Asset Management Plan Addendum – Core Assets

Township of Asphodel-Norwood

Final

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June 23, 2022

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List of Acronyms and Abbreviations

Acronym	Full Description of Acronym
AMP	Asset Management Plan
IJPA	Infrastructure for Jobs and Prosperity Act
O. Reg.	Ontario Regulation
PSAB	Public Sector Accounting Board

Report

Chapter 1
Introduction

1. Introduction

1.1 Overview

The Township of Asphodel-Norwood (Township) retained Watson & Associates Economists Ltd. (Watson) to prepare an Asset Management Plan Addendum Report (Addendum Report) for the Township's core assets. The objective of the Addendum Report is to bring the Township into compliance with the July 2022 requirements of Ontario Regulation (O. Reg.) 588/17.

The Township's core assets can be broadly grouped into the following asset classes:

- Roads;
- Bridges and structural culverts;
- Water treatment, pumping, and distribution;
- Wastewater treatment, pumping, and collection; and
- Stormwater treatment and collection.

1.2 Legislative Context for the Addendum Report

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 (PSAB) 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 AMP. In addition, AMPs encompassing all municipal assets needed to be prepared by the end of 2016 to meet Federal Gas Tax agreement requirements. To help define the components of an AMP, 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 AMPs under this initiative.

The Province's *Infrastructure for Jobs and Prosperity Act, 2015* (IJPA) was proclaimed on May 1, 2016. This legislation detailed principles for evidence-based and sustainable long-term infrastructure planning. IJPA 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 IJPA. The intent of O. Reg. 588/17 is to establish standard content for municipal AMPs. Specifically, the regulations require that AMPs be developed that define the current levels of service, identify the lifecycle activities that would be undertaken to achieve these levels of service, and provide a financial strategy to support the levels of service and lifecycle activities.

This Report has been developed to address the July 1, 2022 requirements of O. Reg. 588/17 that were not covered in the Township's 2016 asset management plan, as described in the following section. The Addendum Report utilizes the best information available to the Township at this time.

1.3 Scope of the Addendum Report

The Addendum Report provides the levels of service, lifecycle management strategies, and resultant 10-year forecasts of costs for lifecycle activities for core assets[1]. The Addendum Report also includes a description of assumptions regarding future changes in population and how these changes may impact the Township's ability to maintain current levels of service[2]. Finally, the Addendum Report provides a summary of average age of core assets[3]. All other requirements of O. Reg. 588/17 have been addressed in the Township's 2016 asset management plan.

[1] Requirements in paragraphs 1, 2, and 4 of subsection 5(2) of O. Reg. 588/17
[2] Requirements in paragraph 5(2).5 of O. Reg. 588/17
[3] Requirements in subparagraph iii of paragraph 5(2).3 of O. Reg. 588/17

Chapter 2
Average Age of Assets

2. Average Age of Assets

O. Reg. 588/17 requires asset management plans to report average age of assets. Because this information was not provided in the 2016 asset management plan, it has been provided in this chapter of the Addendum Report. Table 2-1 shows the average age of the Township's core assets, by asset class.

Table 2-1: Average Age of Core Assets

Asset Category	Asset Class	Average Age
Roads	HCB[1]	13 Years
	LCB	10 Years
	Gravel[2]	Not Available
Structure	Bridges	67 Years
	Culverts	62 Years
Water	Facilities	21 Years
	Distribution	31 Years
Wastewater	Facilities	15 Years
	Collection	42 Years
Stormwater[3]	Infiltration gallery	7 Years
	All Other	Not Available

[1] The average age of paved roads is reflective of the age of the road surface.

[2] Age information for gravel roads is not available.

[3] For stormwater assets, only the age of the infiltration gallery is currently known. Estimates of the average age of the remaining stormwater assets will be included in a future update to the asset management plan.

Chapter 3
Levels of Service

3. Levels of Service

3.1 Introduction

AMPs must identify the current levels of service being provided for each asset category. For core municipal infrastructure assets, O. Reg. 588/17 prescribes both the qualitative descriptions pertaining to community levels of service and measures/metrics pertaining to technical levels of service. This section meets the requirements of O. Reg. 588/17 and includes additional community levels of service and measures/metrics pertaining to technical levels of service identified by the Township's staff through workshops facilitated by Watson. Data for some of the measures/metrics pertaining to technical levels of service identified by the Township is not currently available. These measures/metrics will be reported on in future updates to the plan when data is available.

