioritize where repairs are needed and to ensure that streets are kept in the best condition. 2. Staff also utilize Service Request data and Work order history. 3. Visual Inspection (Varies by Road Class)	1. Currently the scans have been completely every four years. 2. Varies 3. In accordance with O.Reg. 239/02: Minimum Maintenance Standards for Municipal Highways
Gravel Roads	Visual Inspection	In accordance with O.Reg. 239/02: Minimum Maintenance Standards for Municipal Highways
Bridges and Large Diameter Culverts	In compliance with Ontario Structure Inspection Manual requirements	Every two years.
Medium Culverts	Visual Inspection	Varies (typically reactive)
Guiderails	On-site visual inspection	Varies (typically reactive)
Sidewalks	detailed hazard/maintenance assessment	In accordance with O.Reg. 239 /02: Minimum Maintenance Standards for Municipal Highways

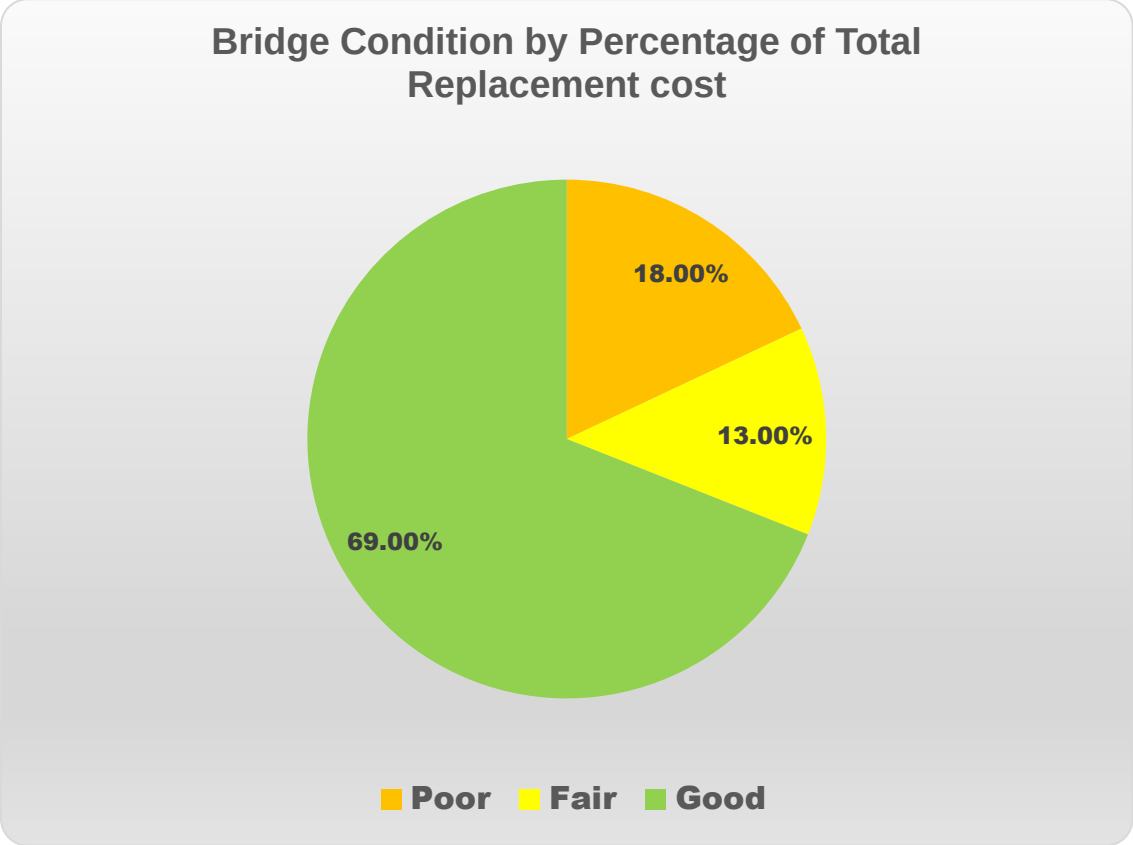
Based on condition data, supplemented by subject matter expert knowledge and professional judgment, the condition of assets is rated on a scale from “Very Good” to “Very Poor” as shown in the table below. The next update to the AMP in 2025 will summarize condition as weighted inclusive of medium culverts, guiderails, and sidewalks.

