Report prepared by:

Asset Management Plan – Core Assets

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List of Acronyms and Abbreviations

Acronym	Full Description of Acronym
BCI	Bridge Condition Index
CCTV	closed-circuit television
DWA	Drinking Water Advisory
HCB	high-class bituminous
ICB	intermediate-class bituminous
IJPA	Infrastructure for Jobs and Prosperity Act, 2015
Km	kilometre(s)
LCB	low-class bituminous
M	million
mm	millimetre(s)
O. Reg.	Ontario Regulation
OSIM	Ontario Structure Inspection Manual
PSAB	Public Sector Accounting Board
SA	Structural Adequacy

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 continuous improvement and updates of the plan, to ensure its relevancy over the long term.

The District Municipality of Muskoka (District) retained Watson & Associates Economists Ltd. (Watson) to update the District's 2018 Asset Management Plan. With this update, the intent is to bring the District's asset management plan into compliance with the July 1, 2022, requirements of Ontario Regulation (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 broad asset classes:

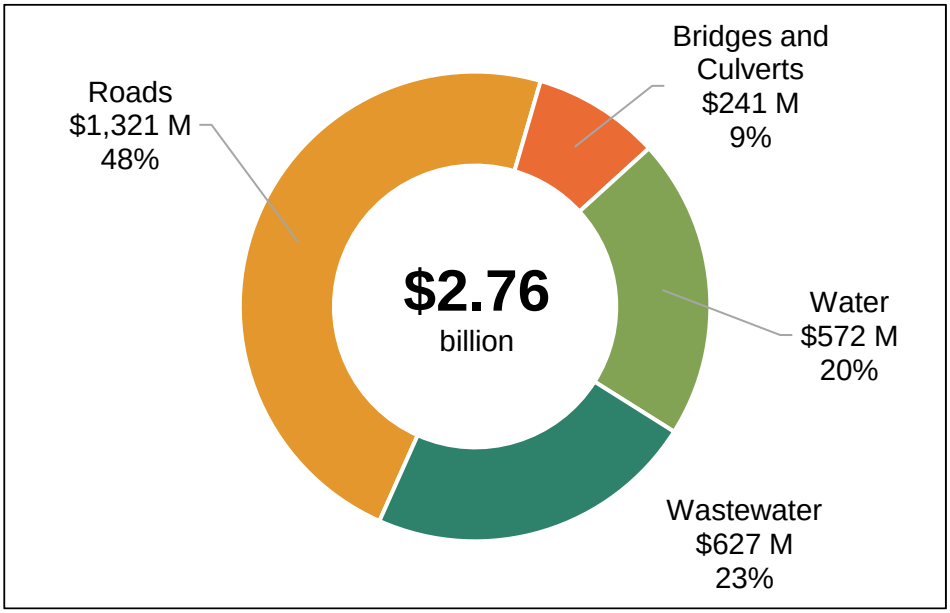
- Roads;
- Bridges and structural culverts;
- Water; and
- Wastewater.

Core assets and their replacement costs are shown in Table 1-1. Figure 1-1 shows the distribution of replacement costs by asset class. Roads account for approximately half of the total replacement cost (48%), followed by wastewater (23%), water (20%), and lastly, bridges and structural culverts (9%).

Table 1-1: Asset Classes and Replacement Costs (2022$)

Asset Class	Replacement Cost
Roads	$1,320,507,764
Bridges and Structural Culverts	$241,410,000
Water	$571,898,679
Wastewater	$627,161,011
Total	**$2,760,977,454**

Figure 1-1: Distribution of Replacement Cost 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, in both 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 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 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 required to be included in municipal asset management plans 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. The 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 the IJPA. The intent of O. Reg. 588/17 is to establish standard content for municipal asset management plans. Specifically, the regulations require that asset management plans 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 plan has been developed to address the July 1, 2022, requirements of O. Reg. 588/17. It utilizes the best information available to the District at this time.

1.3 Asset Management Plan Development

This asset management plan was developed using an approach that leverages the District's capital asset database information, various background reports, and staff input.

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

1. Compile available information pertaining to the District'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 District staff input, existing background reports and studies (e.g., 2021 Ontario Structure Inspection Manual (OSIM) Bridge and Culvert Inspection Program Report), 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 expenditures required to maintain current level of service.

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

1.4 Maintaining and Integrating the Asset Management Plan

To comply with the July 1, 2024, and July 1, 2025, requirements of O. Reg. 588/17, this plan will need to be expanded to cover all assets, to have targets set for levels of service performance measures, and to include a detailed financial strategy. Further integration into other municipal financial and planning documents would assist in ensuring the ongoing accuracy of the asset management plan, as well as the integrated financial and planning documents.

The asset management plan is a snapshot in time and is based on a number of assumptions regarding expected lifecycles and future performance of assets, lifecycle intervention costs, among others. The District will need to establish processes for reviewing and updating these assumptions on a regular basis to keep the plan relevant.

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 District's assets and the current service levels provided by those assets.

O. Reg. 588/17 requires that for each asset category included in the asset management plan, the following information must be identified:[1]

- 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 the condition of assets; and
- The municipality's 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 category. 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 service.

[1] The asset management plan contains asset summary information that has been compiled from various sources, including the District's asset inventory database, and various background reports. For further information regarding these background sources, please contact Engineering and Public Works.

2.2 Transportation Services

2.2.1 State of Local Infrastructure

The core assets that support the District's transportation services comprise roads, bridges, and structural culverts. Other transportation assets such as signs and streetlights are not included in this plan because they are not considered core assets in O. Reg. 588/17.

The road network consists of roads with various surface types, including high-class bituminous (HCB), intermediate-class bituminous (ICB) and low-class bituminous (LCB). The estimated replacement cost of roads is approximately $1.32 billion. Table 2-1 provides a breakdown of the road network length and replacement cost by surface type. The average age of road surfaces and road bases is 15 years and 24 years, respectively. A visual rendering of the data presented in Table 2-1 and the average age information is provided in Figure 2-1.

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

Surface Type	Lane-Kilometres	Replacement Cost (2022$)
HCB	773	$783,000,000
ICB	123	$110,800,000
LCB	569	$426,700,000
Total	**1,465**	**$1,320,500,000**

The District has 51 bridges and 47 structural culverts with an estimated combined replacement cost of $241.4 million. The average age of bridges is 52 years, and the average age of structural culverts is 25 years.[1] Table 2-2 provides counts, average ages, and replacement costs for bridges and structural culverts. A visual rendering of the data presented in Table 2-2 is provided in Figure 2-2.

[1] It is noted that the construction year is unknown for 21 culverts (approximately 45% of the total). The average age of 25 years is reflective of the 26 culverts with known construction years.

Table 2-2: Bridges and Structural Culverts – Summary of Count, Average Age, and Replacement Cost by Structure Type

Structure Type	Count	Average Age	Replacement Cost (2022$)
Bridges	51	52	$209,890,000
Culverts	47	25	$31,520,000
Total	**98**	**35**	**$241,410,000**