The levels of service for each asset category are summarized in two tables. Community levels of service are shown in the first table. Technical levels of service are shown in the second table. The tables are structured as follows:

- The Service Attribute headings and columns indicate the high-level attribute being addressed;
- The Community Levels of Service column in the first table in each section explains the Township's intent in plain language and provides additional information about the service being provided;
- The Performance Measure/Metric column in the second table in each section describes a performance measure/metric connected to the identified service attribute; and
- The 2021 Performance column in the second table in each section reports current performance for the technical levels of service.

3.2 Transportation Services

Table 3-1 and Table 3-2 show the levels of service framework for Transportation assets. Table 3-3, Table 3-4, and Table 3-5 have supporting information referenced in the levels of service framework.

Table 3-1: Transportation Service Community Levels of Service

Service Attribute	Community Levels of Service
Scope	Residents and visitors use the Township's transportation assets to travel from properties to local amenities and regional county and provincial roads. Residents and visitors count on emergency vehicles having reliable access to their properties. The main industry in the Township is farming. Transportation assets support shipping and receiving of goods and relocation of farming equipment. Roads are used by passenger vehicles, commercial trucks, school buses, cyclists, and pedestrians. There is limited ATV, snowmobile, and horse use.
Quality	The Township strives to provide an adequate travel experience to road users.
	Descriptions of paved roads, gravel roads, and structures in different condition state are provided in Table 3-3, Table 3-4, and Table 3-5, respectively. Table 3-5 also includes photos of structures in different condition states.

Table 3-2: Transportation Service Technical Levels of Service

Service Attribute	Performance Measure/Metric	2021 Performance
Scope	Number of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the Township.	Not applicable
	Number of lane-kilometres of collector roads as a proportion of square kilometres of land area of the Township.	0.10 lane-km/km²
	Number of lane-kilometres of local roads as a proportion of square kilometres of land area of the Township.	1.84 lane-km/km²
	Percentage of bridges in the Township with loading or dimensional restrictions.	0%
Quality	For paved roads in the Township, the average pavement condition index value.	53 (Poor)
	Centreline-kilometres of paved roads with PCI < 55 (% of total).	47.8 km (61%)
	For unpaved roads in the Township, the average surface condition.	1.93 (Fair)
	Centreline kilometres of gravel roads with a condition rating of Poor (% of total).	26.5 km (34%)
	For bridges in the Township, the average bridge condition index value.	55
	For structural culverts in the Township, the average bridge condition index value.	74

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

PCI Ranges	Condition State	Description[1]
85 < PCI ≤ 100	**Excellent**	A very smooth ride. Pavement is in excellent condition with few cracks.
70 < PCI ≤ 85	**Good**	A smooth ride with just a few bumps or depressions. The pavement is in good condition with frequent very slight or slight cracking.
55 < PCI ≤ 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 < PCI ≤ 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 < PCI ≤ 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 < PCI ≤ 25	**Serious**	The pavement is in serious condition with extensive severe cracking, alligatoring and distortion.
0 ≤ PCI ≤ 10	**Failed**	

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

Table 3-4: Gravel Road Condition State Descriptions

Condition State	Description
Good (3)	Good drainage, minor potholes present on less than 20% of road surface, gravel thickness of 150mm or more, continue with routine maintenance.
Fair (2)	Some drainage improvements needed, potholes present on 20-50% of road surface, additional gravel needed, routine maintenance required.
Poor (1)	Major drainage improvements needed, potholes present on more than 50% of road surface, gravel resurfacing required.

Table 3-5: Examples and Descriptions of Bridge and Culvert Condition States

Condition State	Bridge Photos	Culvert Photos	Description
Good 70 < BCI ≤ 100			Maintenance is not usually required within the next five years.
Fair 60 < BCI ≤ 70		No Township culverts in this condition state	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.
Poor 0 < BCI ≤ 60		No Township culverts in this condition state	Maintenance work is usually scheduled within one year. Structure may be at increased risk of requiring a loading restriction to be posted.

3.3 Water Service

Table 3-6 and Table 3-7 present the levels of service framework for Water assets.

Table 3-6: Water Service Community Levels of Service

Service Attribute	Community Levels of Service
Scope	The water system provides potable water for residential, business, and institutional consumption, as well as maintenance operations, and firefighting in the urban areas of the Village of Norwood.
Reliability	The water system is managed with the goal of providing safe and reliable delivery of water, minimizing service interruptions and occurrences of adverse water quality events (measured by occurrences of boil water advisories).
	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. Emergency procedures are specified in the "Drinking Water Quality Management Standard – Element 18 SOP-11 Emergency Preparedness and Response Municipal Emergency Plan."