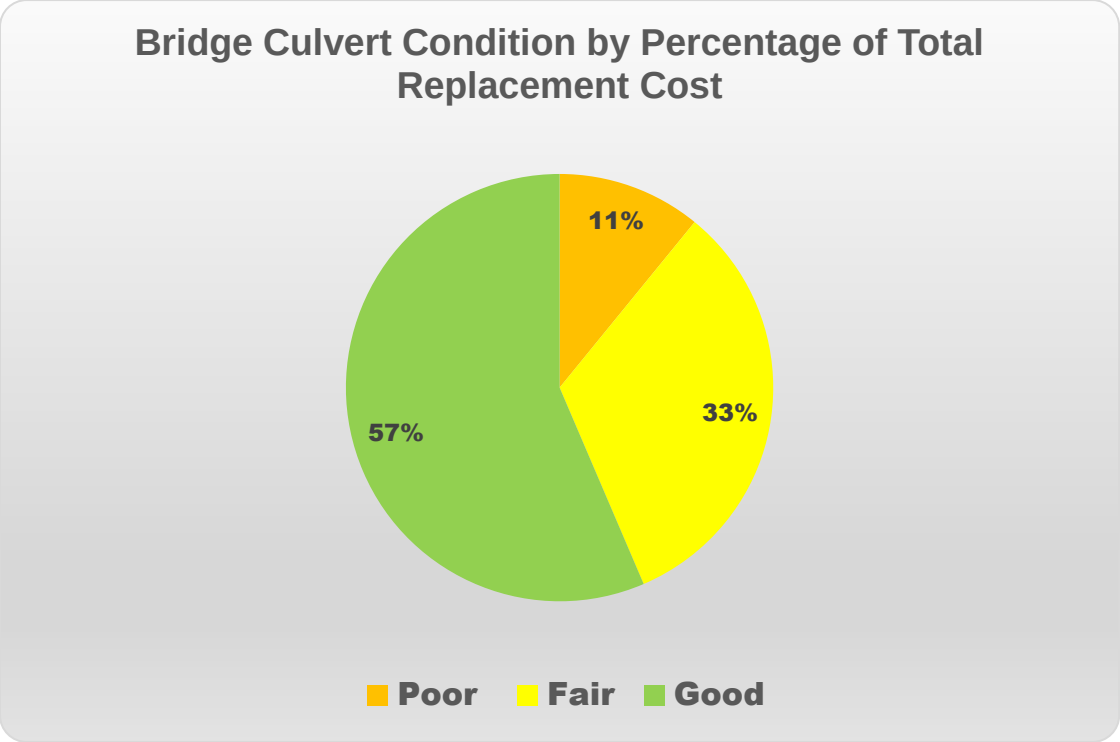
Transportation Condition Indices

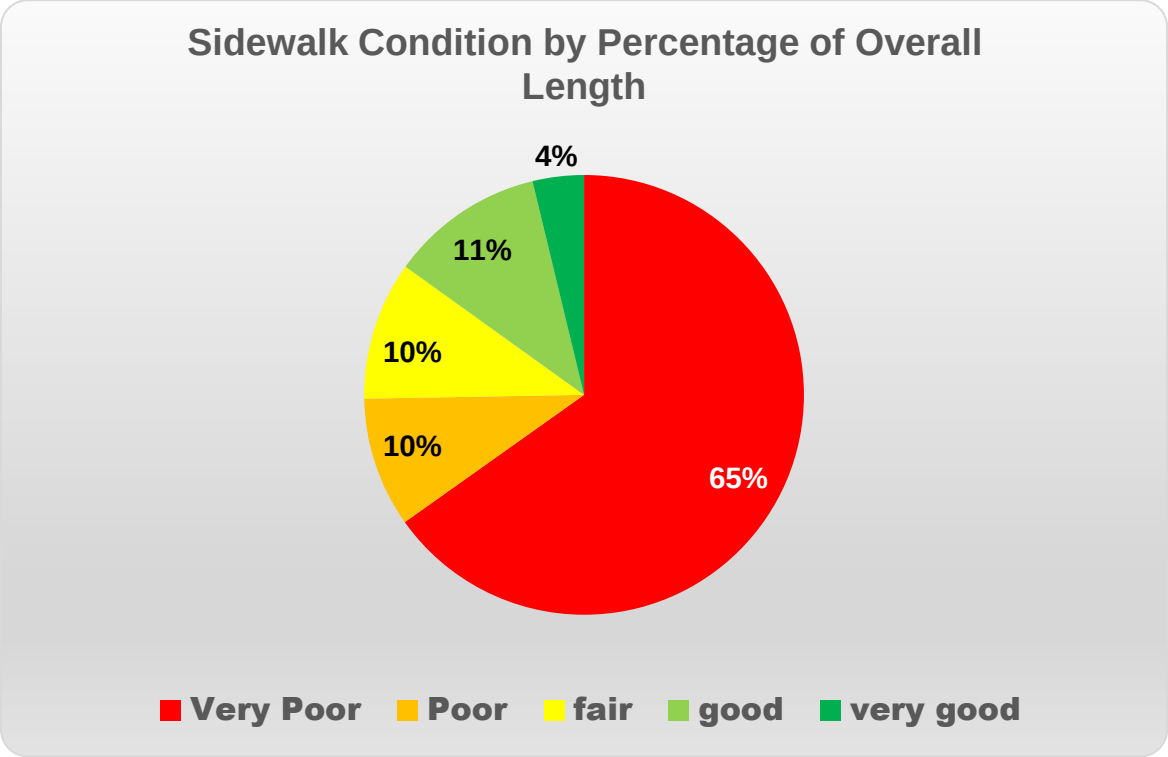
Rating	Rating Description	Pavement Condition Index (PCI) for Roads	Condition Index Bridges and Bridge Culverts	Sidewalks
Very Good	**Very Good – Fit for Future** Well maintained, good condition, new or recently rehabilitated	80-100		5
Good	**Good – Adequate for Now** Acceptable, generally in mid stage of expected service life	60-79	70 < BCI ≤ 100	4
Fair	**Fair – Requires Attention** Signs of deterioration, requires attention, some elements exhibit deficiencies	40-59	60 < BCI ≤ 70	3
Poor	**Poor – Increasing potential of affecting service** Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration	20-39	0 < BCI ≤ 60	2
Very Poor	**Very Poor – Unfit for Sustained Service** Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.	0 to 19		1

The overall condition of Transportation assets is Good and a breakdown for the various asset types is shown in the figures below.


