
# 2021 ASSET MANAGEMENT PLAN

**Transportation, Stormwater, Water and Wastewater Services**

The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

# EXECUTIVE SUMMARY

## INTRODUCTION

This AM Plan is a medium- to long-range planning document that is used to support the Township's infrastructure goals by providing a rational strategy for proactively and effectively managing the Township's transportation, stormwater, water and wastewater assets. This AM Plan fulfils the 2022 requirements of Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure, specifically to report on current level of service performance for the Township's roads, bridges, water, wastewater and stormwater infrastructure.

Assets related to recreation and culture, fire protection, cemetery services and municipal planning and administration will be covered in a future AM Plan, to be delivered by July 1, 2024, in accordance with O.Reg. 588/17's requirement that all municipal assets must be covered in an AM Plan by such date.

This AM Plan is aligned with the Township's vision and goals for asset management, as defined in the Strategic Asset Management Policy (Policy #009-19), and fulfils the AM Plan development component of initiative P1 defined in the Township's Asset Management Strategy & Road Map (2019). This AM Plan updates the Town's 2013 AM Plan, which included roads, bridges and culverts, and stormwater, water and wastewater pipes. The 2021 AM Plan updates the findings for these asset classes, but also expands the plan to include other asset classes in the Transportation Services, such as sidewalks, traffic signals, and streetlights, as well as linear appurtenances and ponds in the Stormwater Service, and linear appurtenances and vertical assets in the Water and Wastewater Services.

In accordance with O.Reg. 588/17, this AM Plan is publicly available at https://wellington-north.com/content/government/departments/finance/, along with the background studies and reports used to develop it.

## ASSET INVENTORY

The Township provides transportation, stormwater, water and wastewater services using over $480.5 million worth of infrastructure assets, as shown in Table ES-1. This portfolio of assets includes 390 km of roads, over 100 bridges and culverts, 35 km of sidewalks, 160 km of underground pipes, 7 wells, 3 water storage facilities, 6 sewage pumping stations, 2 wastewater treatment plants and a 3-cell treatment lagoon.

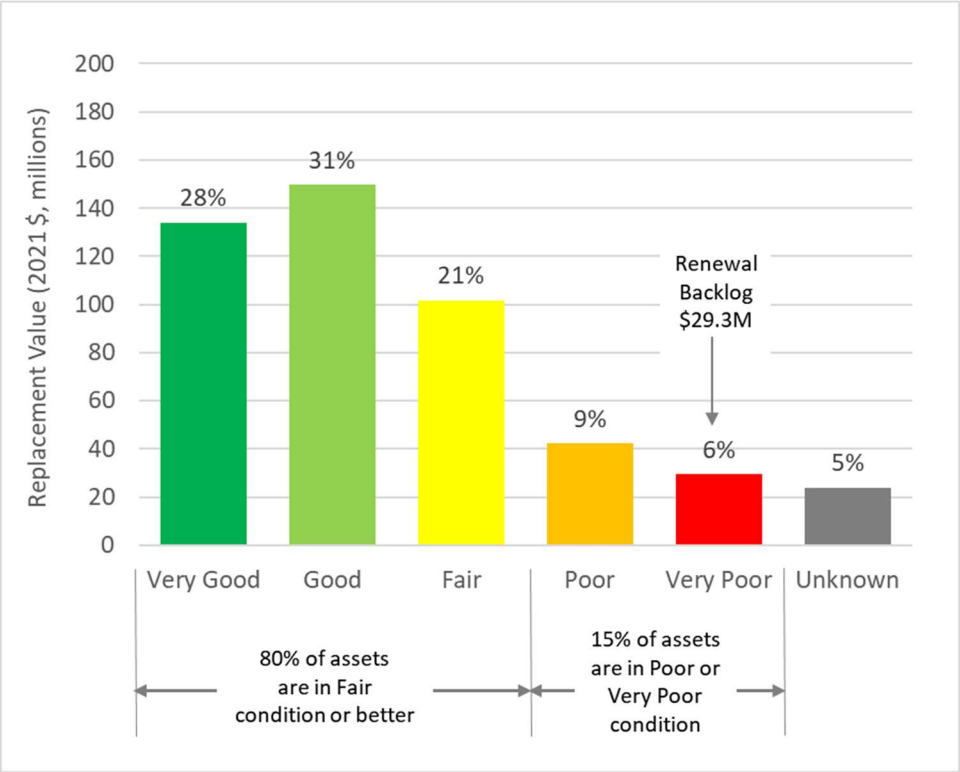
**Table ES-1 Replacement Value of Assets Across the Four Major Services**

| Service | Replacement Value (2021 $, millions) |
|---|---|
| Transportation | $ 215.0 |
| Stormwater | $ 76.4 |
| Water | $ 74.3 |
| Wastewater | $ 114.9 |
| TOTAL | **$ 480.5** |