Table 3-7: Water Service Technical Levels of Service

Service Attribute	Performance Measure/Metric	2021 Performance
Scope	Percentage of properties connected to the municipal water system.	33%
	Percentage of properties where fire flow is available.	33%
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 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 municipal water system.	0 connection-days/ connection

3.4 Wastewater Service

Table 3-8 and Table 3-9 show the levels of service framework for Wastewater assets.

Table 3-8: Wastewater Service Community Levels of Service

Service Attribute	Community Levels of Service
Scope	The Township provides wastewater services to residential, business, and institutional customers in the urban areas of the Village of Norwood.
Reliability	The wastewater system is separated, meaning that sanitary and stormwater flows are carried in different pipes with different destinations. 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).
	The goal of the Wastewater Operations and Maintenance Division is to provide an efficient and effective system of sanitary sewers and sewage pumping stations to allow for the transmission of untreated wastewater to the Township's class 3 wastewater treatment facility located a 34 Industrial Drive in the village of Norwood. The Township uses a sequential batch reactor activated sludge sewage treatment system which allows it to meet strict provincial and federal effluent requirements before treated water is discharged into the Ouse River. The final effluent design objectives are identified in the facility's Environmental Compliance Approval (4097-9U8LQE).

Table 3-9: Wastewater Service Technical Levels of Service

Service Attribute	Performance Measure/Metric	2021 Performance
Scope	Percentage of properties connected to the municipal wastewater system.	39%
Reliability	The number of connection-days lost per year due to wastewater backups compared to the total number of properties connected to the municipal 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 municipal wastewater system.	0.0010 violations/ connection

3.5 Stormwater Service

Table 3-10 and Table 3-11 show the levels of service framework for stormwater assets.

Table 3-10: Stormwater Service Community Levels of Service

Service Attribute	Community Levels of Service
Scope	The stormwater management system provides for the collection of stormwater in order to protect properties and roads from flooding.
	The stormwater system serves the urban areas of the Village of Norwood.
	The Township strives to ensure that the stormwater management system is resilient to 5-year storms and most properties in serviced areas are resilient to 100-year storms.

Table 3-11: Stormwater Service Technical Levels of Service

Service Attribute	Performance Measure/Metric	2021 Performance
Scope	Percentage of properties in the Township resilient to a 100-year storm.	30%
	Percentage of the municipal stormwater management system resilient to a 5-year storm.	100%

3.6 Population and Employment Growth

Based on the 2016 Statistics Canada census, the Township had a population of 4,109 in 2016. The County of Peterborough's Official Plan forecasts the 2031 population of the Township to be 4,502. This corresponds to an average population growth rate of 0.6% per year.

This population growth is expected to result in incremental service demands that may impact the current level of service. These growth-related needs are summarized in the Township's 2018 Development Charges Update 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.

Chapter 3
Lifecycle Management Strategy

4. Lifecycle Management Strategy

4.1 Introduction

This chapter details the lifecycle management strategies required to maintain the current levels of service presented in Chapter 2. Within the context of this Addendum Report, 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 10-year forecast of the lifecycle activities that would need to be undertaken to maintain the current levels of service, and associated costs.

The analysis of lifecycle activity options was undertaken through facilitated workshops with Township staff. For each category of assets, the full sequence of lifecycle activities was documented, along with an estimate of the costs and approximate timing of each lifecycle activity. This documentation provides a generalized representation of each asset's lifecycle (lifecycle model), allowing for the estimation of lifecycle costs, both in total and as an annual average. Understanding the average annual lifecycle costs is important for long-term financial planning as well as tax and rate setting. In addition to the full lifecycle costing, the lifecycle management strategies contained in this Addendum Report also include a 10-year forecast of lifecycle expenditures. The 10-year forecasts were developed using a combination of forecasting using the defined lifecycle models, lifecycle intervention recommendations contained in external reports/background studies (e.g., 2020 OSIM report), and input from Township staff.

[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.

Details of the lifecycle management strategies for the Township's core assets are described in the following sections.

4.2 Transportation Services

4.2.1 Lifecycle Costing

A lifecycle model for paved roads was developed through discussions with the Township's staff, incorporating local knowledge and costing information.

Table 4-1 shows the parameters of the lifecycle model for HCB roads. Based on these parameters, average annual lifecycle capital costs are $16,170 per centreline-kilometre. With 31.0 centreline-kilometres of roads in this category, the total average annual lifecycle capital cost is $501,000.