Road Condition by Percentage of Overall Length
3.5%
0.1%
25.9%
21.7%
48.8%
Very Poor
Poor
Fair
Good
Very Good


Bridge Condition by Percentage of Total Replacement cost
18.00%
13.00%
69.00%
Poor
Fair
Good


Bridge Culvert Condition by Percentage of Total Replacement Cost
11%
33%
57%
Poor
Fair
Good


Sidewalk Condition by Percentage of Overall Length
4%
11%
10%
10%
65%
Very Poor
Poor
fair
good
very good

Levels of Service

The State of the Infrastructure section of the asset management plan provides an overview of the capital assets that support provision of the Municipality's services. The information presented in that section includes asset quantities, replacement cost valuation, age, and condition.

Physical condition of the assets is not sufficient to comprehensively capture the levels of service provided by the Municipality. To cover aspects of services not directly linked to asset condition, a broader levels of service framework has been developed. The levels of service framework presented in this section of the asset management plan contains the following elements:

- Service attributes which identify relevant aspects or characteristics of a service.
- Level of service statements which describe service attributes from a non-technical point of view.
- Performance measures which enable quantitative measurement to support the level-of-service statements.

For each performance measure, the current performance is reported. The Municipality will track and report on the current performance on an annual basis. In the future, targets for each performance measure will be chosen that balance regulatory requirements, the needs/expectations of service users, and various external trends and pressures, with the cost of delivering the service.

Two sets of tables are provided in each of the following subsections. The first table identifies relevant service attributes and defines the community levels of service for each of those attributes. The service attributes are intended to capture all major aspects that are of interest to the users of a service. The community levels of service include qualitative information such as images of assets providing different levels of service and maps, as well as statements describing what the Municipality intends to deliver, generally described from the user's perspective. The second table describes the performance measure(s) connected to each of the service attributes.

The Transportation AMP establishes preliminary level of service measures and the current level of service being provided. The measures align with both the Municipality's goals and Provincial requirements and recognize that transportation assets should provide:

- A road network that provides connectivity
- Bridges that support a wide range of users and vehicle types
- An active transportation network that is connected and accessible
- Streets and sidewalks, and pathways that offer safety, comfort and mobility for all users of the street regardless of their age, ability, or mode of transportation

- Roads and sidewalks that are clean and clear year round
- A low level of disruption to drivers, pedestrians and cyclists
- Roads, structures, sidewalks, pathways, and other assets that are kept in an acceptable state of repair
- Safe travel for all users
- A low level of greenhouse gas emissions

The Municipality owns and manages a variety of assets that support the provision of Transportation Services and that contribute to the overall level of service provided by the Municipality. These assets are summarized in the State of the Infrastructure section of the asset management plan. The focus for the time being has been placed on the level of service provided by the Municipality's roads and bridges, as these are considered core assets under Ontario Regulation 588/17 and must be included in the Municipality's asset management plan by July 1, 2022. The Municipality's Levels of Service framework for Transportation Services will be expanded over the coming years, to include all transportation assets that contribute in various ways to the overall level of service (e.g., sidewalks, retaining walls, guiderails, traffic signals, streetlights, signs and multi-purpose path).

Community Qualitative Descriptions

Service Attribute	Community Levels of Service	Qualitative Description
Scope	Description, which may include maps, of the road network in the municipality and its level of connectivity. *	The scope of the Municipality's Road network is illustrated by the map in Appendix 1 and 2. The maps show the geographical distribution of municipal roads by surface type and class and identifies locations of the municipality's bridges and structural culverts.
Scope	Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The Municipality's roads and bridges enable the movement of people and goods within and through the Municipality. In addition to passenger vehicles, the Municipality's roads and bridges also support public transit, commercial truck traffic, movement of agricultural equipment, and reliable emergency vehicle access to all areas of the Municipality. The broader transportation network also supports other transportation modes such as walking, cycling, and horseback riding.

Service Attribute	Community Levels of Service	Qualitative Description
Quality	Description or images that illustrate the different levels of road class pavement condition. *	The transportation network supports comfortable passage of vehicles. Example photos of roads in different condition states are shown in the tables below, respectively. A general description of how each condition state may affect the use of these assets is also provided in these figures.
Quality	Description or images of the condition of bridges and how this would affect use of the bridges.	The transportation network supports comfortable passage of vehicles. Example photos of bridges in different condition states are shown in the tables below, respectively. A general description of how each condition state may affect the use of these assets is also provided in these figures.
Quality	Description or images of the condition of culverts and how this would affect use of the culverts.	The transportation network supports comfortable passage of vehicles. Example photos of culverts in different condition states are shown in the tables below, respectively. A general description of how each condition state may affect the use of these assets is also provided in these figures.

* Required by Ontario Regulation 588/17.

(1) See Appendix 1 and 2 for maps of the Road Network.