## CONDITION

As shown in Figure ES-1, 80% ($385.3 million) of these assets are considered to be in a "State of Good Repair", meaning that assets are in Fair condition or better, while 15% ($71.5 million) are in Poor or Very Poor condition. Assets in Very Poor condition are considered due or overdue for renewal. As shown in the Figure, 5% ($29.3 million) of the assets across the four major services fall into this category.

Figure ES-1: Condition Distribution of Assets Across the Four Major Services




# PERFORMANCE

The Level of Service analysis focused on indicators defined by O.Reg. 588/17 for roads, bridges and culverts, water assets, wastewater assets and stormwater assets. Indicators for sidewalks were also included. The Township has not yet set targets for these indicators. Instead, current performance is being reported as a baseline for future target-setting when more data will have been collected and analyzed to understand the costs and benefits of different potential LOS targets.

For stormwater assets, O.Reg. 588/17 requires municipalities to report the percentage of properties in the municipality resilient to a 100-year storm and the percentage of the stormwater network resilient to a 5-year storm. The Township will work to obtain this data for the next update of the AM Plan.

# LIFECYCLE MANAGEMENT

As shown in Table ES-2, for the next 10 year-period (2022-2031), $106.07 million of expansion, upgrade and renewal needs have been identified across the four major services. Sixty-five percent (65%, $69.1 million) of that amount consists of renewal of existing assets, while 35% ($37.6 million) consists of expansion and upgrade projects. Major expansion and upgrade projects include construction of a new water tower in Arthur, and another one in Mount Forest, as well as upgrade and expansion of the Wastewater Treatment Plant in Arthur.

Table ES-2 Summary of Capital Needs for 2022-2031

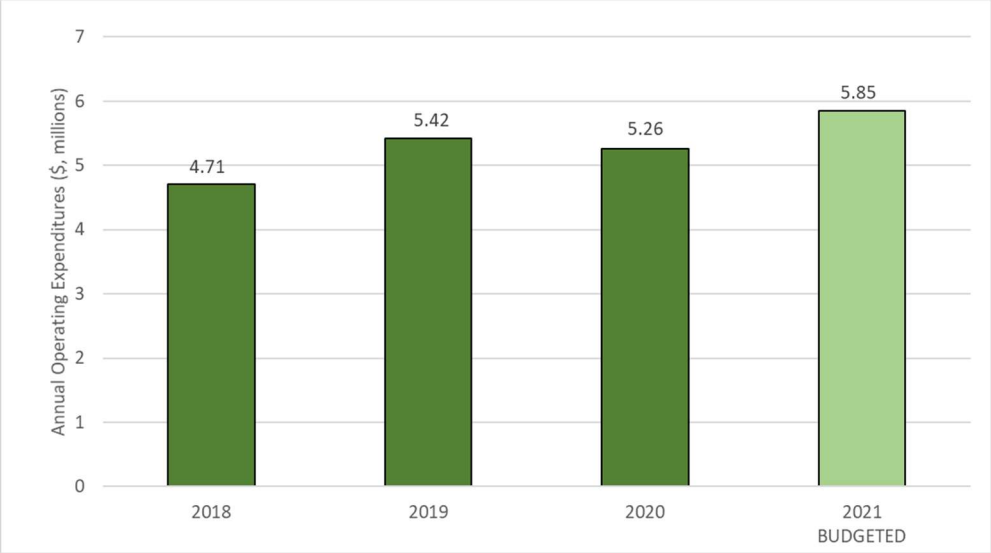
| | Expansion & Upgrade Needs (2021 $, millions) | Renewal Needs (2021 $, millions) | Total Capital Needs (2021 $, millions) |
|---|---|---|---|
| **Transportation** | 5.50 | 21.06 | 26.56 |
| **Stormwater** | 0.16 | 3.02 | 3.18 |
| **Water** | 15.40 | 10.44 | 25.84 |
| **Wastewater** | 16.50 | 34.62 | 51.12 |
| **TOTAL** | **37.56** | **69.14** | **106.07** |

Operations and Maintenance (O&M) needs were estimated based on 2021 budget amounts, which each Department reported to be sufficient for the current level of service and asset portfolio. For transportation and stormwater, a small amount was added to the O&M need each year for growth assets. No addition was made to the water and wastewater forecast needs; however, this may be done in the future after the work order system is implemented, and work order data are available to support asset life cycle cost analysis.