Table 4-1: Lifecycle Model for HCB Roads

Activity Description	Cost per Centreline-kilometre	Average Annual Cost per Centreline-kilometre	Lifecycle Activity Year
Microsurfacing	$66,000	$1,630	20
Reconstruction - remove asphalt, spot base repairs, grade, repave.	$500,000	$3,260	35
Total	**$566,000**	**$16,170**	-

Table 4-2 shows the parameters of the lifecycle model for LCB roads. Based on these parameters, average annual lifecycle capital costs are $18,730 per centreline-kilometre. With 46.9 centreline-kilometres of roads in this category, the total average annual lifecycle capital cost is $878,000.

Table 4-2: Lifecycle Model for LCB Roads

Activity Description	Cost per Centreline-kilometre	Average Annual Cost per Centreline-kilometre	Lifecycle Activity Year
Single surface treatment	$20,500	$1,370	5
Single surface treatment	$20,500	$1,370	10
Reconstruction[1]	$240,000	$16,000	15
Total	**$281,000**	**$18,730**	-

Table 4-3 shows the parameters of the lifecycle model for gravel roads. Based on these parameters, average annual lifecycle capital costs are $2,220 per centreline-kilometre. With 77.7 centreline-kilometres of roads in this category, the total average annual lifecycle capital cost is $172,500.

Table 4-3: Lifecycle Model for Gravel Roads

Activity Description	Cost per Centreline-kilometre	Average Annual Cost per Centreline-kilometre	Lifecycle Activity Year
Regravelling, ditching, brushing	$11,100	$2,220	5
Total	**$11,100**	**$2,220**	-

Table 4-4 shows the parameters of the lifecycle model for bridges. Based on these parameters, average annual lifecycle capital costs are 2% of replacement cost. With a total replacement cost of $1,480,000 for four bridges, the total average annual lifecycle capital cost is $29,500.

[1] Reconstruction includes: Pulverize surface, regravel, culvert replacement, grade, ditching and brushing, spot base repairs on soft spots, double surface treatment

Table 4-4: Lifecycle Model for Bridges: Capital

Activity Description	Percentage of Replacement Cost	Average Annual Cost	Lifecycle Activity Year
Minor rehabilitation	15%	0.20%	25
Major rehabilitation	35%	0.47%	50
Replacement	100%	1.33%	75
Total	**150%**	**2.00%**	-

Table 4-5 shows the parameters of the lifecycle model for culverts. Based on these parameters, average annual lifecycle capital costs are estimated to represent approximately 2% of replacement cost. With a replacement cost of $950,000 for the concrete culvert, the average annual lifecycle capital cost is approximately $19,000.

Table 4-5: Lifecycle Model for Concrete Culverts

Activity Description	Percentage of Replacement Cost	Average Annual Cost	Lifecycle Activity Year
Replacement	100%	2.00%	50
Total	**100%**	**2.00%**	-

Table 4-6 summarizes average annual lifecycle costs for core transportation assets. The total average annual lifecycle cost is estimated to be $1,600,000.

Table 4-6: Average Annual Lifecycle Costs – Transportation Assets

Asset Class	Average Annual Lifecycle Cost (Capital)
HCB Roads	$501,000
LCB Roads	$877,000
Gravel	$173,000
Bridges	$30,000
Structural Culvert	$19,000
Total	**$1,600,000**

4.2.2 Lifecycle Expenditure Forecast

The 10-year lifecycle expenditure forecast for roads is informed by the Township's existing five-year capital plans for asphalt and surface treated roads and the lifecycle model for gravel roads. The average annual investment rates from the five-year capital plans were used to extend the plans to 2031. The 10-year lifecycle expenditure forecast for roads is summarized in Figure 4-1 and is provided in tabular form in Table 4-7. Based on this forecast, the average annual expenditures over the next ten years will be approximately $578,000.

Figure 4-1: 10-year Lifecycle Expenditure Forecast for Roads (2022$)

