Asset Management Plan – Core Assets

Town of Kingsville

Final Draft

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List of Acronyms and Abbreviations

B.C.I.	Bridge Condition Index
C.I.R.C.	Canadian Infrastructure Report Card
E.C.A.	Environmental Compliance Approvals
I.J.P.A.	Infrastructure for Jobs and Prosperity Act
O. Reg. 588/17	Ontario Regulation 588/17
O.S.I.M.	Ontario Structure Inspection Manual
P.C.I.	Pavement Condition Index
P.S.A.B.	Public Sector Accounting Board
U.L.C.%	Useful Life Consumed Percentage

Report

Chapter 1
Introduction

1. Introduction

1.1 Overview

The main objective of an asset management plan is to use a municipality's best available information to develop a comprehensive long-term plan for capital assets. In addition, the plan should provide a sufficiently documented framework that will enable continual improvement and updates of the plan, to ensure its relevancy over the long term.

The Town of Kingsville (Town) retained Watson & Associates Economists Ltd. (Watson) to update the Town's 2013 Asset Management Plan. With this update, the intent is to bring the Town's asset management plan into compliance with the July 1, 2022 requirements of Ontario Regulation 588/17 (O. Reg. 588/17).

The assets included in this iteration of the asset management plan are the core municipal assets which fall into the following asset classes:

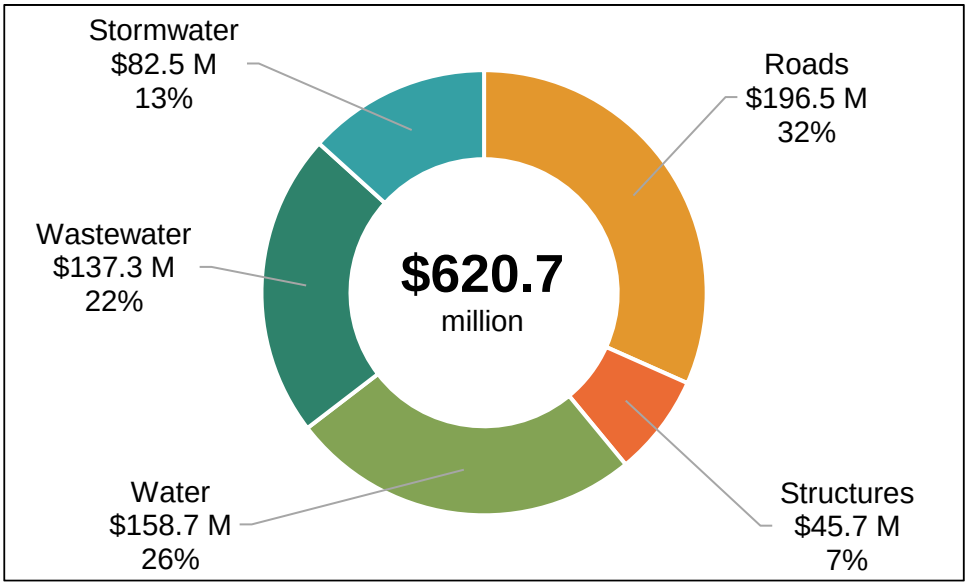
- Roads;
- Bridges and structural culverts (structures);
- Water;
- Wastewater; and
- Stormwater.

The total replacement cost of the Town's core infrastructure assets has been estimated at $621 million. A breakdown of the total replacement cost by asset class is provided in Table 1-1 and illustrated in Figure 1-1. The most significant asset class by replacement cost is roads, accounting for almost one-third (32%) of the total, followed by water (26%), wastewater (22%), stormwater (13%), and bridges and culverts (7%).

Table 1-1: Asset Classes and Replacement Cost

Asset Class	Replacement Cost (2022$)
Roads	$196,520,606
Structures	$45,748,000
Water	$158,686,315
Wastewater	$137,274,008
Stormwater	$82,511,467
Total	**$620,740,396**

Figure 1-1: Distribution of Assets by Asset Class



1.2 Legislative Context for the Asset Management Plan

Asset management planning in Ontario has evolved significantly over the past decade.

Before 2009, capital assets were recorded by municipalities as expenditures in the year of acquisition or construction. The long-term issue with this approach was the lack of a capital asset inventory, both in the municipality's accounting system and financial statements. As a result of revisions to section 3150 of the Public Sector Accounting Board (P.S.A.B.) handbook, effective for the 2009 fiscal year, municipalities were required to capitalize tangible capital assets, thus creating an inventory of assets.

In 2012, the Province launched the municipal Infrastructure Strategy. As part of that initiative, municipalities and local service boards seeking provincial funding were required to demonstrate how any proposed project fits within a detailed asset management plan. In addition, asset management plans encompassing all municipal assets needed to be prepared by the end of 2016 to meet Federal Gas Tax (now the Canada Community-Building Fund) agreement requirements. To help define the components of an asset management plan, the Province produced a document entitled *Building Together: Guide for Municipal Asset Management Plans*. This guide documented the components, information, and analysis that were required to be included in municipal asset management plans under this initiative.

The Province's *Infrastructure for Jobs and Prosperity Act, 2015* (I.J.P.A.) was proclaimed on May 1, 2016. This legislation detailed principles for evidence-based and sustainable long-term infrastructure planning. The I.J.P.A. also gave the Province the authority to guide municipal asset management planning by way of regulation. In late 2017, the Province introduced O. Reg. 588/17 under the I.J.P.A. The intent of O. Reg. 588/17 is to establish standard content for municipal asset management plans. Specifically, the regulation requires that asset management plans be developed that define the current levels of service, identify the lifecycle activities that will be undertaken to achieve these levels of service, and provide a financial strategy to support the levels of service and lifecycle activities.

This plan has been developed to address the July 1, 2022 requirements of O. Reg. 588/17. It utilizes the best information available to the Town at this time.

1.3 Asset Management Plan Development

This asset management plan was developed using an approach that leverages the Town's asset management principles as identified within its strategic asset management policy, capital asset database information, and staff input.

The development of the Town's asset management plan is based on the steps summarized below:

1. Compile available information pertaining to the Town's capital assets to be included in the plan, including attributes such as size, material type, useful life, age, and current replacement cost valuation. Update the current replacement

cost valuation, where required, using benchmark costing data or applicable inflationary indices.

2. Define and assess current asset conditions, based on a combination of Town staff input, existing background reports and studies (e.g., 2021 Bridge and Culvert Inspections, road condition assessment), and an asset age-based condition analysis.

3. Define and document current levels of service based on analysis of available data and consideration of various background reports.

4. Develop lifecycle management strategies that identify the activities required to sustain the levels of service discussed above. The outputs of these strategies are summarized in the forecast of annual capital and operating expenditures required to achieve these levels of service outcomes.

5. Document the asset management plan in a formal report to inform future decision-making and to communicate planning to municipal stakeholders.

Chapter 2
State of Local Infrastructure and Levels of Service

2. State of Local Infrastructure and Levels of Service

2.1 Introduction

This chapter provides an analysis of the Town's assets and the current service levels provided by those assets.

O. Reg. 588/17 requires that for each asset class included in the asset management plan, the following information must be identified:

- Summary of the assets;
- Replacement cost of the assets;
- Average age of the assets (it is noted that the regulation specifically requires average age to be determined by assessing the age of asset components);
- Information available on condition of assets; and
- Approach to condition assessments (based on recognized and generally accepted good engineering practices where appropriate).

Asset management plans must identify the current levels of service being provided for each asset class. For core municipal infrastructure assets, both the qualitative descriptions pertaining to community levels of service and metrics pertaining to technical levels of service are prescribed by O. Reg. 588/17.

The rest of this chapter addresses the requirements identified above, with each section focusing on an individual asset class.

2.2 Transportation

2.2.1 State of Local Infrastructure

The Town 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 Town. The focus for the time being has been placed on the Town's roads and structures as these are considered core assets under O. Reg. 588/17 and must be included in the Town's asset management plan by July 1, 2022. The analysis for

transportation services will be expanded in the future to include all transportation assets that contribute in various ways to the overall level of service (e.g., sidewalks, streetlights, and signs).

The road network consists of paved and gravel roads with an estimated combined replacement cost of $196.5 million. Table 2-1 provides a breakdown of the road network by surface type, showing centreline length, average age, and replacement cost. A visual rendering of the data presented in Table 2-1 is provided in Figure 2-1. A spatial illustration of the Town's road network and its extent is provided in Map 2-1.

Table 2-1: Road Network – Length, Age, and Replacement Cost by Surface Type

Surface Type	Quantity	Average Age	Replacement Cost (2022$)
Paved	235.2 km	15 years	$185,562,388
Gravel	51.1 km	21 years	$10,958,218
Total	**286.3 km**		**$196,520,606**

The Town has 47 bridges (including 44 vehicle bridges and 3 pedestrian bridges) and 16 structural culverts (diameter ≥ 3m) with an estimated combined replacement cost of $45.7 million. Table 2-2 provides a breakdown of the counts, average ages, and replacement costs by structure type. A visual rendering of the data presented in Table 2-2 is provided in Figure 2-2.

Table 2-2: Summary of Quantity, Age, and Replacement Cost by Structure Type – Structures

Structure Type	Quantity	Average Age	Replacement Cost (2022$)
Bridges	44	44 years	$27,896,000
Pedestrian Bridges	3	52 years	$779,000
Structural Culverts	16	24 years	$17,073,000
Total	**63**		**$45,748,000**