Figure ES-2 shows that the combined 2021 budget for all four major service areas was $5.85 million. As such, this represents the annual O&M need for 2022-2031, with amounts added each year to Transportation Service and Stormwater service to cover O&M costs associated with growth assets. For the Water and Wastewater services, O&M needs associated with growth assets will be absorbed into the existing budget.

In the next few years, the Township is working toward implementing a work order management system, which will provide detailed information on operations and maintenance costs associated with different assets and activities. This will provide a more reliable basis for calculating the operating cost impacts of growth assets.

Figure ES-2: Operating Expenditures 2018-20 and 2021 Budget Across the Four Major Services



# FINANCIAL IMPACT

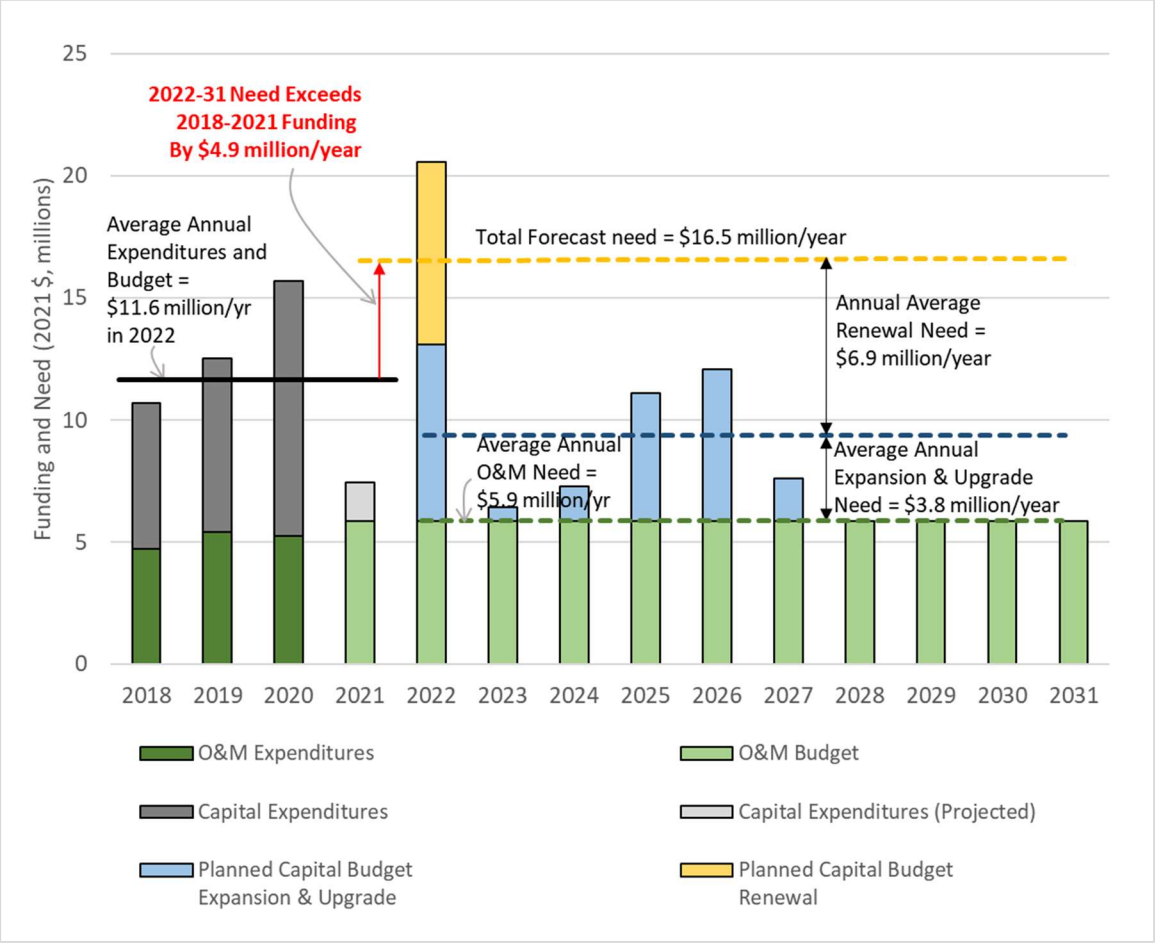
Figure ES-3 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $11.6 million/year. In contrast, the forecast need for O&M, renewal, expansion, and upgrade funding for the next ten-year period (2022-2031) is $16.5 million/year. This includes the life cycle costs described in the Lifecycle Management section above.