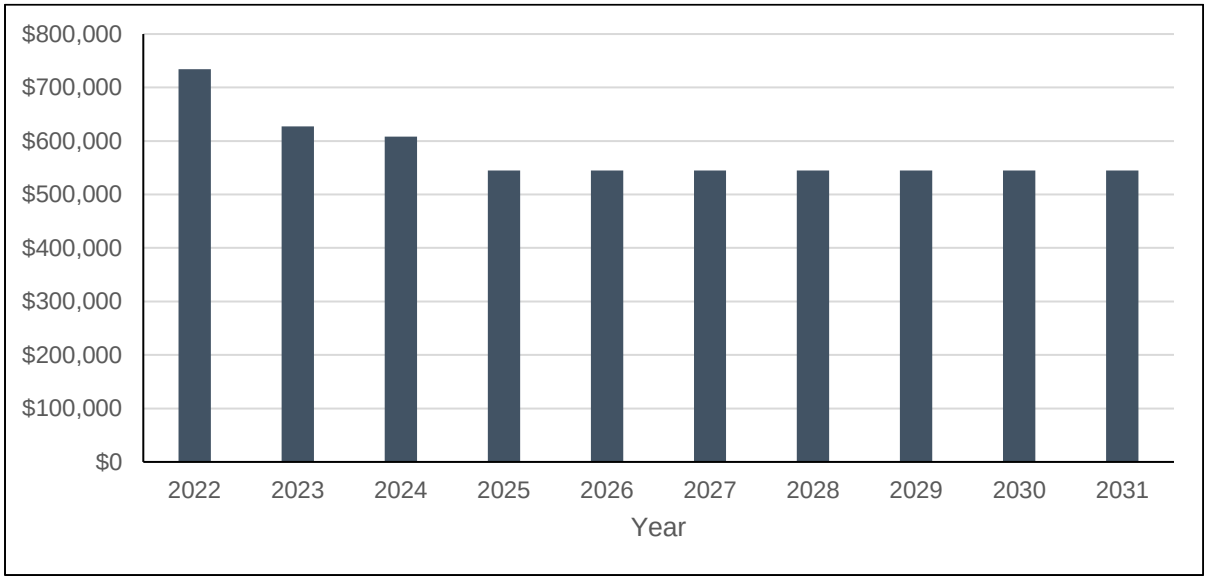

Table 4-7: 10-year Lifecycle Expenditure Forecast for Roads (2022$)

Surface Type	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
HCB	$158,658	$96,464	$96,464	$96,464	$96,464	$96,464	$96,464	$96,464	$96,464	$96,464
LCB	$403,134	$358,380	$338,866	$275,966	$275,966	$275,966	$275,966	$275,966	$275,966	$275,966
Gravel	$172,543	$172,543	$172,543	$172,543	$172,543	$172,543	$172,543	$172,543	$172,543	$172,543
Total	$734,335	$627,388	$607,874	$544,973	$544,973	$544,973	$544,973	$544,973	$544,973	$544,973

The 10-year lifecycle expenditure forecast for structures was developed based on the recommendations identified in the 2020 OSIM report with adjustments made by Township staff. Table 4-8 shows the lifecycle activities, their estimated cost and approximate timing over the next ten years. Based on these estimates, the average annual cost over the 10 years is approximately $79,000.

Table 4-8: 10-year Lifecycle Expenditure Forecast for Structures (2022$)

Structure	Activity	Now	1-5	6-10	Total
Bridge No. 1	Now: Install guide rail over the structure and on the approaches Years 1-5: Repair curbs, deck soffit and fascia – Sand Rd.	$35,000	$0	$35,000	**$70,000**
Bridge No. 2	Replacement – Mill St.	$0	$250,000	$0	**$250,000**
Bridge No. 4	Replacement – Transfer Station	$0	$185,000	$0	**$185,000**
Bridge No. 6	Replacement – Alma St. pedestrian bridge	$250,000	$0	$0	**$250,000**
Culvert No. 1	Restore embankments	$0	$10,000	$0	**$10,000**
Culvert No. 3	Place rock protection at the inlet	$0	$25,000	$0	**$25,000**
	Total	**$285,000**	**$470,000**	**$35,000**	**$790,000**

4.3 Water

4.3.1 Lifecycle Costing

A lifecycle model for the water system was developed through discussions with the Township's staff, incorporating local knowledge and costing information. Supporting data was obtained from the Township's asset inventory databases (CityWide and GIS).

Table 4-9 shows the parameters of the lifecycle model for water mains. Based on these parameters, average annual lifecycle capital costs are $6,080 per kilometre. With 14.4 kilometres of water mains, the total average annual lifecycle capital cost is $88,000.

Table 4-9: Lifecycle Model for Water Mains

Activity Description	Cost per kilometre	Average Annual Cost per Kilometre	Lifecycle Activity Year
Replace water main	$456,000	$6,080	75
Total	**$456,000**	**$6,080**	-

Water treatment assets are componentized in the Township's asset inventory databases. Table 4-10 shows a summary of the useful lives of the water treatment components. Based on these parameters, average annual lifecycle capital costs are estimated to be $135,000. The average expected useful life across all components is 28 years.