Figure 2-1: Summary Information – Road Network

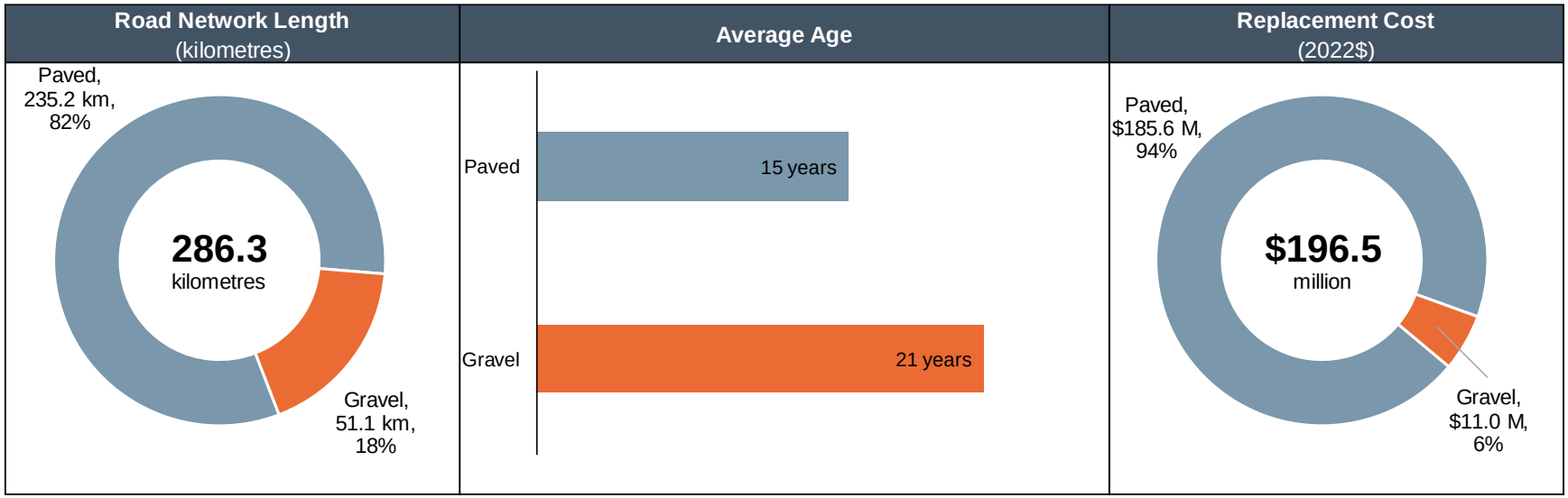
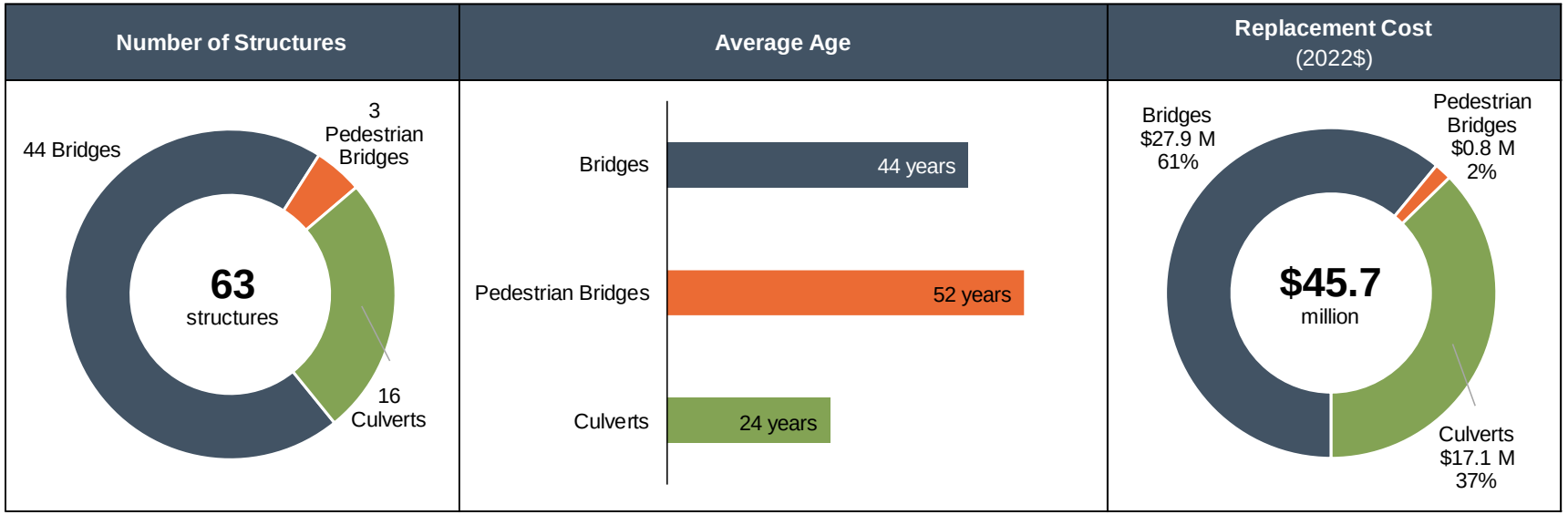
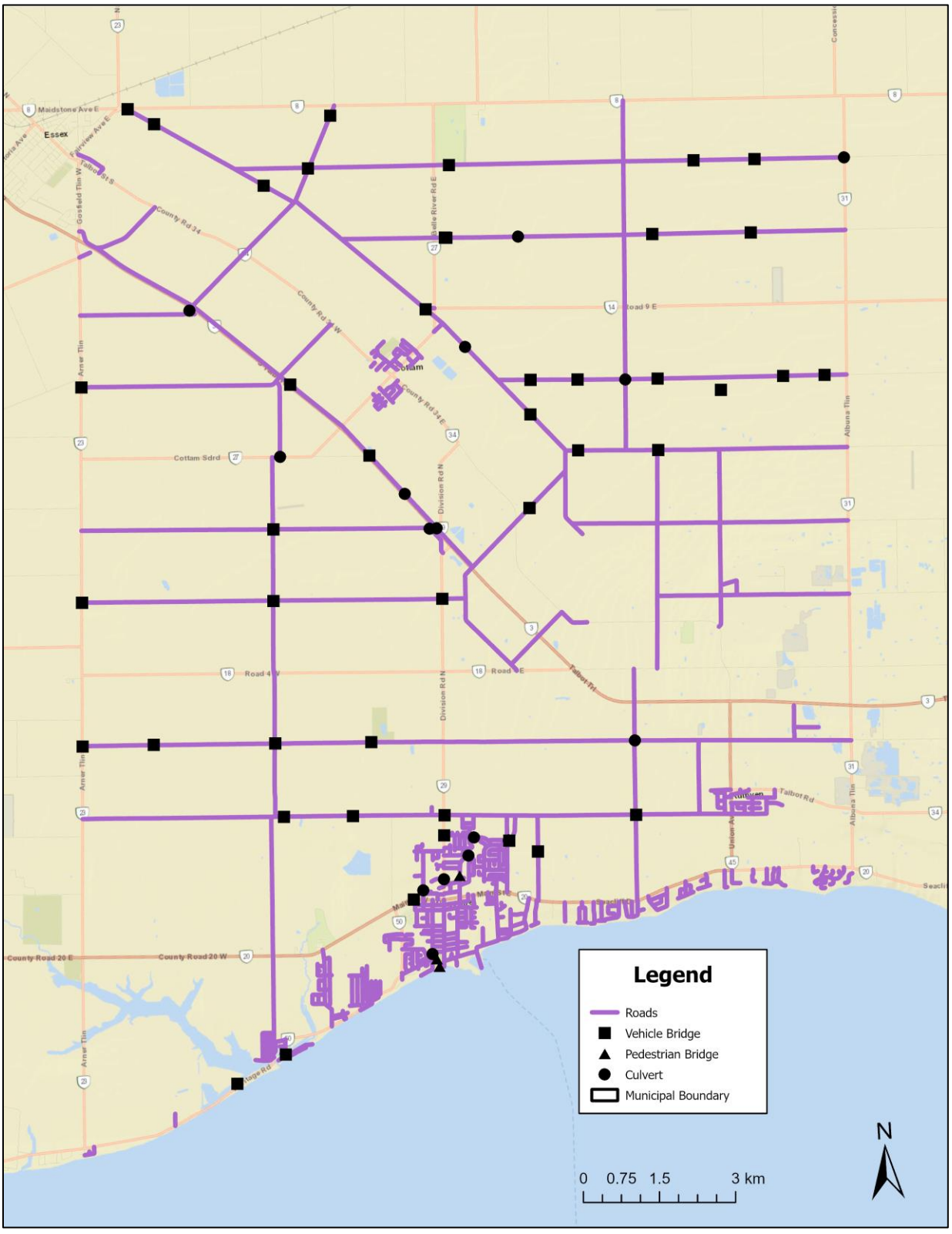


Figure 2-2: Summary Information – Structures



Map 2-1: Roads and Structures



2.2.2 Condition

The Town completes regular condition assessments of the road network. Roads are assessed using the Pavement Condition Rating (P.C.I.). The P.C.I. is measured on a scale from 0 to 100, with 100 being an asset in as-new condition and 0 being a failed asset. Based on the most recent assessment, the average condition of paved roads is a P.C.I. of 73.

To better communicate the condition of the paved road network, the numeric condition ratings for paved roads have been segmented into qualitative condition states as shown in Table 2-3. Moreover, descriptions of roads in these condition states are provided to better communicate the condition to the reader.

The condition of the Town's gravel roads has not been formally assessed, however, based on current maintenance practices it is estimated that gravel roads are on average in fair condition.

In accordance with O. Reg. 104/97, the Town completes biennial inspections of its bridges and structural culverts following the O.S.I.M. The most recent inspections were completed by AMTEC Engineering Ltd. in 2021. Each structure was assigned a Bridge Condition Index (B.C.I.). The B.C.I. is on a scale of 0 to 100, with 100 being an asset in as-new condition and 0 being a failed asset. Similar to the analysis for roads described above, the numeric condition ratings for structures have been segmented into qualitative condition states. Photographs and descriptions of these condition states are provided in Table 2-4 to better communicate the condition to the reader.

Table 2-3: Road Condition States Defined with Respect to Pavement Condition Index

P.C.I. Range	Condition State	Description[1]
85 < P.C.I. ≤ 100	**Good**	A very smooth ride. Pavement is in good condition with few cracks.
70 < P.C.I. ≤ 85	**Satisfactory**	A smooth ride with just a few bumps or depressions. The pavement is in satisfactory condition with frequent very slight or slight cracking.
55 < P.C.I. ≤ 70	**Fair**	A comfortable ride with intermittent bumps or depressions. The pavement is in fair condition with intermittent moderate and frequent slight cracking, and with intermittent slight or moderate alligatoring and distortion.
40 < P.C.I. ≤ 55	**Poor**	An uncomfortable ride with frequent to extensive bumps or depressions. Cannot maintain the posted speed at the lower end of the scale. The pavement is in poor to fair condition with frequent moderate cracking and distortion, and intermittent moderate alligatoring.
25 < P.C.I. ≤ 40	**Very Poor**	A very uncomfortable ride with constant jarring bumps and depressions. Cannot maintain the posted speed and must steer constantly to avoid bumps and depressions. The pavement is in very poor condition with moderate alligatoring and extensive severe cracking and distortion.
10 < P.C.I. ≤ 25	**Serious**	The pavement is in serious condition with extensive severe cracking, alligatoring and distortion.
0 ≤ P.C.I. ≤ 10	**Failed**	

[1] Descriptions adapted from "SP-024 Manual for Condition Rating of Flexible Pavements" (Ontario Ministry of Transportation, 2016).