Figure 2-1: Road Network Summary Information

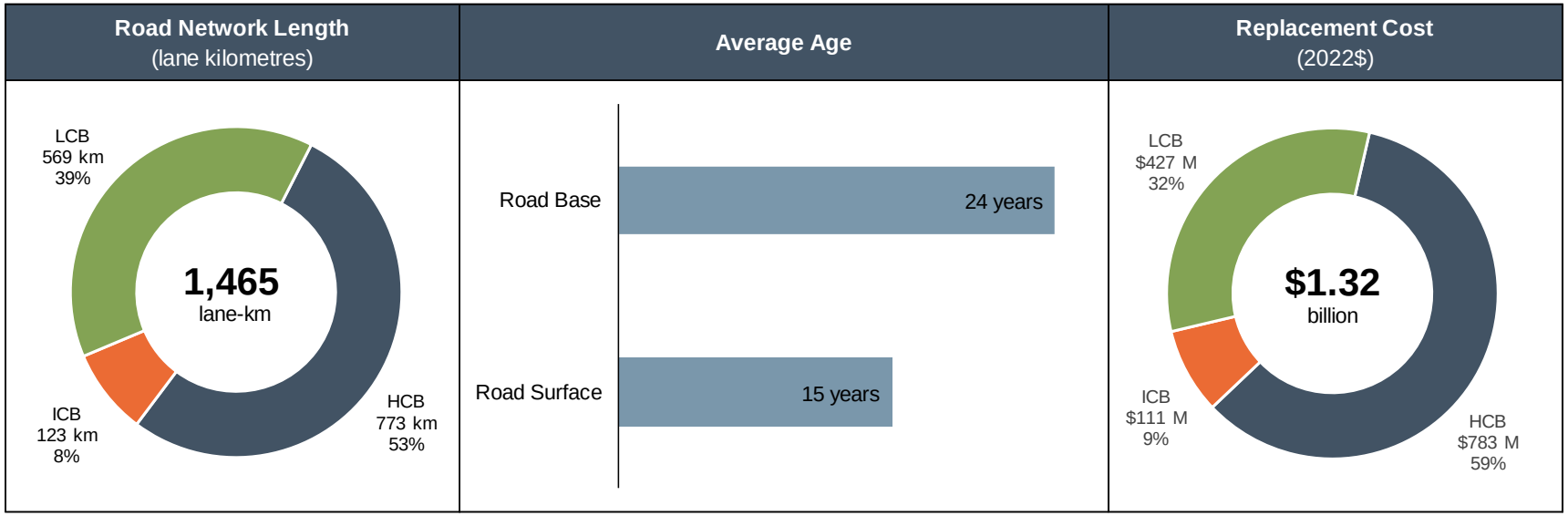
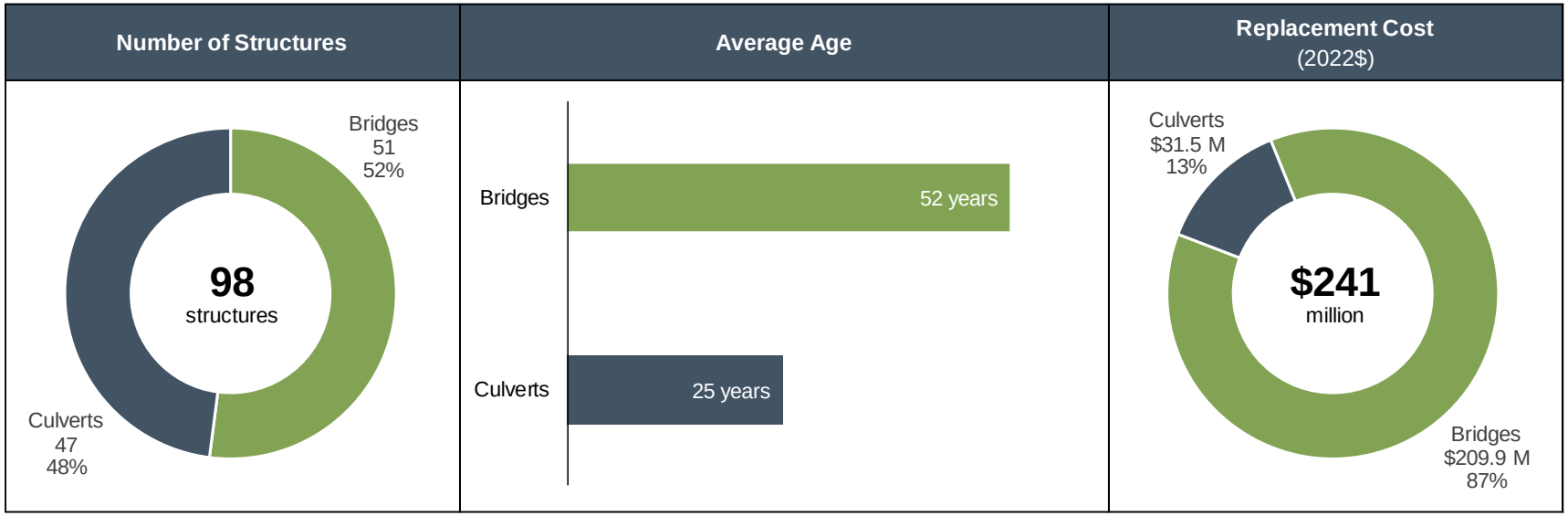


Figure 2-2: Bridges and Structural Culverts – Summary Information



2.2.2 Condition

In this asset management plan, road condition is reported using the Structural Adequacy (SA) score. Road appraisals are completed for the District's entire road network by District staff on an annual basis. Appraisals are completed by staff members from the District's roads engineering, design and operations divisions and are based on a combination of ride condition rating, staff knowledge of historical performance of the roadway, and appraisal criteria from the Ministry of Transportation Inventory Manual for Municipal Roads. Road sections are assigned an SA score between 0 and 20 (with 20 being highest). Capital and maintenance improvements and upgrades are scheduled based on the result of this scoring system and incorporated into the District's Ten-year Tax Supported Capital Budget and Forecast.

To better communicate the condition of the road network, the numeric SA ratings have been segmented into qualitative condition states. Moreover, descriptions of roads in these condition states are provided to better communicate the condition to the reader. Table 2-3 summarizes the various SA ratings and the condition state they represent.

Table 2-3: Road Condition States Defined with Respect to Structural Adequacy

Structural Adequacy (SA) Ranges	Condition State	Description
18 < SA ≤ 20	**Excellent**	Signs of surface distress represent less than 5% of the length of the section. A very smooth ride. Road has potentially been recently resurfaced or reconstructed. No noted drainage deficiencies.
14 < SA ≤ 18	**Very Good**	Distress is noted on from 5% to 10% of the length. A smooth to very smooth ride with very few surface deformations or cracking. The required maintenance effort may be above average but not uneconomical when compared to the cost of reconstruction. Very minor drainage and/or base improvements are identified.
10 < SA ≤ 14	**Good**	Distress is noted on from 11% to 15% of the length. A smooth to comfortable ride with few or intermittent bumps and depressions and/or surface cracking. Again, the required maintenance effort may be above average but not necessarily uneconomical when compared to the cost of reconstruction. Drainage deficiencies identified but are not critical to road performance.
7 < SA ≤ 10	**Fair**	Distress is noted on from 16% to 20% of the length and the required maintenance effort is high. A somewhat uncomfortable ride but the operating speed can be maintained despite surface deformations, cracking and/or aggregate loss. Drainage and road base deficiencies identified but are not critical to road performance.
2 < SA ≤ 7	**Poor**	Distress is noted on more than 20% of the length and the required maintenance effort is excessive. An uncomfortable ride with extensive bumps, depressions and/or cracking. Operating speed of the road cannot be maintained due to surface deformations and pavement condition. Significant drainage and road base deficiencies identified.
0 < SA ≤ 2	**Very Poor**	Distress is noted on more than 50% of the length and required maintenance efforts are excessive. A very uncomfortable ride. Road is significantly deformed with constant bumps, depressions or surface loss requiring additional navigation to avoid. Significant/constant identified drainage and road base deficiencies.
SA = 0	**End of Life**	Road is impassable and unsafe for public use.

Table 2-4 shows the average condition of District roads by surface type, weighted based on centreline-kilometres. On average, all surface types are in the Good condition state. Figure 2-3 shows the overall distribution of District roads by condition state and Figure 2-4 provides a further breakdown of this information by surface type.

Table 2-4: Road Condition Analysis – Paved Roads

Road Surface	Lane-Kilometres	Structural Adequacy (Weighted Average)	Average Condition State
HCB	773	14	**Good**
ICB	123	13	**Good**
LCB	569	13	**Good**
Total	**1,465**	**13**	**Good**

Figure 2-3: Distribution of Road Length (lane-kilometres) by Condition State

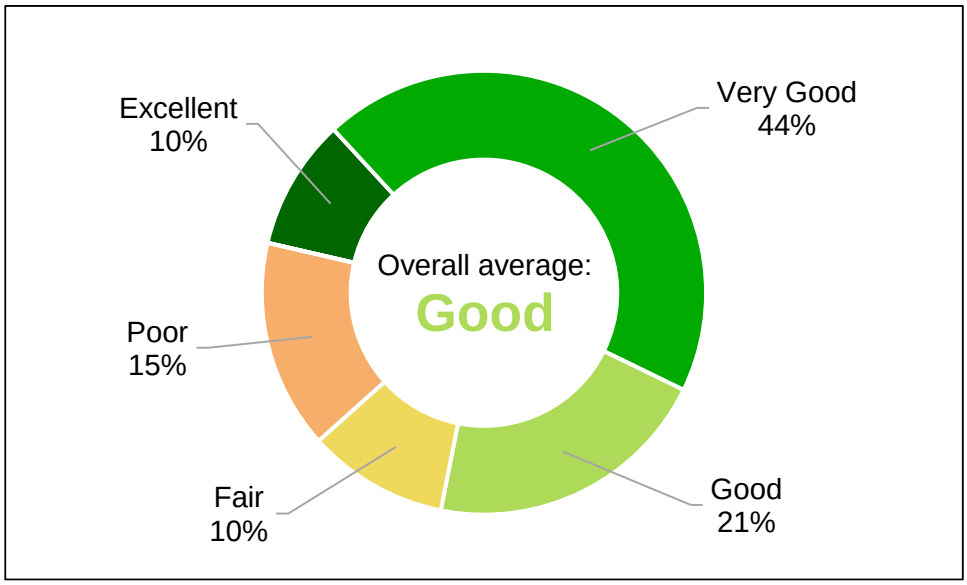
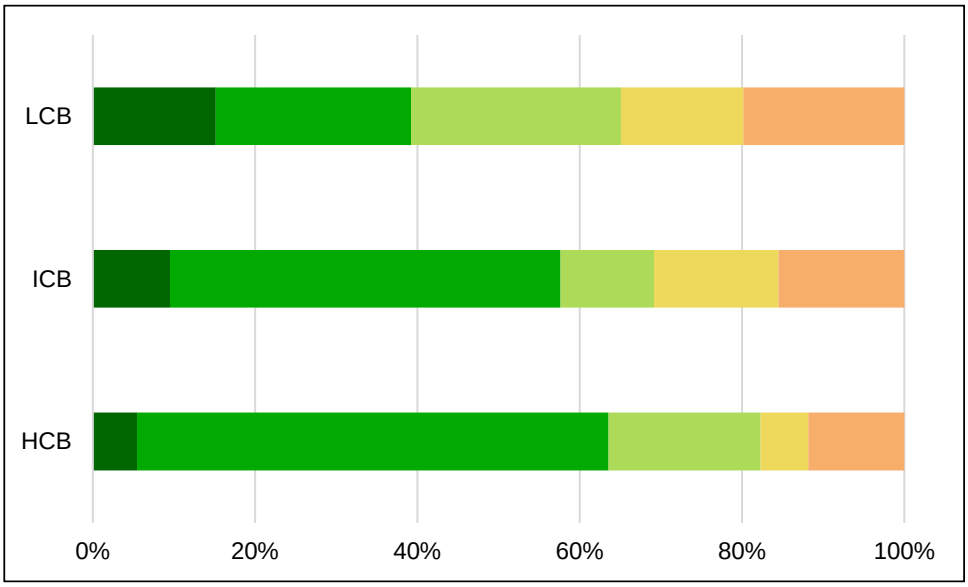


Figure 2-4: Distribution of Road Length (lane-kilometres) by Condition State for Each Surface Type



The condition of the District's bridges and structural culverts was assessed by D.M. Wills Associates Limited in 2021. The assessment was completed as part of the biennial inspections required by O. Reg. 104/97, following the OSIM. Each bridge and structural culvert was assigned a Bridge Condition Index (BCI). The BCI 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 bridges and structural culverts have been segmented into qualitative condition states.