To fund this gap, the Township may:

- Seek opportunities to reduce costs by adjusting life cycle strategies
- Raise revenue (taxes, user rates, grants, Development Charges, Stormwater Levy, etc.)
- Lower service level standards
- Prioritize activities based on risk.

Risks scores are provided in the report to support prioritization.

Figure ES-3: Historical Expenditures and Projected Needs Across the Four Major Services



# CONTINUOUS IMPROVEMENT

The AM plan should evolve and improve with each iteration. Improvements in the next iterations will be driven by requirements of the O.Reg. 588/17, specifically to report on non-core assets by July 1, 2024, and then to incorporate proposed levels of service for all municipal assets by July 1, 2025. To establish proposed levels of service, it will be beneficial to have a computerized work order management system (CWMS) in place to track historical operations and maintenance costs.

For the next iteration that includes stormwater assets, it is recommended that the Township prepare the flood analyses required by the O.Reg. 588/17 Level of Service metrics (number of properties resilient to a 100-year storm, and percent of network resilient to a 5-year storm).

It is also recommended that the Township establish an authoritative asset database with GIS attributes, unique IDs assigned to each asset and other attributes relevant to AM planning. Renewal, reconstruction and expansion activities should be recorded by asset (including updating the asset installation year and condition), to enable more accurate prediction of future condition and renewal need.

# TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... i
TABLE OF CONTENTS ..... vi
LIST OF TABLES ..... ix
LIST OF FIGURES ..... xi
LIST OF ABBREVIATIONS ..... xiii
1 INTRODUCTION ..... 1
1.1 WHAT IS ASSET MANAGEMENT? ..... 3
1.2 ALIGNMENT WITH ONTARIO REGULATION 588/17 ..... 4
1.3 RELATIONSHIP WITH OTHER TOWNSHIP ACTIVITIES AND PLANNING DOCUMENTS ..... 5
1.4 AM PLAN FRAMEWORK AND METHODOLOGY ..... 6
1.5 ORGANIZATION OF THE AM PLAN ..... 6
1.6 PUBLIC POSTING OF AM PLAN ..... 6
2 KEY CONCEPTS IN ASSET MANAGEMENT ..... 7
2.1 REPLACEMENT VALUE ..... 8
2.2 USEFUL LIFE ..... 9
2.3 CONDITION ..... 9
2.4 LEVELS OF SERVICE ..... 10
2.5 LIFECYCLE MANAGEMENT ..... 11
2.6 RISK MANAGEMENT ..... 13
3 INFRASTRUCTURE SUMMARY ..... 19
3.1 TRANSPORTATION SERVICE ..... 20
3.1.1 CONDITION ..... 20
3.1.2 PERFORMANCE ..... 21
3.1.3 LIFECYCLE MANAGEMENT ..... 21
3.1.4 FINANCIAL IMPACT ..... 22
3.1.5 RISK MANAGEMENT ..... 22
3.1.6 CONTINUOUS IMPROVEMENT ..... 23
3.2 STORMWATER MANAGEMENT ..... 24
3.2.1 CONDITION ..... 24
3.2.2 PERFORMANCE ..... 25
3.2.3 LIFE CYCLE MANAGEMENT ..... 25
3.2.4 FINANCIAL IMPACT ..... 26