Table 2-4: Examples and Descriptions of Structure Condition States

Condition State	B.C.I. Range	Bridge Photos[1]	Structural Culvert Photos[1]	Description
Good	80 - 100			Repair/maintenance work is not usually required within the next five years.
Good	70 - 80			
Fair	60 - 70			Repair/maintenance work is usually scheduled within the next five years. This may represent an ideal time to schedule major rehabilitation, from an economic perspective.
Poor	50 - 60			Repair/maintenance work is usually scheduled within approximately one year.
Poor	40 - 60			
Poor	< 40			

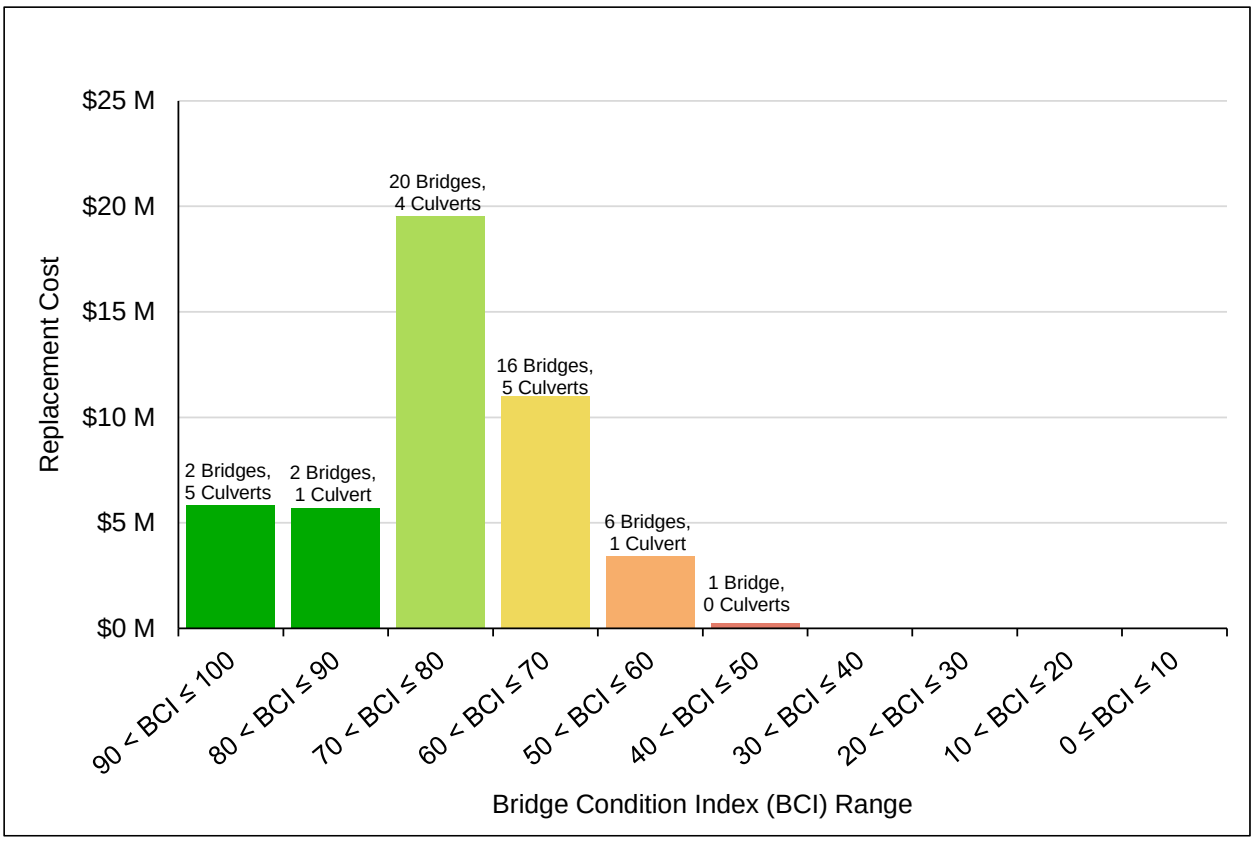
[1] Photos are reproduced from the Town's Bridge and Culvert Inspections Report (AMTEC Engineering Ltd., Nov. 2021)

The average B.C.I. ratings and corresponding condition states for structures are summarized in Table 2-5 below. On average (weighted by replacement cost), bridges are in a Good condition state, pedestrian bridges are in a Fair condition state, and structural culverts are in a Good condition state. The distribution of structure condition (as measured by B.C.I.) by structure replacement value by is presented in Figure 2-3.

Table 2-5: Structure Condition Analysis

Structure Type	Quantity	Condition (Weighted Average B.C.I.)	Average Condition State
Bridges	44	72.4	**Good**
Pedestrian Bridges	3	62.6	**Fair**
Structural Culverts	16	78.9	**Good**

Figure 2-3: Distribution of Structures by B.C.I.



2.2.3 Current Levels of Service

The levels of service currently provided by the Town's transportation system are, in part, a result of the state of local infrastructure identified above. The levels of service framework defines the current levels of service that will be tracked over time. There are prescribed levels of service reporting requirements under O. Reg. 588/17 for core transportation assets (i.e., roads and structures). Table 2-6 and Table 2-7 include the prescribed technical levels of service. In future iterations of the asset management plan, additional performance measures may be added to more comprehensively capture the level of service transportation assets provide. Targets will also need to be set for all performance measures by July 1, 2025.

The tables are structured as follows:

- The Service Attribute columns indicate the high-level attribute being addressed;
- The Community Levels of Service column in Table 2-6 explains the Town's intent in plain language and provides additional information about the service being provided;
- The Performance Measure column in Table 2-7 describes the performance measure(s) connected to the identified service attribute; and
- The 2021 Performance column in Table 2-7 reports current performance for the performance measure.

Table 2-6: Community Levels of Service – Roads and Structures

Service Attribute	Community Levels of Service
Scope	The Town's transportation assets enable the movement of people and goods within the Town and provide connectivity to regional roads. The Town's transportation assets are used by pedestrians, cyclists, passenger vehicles, commercial truck traffic, and emergency vehicles.
	The scope of the Town's transportation network, including roads and structures, is illustrated by Map 2-1. This map shows the geographical distribution of the Town's roads and locations of structures.
Quality	To aid in interpreting condition states, descriptions of roads, and structures in different condition states are provided in Table 2-3 and Table 2-4, respectively. Table 2-4 also includes photos of structures in different condition states.

Table 2-7: Technical Levels of Service – Roads and Structures

Service Attribute	Performance Measure	2021 Performance
Scope	Number of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the Town.	0.0550 km/km²
	Number of lane-kilometres of collector roads as a proportion of square kilometres of land area of the Town.	0.0557 km/km²
	Number of lane-kilometres of local roads as a proportion of square kilometres of land area of the Town.	0.7491 km/km²
	Percentage of bridges in the Town with loading or dimensional restrictions.	2.3%[1]
Quality	For paved roads in the Town, the average pavement condition index value.	73
	For unpaved roads in the Town, the average surface condition.	Fair
	For bridges in the Town, the average bridge condition index value.	72.5[2]
	For structural culverts in the Town, the average bridge condition index value.	78.9

2.3 Water

2.3.1 State of Local Infrastructure

The Town's water distribution system supplies water to the majority of properties in the municipality from the Union Area Water Supply System. A spatial illustration of the extent of the Town's water distribution system is provided in Map 2-2. The Town's water infrastructure comprises approximately 224 kilometres of water mains, several thousand appurtenances directly related to the mains (such as valves, fire hydrants, and service connections), and over 8,700 water meters. The combined replacement cost of

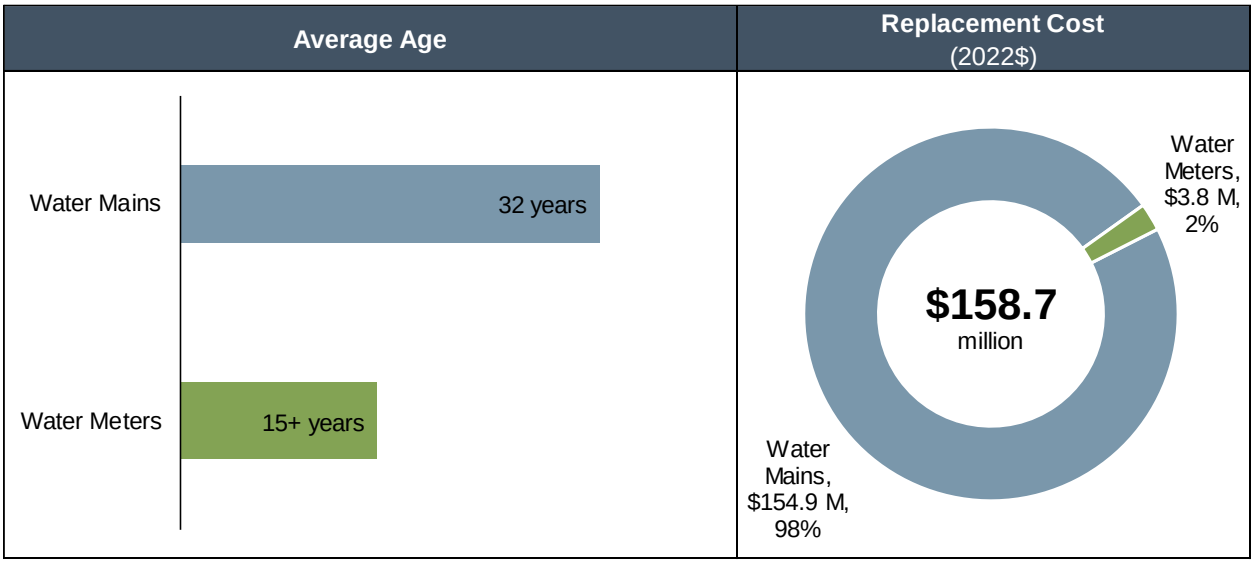
[1] Reflects 1 vehicle bridge that is a single-lane bridge. There are no bridges with loading restrictions.
[2] Average excludes pedestrian bridges.

this infrastructure is estimated at $158.7 million. Table 2-8 provides summary information for the Town's water infrastructure, including quantities, average ages, and replacement costs by asset category. A visual rendering of the data presented in Table 2-8 is provided in Figure 2-4.