Table 2-5 summarizes the BCI ratings and the condition state they represent, along with a description of each condition state.

Table 2-5: Examples and Descriptions of Bridge and Culvert Condition States

Bridge Condition Index (BCI) Range	Condition State	Description
90 < BCI ≤ 100	**Excellent**	A bridge with a BCI greater than 70 is generally considered to be in good to excellent condition, and repair or rehabilitation work is not usually required within the next five years. Routine maintenance, such as sweeping cleaning, and washing are still recommended.
80 < BCI ≤ 90	**Very Good**	
70 < BCI ≤ 80	**Good**	
50 < BCI ≤ 70	**Fair**	A bridge with a BCI between 50 and 70 is generally considered to be in good to fair condition. Repair or rehabilitation work recommended is ideally scheduled to be completed within the next five years. This is the ideal time to schedule major bridge repairs from an economic perspective.
25 < BCI ≤ 50	**Poor**	A bridge with a BCI rating of less than 50 is generally considered poor with lower numbers representing structures nearing the end of their service life. The posting of load limits is more likely to be required once a bridge/culvert gets to this condition state.
BCI ≤ 50	**Very Poor**	

Table 2-6 shows the average condition of District bridges and structural culverts by structure type, weighted based on replacement cost. On average, bridges are in the Good condition state and structural culverts are in the Fair condition state. The overall distribution of the District's bridges and structural culverts by condition state is presented in Figure 2-5 and a further breakdown of this information by structure type is provided in Figure 2-6.

Table 2-6: Bridges and Structural Culverts Condition Analysis

Structure Type	Count	Average Condition	Average Condition State
Bridges	51	71.6	Good
Culverts	47	68.9	Fair
Total	**98**	**71.3**	**Good**

Figure 2-5: Distribution of Bridges and Structural Culverts by Condition State

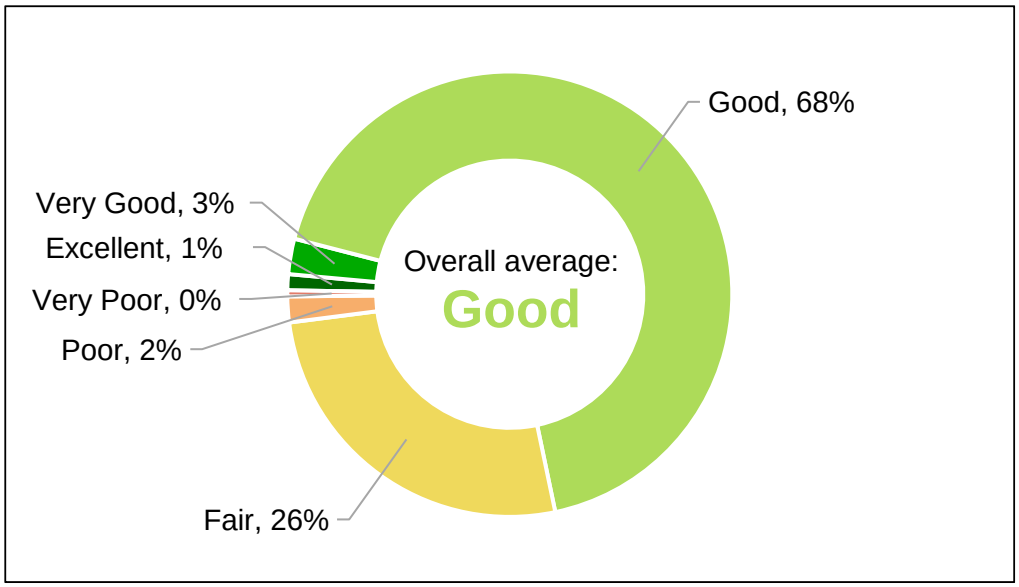
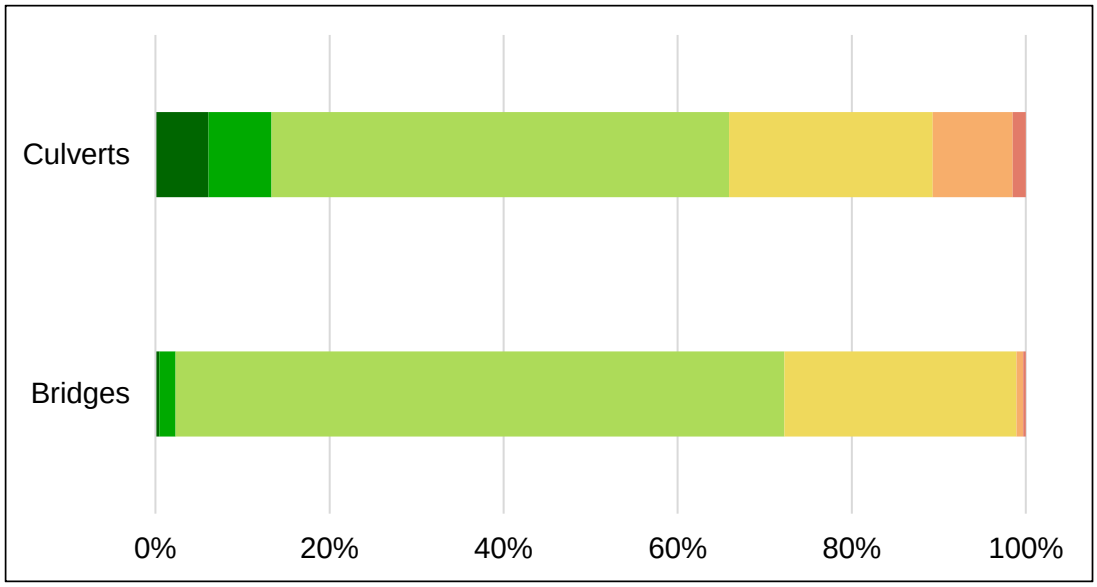


Figure 2-6: Distribution of Structure Replacement Costs by Condition State for Each Structure Type



2.2.3 Current Levels of Service

The levels of service currently provided by the District's transportation system are, in part, a result of the state of local infrastructure identified above. A levels of service analysis defines the current levels of service that will be tracked over time. In future iterations of the asset management plan, targets will be set for the technical levels of service.

There are prescribed levels of service reporting requirements under O. Reg. 588/17 for some transportation assets (i.e., roads, bridges and culverts). Table 2-7 and Table 2-8 include the prescribed community and technical levels of service.

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 Table 2-7 explains the District's intent in plain language and provides additional information about the service being provided;
- The Performance Measure column in Table 2-8 describes the performance measure(s) connected to the identified service attribute; and

- The 2021 Performance column in Table 2-8 reports current performance for the performance measure.

Table 2-7: Community Levels of Service – Roads and Bridges

Service Attribute	Community Levels of Service
Scope	The District's roads and bridges enable the movement of people and goods within the District. The assets also support transient traffic passing through the District. In addition to passenger vehicles, the District's transportation assets also support public transit, commercial truck traffic, movement of agricultural equipment, products and animals, and reliable emergency vehicle access to all areas of the District.
	The scope of the District's transportation network, including roads and bridges, is illustrated by the map in Appendix A.
Quality	General descriptions of how different condition states may affect the use of roads, bridges and structural culverts are provided in Table 2-3 and Table 2-5.

Table 2-8: Technical Levels of Service – Roads and Bridges

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 District	0.01 km/km²
	Number of lane-kilometres of collector roads as a proportion of square kilometres of land area of the District	0.28 km/km²
	Number of lane-kilometres of local roads as a proportion of square kilometres of land area of the District	0.08 km/km²
	Percentage of bridges in the District with loading or dimensional restrictions	5.9%
Quality	For paved roads in the District, the average pavement condition index value	66.2[1]
	For unpaved roads in the District, the average surface condition	N/A[2]
	For bridges in the District, the average bridge condition index value	71.6
	For structural culverts in the District, the average bridge condition index value	68.9

[1] The District measures condition using the Structural Adequacy rating instead of the Pavement Condition Index. The average Pavement Condition Index has been estimated using the average Structural Adequacy rating multiplied by five.
[2] The District does not have any unpaved roads.