Technical Metrics

Service Attribute	Performance Measure	2020-2021 Performance
Scope	Number of lane-kilometres of each of arterial roads, collector roads and local roads as a proportion of square kilometres of land area of the municipality. *	0.7% lane-km / km²
Scope	Number of lane-kilometres of collector roads as a proportion of square kilometres of land area of the municipality.	0.5% lane-km / km²
Scope	Number of lane-kilometres of local roads as a proportion of square kilometres of land area of the municipality.	1.8% lane-km / km²
Scope	Percentage of bridges in the municipality with loading or dimensional restrictions.	15%
Quality	For paved roads in the municipality, the average pavement condition index value.*	72
Quality	For unpaved roads in the municipality, the average surface condition (e.g. excellent, good, fair or poor).*	75
Quality	Percentage of paved roads with a PCI below 30	1%
Quality	For bridges in the municipality, the average bridge condition index value. *	75
Quality	For structural culverts in the municipality, the average bridge condition index value. *	69
Safety	Percentage of walking and cycling infrastructure that provides Low Traffic Stress	Future Measure
Sustainability	Community greenhouse gas emissions from transportation (kt CO2e)	Future measure

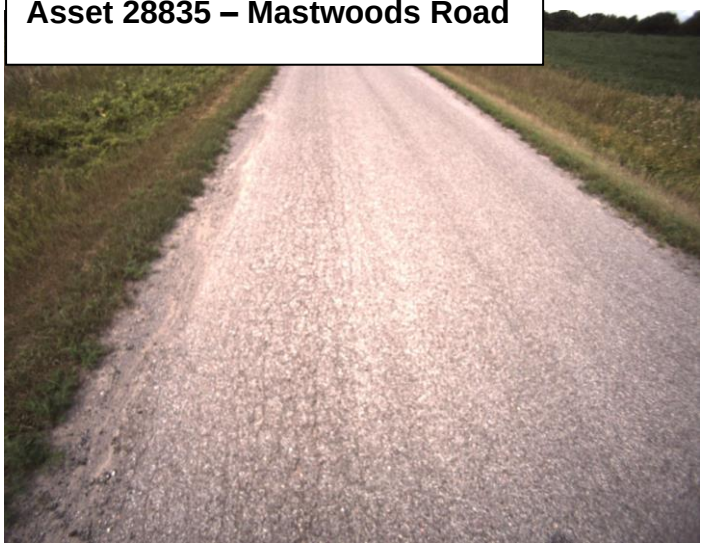
* Required by Ontario Regulation 588/17.

Levels of Road Class Condition

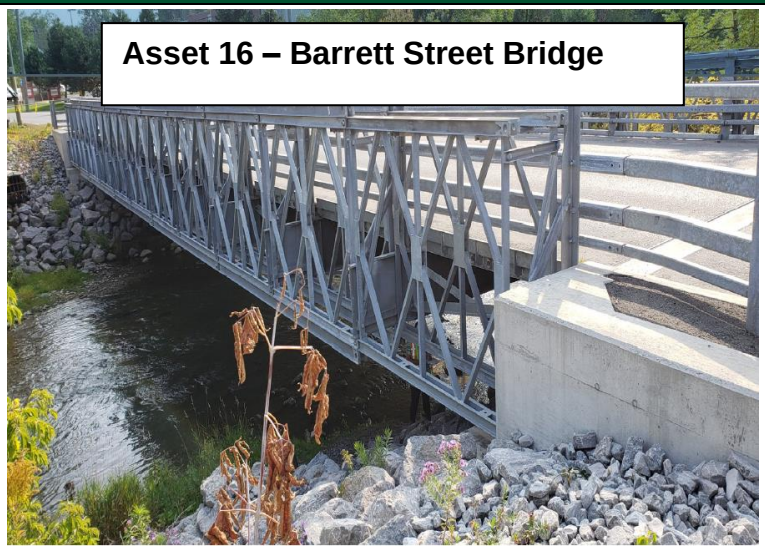
All classifications of road within the municipality are currently evaluated on the same condition scale based on MMS requirements for our Municipal highways. It is recommended that a Roads Need Assessment be completed to determine where different PCI thresholds and associated lifecycle events would prolong differing classifications estimated useful life at the lowest cost while maintaining Transportation service levels.

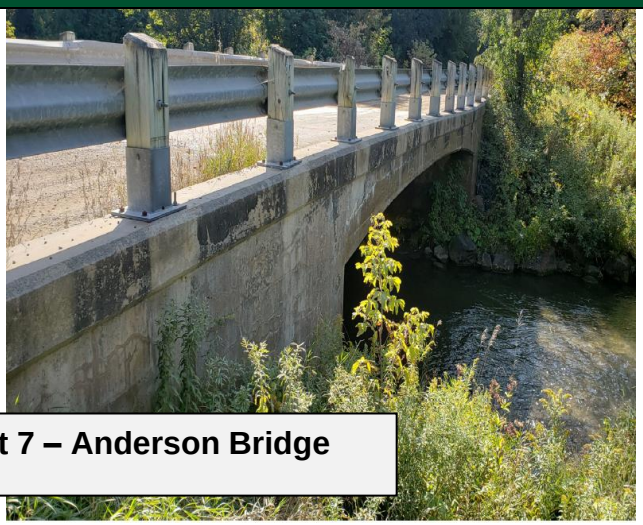
Pavement Condition Index (PCI) Range[1]	Condition State	Example Photo	Description	Maintenance Suggestion
80 < PCI ≤ 100	**Excellent**	**Asset 28496 – Heneage Street** 	A very smooth ride. No major distresses. Possibly some crack seal in place. No maintenance required.	**Defer Maintenance:** Pavement is in good condition and does not require maintenance.