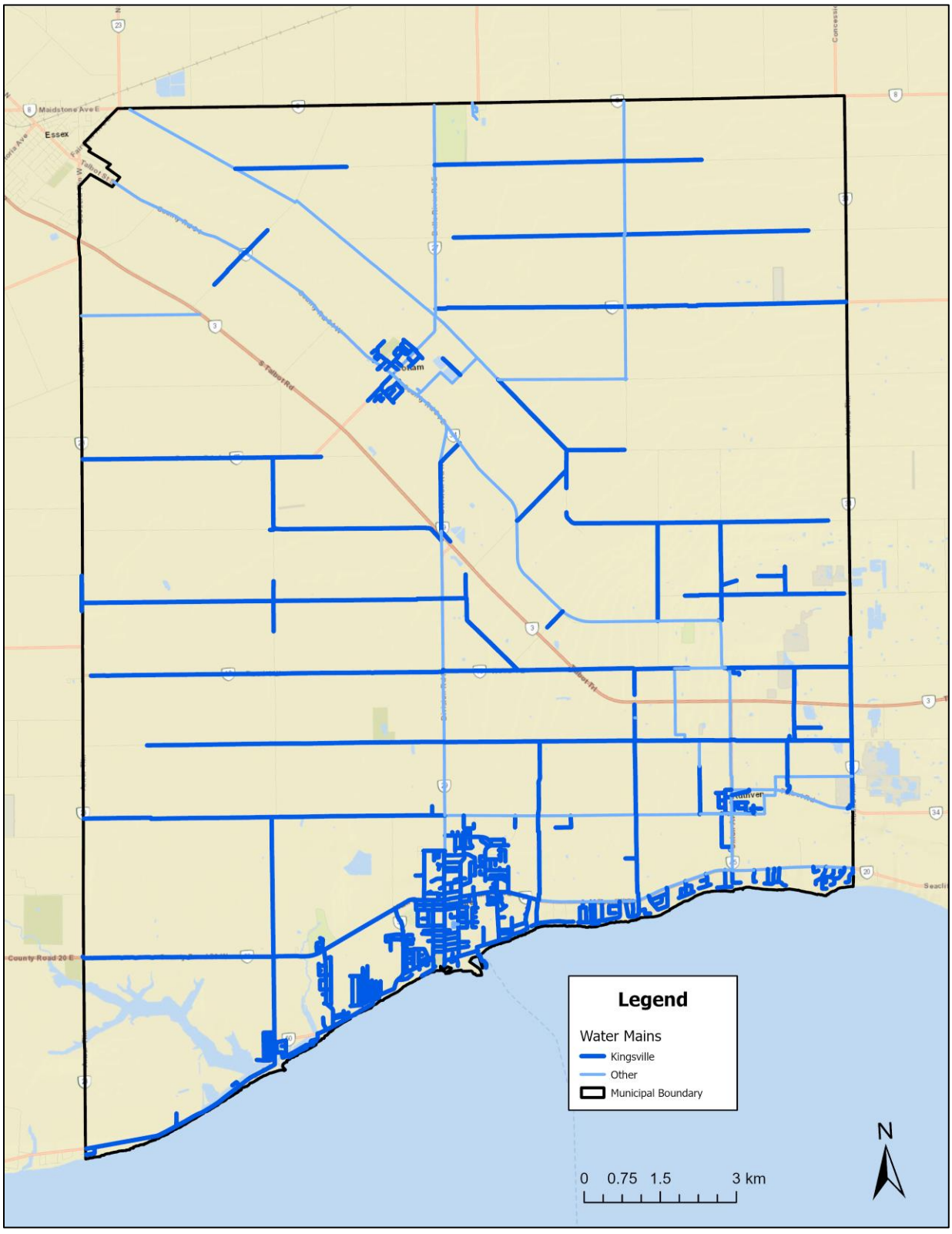
Table 2-8: Water Infrastructure – Quantity, Age, and Replacement Cost by Asset Category

Asset Category	Quantity	Average Age	Replacement Cost (2022$)
Water Mains	224 km	32 years	$154,898,335
Valves	1,206		Included above
Isolated Valves	1,004		Included above
Hydrants	1,095		Included above
Water Meters	8,708	15+ years	$3,787,980
Total			**$158,686,315**

Figure 2-4: Summary Information – Water Infrastructure



Map 2-2: Water Distribution System



2.3.2 Condition

The condition of the Town's water assets has not been directly assessed through a physical condition assessment. In this asset management plan, the condition of the water assets is evaluated based on age relative to the expected useful life (i.e., based on the percentage of useful life consumed (U.L.C.%)). Useful lives were assigned to individual pipe segments based on material, and range from 80 to 100 years. A brand-new asset would have a U.L.C.% of 0%, indicating that zero percent of the asset's life expectancy has been utilized. Conversely, an asset that has reached its life expectancy would have a U.L.C.% of 100%. It is possible for assets to have a U.L.C.% greater than 100%, which occurs if an asset has exceeded its typical life expectancy but continues to be in service. This is not necessarily a cause for concern; however, it must be recognized that assets that are near or beyond their typical life expectancy are likely to require replacement or rehabilitation in the near term.

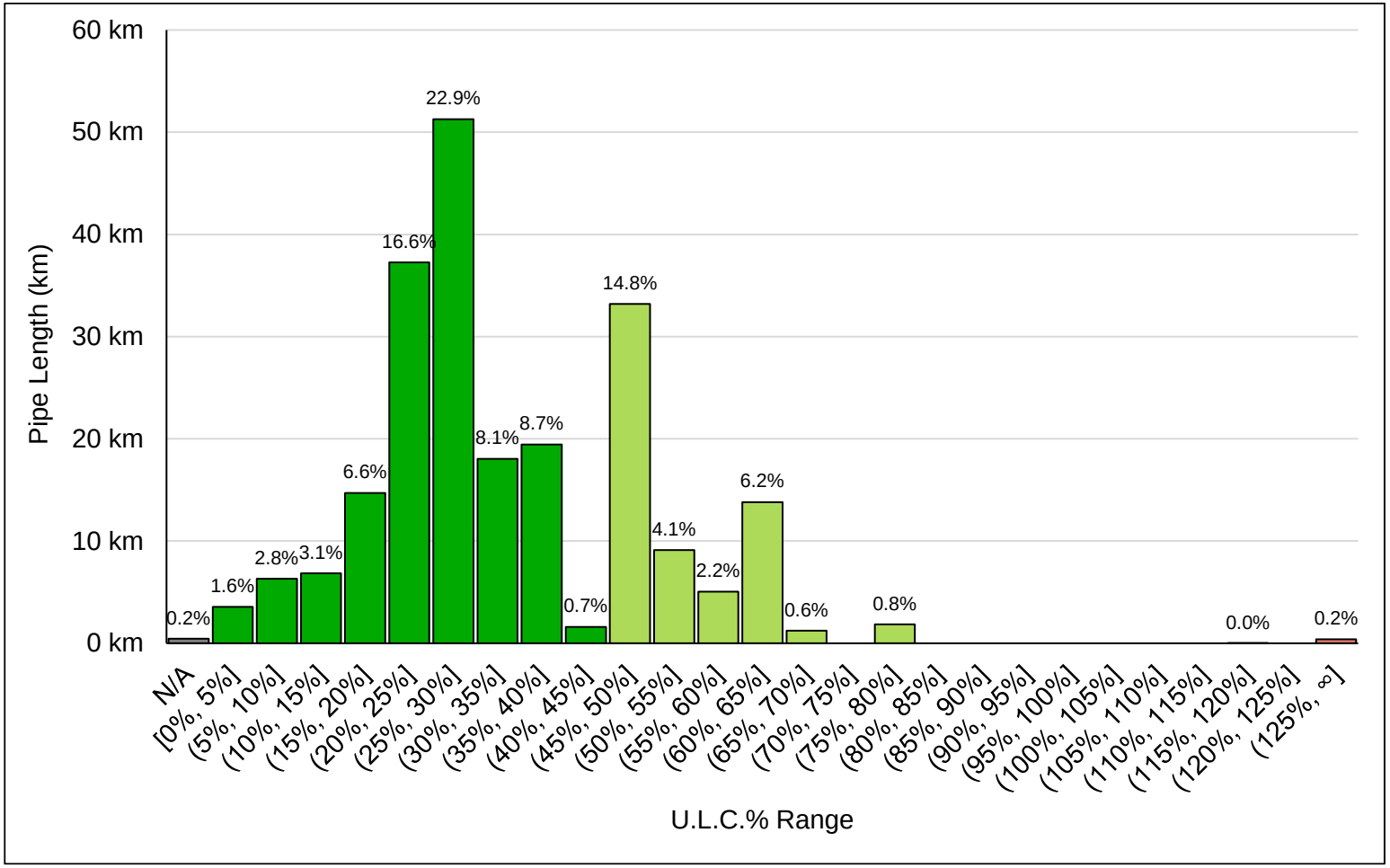
To better communicate the condition of water and other assets where U.L.C.% will be used, the U.L.C.% ratings have been segmented into qualitative condition states as summarized in Table 2-9. The scale is set to show that if assets are replaced around the expected useful life, they would be in the Fair condition state. The Fair condition state extends to 100% of expected useful life. Beyond 100% of useful life, the probability of failure is assumed to have increased to a point where performance would be characterized as Poor or Very Poor.

Table 2-9: Condition States Defined with Respect to U.L.C.% – Water Assets

Condition State	U.L.C.%
Very Good	0% ≤ U.L.C.% ≤ 45%
Good	45% < U.L.C.% ≤ 90%
Fair	90% < U.L.C.% ≤ 100%
Poor	100% < U.L.C.% ≤ 125%
Very Poor	125% < U.L.C.%

Figure 2-5 shows the distribution of water main length by condition (as measured by U.L.C.%). On average, Town's water mains are in the Very Good condition state.

Figure 2-5: Distribution of Water Mains by U.L.C.%



2.3.3 Current Levels of Service

This section provides an overview of the Town's level of service framework for water services.

Table 2-10: Community Levels of Service – Water

Service Attribute	Community Levels of Service
Scope	Water service is provided to customers in most areas of the Town, as illustrated in Map 2-2.
Reliability	The Town is committed to providing safe drinking water to its customers. The Town's Environmental Services Department: • Operates and maintains the drinking water supply system following all applicable legislation and regulations. • Ensures that all staff are well trained, competent to undertake the duties assigned them and certified appropriately. • Maintains and continually improves the Quality Management System. Boil water advisories can be triggered by adverse water quality test results or other problems in the water distribution system. Service interruptions can occur as a result of routine water system maintenance or asset failure. Both boil water advisories and service interruptions are handled in accordance with the Town's Quality Management System.

Table 2-11: Technical Levels of Service – Water

Service Attribute	Performance Measure	2021 Performance
Scope	Percentage of properties connected to the Town water system.	85%[1]
	Percentage of properties where fire flow is available.	82%[2]
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 Town water system.	0 connection days / connection
	The number of connection-days per year lost due to water main breaks compared to the total number of properties connected to the Town water system.	0.00115[3] connection days / connection

2.4 Wastewater

2.4.1 State of Local Infrastructure

The Town owns a wastewater system servicing customers in Cottam, Kingsville/Lakeshore West, and Ruthven. A spatial illustration of the extent of the Town's wastewater collection system is provided in Map 2-3. The Town's wastewater infrastructure comprises approximately 110 kilometres of wastewater mains, 1,207 maintenance holes, 824 sanitary cleanouts, and several facilities including a wastewater treatment plant, two facultative lagoons, 13 pump stations, a blower building and a sludge dewatering building. The combined replacement cost of this infrastructure is estimated at $137.3 million. Table 2-12 provides summary information for the Town's wastewater infrastructure, including quantities, average ages, and replacement costs by