2.3 Water Services

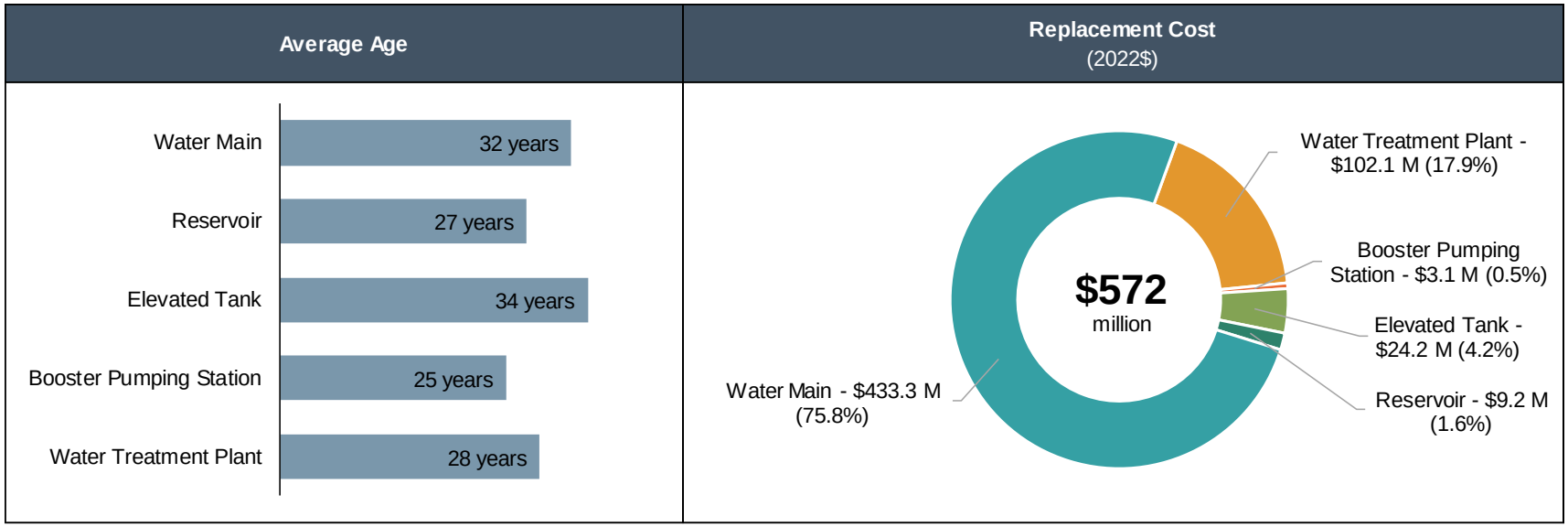
2.3.1 State of Local Infrastructure

The District owns and maintains nine drinking water systems, and is responsible for the operation of multiple pumping stations, storage facilities, water mains, and fire hydrants. The combined replacement cost of the District's water infrastructure is approximately $571.9 million. Table 2-9 provides a summary of the assets with quantity, average age, and replacement cost. A visual rendering of the data presented in Table 2-9 is provided in Figure 2-7.

Table 2-9: Water System – Summary of Quantities, Age, and Replacement Cost by Asset Category

Asset Category	Quantity	Average Age (Years)	Replacement Cost (2022$)
Water Main	361 km	32	$433,324,079
Reservoir	3 facilities	27	$9,241,900
Elevated Tank	6 facilities	34	$24,165,300
Booster Pumping Station	3 facilities	25	$3,072,500
Water Treatment Plant	9 facilities	28	$102,094,900
Total			**$571,898,679**

Figure 2-7: Water Infrastructure – Summary Information



2.3.2 Condition

The condition of the District's water infrastructure has not been formally assessed through a physical condition assessment. For water mains, the District uses an age-based rating, augmented by a performance rating that is assigned based on breakage history, where available. Similarly for facilities, the District uses an age-based rating, augmented by a performance rating that is assigned based on operational observations, where available. For facilities, both the age-based rating and the performance rating are assigned at the component level. For both water mains and water facilities, an overall condition rating is calculated by taking the worst of the age-based and performance ratings.

Table 2-10 provides information on how the overall condition rating (from one to five) correlates with qualitative condition states (from Very Good to Poor).

Table 2-10: Water Infrastructure Overall Condition Ratings and Corresponding Condition States

Overall Condition Rating	Condition State
1	**Very Good**
2	**Good**
3	**Fair**
4	**Poor**
5	**Very Poor**

Table 2-11 shows the average condition of the District's water infrastructure by asset category, weighted based on replacement cost. On average, water towers and reservoirs are in the Very Good condition state and water mains, water treatment plants, booster pumping stations, and elevated tanks are in the Good condition state. The overall distribution of the District's water infrastructure by condition state is presented in Figure 2-8 and a further breakdown of this information by asset category is provided in Figure 2-9.

Table 2-11: Water Infrastructure Condition Analysis

Asset Category	Quantity	Average Condition	Average Condition State
Water Main	361 km	2	**Good**
Reservoir	3 facilities	1	**Very Good**
Elevated Tank	6 facilities	2	**Good**
Booster Pumping Station	3 facilities	1	**Very Good**
Water Treatment Plant	9 facilities	2	**Good**

Figure 2-8: Distribution of Water Infrastructure by Condition State

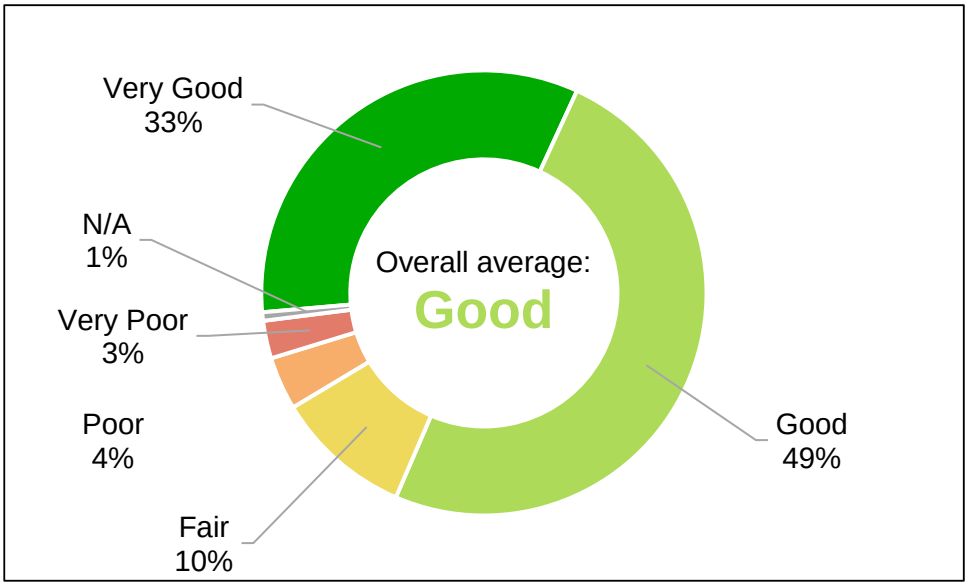
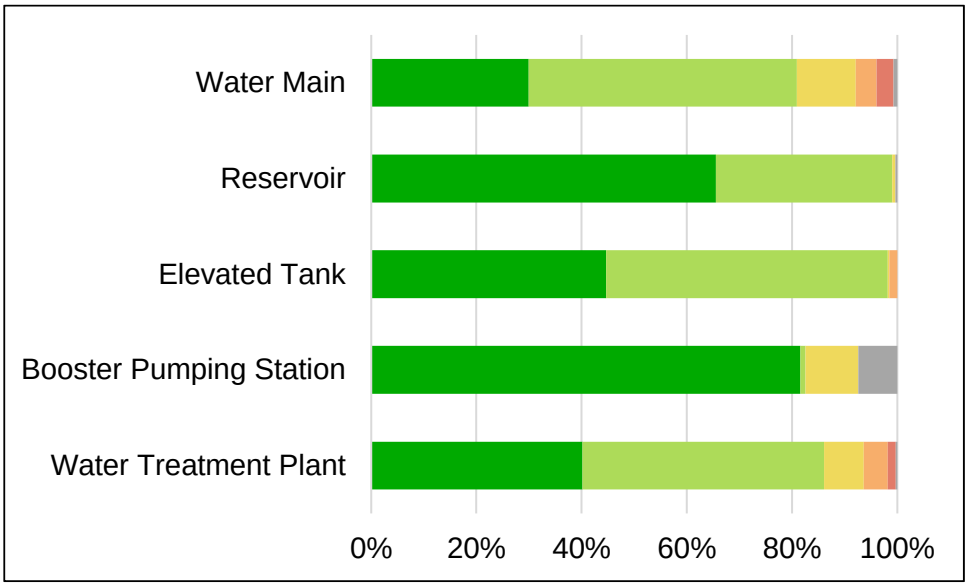


Figure 2-9: Distribution of Water Infrastructure Replacement Costs by Condition State for Each Asset Category



2.3.3 Current Levels of Service

The levels of service currently provided by the District's water infrastructure are, in part, a result of the state of local infrastructure identified above. A levels of service analysis defines the current levels of service that will be tracked over time. In future iterations of the asset management plan, targets will be set for the technical levels of service.

Water assets have prescribed levels of service reporting requirements under O. Reg. 588/17. These requirements include levels of service reporting at two different levels, i.e., community levels of service and technical levels of service. Community levels of service objectives describe service levels in terms that customers understand and reflect customers' expectations with respect to the scope, reliability, affordability, and efficiency of the water systems. Technical levels of service describe these aspects of the District's water infrastructure through performance measures that can be quantified and evaluated.

Table 2-12 and Table 2-13 present the current levels of service for the water system.