3.2.5 RISK MANAGEMENT ..... 26
3.2.6 CONTINUOUS IMPROVEMENT ..... 27
3.3 WATER SERVICE ..... 28
3.3.1 CONDITION ..... 28
3.3.2 PERFORMANCE ..... 29
3.3.3 LIFECYCLE MANAGEMENT ..... 29
3.3.4 FINANCIAL IMPACT ..... 29
3.3.5 RISK ..... 30
3.3.6 CONTINUOUS IMPROVEMENT ..... 31
3.4 WASTEWATER SERVICE ..... 32
3.4.1 CONDITION ..... 32
3.4.2 PERFORMANCE ..... 33
3.4.3 LIFECYCLE MANAGEMENT ..... 33
3.4.4 FINANCIAL IMPACT ..... 33
3.4.5 RISK ..... 34
3.4.6 CONTINUOUS IMPROVEMENT ..... 35
4 ASSET DETAILS ..... 36
4.1 TRANSPORTATION SERVICE ..... 37
4.1.1 INTRODUCTION ..... 37
4.1.2 INVENTORY ..... 37
4.1.3 ESTIMATED USEFUL LIFE ..... 41
4.1.4 CONDITION ..... 42
4.1.5 METHODOLOGY ..... 47
4.1.6 LEVELS OF SERVICE ..... 50
4.1.7 LIFECYCLE MANAGEMENT ..... 53
4.1.8 RISK ..... 66
4.1.9 FINANCIAL IMPACT ..... 71
4.2 STORMWATER NETWORK ..... 74
4.2.1 INTRODUCTION ..... 74
4.2.2 INVENTORY ..... 74
4.2.3 REPLACEMENT VALUE ..... 74
4.2.4 ESTIMATED USEFUL LIFE ..... 76
4.2.5 CONDITION ..... 76

4.2.6 LEVELS OF SERVICE ..... 80
4.2.7 LIFECYCLE MANAGEMENT ..... 82
4.2.8 RISK ..... 88
4.2.9 FINANCIAL IMPACT ..... 90
4.3 WATER SERVICE ..... 92
4.3.1 INTRODUCTION ..... 92
4.3.2 INVENTORY ..... 92
4.3.3 REPLACEMENT VALUE ..... 92
4.3.4 ESTIMATED USEFUL LIFE ..... 95
4.3.5 CONDITION ..... 96
4.3.6 LEVELS OF SERVICE ..... 103
4.3.7 LIFECYCLE MANAGEMENT ..... 105
4.3.8 RISK ..... 112
4.3.9 FINANCIAL IMPACT ..... 116
4.4 WASTEWATER SERVICE ..... 118
4.4.1 INTRODUCTION ..... 118
4.4.2 INVENTORY ..... 118
4.4.3 REPLACEMENT VALUE ..... 118
4.4.4 ESTIMATED USEFUL LIFE ..... 121
4.4.5 CONDITION ..... 122
4.4.6 LEVELS OF SERVICE ..... 126
4.4.7 LIFECYCLE MANAGEMENT ..... 130
4.4.8 RISK ..... 134
4.4.9 FINANCIAL IMPACT ..... 138
APPENDIX A: REGULATORY COMPLIANCE ..... 140
APPENDIX B: DATA SOURCES ..... 142
APPENDIX C: GLOSSARY OF TERMS ..... 145

# LIST OF TABLES

Table ES-1 Replacement Value of Assets Across the Four Major Services ..... i
Table ES-2 Summary of Capital Needs for 2022-2031 ..... iii
Table 2-1 Methods for Estimating Replacement Value ..... 8
Table 2-2 Standardized Condition Ratings ..... 10
Table 2-3 Asset Lifecycle Management Categories ..... 12
Table 2-4 Probability of Failure Matrix ..... 16
Table 2-5 Consequence of Failure (Asset Criticality) Ratings ..... 17
Table 3-1 Replacement Value of Assets Across the Four Major Services ..... 19
Table 3-2 Transportation Asset Summary – Inventory and Replacement Value ..... 20
Table 3-3 Stormwater Asset Summary – Inventory and Replacement Value ..... 24
Table 3-4 Water Asset Summary – Inventory and Replacement Value ..... 28
Table 3-5 Wastewater Asset Summary – Inventory and Replacement Value ..... 32
Table 4-1 Transportation Assets – Inventory and Replacement Value ..... 37
Table 4-2 Inventory and Replacement Value – Bridges ..... 39
Table 4-3 Inventory and Replacement Value – Culverts ..... 40
Table 4-4 Transportation Assets – Estimated Useful Life Values ..... 41
Table 4-5 Assets in Very Poor Condition – Roads ..... 42
Table 4-6 Average Condition by Road Type ..... 43
Table 4-7 Assets in Very Poor condition - Bridges & Culverts ..... 45
Table 4-8 Assets in Very Poor condition – Traffic Signal Components ..... 46
Table 4-9 Assets in Very Poor condition – Sidewalks ..... 46
Table 4-10 Source of Asset Condition Scores ..... 47
Table 4-11 Condition Scale Conversions by Asset Type – Transportation ..... 48
Table 4-12 Pavement Condition Scores – Descriptions of Condition ..... 48
Table 4-13 Bridge Condition Index scores and Associated Work Descriptions ..... 49
Table 4-14 Transportation Assets – Community Levels of Service ..... 51
Table 4-15 Transportation Assets – Technical Levels of Service ..... 52
Table 4-16 Transportation Service Asset Renewal Practices & Needs to 2031 ..... 55
Table 4-17 Operating Activities and Frequencies – Transportation Service ..... 64
Table 4-18 Growth Impacts on Operating Budget Need – Transportation Service ..... 65
Table 4-19 Projected Operating Budget Need including Estimated Growth Impacts – Transportation Service ..... 65
Table 4-20 Transportation Assets – Consequence Ratings ..... 66
Table 4-21 Number of Bridge & Culvert Assets by CoF Rating ..... 67
Table 4-22 Bridge & Culvert Assets – Very High-Risk Renewal and Repair Needs (from Bridge Inspection Data) ..... 68
Table 4-23 Traffic Signal Assets – Very High-Risk Asset(s) ..... 69
Table 4-24 Sidewalk Assets – Very High-Risk Asset(s) ..... 71
Table 4-25 Stormwater Assets – Inventory and Replacement Value ..... 74
Table 4-26 Stormwater Assets – Unit Costs ..... 75
Table 4-27 Stormwater Assets – Pond Replacement Values ..... 75
Table 4-28 Stormwater Assets – Useful Life ..... 76
Table 4-29 Stormwater Assets – Age-based Condition Index ..... 76