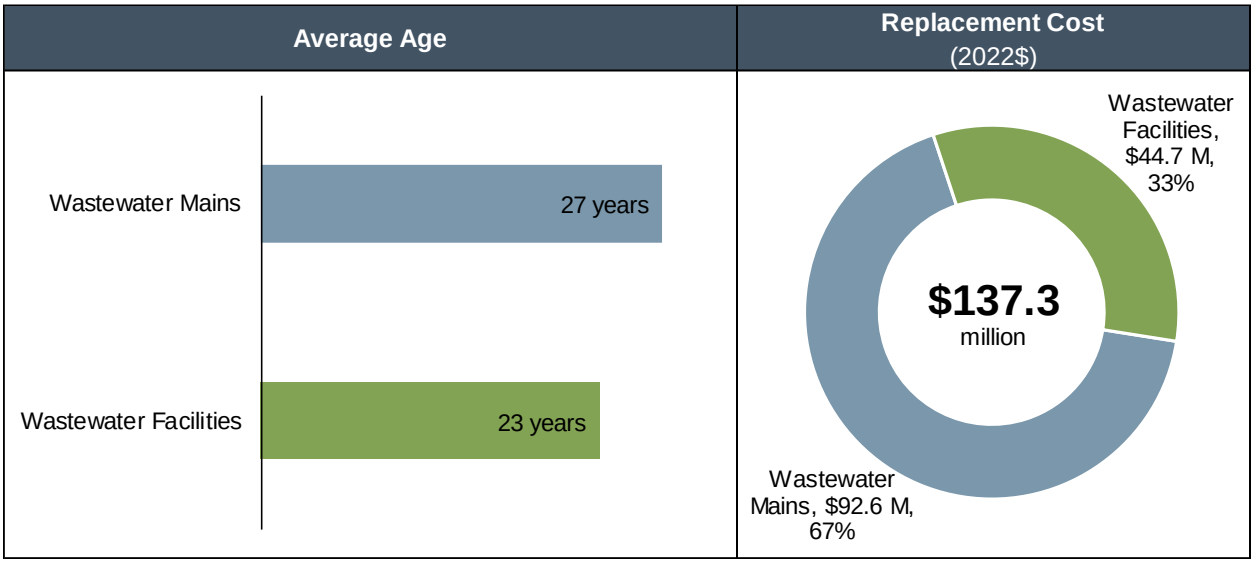
[1] Estimated based on number of water meters relative to number of properties.
[2] Percentage of properties where fire flow is available is lower than the percentage of properties connected to the Town's water system because watermains with a diameter ≤ 4" do not support fire flow.
[3] The Town's records indicate that 6 water main breaks occurred in 2021. All were short duration repairs (assumed to take 4 hours per break, on average), with the disturbance isolated to a very small number of residents for each break (10 residences per break, on average).

asset category. A visual rendering of the data presented in Table 2-12 is provided in Figure 2-6.

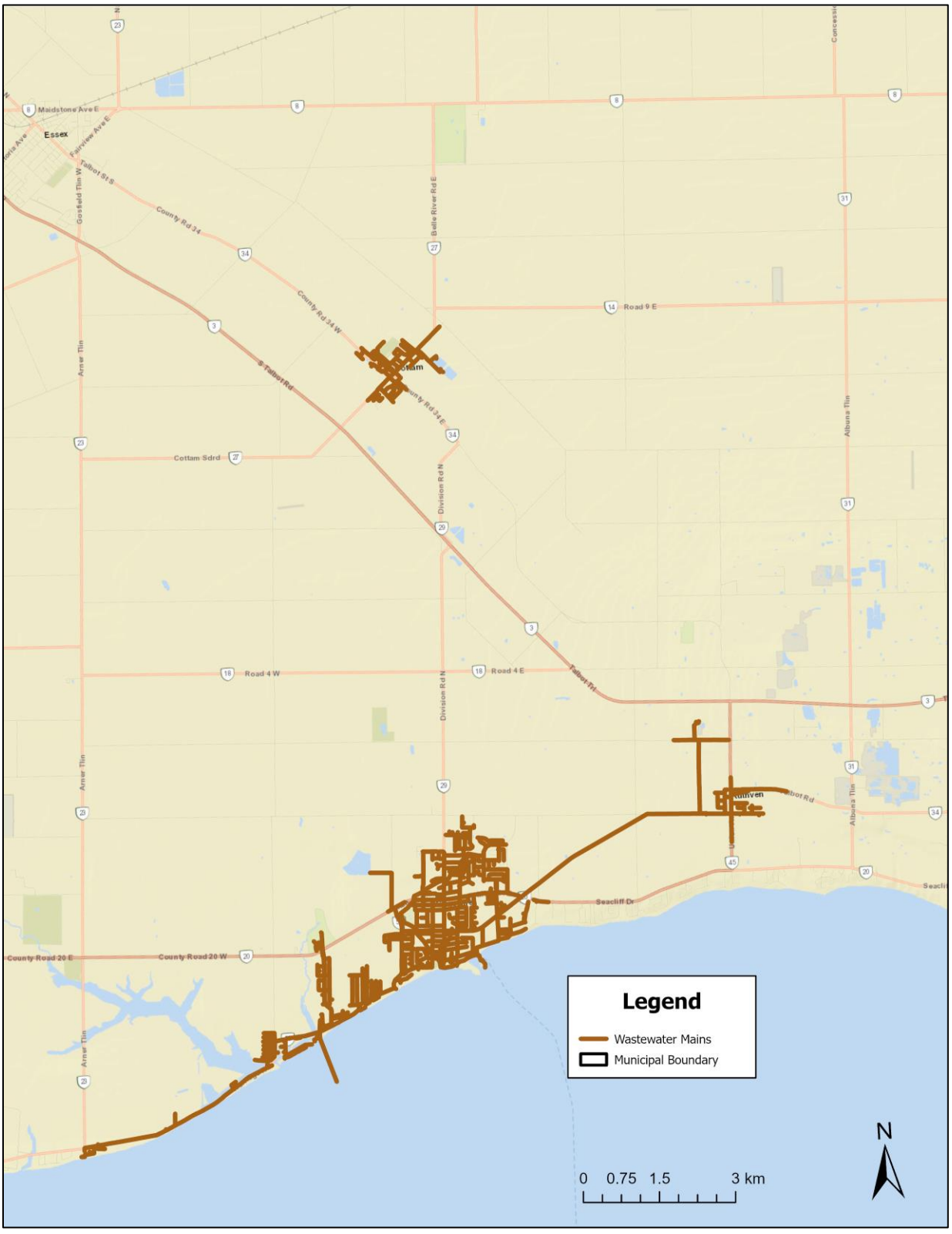
Table 2-12: Wastewater Infrastructure – Summary of Quantity, Age, and Replacement Cost by Asset Category

Asset Category	Quantity	Average Age	Replacement Cost (2022$)
Wastewater Mains	109.6 km	27 years	$92,563,008
Maintenance Holes	1,207		Included above
Sanitary Cleanouts	824		Included above
Wastewater Facilities	1 Wastewater Treatment Plant 2 Facultative Lagoons 13 Pump Stations 1 Blower Building 1 Sludge Dewatering Building	23 years	$44,711,000
Total			**$137,274,008**

Figure 2-6: Summary Information – Wastewater



Map 2-3: Wastewater Service Area



2.4.2 Condition

The condition of the Town's wastewater assets has not been directly assessed through a physical condition assessment. In this asset management plan, the condition of the wastewater assets is evaluated based on age relative to the expected useful life (i.e., based on the percentage of useful life consumed (ULC%)) as described for water assets in subsection 2.3.2.

Figure 2-7 shows the distribution of wastewater main length by condition (U.L.C.%) range. Figure 2-8 depicts the distribution of wastewater facilities by condition (U.L.C.%) range. On average, the Town's wastewater mains and wastewater facilities are in the Very Good condition state.