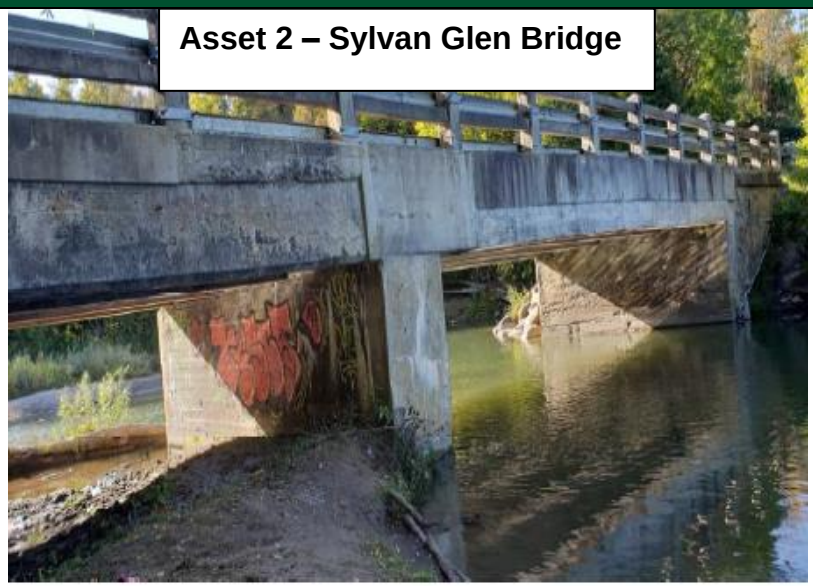
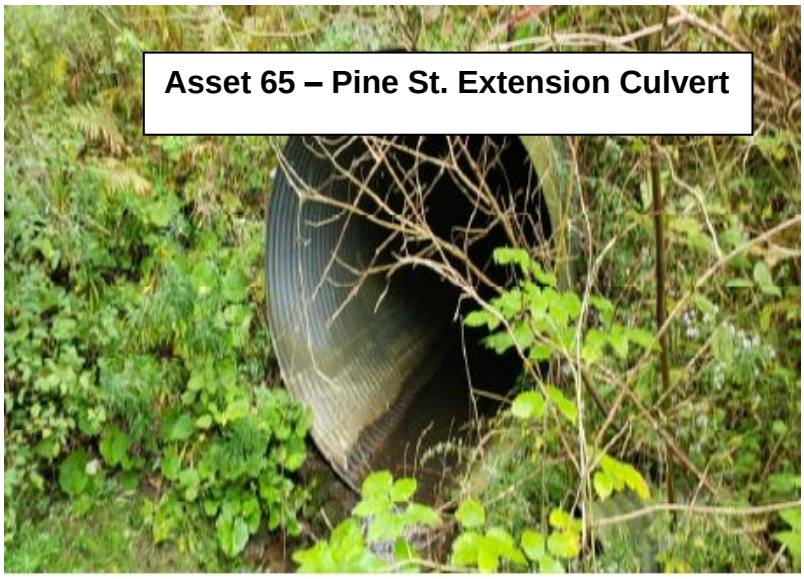
[1] The mapping of PCI values to Condition States (PCI Labels) was established based on the Municipality's 2018 Roads Asset Management Plan (LAS Roads Assessment Service, 2018).

Pavement Condition Index (PCI) Range[1]	Condition State	Example Photo	Description	Maintenance Suggestion
60 < PCI ≤ 79	**Good**	**Asset 28738 – Gilmour Road** 	A smooth ride with just a few bumps or depressions.	**Preventative Maintenance:** Pavement is in the early stages of its life-cycle. This is when repairs are cheapest, fastest, and have the greatest long-term benefit. crack seal, joint seal, micro surfacing, slurry sealing, chip seal
40 < PCI ≤ 59	**Fair**	**Asset 28835 – Mastwoods Road** 	A comfortable ride with intermittent bumps or depressions.	**Rehabilitation:** Pavement needs some form of resurfacing to mitigate the effects of rutting, cracking, and other distresses. Hot-mix overlay, mill and overlay, hot-in-place recycling, hi-float chip seal

Pavement Condition Index (PCI) Range[1]	Condition State	Example Photo	Description	Maintenance Suggestion
25 < PCI ≤ 39	**Poor**	**Asset 28248 – Rosevear Boulevard** 	An uncomfortable ride with frequent to extensive bumps or depressions. Cannot maintain the posted speed at lower end of the scale.	**Reconstruction:** Pavement has endured significant structural damage and a full reconstruction is required to restore the condition. Reclamation, full depth reconstruction, major mill and overlay
0 < PCI ≤ 24	**Very Poor**	**Asset 28891 – Clayton's Lane** 	A very uncomfortable ride affected by deep and dense potholes, failed patches, and alligator cracking. Cannot maintain the posted speed and must steer constantly to avoid bumps and depressions.	**End of life replacement**

Bridge Condition Index (BCI) Range	Condition State	Example Photo Bridge / Culvert within Condition Range	Description	Service Impact
70 < BCI ≤ 100	**Good**	**Asset 16 – Barrett Street Bridge**  **Asset 33 – Scott Grey Culvert** 	Maintenance is not usually required within the next five years	Common practice lifecycle maintenance events would cause minimal traffic impact. No major work would be scheduled while the asset remains in this condition.