Table 4-30 Stormwater Assets – Community Levels of Service ..... 80
Table 4-31 Stormwater Assets – Technical Levels of Service ..... 80
Table 4-32 Stormwater Service Asset Renewal Practices & Needs to 2031 ..... 83
Table 4-33 Operating Activities and Frequencies – Stormwater Service ..... 86
Table 4-34 Growth Impacts on Operating Budget Need – Stormwater Service ..... 86
Table 4-35 Projected Operating Budget Need including Estimated Growth Impacts – Stormwater Service ..... 87
Table 4-36 Consequence of Failure Ratings – Stormwater Assets ..... 88
Table 4-37 Water Assets – Inventory and Replacement Value ..... 92
Table 4-38 Water Assets – Unit Costs ..... 93
Table 4-39 Vertical Water Facilities – Replacement Costs Inflated and Escalated from TCA ..... 94
Table 4-40 Arthur Wells – Replacement Costs by Facility System ..... 94
Table 4-41 Mount Forest Wells – Replacement Costs by Facility System ..... 95
Table 4-42 Water Assets – Useful Life ..... 95
Table 4-43 Water Assets – Age-based Condition Index ..... 96
Table 4-44 Water Assets – Community Levels of Service ..... 103
Table 4-45 Water Assets – Technical Levels of Service ..... 104
Table 4-46 Water Service Asset Renewal Needs to 2031 ..... 107
Table 4-47 Operating Activities and Frequencies – Water Service ..... 112
Table 4-48 Consequence of Failure Ratings – Water Assets ..... 112
Table 4-49 Consequence of Failure Ratings – Components of Water Vertical Assets ..... 115
Table 4-50 Wastewater Assets – Inventory and Replacement Value ..... 118
Table 4-51 Wastewater Assets – Unit Costs ..... 119
Table 4-52 Wastewater Facilities – Replacement Values ..... 119
Table 4-53 Arthur Sewage Pumping Stations – Replacement Costs by Facility System ..... 120
Table 4-54 Mount Forest Sewage Pumping Stations – Replacement Costs by Facility System ..... 120
Table 4-55 Arthur WWTP – Replacement Costs by Facility System ..... 121
Table 4-56 Mount Forest WWTP – Replacement Costs by Facility System ..... 121
Table 4-57 Wastewater Assets – Useful Life ..... 122
Table 4-58 Wastewater Assets – Age-based Condition Index ..... 122
Table 4-59 Wastewater Assets – Community Levels of Service ..... 127
Table 4-60 Wastewater Assets – Technical Levels of Service ..... 128
Table 4-61 Wastewater Service Asset Renewal Needs to 2031 ..... 131
Table 4-62 Operating Activities and Frequencies – Wastewater Service ..... 134
Table 4-63 Consequence of Failure Ratings – Wastewater Assets ..... 134
Table 4-64 Wastewater Main Assets, Arthur – Very High-Risk Asset(s) ..... 136
Table 4-65 Vertical Wastewater Assets, Building & Process Systems – CoF Ratings ..... 137
Table 4-66 Vertical Wastewater Assets – Very High-Risk Asset(s) ..... 138
Table A-1 Regulatory Compliance ..... 140
Table B-1 Data Sources – Transportation Assets ..... 142
Table B-2 Data Sources – Stormwater Assets ..... 142
Table B-3 Data Sources – Water Assets ..... 143
Table B-4 Data Sources – Wastewater Assets ..... 144