Figure 2-7: Distribution of Wastewater Mains by Condition

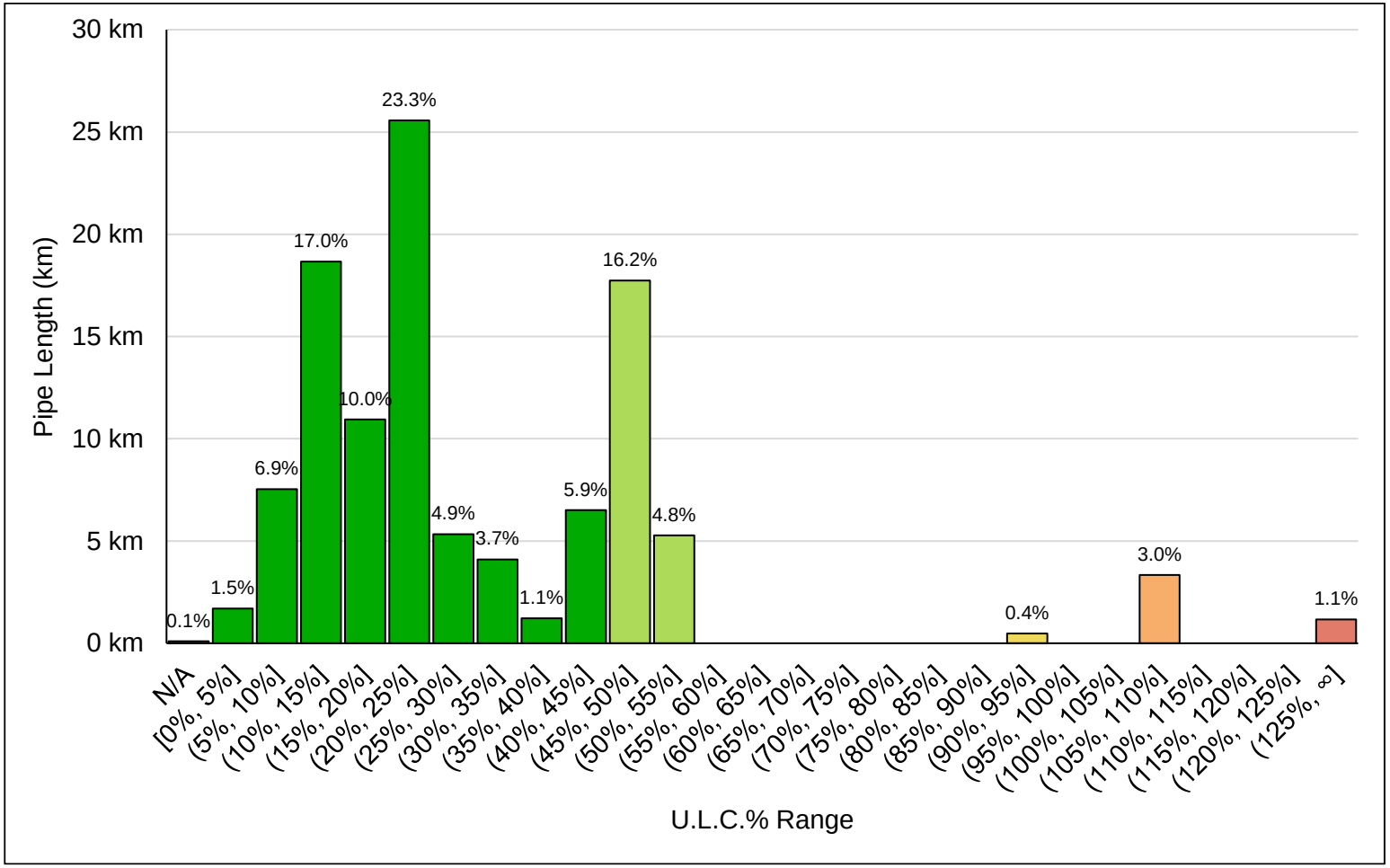
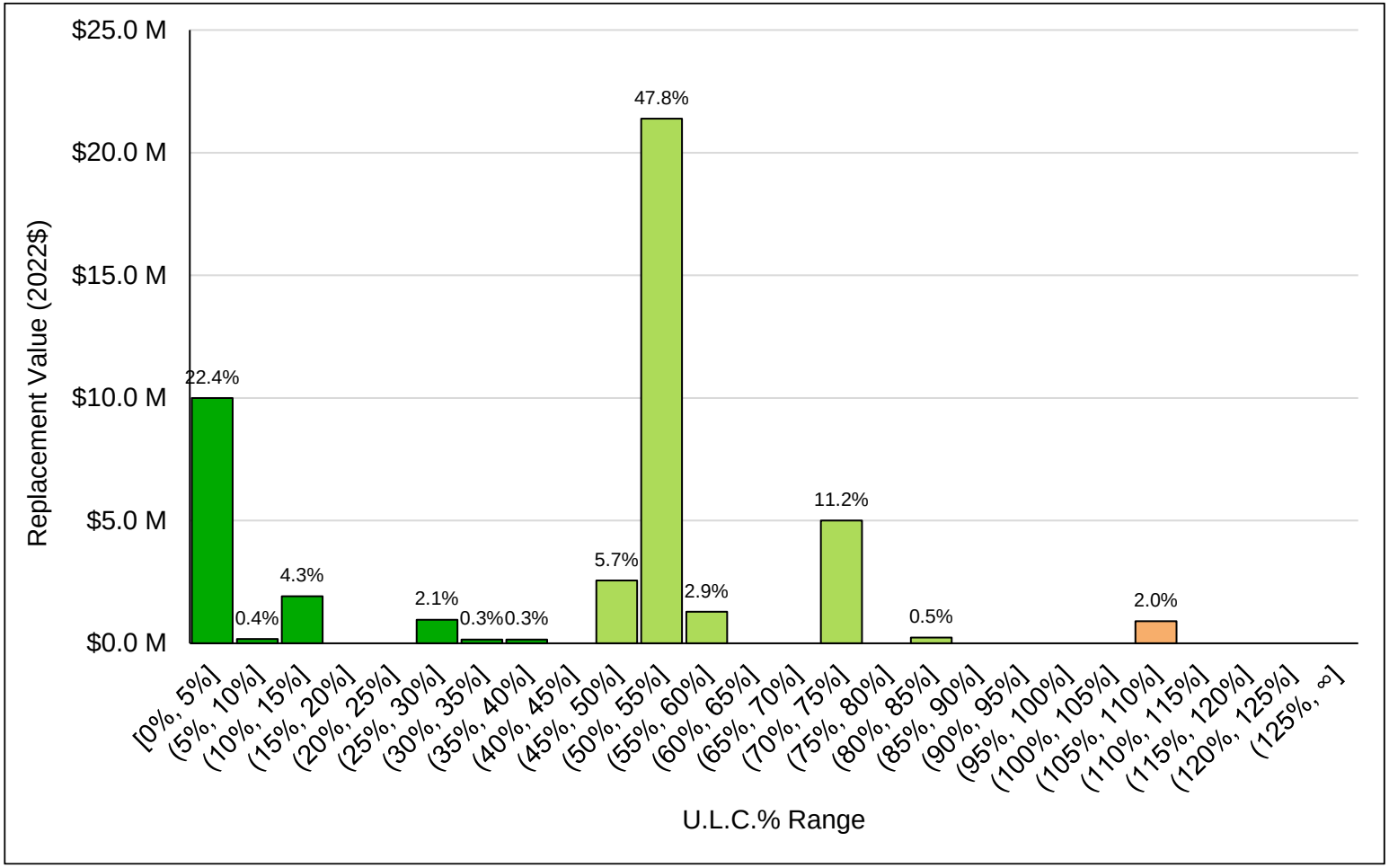


Figure 2-8: Distribution of Wastewater Facilities by Condition



2.4.3 Current Levels of Service

This section provides an overview of the Town's level of service framework for wastewater services.

Table 2-13: Community Levels of Service – Wastewater

Service Attribute	Community Levels of Service
Scope	Wastewater service is provided to customers in in Cottam and Kingsville/Lakeshore West, as illustrated in Map 2-3.
Reliability	The Town does not have combined sewers (sewers designed to carry both sanitary and storm water in a single pipe). Despite this, stormwater can enter the wastewater system through numerous sources (e.g., openings on maintenance hole covers, cracks, holes, failed joints, and incorrect or faulty connections). There are ongoing investigations underway to identify sources of inflow and infiltration as part of the Town's asset management initiatives.
	The Town's facilities are operated in accordance with Environmental Compliance Approvals (E.C.A.) as issued by the Ministry of Environment, Conservation and Parks. A description of the effluent that is discharged from each wastewater treatment facility is provided in the respective E.C.A.: • Cottam: 0434-CADSRQ • Kingsville: 6796-5JXRYS • Lakeshore West: 2771-A2CJL9

Table 2-14: Technical Levels of Service – Wastewater

Service Attribute	Performance Measure	2021 Performance
Scope	Percentage of properties connected to the Town wastewater system.	54%
Reliability	The number of connection-days per year lost due to wastewater backups compared to the total number of properties connected to the Town wastewater system.	0 connection days / connection
	The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the Town wastewater system.	0 violations / connection

2.5 Stormwater

2.5.1 State of Local Infrastructure

The stormwater management system provides for the collection of stormwater in order to protect properties and roads from flooding, and to manage the volume and quality of stormwater discharged back to the environment. A spatial illustration of the extent of the Town's stormwater system is provided in Map 2-4. The Town's stormwater infrastructure comprises approximately 59 kilometres of stormwater mains, several thousand appurtenances directly related to the mains (such as maintenance holes, catch basins, and storm cleanouts), and 13 stormwater ponds. The combined replacement cost of this infrastructure is estimated at $82.5 million. Table 2-15 shows summary information for the Town's stormwater system, including quantities, average ages and replacement costs by asset category.

Table 2-15: Stormwater Infrastructure – Quantity, Age, and Replacement Cost by Asset Category

Asset Category	Quantity	Average Age	Replacement Cost (2022$)
Stormwater Mains	59.3 km	29 years	$77,471,467
Maintenance Holes	747		Included above
Catch Basins	2,236		Included above
Storm Cleanouts	756		Included above
Stormwater Ponds	9 Wet Ponds 4 Dry Ponds	N/A	$5,040,000
Total			**$82,511,467**

2.5.2 Condition

The condition of the Town's stormwater assets has not been directly assessed through a physical condition assessment. In this asset management plan, the condition of the stormwater assets is evaluated based on age relative to the expected useful life (i.e., based on the percentage of useful life consumed (ULC%)) as described for water assets in subsection 2.3.2.

Figure 2 9 shows the distribution of stormwater main length by condition (U.L.C.%) range. On average, Town's stormwater mains are in the Good condition state.

Map 2-4: Stormwater System

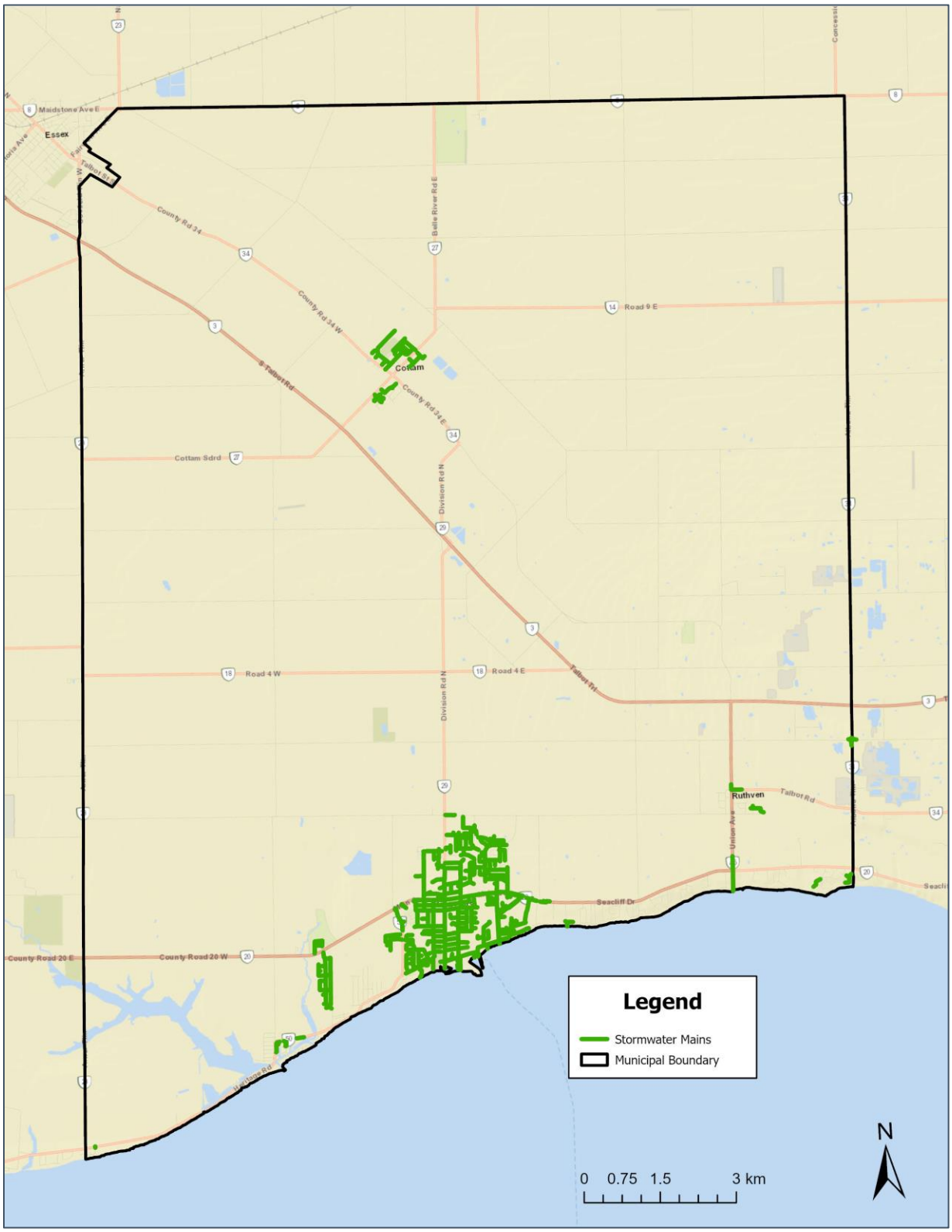
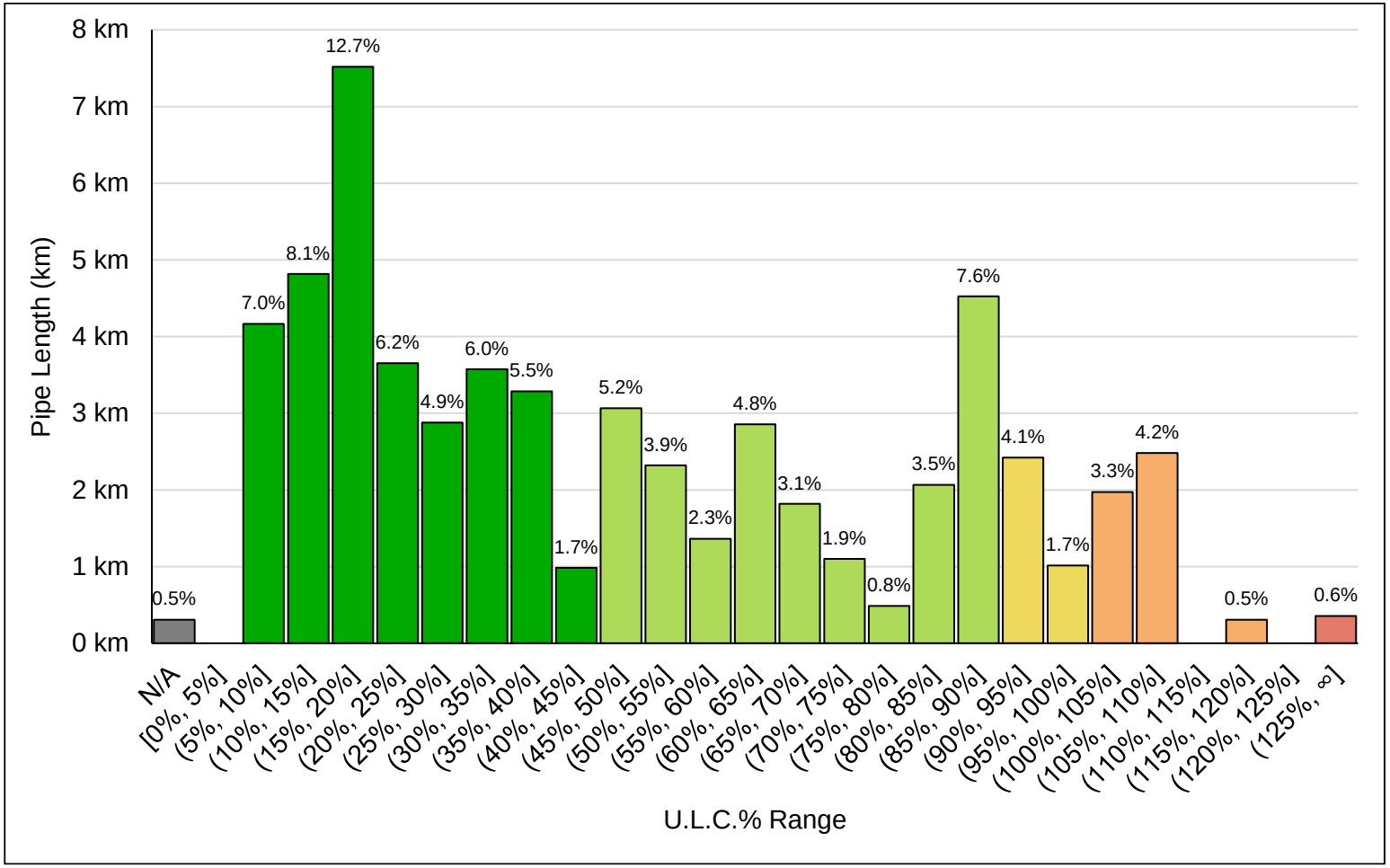