Table 2-12: Community Levels of Service – Water Services

Service Attribute	Community Levels of Service
Scope	The District owns and maintains nine drinking water systems, serving the communities of Gravenhurst, Huntsville, MacTier, Port Carling, Port Severn, Port Sydney, Bala, Baysville, and Bracebridge. Generally, all areas that are connected to the water systems have fire flow available, except for Port Sydney and Hidden Valley.
	The scope of the District's water distribution system is illustrated by the maps in Appendix A. The maps show the geographical distribution of the District's water infrastructure.
Reliability	The District is committed to ensuring a consistent supply of safe, high-quality drinking water. To ensure safe drinking water, the District's drinking water systems operate under a Quality Management System as legislated under the *Safe Drinking Water Act*, *2002*, and regulated by the Ontario Ministry of the Environment and Climate Change. Water quality is tested regularly, as required, and the results of this testing are reported annually. The District has developed a standard operating procedure that outlines the roles and responsibilities during a Drinking Water Advisory (DWA). There are two types of DWAs: a boil water advisory or a water avoidance advisory. Boil water advisories are issued whenever a water supply is or may become contaminated and the nature of the contamination is such that boiling of the water will mitigate its effects. Drinking water avoidance advisories are issued to notify the public that they should avoid using their tap water, either completely or for specified uses.

Table 2-13: Technical Levels of Service – Water Services

Service Attribute	Performance Measure	2021 Performance
Scope	Percentage of properties connected to the municipal water system.	17.5%[1]
	Percentage of properties where fire flow is available.	17.1%[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 municipal water system.	2.2576 connection-days/ connection[3]
	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.	0.7437 connection-days/ connection[4]

2.4 Wastewater Services

2.4.1 State of Local Infrastructure

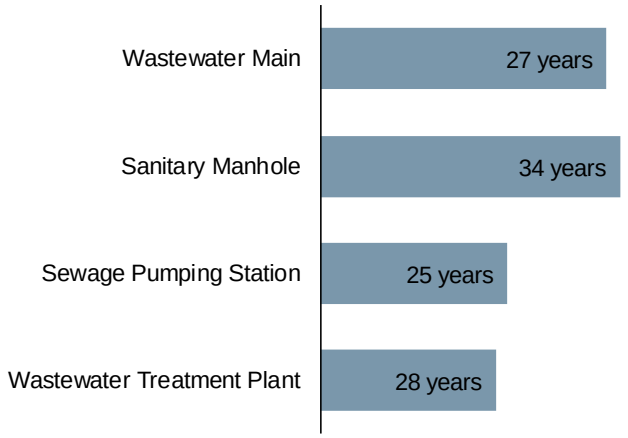
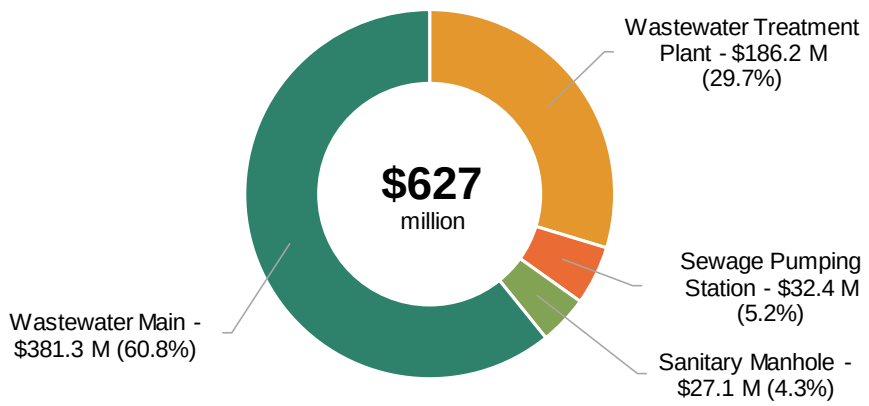
The District owns and maintains nine wastewater systems, and is responsible for the operation of multiple wastewater treatment plants, sewage pumping stations, wastewater mains, and sanitary manholes. The combined replacement cost of the District's wastewater infrastructure is approximately $627.2 million. Table 2-14 provides a summary of the assets with quantity, average age, and replacement cost. A visual rendering of the data presented in Table 2-14 is provided in Figure 2-10.

[1] Number of connected properties was estimated based on the number of Tax Roll Numbers that are associated with water meters (11,859). Total number of properties was estimated based on the number of Prime Tax Roll Numbers (67,800).
[2] There are approximately 250 properties that have water but not fire flows.
[3] There were two boil water advisories issued in 2021. One was in Bracebridge and lasted four days; the other one was in Gravenhurst and lasted three days. It is noted that these were anomalies, as there were no boil water advisories issued for any of the systems in the preceding five years.
[4] Only includes water main breaks that resulted in a complete service interruption. The value reported for 2021 is skewed by a significant event that occurred in Bracebridge, which resulted in approximately 4,398 customers being without water for two days.

Table 2-14: Wastewater Infrastructure – Summary of Quantities, Age, and Replacement Cost by Asset Category

Asset Category	Quantity	Average Age (years)	Replacement Cost (2022$)
Wastewater Mains	318 km	31	$381,342,111
Sanitary Manholes	3,435 manholes	33	$27,136,500
Sewage Pumping Stations	74 facilities	21	$32,435,900
Wastewater Treatment Plant	9 facilities	19	$186,246,500
Total			**$627,161,011**

Figure 2-10: Wastewater Infrastructure – Summary Information

Average Age	Replacement Cost (2022$)
	

2.4.2 Condition

The condition of the District's wastewater infrastructure reflects a combination of structural defect ratings, staff-assigned performance ratings, and age-based condition ratings. For wastewater mains and sanitary manholes, the District uses structural defect ratings obtained through closed-circuit television (CCTV) inspections, where available, and age-based ratings, augmented by a performance rating that is assigned based on performance history, where available. An overall condition rating is calculated by taking the worst of the structural defect, age-based, and performance ratings. For facilities, the District uses an age-based rating, augmented by a performance rating that is assigned based on operational observations, where available. For facilities, both the age-based rating and the performance rating are assigned at the component level. An overall condition rating is calculated by taking the worst of the age-based and performance ratings.

Table 2-15 provides information on how the overall condition rating (from one to five) correlates with qualitative condition states (from Very Good to Poor).

Table 2-15: Wastewater Infrastructure Overall Condition Ratings and Corresponding Condition States

Overall Condition Rating	Condition State
1	Very Good
2	Good
3	Fair
4	Poor
5	Very Poor

Table 2-16 shows the average condition of the District's wastewater infrastructure by asset category, weighted based on replacement cost. On average, sewage pumping stations are in the Very Good condition state and wastewater mains, sanitary manholes, and wastewater treatment plants are in the Good condition state. The overall distribution of the District's wastewater infrastructure by condition state is presented in Figure 2-11 and a further breakdown of this information by asset category is provided in Figure 2-12.

Table 2-16: Wastewater Infrastructure Condition Analysis

Asset Category	Quantity	Average Condition	Average Condition State
Wastewater Mains	318 km	2	**Good**
Sanitary Manholes	3,435 manholes	2	**Good**
Sewage Pumping Stations	73 facilities	1	**Very Good**
Wastewater Treatment Plant	9 facilities	2	**Good**

Figure 2-11: Distribution of Wastewater Infrastructure by Condition State

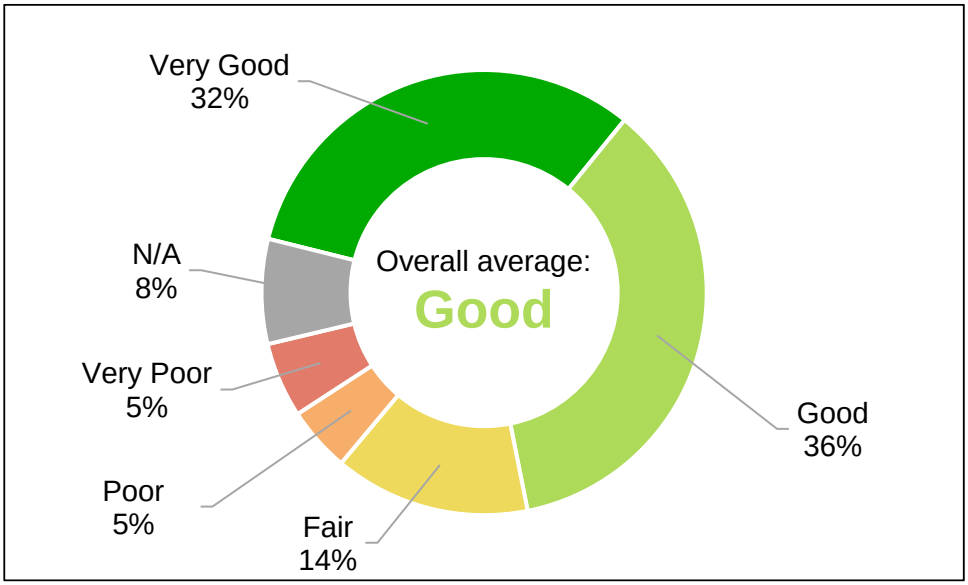
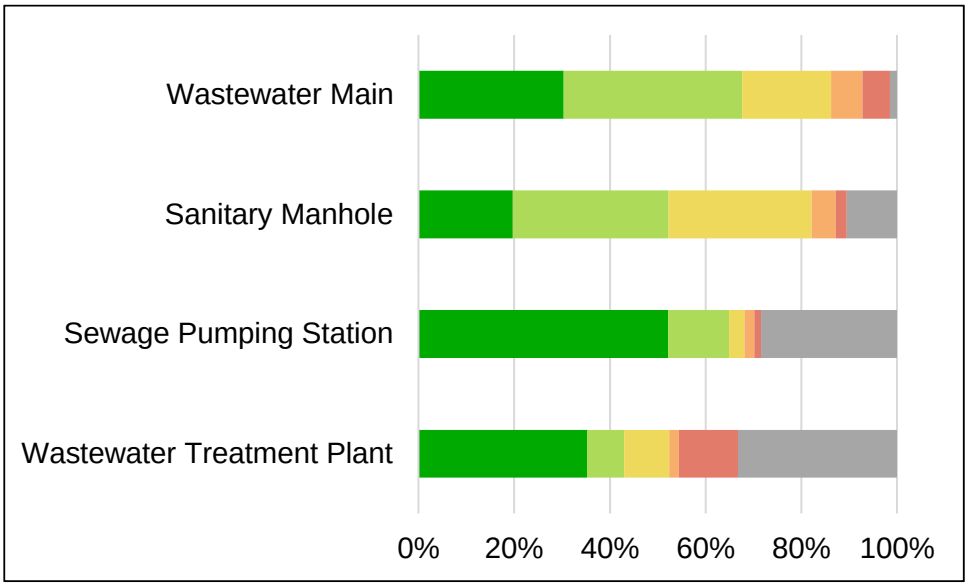