# LIST OF FIGURES

Figure ES-1: Condition Distribution of Assets Across the Four Major Services ..... ii
Figure ES-2: Operating Expenditures 2018-20 and 2021 Budget Across the Four Major Services ..... iii
Figure ES-3: Historical Expenditures and Projected Needs Across the Four Major Services ..... iv
Figure 1-1 Ontario Regulation 588/17 Requirements ..... 4
Figure 1-2 Relationship of AM Plan to Other Township Documents ..... 5
Figure 2-1 Level of Service Framework ..... 11
Figure 2-2 Conceptual Lifecycle Cost Model ..... 13
Figure 2-3: Proposed Risk Thresholds ..... 14
Figure 3-1: Condition Distribution of Assets Across the Four Major Services ..... 19
Figure 3-2: Transportation Asset Summary – Condition Distribution ..... 20
Figure 3-3: Transportation Service – Historical Expenditures and Projected Needs ..... 22
Figure 3-4: Stormwater Asset Summary – Condition Distribution ..... 24
Figure 3-5: Stormwater Service – Historical Expenditures and Projected Needs ..... 26
Figure 3-6: Water Asset Summary – Condition Distribution ..... 28
Figure 3-7: Water Service – Historical Expenditures and Projected Needs ..... 30
Figure 3-8: Wastewater Asset Summary – Condition Distribution ..... 32
Figure 3-9: Wastewater Service – Historical Expenditures and Projected Needs ..... 34
Figure 4-1: Map of Road Network ..... 38
Figure 4-2: Transportation Assets – Overview of Condition Distribution ..... 42
Figure 4-3: Detailed Condition Distribution – Roads by Surface Type ..... 43
Figure 4-4: Average Age – Roads by Surface Type ..... 44
Figure 4-5: Detailed Condition Distribution – Bridges & Culverts ..... 44
Figure 4-6: Detailed Condition Distribution – Signals, Signs, Streetlights and Sidewalks ..... 45
Figure 4-7: Average Age – Transportation Assets (excluding Roads) ..... 46
Figure 4-8: Pavement Condition Scores – Photo Examples of Condition ..... 49
Figure 4-9: Operating Expenditures 2018-20 and 2021 Budget – Transportation Service ..... 63
Figure 4-10: Road Assets – Risk Exposure Map ..... 67
Figure 4-11: Bridge & Culvert Assets – Risk Exposure Map ..... 67
Figure 4-12: Traffic Signal Assets – Risk Exposure Map ..... 69
Figure 4-13: Sign Assets – Risk Exposure Map ..... 69
Figure 4-14: Sidewalk Assets – Risk Exposure Map ..... 70
Figure 4-15: Historical Expenditures and Projected Needs – Transportation Service ..... 72
Figure 4-16: Stormwater Pipes – Condition by Replacement Value ..... 77
Figure 4-17: Average Age – Stormwater Pipes by Material ..... 78
Figure 4-18: Stormwater Appurtenances and Ponds – Condition by Replacement Value ..... 79
Figure 4-19: Average Age – Stormwater Appurtenances and Ponds ..... 79
Figure 4-20: Stormwater Management – Flood Emergency Map for Grand River Watershed ..... 81
Figure 4-21: Operating Expenditures 2018-20 and 2021 Budget – Stormwater Service ..... 85
Figure 4-22: Stormwater Main Assets – Risk Exposure Map ..... 89
Figure 4-23: Stormwater Wet Ponds – Risk Exposure Map ..... 89
Figure 4-24: Historical Expenditures and Projected Needs – Stormwater Service ..... 90
Figure 4-25: Condition Distribution - Arthur Watermains ..... 97
Figure 4-26: Average Age – Arthur Watermains ..... 97