Figure 2-9: Distribution of Stormwater Mains by Condition (U.L.C.%) Range



2.5.3 Current Levels of Service

This section provides an overview of the Town's level of service framework for wastewater service.

Table 2-16: Community Levels of Service – Stormwater

Service Attribute	Community Levels of Service
Scope	The Town's stormwater system helps protect several areas of the municipality from flooding. The extent of the Town's stormwater management system is illustrated in Map 2-4.

Table 2-17: Technical Levels of Service – Stormwater

Service Attribute	Performance Measure	2021 Performance
Scope	Percentage of properties in the municipality resilient to a 100-year storm.	N/A[1]
	Percentage of the municipal stormwater management system resilient to a 5-year storm.	All stormwater infrastructure constructed in accordance with current design standards is expected to be resilient to a 5-year storm event. However, some of the older infrastructure may not be resilient to a 5-year storm.

[1] The resiliency of properties in the Town to a 100-year storm has not been formally assessed. There have been several significant rainfall events in recent years that resulted in reports of flooding. Therefore, there are likely some properties in the Town that may not be resilient to a 100-year storm. It is noted that the Town's stormwater mains are sized to accommodate a 5-year storm, with roads designed to act as overland conveyance during more severe storm events. Stormwater ponds are sized to accommodate a 100-yr. storm.

2.6 Population Growth

According to the 2021 census, the Town's 2021 population was 22,119. Based on the growth forecast contained in the Town's 2017 Development Charges Background Study, the Town's population is anticipated to reach 26,242 by 2037.

Future growth in population is expected to result in incremental service demands that may impact the current level of service. These growth-related needs are summarized in the Town's 2017 Development Charges Background Study and are funded through development charges imposed on new development. Utilizing development charges helps reduce the effects that future population and employment growth have on the cost of maintaining levels of service for existing tax and rate payers.

The estimated capital expenditures related to the lifecycle activities required to maintain the current levels of service considering the projected increases in demand caused by growth are included in the 10-year lifecycle expenditure forecast presented in the next chapter of this report.

Chapter 3
Lifecycle Management Strategies

3. Lifecycle Management Strategy

3.1 Introduction

The lifecycle management strategy in this asset management plan identifies the lifecycle activities that would need to be undertaken to maintain the current levels of service presented in Chapter 2. Within the context of this asset management plan, lifecycle activities are the specified actions that can be performed on an asset in order to ensure it is performing at an appropriate level, and/or to extend its service life.[1] These actions can be carried out on a planned schedule in a prescriptive manner, or through a dynamic approach where the lifecycle activities are only carried out when specified conditions are met.

O. Reg. 588/17 requires that all potential lifecycle activity options be assessed, with the aim of identifying the set of lifecycle activities that can be undertaken at the lowest cost to maintain current levels of service. Asset management plans must include a ten-year capital forecast, identifying the lifecycle activities resulting from the lifecycle management strategy.

[1] The full lifecycle of an asset includes activities such as initial planning and maintenance which are typically addressed through master planning studies and maintenance management, respectively.

3.2 10-year Lifecycle Expenditure Forecast

This section presents a preliminary estimate of the costs associated with maintaining the Town's core infrastructure assets at the current level of service.

The estimate was developed based on the following sources:

- Town's multi-year (2023-2028) capital forecasts;
- Average annual lifecycle expenditures by asset class (see section 3.3);
- Proposed replacement program for water meters identified in staff report No. IED 2022-07; and
- Major maintenance forecast for wastewater facilities, developed by the Ontario Clean Water Agency (OCWA).

The ten-year lifecycle expenditure forecast for the Town's core infrastructure assets is summarized in Figure 3-1. A further breakdown of the lifecycle expenditure forecast is provided in Table 3-1. Average annual expenditures over the forecast period have been estimated at approximately $16.5 million.

Figure 3-1: 10-year Lifecycle Expenditure Forecast (2022$)

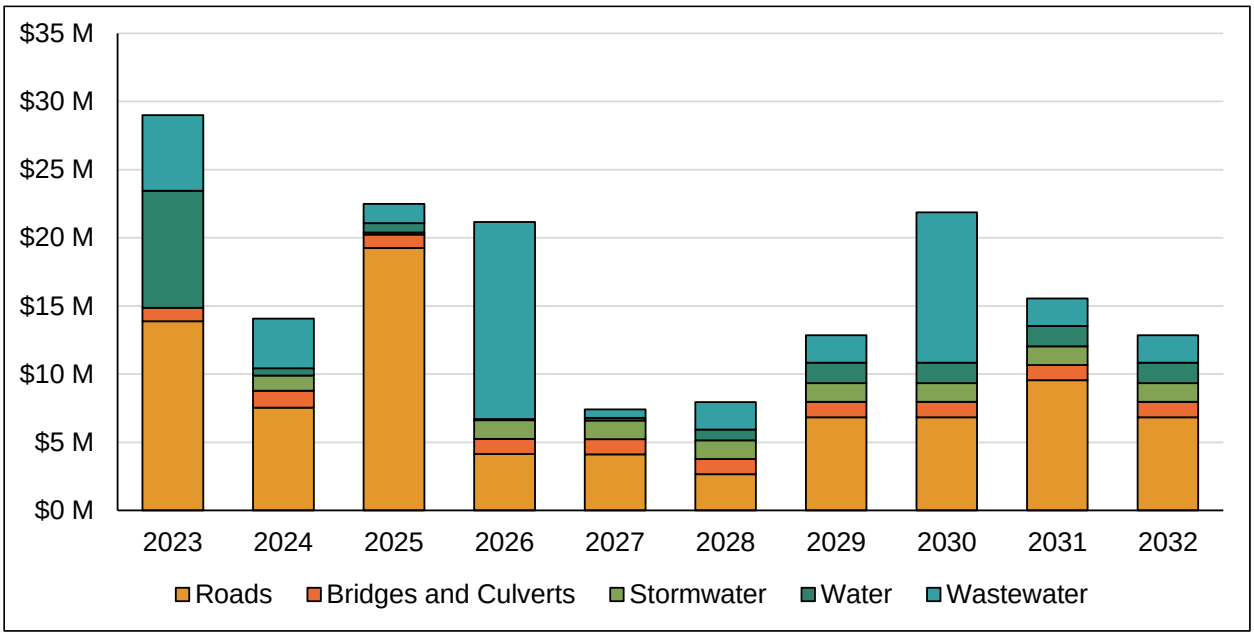


Table 3-1: 10-year Lifecycle Expenditure Forecast (2022$)