Figure 2-12: Distribution of Wastewater Infrastructure Replacement Costs by Condition State for Each Asset Category



2.4.3 Current Levels of Service

The levels of service currently provided by the District's wastewater infrastructure are, in part, a result of the state of local infrastructure identified above. A levels of service analysis defines the current levels of service that will be tracked over time. In future iterations of the asset management plan, targets will be set for the technical levels of service.

Wastewater assets have prescribed levels of service reporting requirements under O. Reg. 588/17. These requirements include levels of service reporting at two different levels, i.e., community levels of service and technical levels of service. Community levels of service objectives describe service levels in terms that customers understand and reflect customers' expectations with respect to the scope, reliability, affordability, and efficiency of the water systems. Technical levels of service describe these aspects of the District's wastewater infrastructure through performance measures that can be quantified and evaluated.

Table 2-17 and Table 2-18 present the current levels of service for wastewater.

Table 2-17: Community Levels of Service – Wastewater Services

Service Attribute	Community Levels of Service
Scope	The District owns and maintains nine wastewater systems, serving the communities of Gravenhurst, Huntsville, MacTier, Port Carling, Port Severn, Port Sydney, Bala, Baysville, and Bracebridge.
	The scope of the District's wastewater collection system is illustrated by the maps in Appendix A. The maps show the geographical distribution of the District's wastewater infrastructure.
Reliability	The District does not have combined sewers (sewers designed to carry both sanitary and storm water in a single pipe). Historical construction practices and the aging of existing infrastructure has resulted in degradation of the system over time, allowing storm and groundwater to enter the sanitary sewers (also referred to as inflow and infiltration) reducing available capacity in the sewer and treatment facilities. There are several initiatives underway to reduce inflow and infiltration as part of the District's asset management initiatives.
	The District's facilities are operated in accordance with Environmental Compliance Approvals (ECA) as issued by the Ministry of Environment, Conservation and Parks (MECP). In accordance with O. Reg. 588/17 a description of the effluent that is discharged from each wastewater treatment facility is provided in the ECA for each facility: • Bala Wastewater Treatment Plant: 5049-B55KXT • Baysville Wastewater Treatment Plant: 8132-7QXPCV • Bracebridge Wastewater Treatment Plant: 3237-BDGQDG • Gravenhurst Wastewater Treatment Plant: 7847-ABVPD3 • Huntsville Golden Pheasant Wastewater Treatment Plant: 6591-&M9LU6 amended under ECA#9847B6KR4X • Huntsville Mountview Wastewater Treatment Plant: 1-0088-67-763806 • MacTier Wastewater Treatment Plant: 7599-7PCKPU • Port Carling Wastewater Treatment Plant: 4174-AG8T75 • Port Severn Wastewater Treatment Plant: 3-0429-96-006

Table 2-18: Technical Levels of Service – Wastewater Services

Service Attribute	Performance Measure	2021 Performance
Scope	Percentage of properties connected to the municipal wastewater systems	15.3%
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 collection systems	0.0009[1] 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 violations per connection

2.5 Population and Employment Growth

Based on the District's 2019 Official Plan, in 2016 the District had a year-round population of approximately 60,900 and seasonal population of approximately 83,000. By 2031, the District's year-round population is anticipated to reach 77,500 and seasonal population is anticipated to reach 92,100.

This growth in year-round and seasonal 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 District's 2019 Development Charges Background Study and are partially 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 ten-year capital forecasts presented in the next chapter of this report.

[1] Number of wastewater backups are reported in annual reports for each facility as "Sewer Lateral Blockage." For the purposes of this asset management plan, it has been assumed that each lateral blockage lasted up to one day.

Chapter 3
Lifecycle Management Strategy

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.[1] 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.[2] 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.

The following sections detail the ten-year forecasts of lifecycle activities and associated costs that would be required to allow the District to maintain current levels of service.

[1] Future iterations of the District's asset management plan will include proposed levels of service and the lifecycle management strategy will identify the lifecycle activities that would need to be undertaken to provide the proposed levels of service.
[2] 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 Transportation Services

This section presents a preliminary estimate of the costs associated with maintaining all the District's roads, bridges, and structural culverts at their current level of service. For roads, the estimate is based on a combination of deterioration models and asset treatment strategies, modelled in the District's asset management decision support system. Further details of the lifecycle management strategy inputs for roads are provided in Appendix B. For bridges and structural culverts, the estimate is based on the repair, rehabilitation and replacement recommendations identified through the 2021 OSIM Bridge and Culvert Inspection Program.

The ten-year lifecycle expenditure forecast for roads, bridges, and structural culverts 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 $22.3 million.

Figure 3-1: Lifecycle Expenditure Forecast for Roads, Bridges, and Structural Culverts (2022$)