Bridge Condition Index (BCI) Range	Condition State	Example Photo Bridge / Culvert within Condition Range	Description	Service Impact
60 < BCI ≤ 70	**Fair**	 **Asset 7 – Anderson Bridge**  **Asset 35 – Dundee Crescent Culvert**	Maintenance work is usually scheduled within the next five years. This is the ideal time to schedule major bridge repairs to get the most out of bridge spending.	Common practice lifecycle maintenance events would cause minimal traffic impact. No major work would be scheduled while the asset remains in this condition.

Bridge Condition Index (BCI) Range	Condition State	Example Photo Bridge / Culvert within Condition Range	Description	Service Impact
0 < BCI ≤ 60	**Poor**	**Asset 2 – Sylvan Glen Bridge**  **Asset 65 – Pine St. Extension Culvert** 	Maintenance work is usually scheduled within one year.	A staged approach to repairs would have traffic maintained where possible or detours planned for the least amount of time possible. Load restrictions are possible in this condition range as determined on a structure-by-structure basis.

It is important to note that these do not describe how the condition may affect the use of bridges/culverts. This is because the BCI is not used to rate or indicate the safety of a bridge. The BCI rating is a planning tool developed by Ontario Ministry of Transportation that helps schedule maintenance and rehabilitation work.

Asset Management Strategy

Practices, Procedures and Tools

The Municipality has well-established overall principles, framework and decision-making approaches for asset management, and these are presented in the 2016 Asset Management Plan. They provide a holistic approach to asset management as demonstrated by the capital investment prioritization process that drives the decision-making towards meeting the desired levels of service at the lowest lifecycle cost.

Future Demand and Service Enhancement

Port Hope's population is expected to increase to 20,850 people by 2029, an increase of 17.31% over the next 7 years. The Municipality's Official Plan provides the vision for the future growth of the Municipality including areas identified for intensification. Further Projections for the urban area are referenced in Northumberland County's Municipal Comprehensive Review – Long-Term Growth Forecast and Urban Land Needs Analysis which projects growth for the urban area up to 2051. The Official Plan is supported by the Development Charges Study. These strategic documents assist the Municipality to ensure that Transportation services will be available to support future growth.

In addition to the growth and enhancement objectives of the Municipality's master plans, asset management planning also needs to consider the Climate Action Plan goals for both resiliencies to changing climate and reduction of greenhouse gas emissions. Existing assets must be maintained, and new assets brought into service, to meet these various growth and service enhancement objectives.

Lifecycle Management and Risk

Lifecyle management activities refer to the set of planned activities and actions undertaken to maintain the current levels of service and achieve good economic life of the assets. The activities undertaken range from operations and maintenance activities, including planned and reactive maintenance, renewal activities (such as condition assessments and rehabilitations), disposal activities and non-infrastructure solutions (such as policies and processes that reduce costs, mitigate risks or maintain/enhance service delivery).

In developing the Transportation AMP, a preliminary estimate of future costs was generated based on the preliminary forecast to support events occurring throughout the lifespan of the asset, at this time, this provides the best available information for generating this estimate. It was developed through a collaborative effort of Watson & Associates Economists Ltd. Combined with staff input that aligns with the Municipality's current decision-making and asset capital expenditure processes. The lifecycle activities that will be required over the 10-year period are based on the asset management strategies that are currently captured in the Annual Capital and Operating Budget processes. For transportation assets, this includes operational and maintenance strategies, asset management decision making, lifecycle cost and value optimisation, options analysis, ageing assets strategy, non-infrastructure solutions, capital investment planning, condition assessment programs, as well as consideration of mobility impacts and impacts to other services.

The Municipality applies a risk-based approach to prioritizing asset renewals. The risk assessment frameworks and methods vary across the different types of assets but are generally based on the importance of each asset in terms of service delivery/ continuity and the number of users who could be impacted.

Roads

Category	Frequency
Inspection and Condition Assessment	The Municipality completed a condition assessment of its roads in 2018. The condition assessment was completed by Street Scan, utilizing specialized Scan Van vehicles outfitted with an array of sensors that include 2D and 3D cameras. Data collected from the sensors was processed to identify specific road distresses and an overall condition rating for each road segment known as the Pavement Condition Index (PCI).
Major Lifecycle Activities - Operating	The Roads Division is responsible for the upkeep and maintenance of roadways, sidewalks, and boulevards within the Municipality of Port Hope, including winter snow removal.
Major Lifecycle Activities - Capital	Lifecycle rehabilitation (incl. resurfacing) and reconstruction activities for roads are performed as needed, guided by the recommendations identified through condition assessments and, where possible, are aligned with other asset replacements through a coordinated reconstruction program. For long-term capital planning purposes an annual reinvestment rate of 2.5% of replacement cost was utilized to calculate an average annual lifecycle funding target.
Identification of Short-term Priorities	The Municipality obtained a list of lifecycle maintenance and repair suggestions for roads as part of the condition assessment completed in 2018. The list of recommendations developed through the 2018 assessment is supplemented with priorities that are identified through ongoing operations and coordination of lifecycle replacement activities related to underground infrastructure. Furthermore, some road reconstructions are addressed through the federal government's Port Hope Area Initiative which involves the cleanup of historic low-level radioactive waste from various sites in Port Hope.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service for transportation services. The growth-related capital investments related to roads include various road reconstruction, widening, oversizing, and resurfacing projects which are summarized in the Municipality's development charges background study.