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Roads										
New Construction	$ 1,100,000	$ -	$ 9,400,000	$ -	$ -	$ -	$ -	$ -	$ 2,700,000	$ -
Reconstruction	$ 9,500,000	$ 4,981,200	$ 5,978,000	$ -	$ 710,400	$ -	$ 3,528,000	$ 3,528,000	$ 3,528,000	$ 3,528,000
Resurfacing	$ 2,752,000	$ 2,554,080	$ 3,874,859	$ 3,957,376	$ 3,230,057	$ 2,483,290	$ 3,142,000	$ 3,142,000	$ 3,142,000	$ 3,142,000
Engineering Only	$ 525,000	$ -	$ -	$ 175,000	$ 175,000	$ 175,000	$ 175,000	$ 175,000	$ 175,000	$ 175,000
Sub-total Roads	**$ 13,877,000**	**$ 7,535,280**	**$ 19,252,859**	**$ 4,132,376**	**$ 4,115,457**	**$ 2,658,290**	**$ 6,845,000**	**$ 6,845,000**	**$ 9,545,000**	**$ 6,845,000**
Bridges and Culverts										
Replacement	$ 950,000	$ 600,000	$ 950,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000	$ 1,065,000
Rehabilitation	$ -	$ 550,000	$ -							
Engineering	$ 35,000	$ 100,000	$ 35,000	$ 57,000	$ 57,000	$ 57,000	$ 57,000	$ 57,000	$ 57,000	$ 57,000
Sub-total Roads	**$ 985,000**	**$ 1,250,000**	**$ 985,000**	**$ 1,122,000**	**$ 1,122,000**	**$ 1,122,000**	**$ 1,122,000**	**$ 1,122,000**	**$ 1,122,000**	**$ 1,122,000**
Stormwater										
Stormwater Mains	$ -	$ 1,104,960	$ 150,000	$ 1,279,000	$ 1,279,000	$ 1,279,000	$ 1,279,000	$ 1,279,000	$ 1,279,000	$ 1,279,000
Stormwater Ponds	$ -	$ -	$ -	$ 93,000	$ 93,000	$ 93,000	$ 93,000	$ 93,000	$ 93,000	$ 93,000
Sub-total Stormwater	**$ -**	**$ 1,104,960**	**$ 150,000**	**$ 1,372,000**	**$ 1,372,000**	**$ 1,372,000**	**$ 1,372,000**	**$ 1,372,000**	**$ 1,372,000**	**$ 1,372,000**
Water										
Water Mains & Related	$ 4,400,000	$ 538,668	$ 690,792	$ 72,540	$ 191,880	$ 777,240	$ 1,315,000	$ 1,315,000	$ 1,315,000	$ 1,315,000
Water Meters	$ 4,200,000	$ -	$ -	$ -	$ -	$ -	$ 189,000	$ 189,000	$ 189,000	$ 189,000
Sub-total Water	**$ 8,600,000**	**$ 538,668**	**$ 690,792**	**$ 72,540**	**$ 191,880**	**$ 777,240**	**$ 1,504,000**	**$ 1,504,000**	**$ 1,504,000**	**$ 1,504,000**
Wastewater										
Wastewater Mains & Related	$ 4,600,000	$ 621,540	$ -	$ 500,000	$ 221,400	$ 1,077,000	$ 1,077,000	$ 6,077,000	$ 1,077,000	$ 1,077,000
Wastewater Facilities	$ 933,500	$ 3,017,500	$ 1,408,500	$ 13,957,500	$ 383,500	$ 939,000	$ 939,000	$ 4,939,000	$ 939,000	$ 939,000
Sub-total Wastewater	**$ 5,533,500**	**$ 3,639,040**	**$ 1,408,500**	**$ 14,457,500**	**$ 604,900**	**$ 2,016,000**	**$ 2,016,000**	**$ 11,016,000**	**$ 2,016,000**	**$ 2,016,000**
Grand Total	**$ 28,995,500**	**$ 14,067,948**	**$ 22,487,151**	**$ 21,156,416**	**$ 7,406,237**	**$ 7,945,530**	**$ 12,859,000**	**$ 21,859,000**	**$ 15,559,000**	**$ 12,859,000**

3.3 Lifecycle Funding Requirements

Looking beyond the specific lifecycle activities identified in the Town's 10-year forecast, it is important to establish annual lifecycle funding targets for the Town's core infrastructure assets.

An annual lifecycle funding target describes the amount of funding that would be required annually to fully finance a lifecycle management strategy over the long term. By planning to achieve this annual funding level, the Town would theoretically be able to fully fund capital works as they arise. In practice, capital needs are often "lumpy" in nature due to the value of works being undertaken changing year to year. By planning to achieve this level of funding over the long term, however, the periods of relatively low capital needs would allow for the building up of lifecycle reserve funds that could be drawn upon in times of relatively high capital needs.

The annual lifecycle funding targets by asset class and category are presented in Table 3-2 below. A variety of methods were used to estimate the lifecycle funding targets, and a description of each method is provided in Table 3-3.

Table 3-2: Annual Lifecycle Funding Targets by Asset Class and Category

Asset Class/Category	Lifecycle Cost Estimation Method	Annual Lifecycle Cost (2022$)
Roads		**$ 5,316,000**
Local Asphalt	Lifecycle Analysis (see Figure 3-2)	$ 3,094,000
Collector and Arterial Asphalt	Lifecycle Analysis (see Figure 3-3)	$ 705,000
Rural Surface Treated	Lifecycle Analysis (see Figure 3-4)	$ 1,517,000
Structures		**$ 1,065,000**
Bridge	Lifecycle Analysis (see Figure 3-5)	$ 554,000
Culvert - Concrete	Lifecycle Analysis (see Figure 3-5)	$ 161,000
Culvert - CSP	Lifecycle Analysis (see Figure 3-6)	$ 350,000
Water		**$ 1,504,000**
Water Mains	Useful Life (80-100 years, depending on material)	$ 1,315,000
Water Meters	Useful Life (20 years)	$ 189,000
Wastewater		**$ 2,016,000**
Wastewater Mains	Useful Life (50-100 years, depending on material)	$ 1,077,000
Wastewater Facilities	Annual Reinvestment Rate (2.10%)	$ 939,000
Stormwater		**$ 1,372,000**
Stormwater Mains	Useful Life (50-100 years, depending on material)	$ 1,279,000
Stormwater Ponds [A]	Annual Reinvestment Rate (1.85%)	$ 93,000

[A] The Town should consider undertaking an assessment of the cleanout volumes and frequencies associated with each stormwater pond, which would provide a better means of estimating annual lifecycle costs for these assets. Furthermore, the Town should consider and implementing a regular inspection program for these assets.

Table 3-3: Descriptions of Lifecycle Cost Estimation Methods

Lifecycle Cost Estimation Method	Description
Lifecycle Analysis Method	Average annual lifecycle costs estimated through generalized lifecycle models specific to an asset category. These generalized models were developed for the Town's Roads and Structures through discussions with Town staff, incorporating local knowledge and costing information. The generalized lifecycle models are summarized in figures 3-2 to 3-6.
Useful Life Method	Average annual lifecycle cost estimated by dividing the replacement cost of an asset by its life expectancy (useful life). This method was used to estimate the average annual lifecycle costs of the Town's water mains, water meters, wastewater mains, and stormwater mains.
Annual Reinvestment Rate Method	Annual lifecycle funding target estimated using annual reinvestment rates identified in the 2016 Canadian Infrastructure Report Card[1] (2016 C.I.R.C.). Because the C.I.R.C provides a range of annual reinvestment rates for each infrastructure category, the midpoint of the applicable range was used to calculate the annual lifecycle funding target. This method was used to estimate the annual lifecycle funding target for the Town's wastewater facilities and stormwater ponds.

[1] Canadian Infrastructure Report Card: Informing the Future. (The Canadian Council for Public-Private Partnerships, 2016). Accessed from https://www.pppcouncil.ca/web/pdf/infra_report_card_2016.pdf

3.3.1 Generalized Lifecycle Models

Figure 3-2: Generalized Lifecycle Model for Local Asphalt Roads

Age	Lifecycle Activity	Notes	Unit Cost (per m², 2022$)
17	Mill and Pave (Two lifts)		$ 54.00
34	Mill and Pave (Two lifts)		$ 54.00
51	Mill and Pave (Two lifts)		$ 54.00
68	Mill and Pave (Two lifts)		$ 54.00
85	Full depth reconstruction (90mm thick asphalt)	Reconstruction includes curbs and boulevard restoration, but no catch basins or any other storm components.	$ 126.10

Average Annual Lifecycle Cost (per m²):	$	4.02
Total Surface Area of Local Asphalt Roads (m²):		768,770
Total Annual Lifecycle Cost of Local Asphalt Roads:	**$**	**3,094,073**

Figure 3-3: Generalized Lifecycle Model for Collector and Arterial Asphalt Roads

Age	Lifecycle Activity	Notes	Unit Cost (per m², 2022$)
17	Mill and Pave (Two lifts - 100mm)		$ 54.00
34	Mill and Pave (Two lifts - 100mm)		$ 54.00
51	Mill and Pave (Two lifts - 100mm)		$ 54.00
68	Mill and Pave (Two lifts - 100mm)		$ 54.00
85	Full depth reconstruction (140mm thick asphalt)	Reconstruction includes curbs and boulevard restoration, but no catch basins or any other storm components.	$ 144.10

Average Annual Lifecycle Cost (per m²):	$	4.24
Total Surface Area of Collector and Arterial Asphalt Roads (m²):		166,430
Total Annual Lifecycle Cost of Collector and Arterial Asphalt Roads:	**$**	**705,076**

Figure 3-4: Generalized Lifecycle Model for Rural Surface Treated Roads

Age	Lifecycle Activity	Notes	Unit Cost (per m², 2022$)
10	Tar and chip resurfacing	Pulverizing, 2" of granular, and 3 lifts of tar and chip. Includes replacement of minor culverts and spot base repairs.	$ 18.00
n/a	Full depth reconstruction	Includes excavation, new granular, and three lifts of tar and chip. Excludes swales.	$ 76.70

Average Annual Lifecycle Cost (per m²):	$	1.80
Total Surface Area of Rural Surface Treated Roads (m²):		842,737
Total Annual Lifecycle Cost of Rural Surface Treated Roads:	**$**	**1,516,927**

Figure 3-5: Generalized Lifecycle Model for Bridges & Concrete Culverts

Age	Lifecycle Activity	Notes	Cost
25	Minor Rehabilitation		15% of replacement value
50	Major Rehabilitation		30% of replacement value
75	Replacement		100% of replacement value

Average Annual Lifecycle Cost (per $1 of replacement value):	$	0.0193
Total Replacement Value of Bridges & Concrete Culverts:	$	36,992,000
Total Annual Lifecycle Cost of Bridges & Concrete Culverts:	**$**	**715,179**

Figure 3-6: Generalized Lifecycle Model for CSP Culverts

Age	Lifecycle Activity	Notes	Cost
25	Replacement		100% of replacement value

Average Annual Lifecycle Cost (per $1 of replacement value):	$	0.0400
Total Replacement Value of CSP Culverts:	$	8,756,000
Total Annual Lifecycle Cost of CSP Culverts:	**$**	**350,240**

Chapter 4
Summary

4. Summary

This asset management plan has been developed to address the July 1, 2022 requirements of O. Reg. 588/17. The plan provides summary information for the Town's core infrastructure assets (including replacement cost valuation and condition), identifies current levels of service, and includes a 10-year forecast of lifecycle activities and associated costs that would be required for the Town to maintain current levels of service. The plan is based on the best information available to the Town at this time. In the coming years, the Town will need to further expand the asset management plan to include all Town assets, to have targets set for levels of service performance measures, and to include a detailed financial strategy. The future expansion of this asset management plan will need to be undertaken to ensure the Town's compliance with the July 1, 2024, and July 1, 2025 requirements of O. Reg. 588/17.