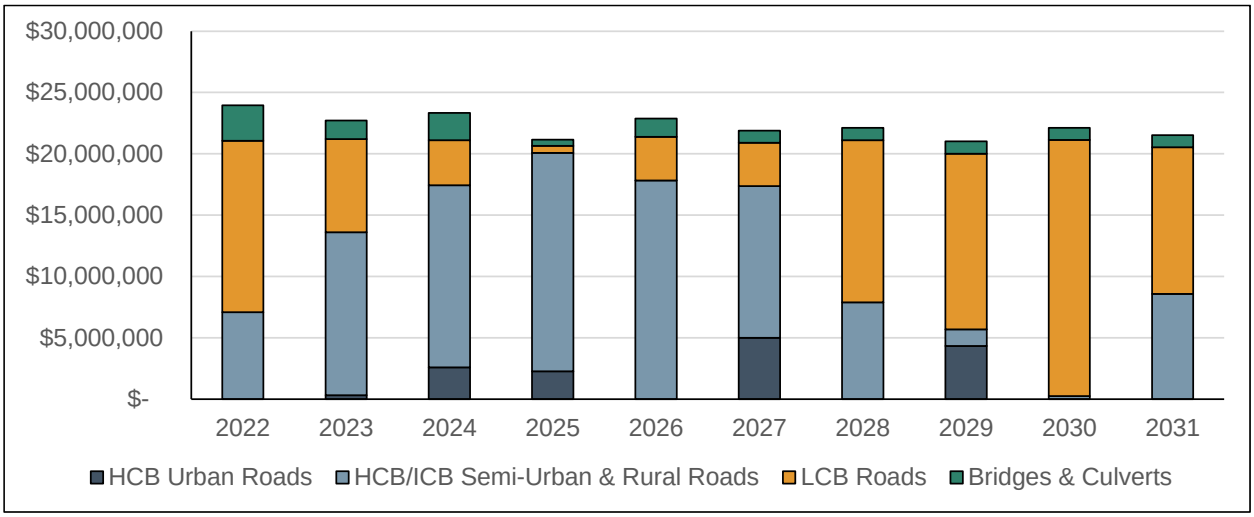


Table 3-1: Lifecycle Expenditure Forecast for Roads, Bridges, and Structural Culverts (2022$)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
HCB Urban Roads										
Mill and Pave 40mm	$ -	$ -	$ 2,576,438	$ 1,234,225	$ -	$ 4,983,875	$ -	$ 4,327,275	$ -	$ -
Remove and Replace Asphalt	$ -	$ 307,903	$ -	$ 1,018,133	$ -	$ -	$ -	$ -	$ -	$ -
Full Depth Reconstruction	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sub-Total HCB Urban Roads	**$ -**	**$ 307,903**	**$ 2,576,438**	**$ 2,252,358**	**$ -**	**$ 4,983,875**	**$ -**	**$ 4,327,275**	**$ -**	**$ -**
HCB/ICB Semi-Urban & Rural Roads										
Microsurfacing	$ 7,073,124	$ -	$ 2,149,334	$ 648,172	$ 598,757	$ -	$ -	$ 522,354	$ 235,582	$ -
Pulverize & Pave	$ -	$ 13,286,723	$ 12,720,498	$ -	$ 764,197	$ -	$ -	$ 830,097	$ -	$ 8,566,780
Full Depth Reconstruction	$ -	$ -	$ -	$ 17,175,314	$ 16,462,377	$ 12,392,349	$ 7,880,555	$ -	$ -	$ -
Sub-Total HCB/ICB Semi-Urban & Rural Roads	**$ 7,073,124**	**$ 13,286,723**	**$ 14,869,832**	**$ 17,823,486**	**$ 17,825,331**	**$ 12,392,349**	**$ 7,880,555**	**$ 1,352,451**	**$ 235,582**	**$ 8,566,780**
LCB Roads										
Single Surface Treatment	$ 8,928,004	$ -	$ 3,279,348	$ 578,566	$ 1,899,762	$ -	$ 3,252,803	$ -	$ 2,425,458	$ 3,638,517
Pulverize and Double Surface Treatment	$ 5,071,413	$ 7,607,808	$ 388,462	$ -	$ 414,000	$ 751,618	$ 2,560,883	$ -	$ 2,634,925	$ -
Full Depth Reconstruction	$ -	$ -	$ -	$ -	$ 1,236,356	$ 2,771,938	$ 7,420,683	$ 14,334,281	$ 15,826,600	$ 8,333,277
Sub-Total LCB Roads	**$ 13,999,417**	**$ 7,607,808**	**$ 3,667,810**	**$ 578,566**	**$ 3,550,118**	**$ 3,523,556**	**$ 13,234,369**	**$ 14,334,281**	**$ 20,886,983**	**$ 11,971,794**
Bridges & Culverts										
Bridges & Culverts	$ 2,872,700	$ 1,517,100	$ 2,217,900	$ 509,500	$ 1,489,700	$ 994,300	$ 994,300	$ 994,300	$ 994,300	$ 994,300
Sub-Total Bridges & Culverts	**$ 2,872,700**	**$ 1,517,100**	**$ 2,217,900**	**$ 509,500**	**$ 1,489,700**	**$ 994,300**	**$ 994,300**	**$ 994,300**	**$ 994,300**	**$ 994,300**
Total Transportation	**$ 23,945,241**	**$ 22,719,533**	**$ 23,331,980**	**$ 21,163,910**	**$ 22,865,149**	**$ 21,894,080**	**$ 22,109,224**	**$ 21,008,307**	**$ 22,116,865**	**$ 21,532,874**

3.3 Water Services

This section presents a preliminary estimate of the costs associated with maintaining all the District's water infrastructure at the current level of service. The estimate is based on the forecast developed through the District's budget process, as presented in the 2022 Draft Rate Supported Operating Budget and Capital Budget and Forecast.

The ten-year lifecycle expenditure forecast for water infrastructure is summarized in Figure 3-2. A further breakdown of the lifecycle expenditure forecast is provided in Table 3-2. Average annual expenditures over the forecast period have been estimated at approximately $5.2 million.

Figure 3-2: Lifecycle Expenditure Forecast for Water Infrastructure (2022$)

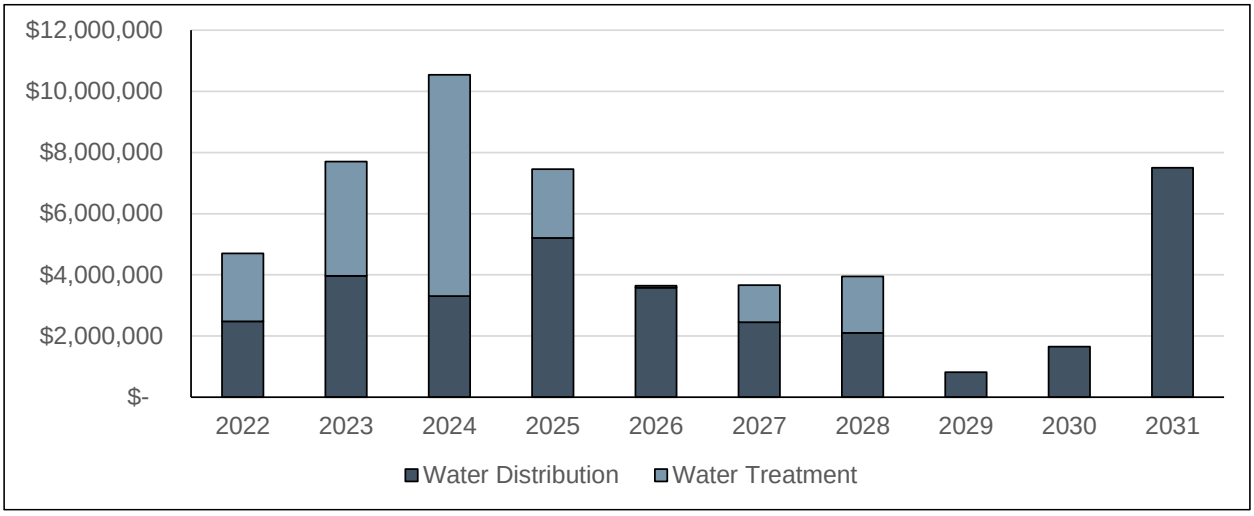


Table 3-2: Lifecycle Expenditure Forecast for Water Infrastructure (2022$)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Water Distribution										
Replacement/Upgrade	$ 2,225,000	$ 3,683,500	$ 3,303,300	$ 5,123,000	$ 3,495,400	$ 2,358,800	$ 2,106,650	$ 815,400	$ 1,653,700	$ 7,501,000
Rehabilitation	$ 254,800	$ 284,000		$ 86,200	$ 87,900	$ 89,600				
Sub-Total Water Distribution	**$ 2,479,800**	**$ 3,967,500**	**$ 3,303,300**	**$ 5,209,200**	**$ 3,583,300**	**$ 2,448,400**	**$ 2,106,650**	**$ 815,400**	**$ 1,653,700**	**$ 7,501,000**
Water Treatment										
Plant	$ 257,800	$ 1,928,200	$ 1,282,100	$ 660,000	$ 64,000		$ 158,400			
Reservoir	$ 1,216,000	$ 1,410,000	$ 5,360,000	$ 1,137,700		$ 1,215,700	$ 1,680,600			
SCADA	$ 750,000	$ 400,000	$ 595,000	$ 450,000						
Sub-Total Water Treatment	**$ 2,223,800**	**$ 3,738,200**	**$ 7,237,100**	**$ 2,247,700**	**$ 64,000**	**$ 1,215,700**	**$ 1,839,000**	**$ -**	**$ -**	**$ -**
Total Public Works - Water	**$ 4,703,600**	**$ 7,705,700**	**$ 10,540,400**	**$ 7,456,900**	**$ 3,647,300**	**$ 3,664,100**	**$ 3,945,650**	**$ 815,400**	**$ 1,653,700**	**$ 7,501,000**

3.4 Wastewater Services

This section presents a preliminary estimate of the costs associated with maintaining all the District's wastewater infrastructure at the current level of service. The estimate is based on the forecast developed through the District's budget process, as presented in the 2022 Draft Rate Supported Operating Budget and Capital Budget and Forecast.

The ten-year lifecycle expenditure forecast for water infrastructure is summarized in Figure 3-3. A further breakdown of the lifecycle expenditure forecast is provided in Table 3-3. Average annual expenditures over the forecast period have been estimated at approximately $4.7 million.

Figure 3-3: Lifecycle Expenditure Forecast for Wastewater Infrastructure (2022$)