Bridges and Bridge Culverts

Category	Frequency
Inspection and Condition Assessment	The Municipality completes regular assessments of bridges and structural culverts as part of the biennial inspections required by O. Reg. 104/97, following the Ontario Structure Inspection Manual (OSIM). Each bridge and large diameter culvert is assigned a Bridge Condition Index (BCI).
Major Lifecycle Activities - Capital	Lifecycle rehabilitation and replacement of bridges and large diameter culverts is performed as needed, guided by the recommendations identified through condition assessments. For long-term capital planning purposes and budgeting, bridges and culverts are assumed to have a useful life of 75 years, with a minor rehabilitation and a major rehabilitation taking place part-way through the lifecycle, around age 25 and 50, respectively.
Identification of Short-term Priorities	The Municipality develops and updates a prioritized list of lifecycle activities for bridges and culverts using recommendations provided in the biennial inspection reports.
Growth-related Lifecycle Needs	Future population and employment growth in the Municipality is expected to result in incremental service demands that may impact the current level of service for transportation services. The growth-related capital investments related to bridges and culverts include two watercourse crossings and are summarized in the Municipality's development charges background study which is updated every five years.

The Municipality continues to invest in maintaining infrastructure and has been increasing its capital investments to align with long-range forecasts available in the 2016 AMP, Development Charges Study and Water & Wastewater Rate Study. The Municipality's existing funding model incurs an annual shortfall to maintain critical infrastructure in a state of good repair. There are annual contributions to the Asset Management Reserve to increase the current funding model. Changes will again impact the financing strategy when the new service levels are defined in the next version of the asset management plans, which are due in 2025.

Annual Reinvestment required based on Lifecycle Management Strategy costs

Asset Category	Quantity	Unit of Measure	Replacement Cost	Average Annual Lifecycle Cost (Capital)	Average Annual Lifecycle Cost as % of Replacement Cost	2016 Canadian Infrastructure Report Card Reinvestment	2016 Canadian Infrastructure Report Card Reinvestment

						Rate – Low Target	Rate – High Target
Bridges and Large Diameter Culverts	65	each	$55,675,000	$1,113,500	2.0%	1.0%	1.5%
Roads	690	Lane-km	$321,730,410	$8,043,260	2.5%	2.0%	3.0%
Sidewalk	69	Km	$9,371,182	Future Update			
Other Structures	Future Update	Future Update	$4.8 million	Future Update			

Improvement and Monitoring Plan

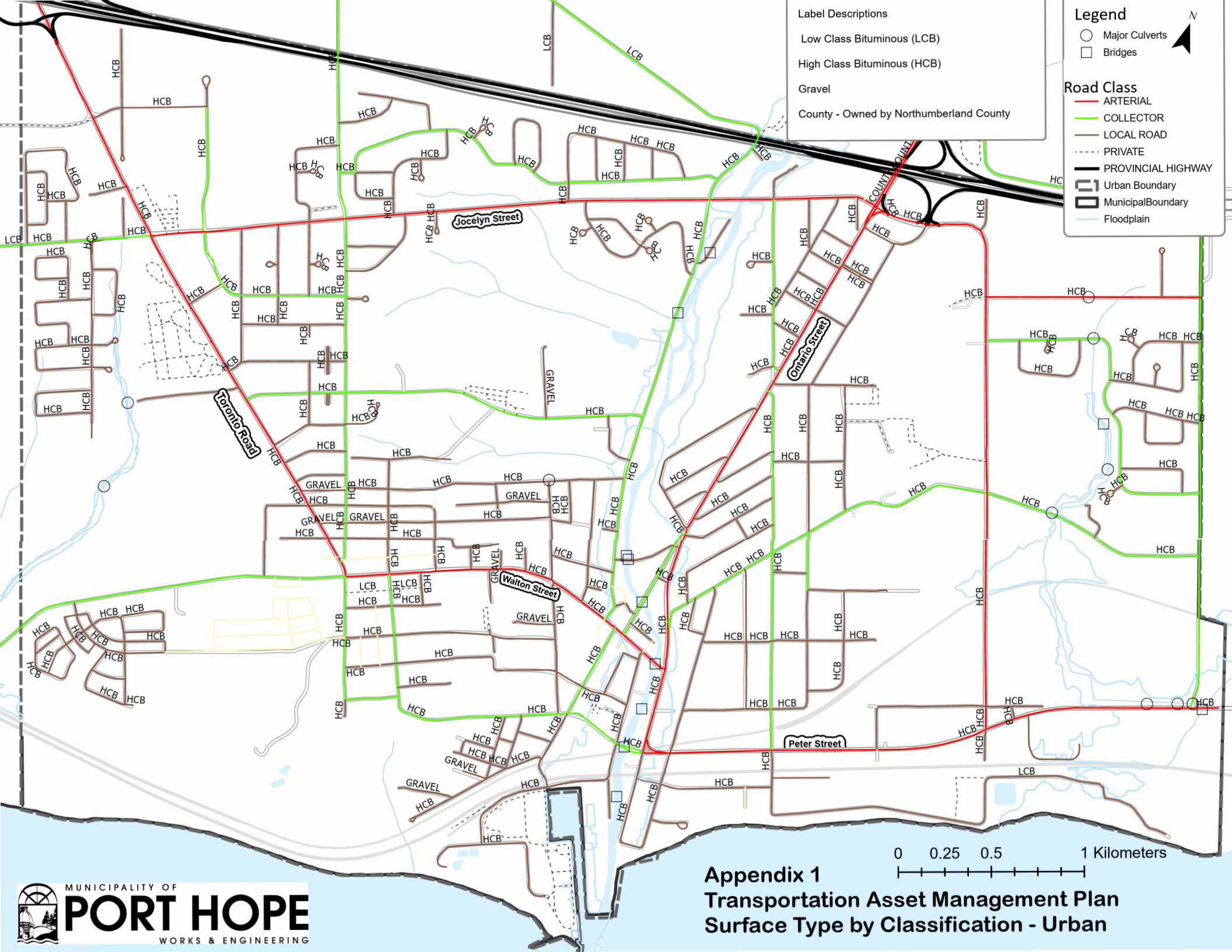
Based on the snapshot of current conditions and existing plans presented in the Transportation AMP, areas of potential improvement include:

- Asset information, data quality, identify data gaps and record keeping
- Cost estimating
- Level of service measures and targets
- Lifecycle renewal needs forecasting
- Climate change resiliency
- Equity and inclusion

The Transportation AMP will be reviewed and updated on a regular basis and over time these improvements will be reflected in future versions of the plan.

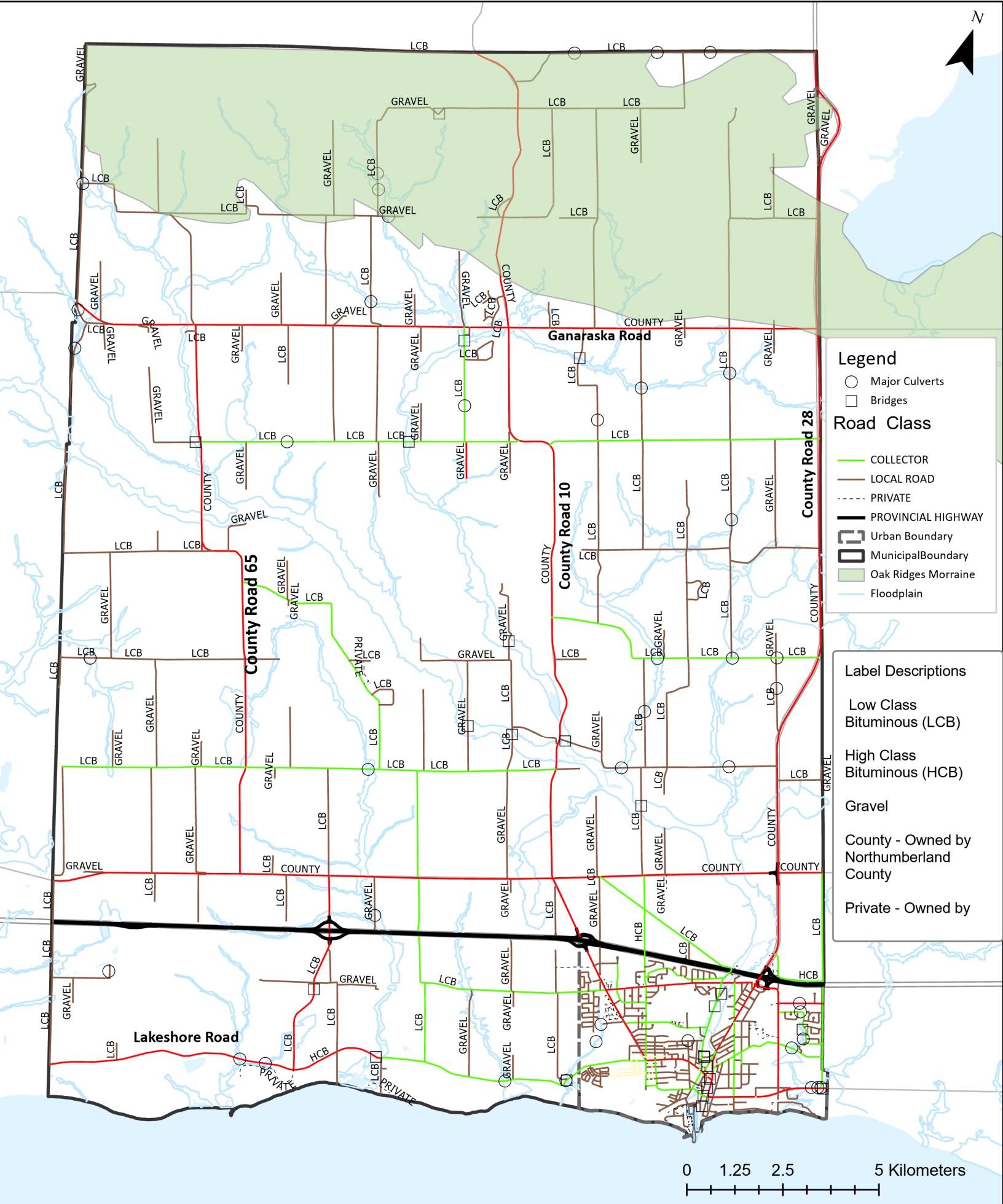
More Information

For more information about asset management, or to learn more about the Municipality's Asset Management Program, please visit porthope.ca.



MUNICIPALITY OF PORT HOPE
WORKS & ENGINEERING

Appendix 1
Transportation Asset Management Plan
Surface Type by Classification - Urban



MUNICIPALITY OF PORT HOPE
WORKS & ENGINEERING

Appendix 2
Transportation Asset Management Plan
Surface Type by Classification - Rural