Table 4-10: Lifecycle Model for Water Treatment Components

Expected Useful Life (Years)	Examples of Components	Replacement Cost	Average Annual Lifecycle Cost
5	Pump	$3,000	$600
7	Unit heater, distribution chlorine analyzer, sodium hypo pump	$58,000	$8,300
10	Turbidimeter, flow meter, pressure transmitter	$197,000	$19,700
15	Pump, valve, aeration breeze tank	$865,000	$57,700
20	Well level probe, Pribusin controller	$221,000	$11,100
25	Generator	$81,000	$3,200
50	Well, breeze tank, gate valve, blower	$449,000	$9,000
75	Water tower, chlorine contact pipe, process piping	$1,884,000	$25,100
	Total	**$3,759,000**	**$134,700**

Table 4-11 summarizes average annual lifecycle costs for water assets. The total average annual lifecycle cost is estimated to be $223,000.

Table 4-11: Average Annual Lifecycle Costs – Water Assets

Asset Class	Average Annual Lifecycle Cost (Capital)
Water Mains	$88,000
Water Facilities	$135,000
Total	**$223,000**

4.3.2 Lifecycle Expenditure Forecast

The ten-year capital plan for water is based on the lifecycle model presented in subsection 4.3.1, with asset replacement occurring at the end of the asset's expected useful life. If an asset is beyond its useful life already, it is assumed to be require replacement in 2022. The current age of assets is calculated from the in-service date for each component in the Township's asset inventory databases. Based on these assumptions, the total expenditures over the next 10 years are $2.62 million.

The 10-year lifecycle expenditure forecast for water infrastructure is summarized in Figure 4-2 and is provided in tabular form in Table 4-12. Based on this forecast, average annual expenditures over the forecast period have been estimated at approximately $262,000.

Figure 4-2: 10-year Lifecycle Expenditure Forecast for the Water System (2022$)

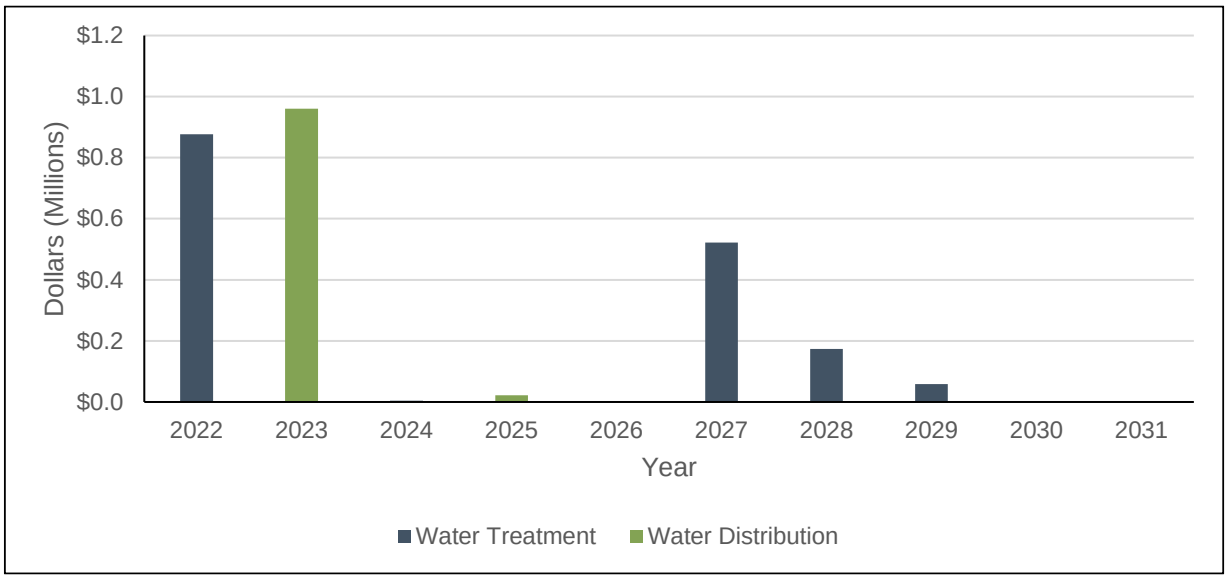

Table 4-12: 10-year Lifecycle Expenditure Forecast for the Water System (2022$)

Asset Class	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Water Treatment	$876,912	$0	$3,417	$0	$0	$522,457	$173,588	$58,236	$0	$0
Water Distribution	$0	$960,957	$0	$21,732	$0	$0	$0	$0	$0	$0
Total	$876,912	$960,957	$3,417	$21,732	$0	$522,457	$173,588	$58,236	$0	$0

4.4 Wastewater

4.4.1 Lifecycle Costing

A lifecycle model for the wastewater system was developed through discussions with the Township's staff, incorporating local knowledge and costing information. Supporting data was obtained from the Township's asset inventory databases.