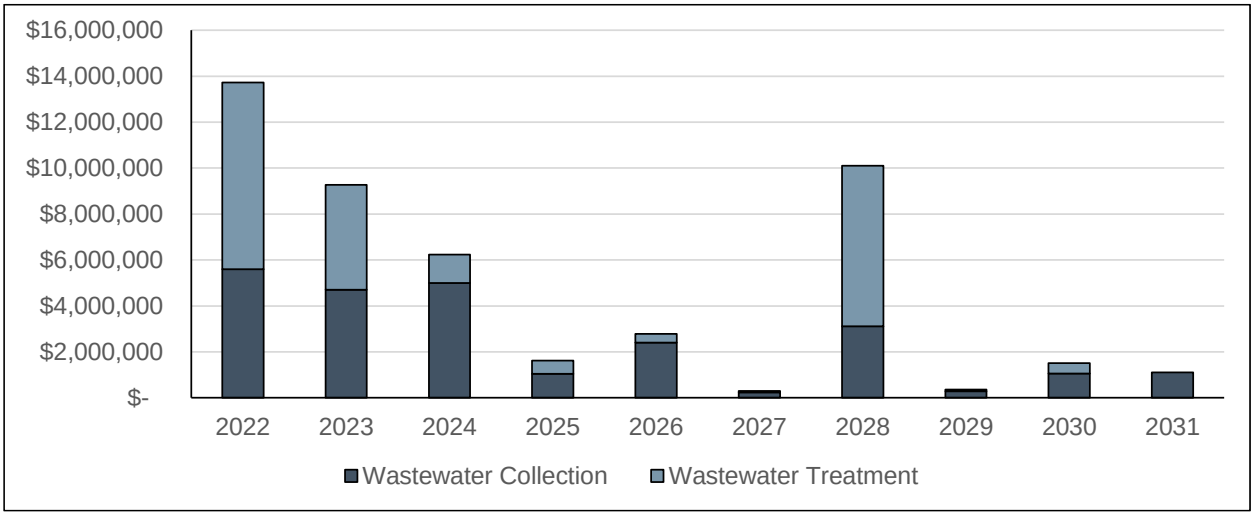


Table 3-3: Lifecycle Expenditure Forecast for Wastewater Infrastructure (2022$)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Wastewater Collection										
System Expansion									$ 350,000	
Pumping Station Large	$ 927,080	$ 751,700	$ 801,020		$ 181,000			$ 149,400		
Pumping Station Small	$ 354,040	$ 287,500	$ 139,600	$ 51,700	$ 120,700			$ 59,800		
Replacements/Upgrade	$ 2,564,300	$ 3,171,100	$ 2,905,400	$ 926,800	$ 1,960,000	$ 71,200	$ 2,962,800	$ 16,200	$ 394,100	$ 1,104,100
Rehabilitation	$ 1,746,900	$ 495,400	$ 1,157,600	$ 59,200	$ 140,400	$ 161,900	$ 145,900	$ 63,900	$ 312,200	
Sub-Total Wastewater Collection	**$ 5,592,320**	**$ 4,705,700**	**$ 5,003,620**	**$ 1,037,700**	**$ 2,402,100**	**$ 233,100**	**$ 3,108,700**	**$ 289,300**	**$ 1,056,300**	**$ 1,104,100**
Wastewater Treatment										
Plant	$ 3,884,100	$ 4,050,800	$ 708,100	$ 96,400		$ 62,400	$ 7,000,000	$ 64,900	$ 448,200	
Mountview/Golden Pheasant	$ 3,700,000									
SCADA	$ 557,000	$ 516,000	$ 525,000	$ 487,100	$ 375,000					
Sub-Total Wastewater Treatment	**$ 8,141,100**	**$ 4,566,800**	**$ 1,233,100**	**$ 583,500**	**$ 375,000**	**$ 62,400**	**$ 7,000,000**	**$ 64,900**	**$ 448,200**	**$ -**
Total Public Works - Wastewater	**$ 13,733,420**	**$ 9,272,500**	**$ 6,236,720**	**$ 1,621,200**	**$ 2,777,100**	**$ 295,500**	**$ 10,108,700**	**$ 354,200**	**$ 1,504,500**	**$ 1,104,100**

Appendices

Appendix A
Maps

Appendix A: Maps

Maps referenced throughout this asset management plan have been included as a separate appendix due to file size.

Appendix B
Lifecycle Management Strategy Inputs – Roads

Appendix B: Lifecycle Management Strategy Inputs – Roads

Figure B-1: Illustration of Lifecycle Management Strategy for HCB Urban Roads

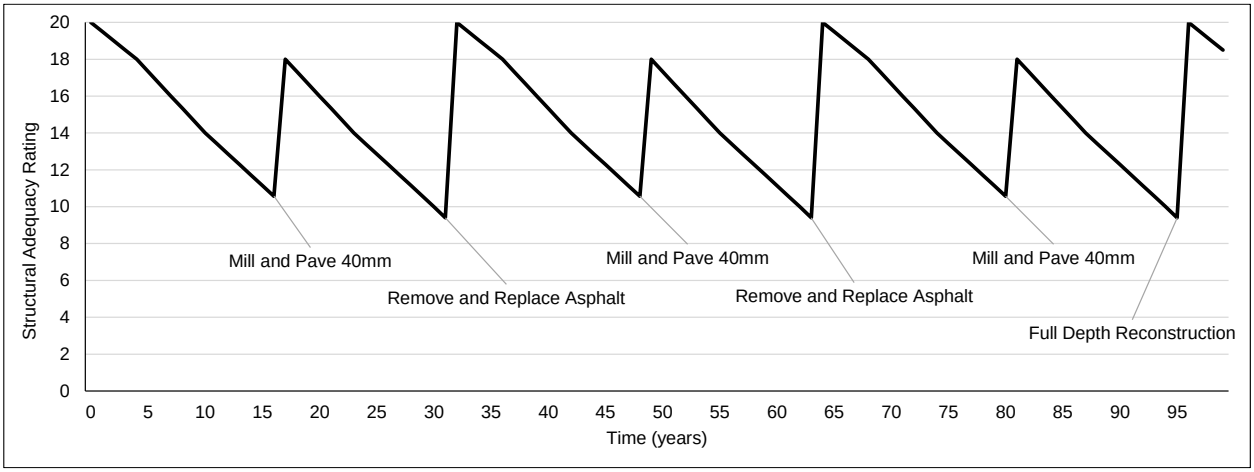


Table B-1: Lifecycle Treatment Criteria and Effects for HCB Urban Roads

Treatment	Treatment Trigger	Treatment Effect	Maximum Number of Repeats Before Reconstruction
	Structural Adequacy Range	Structural Adequacy After Treatment	
Mill and Pave 40mm	6 ≤ SA ≤ 10	18	3
Remove and Replace Asphalt	5 ≤ SA ≤9	20	2
Full Depth Reconstruction	SA ≤ 9	20	N/A

Figure B-2: Illustration of Lifecycle Management Strategy for HCB/ICB Semi-Urban & Rural Roads

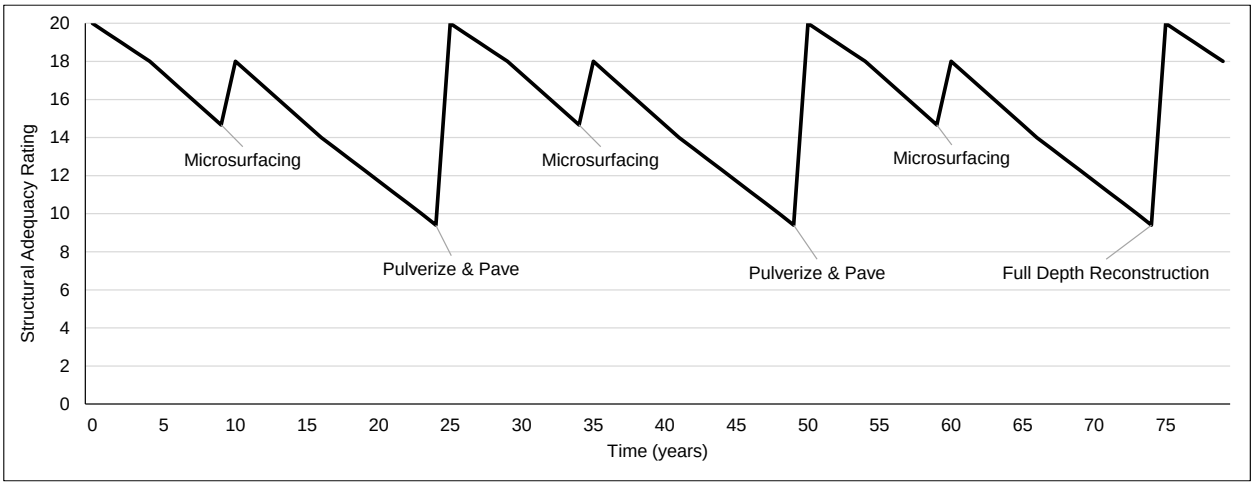


Table B-2: Lifecycle Treatment Criteria and Effects for HCB/ICB Semi-Urban & Rural Roads

Treatment	Treatment Trigger	Treatment Effect	Maximum Number of Repeats Before Reconstruction
	Structural Adequacy Range	Structural Adequacy After Treatment	
Microsurfacing	11 ≤ SA ≤ 14	18	3
Pulverize & Pave	6 ≤ SA ≤9	20	2
Full Depth Reconstruction	SA ≤ 9	20	N/A

Figure B-3: Illustration of Lifecycle Management Strategy for LCB Roads

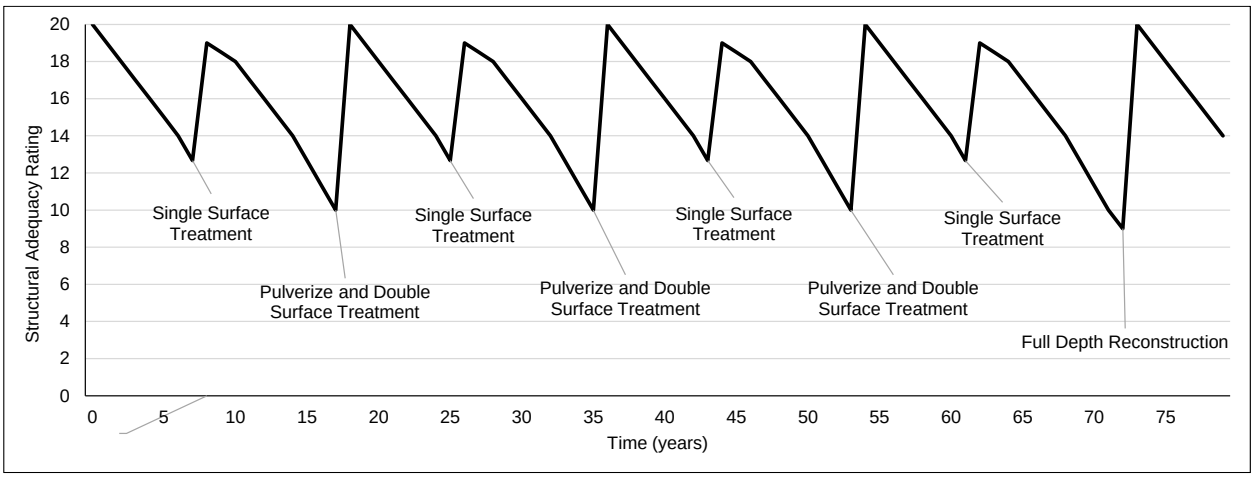


Table B-3: Lifecycle Treatment Criteria and Effects for LCB Roads

Treatment	Treatment Trigger	Treatment Effect	Maximum Number of Repeats Before Reconstruction
	Structural Adequacy Range	Structural Adequacy After Treatment	
Single Surface Treatment	8 ≤ SA ≤ 12	19	4
Pulverize and Double Surface Treatment	5 ≤ SA ≤9	20	3
Full Depth Reconstruction	SA ≤ 8	20	N/A