Table 4-13 shows the parameters of the lifecycle model for wastewater mains. Based on these parameters, average annual lifecycle capital costs are $6,080 per kilometre. With 18.1 kilometres of wastewater mains in this category, the total average annual lifecycle capital cost is $110,000.

Table 4-13: Lifecycle Model for Wastewater Mains

Activity Description	Cost per kilometre	Average Annual Cost per Kilometre	Lifecycle Activity Year
Replace wastewater main	$456,000	$6,080	75
Total	**$456,000**	**$6,080**	-

Wastewater treatment assets are componentized in the Township's asset inventory databases. Table 4-14 shows a summary of the useful lives of the wastewater treatment components. Based on these parameters, average annual lifecycle capital costs are estimated to be $299,000.

Table 4-14: Lifecycle Model for Wastewater Treatment Components

Expected Useful Life (Years)	Example Components	Replacement Cost	Average Annual Lifecycle Cost
1	Compressor air filters	$7,000	$7,000
2	Dissolved oxygen probe	$2,000	$1,000
5	Portable oxygen analyzer, electric heater, exhaust fan filter	$28,000	$6,000
7	Aluminum diaphragm pump, alarm dialer control	$110,000	$16,000
8	Panel control, final effluent sampler	$8,000	$1,000
10	Blower, filter sand, natural gas heater, VFD drive	$700,000	$70,000
15	Valve plug transfer pump, meter flow equalizer tank, conveyor auger muffin monster	$1,011,000	$67,000
20	Engine diesel generator plant, PLC Panel Fluidyne	$315,000	$16,000
25	Tank, gear drive clarifier (secondary)	$2,879,000	$115,000
	Total	**$5,059,000**	**$299,000**

Table 4-15 summarizes average annual lifecycle costs for wastewater assets. The total average annual lifecycle cost is estimated to be $409,000.

Table 4-15: Average Annual Lifecycle Costs – Wastewater Assets

Asset Class	Average Annual Lifecycle Cost (Capital)
Wastewater Mains	$110,000
Wastewater Treatment	$299,000
Total	**$409,000**

4.4.2 Lifecycle Expenditure Forecast

The ten-year capital plan for wastewater is based on the lifecycle model presented in subsection 4.4.1. It is assumed that assets are replaced at the end of their useful life. If an asset is beyond its useful life already, it is assumed to be replaced in 2022. The current age of assets is calculated from the in-service date in for each component in the Township's asset inventory databases.

The 10-year lifecycle expenditure forecast for wastewater infrastructure is summarized in Figure 4-3 and is provided in tabular form in Table 4-16. Based on this forecast, average annual expenditures over the forecast period have been estimated at approximately $341,000.

Figure 4-3: 10-year Lifecycle Expenditure Forecast for the Wastewater System (2022$)

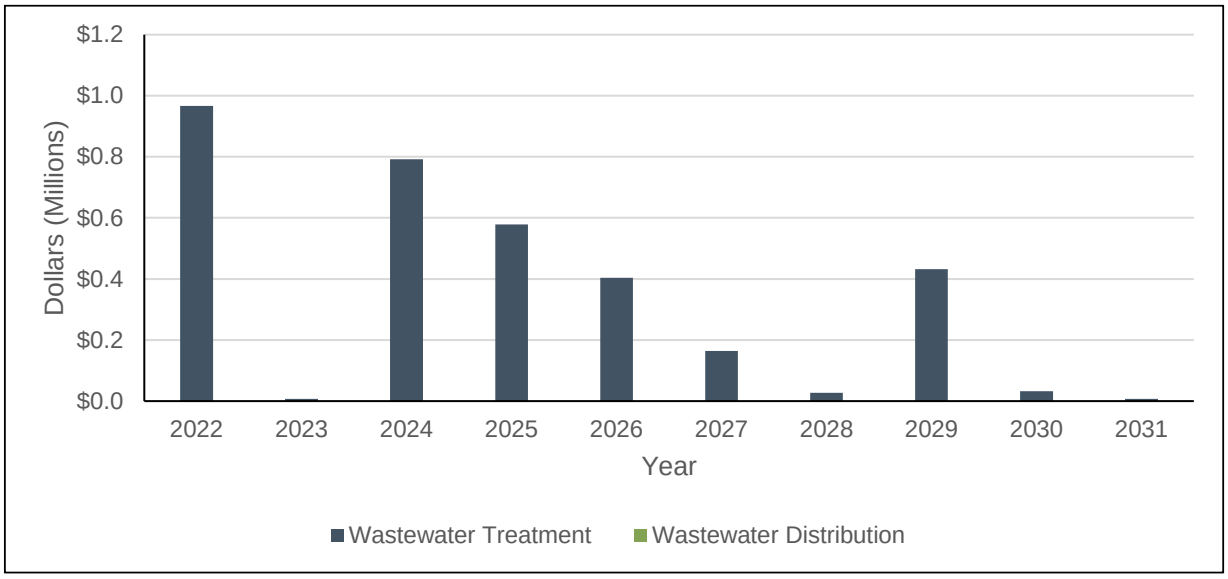

Table 4-16: 10-year Lifecycle Expenditure Forecast for the Wastewater System (2022$)

Asset Class	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Wastewater Treatment	$966,872	$7,428	$791,623	$578,023	$403,373	$163,772	$26,629	$431,939	$32,545	$7,428
Wastewater Collection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$966,872	$7,428	$791,623	$578,023	$403,373	$163,772	$26,629	$431,939	$32,545	$7,428

4.5 Stormwater

4.5.1 Lifecycle Costing

A lifecycle model for the stormwater system was developed through discussions with the Township's staff, incorporating local knowledge and costing information.

Table 4-17 shows the parameters of the lifecycle model for stormwater mains. Based on these parameters, average annual lifecycle capital costs are $6,080 per kilometre. With 6.5 kilometres of stormwater mains, the total average annual lifecycle capital cost is $39,000.

Table 4-17: Lifecycle Model for Stormwater Mains

Activity Description	Cost per kilometre	Average Annual Cost per Kilometre	Lifecycle Activity Year
Replace stormwater main	$456,000	$6,080	75
Total	**$456,000**	**$6,080**	-

Stormwater treatment assets consist of one infiltration gallery that will need to be replaced at the end of its useful life and stormwater ponds that can be maintained indefinitely through periodic cleanouts. Table 4-18 shows the parameters of the lifecycle model for stormwater treatment. Based on these parameters, average annual lifecycle capital costs are estimated to be $5,000.

Table 4-18: Lifecycle Model for Stormwater Treatment Assets

Treatment Asset	Replacement Cost	Lifecycle Cost	Average Annual Lifecycle Cost	Lifecycle Length
Infiltration gallery	$179,000	$179,000	$3,600	50
Stormwater ponds	$624,000	$21,000	$1,400	15
Total	**$803,000**	**200,000**	**$5,000**	

Table 4-19 summarizes average annual lifecycle costs for stormwater assets. The total average annual lifecycle cost for stormwater assets is estimated to be $44,000.

Table 4-19: Average Annual Lifecycle Costs – Stormwater Assets

Asset Class	Average Annual Lifecycle Cost (Capital)
Stormwater Mains	$39,000
Stormwater Facilities	$5,000
Total	**$44,000**

4.5.2 Lifecycle Expenditure Forecast

Given the limited records currently available (i.e., only partial age-based information), a lifecycle expenditure forecast for the Township's stormwater infrastructure has not been developed.

It should be noted, however, that the Township does take a proactive approach to managing stormwater infrastructure through ongoing operations and maintenance programs which include:

- Cleaning of stormwater mains, catch basins and ponds;
- Street sweeping;
- Leaf collection; and
- Site investigations (based on customer complaints or calls).

In the coming years the Township may wish to consider including stormwater infrastructure in Master Service Plans/Assessments and developing Operational Maintenance Plans for stormwater ponds (including condition/sedimentation surveys). These plans would form the basis for developing a 10-year lifecycle expenditure forecast.

4.6 Summary of Average Annual Lifecycle Costs

The total of the average annual lifecycle costs identified for core assets in this chapter is $2.32 million. Figure 4 shows how this total is distributed by core asset class. Roads accounts for 67%, two-thirds of the total. Environmental assets account for most of the remaining third, 18% for wastewater and 11% for water. Structures and stormwater each account for 2%. In future iterations of the Township's asset management plan, the estimates of average annual lifecycle costs will be used to inform the financial strategy.

Figure 4: Summary of Average Annual Lifecycle Costs for Core Assets