Figure 4-27: Condition Distribution – Mount Forest Watermains ..... 98
Figure 4-28: Average Age – Mount Forest Watermains ..... 99
Figure 4-29: Water Valves and Hydrants – Condition Distribution ..... 100
Figure 4-30: Water Vertical Facilities – Condition by Replacement Value ..... 101
Figure 4-31: Water Towers serving the Arthur Community ..... 101
Figure 4-32: Average Age – Arthur Water System Appurtenances and Vertical Assets ..... 102
Figure 4-33: Average Age – Mount Forest Water System Appurtenances and Vertical Assets ..... 102
Figure 4-34: Operating Expenditures 2018-20 and 2021 Budget – Water Service ..... 111
Figure 4-35: Watermain Assets – Risk Exposure Map ..... 114
Figure 4-36: Water Vertical Facility Assets – Risk Exposure Map ..... 115
Figure 4-37: Historical Expenditures and Projected Needs – Water Service ..... 116
Figure 4-38: Condition by Replacement Value – Arthur Wastewater Mains ..... 123
Figure 4-39: Average Age – Arthur Wastewater Mains ..... 123
Figure 4-40: Condition by Replacement Value – Mount Forest Wastewater Mains ..... 124
Figure 4-41: Average Age – Mount Forest Wastewater Mains ..... 124
Figure 4-42: Wastewater Maintenance Holes – Condition by Replacement Value ..... 125
Figure 4-43: Vertical Wastewater Facilities – Condition by Replacement Value ..... 125
Figure 4-44: Average Age – Arthur Wastewater Assets (excluding mains) ..... 126
Figure 4-45: Average Age – Mount Forest Wastewater Assets (excluding mains) ..... 126
Figure 4-46: Operating Expenditures 2018-20 and 2021 Budget – Wastewater Service ..... 133
Figure 4-47: Wastewater Main Assets, Arthur – Risk Exposure Map ..... 135
Figure 4-48: Wastewater Main Assets, Mount Forest – Risk Exposure Map ..... 136
Figure 4-49: Vertical Wastewater Assets – Risk Exposure Map ..... 137
Figure 4-50: Historical Expenditures and Projected Needs – Wastewater Service ..... 139

# LIST OF ABBREVIATIONS

| | |
|---|---|
| AM | Asset Management |
| AC | Asbestos Cement |
| BCI | Bridge Condition Index |
| BWA | Boil Water Advisory |
| CCTV | Closed Circuit Television Video |
| CI | Cast Iron |
| CoF | Consequence of Failure |
| CWMS | Computerized Work Management System |
| EUL | Estimated Useful Life |
| FA | Fixed Asset |
| GIS | Geographic Information System |
| GRCA | Grand River Conservation Authority |
| HCB | High Class Bituminous |
| ICI | Industrial / Commercial / Institutional |
| ID | Identification |
| IIMM | International Infrastructure Management Manual |
| LCB | Low Class Bituminous |
| LED | Light Emitting Diode |
| LOS | Levels of Service |
| MF | Mount Forest |
| MFOA | Municipal Finance Officers' Association of Ontario |
| O&M | Operations & Maintenance |
| O.Reg. | Ontario Regulation |
| PCI | Pavement Condition Index |
| PoF | Probability of Failure |
| PSAB | Public Sector Accounting Board |
| PVC | Polyvinyl Chloride |
| RoW | Right-of-Way |
| SPS | Sewage Pumping Station |
| TAN | Total Ammonia Nitrogen |
| TCA | Tangible Capital Asset |
| TSS | Total Suspended Solids |
| WWTP | Wastewater Treatment Plant |

PHOTO | DOWNTOWN WELLINGTON NORTH

# 1. INTRODUCTION

# 1 INTRODUCTION

This Asset Management (AM) Plan focuses on assets used to deliver the transportation, stormwater, water and wastewater services in accordance with the Ontario Regulation (O.Reg.) 588/17 requirement for each municipality to deliver a Council-approved AM Plan report on core assets by July 1, 2022. O.Reg. 588/17 defines core assets as roads, bridges and culverts, and assets used to deliver stormwater management, water service and wastewater service. Assets related to recreation and culture, fire protection, cemetery services and municipal planning and administration will be covered in a future AM Plan, to be delivered by July 1, 2024, in accordance with O.Reg. 588/17's requirement that all municipal assets must be covered in an AM Plan by such date.

Assets are things that have potential or actual value to the Township. This includes everything from roads and pipes to stormwater ponds and water wells. All of these things help us provide services to residents, and it is our responsibility to make sure that we are able to provide those services in a cost-efficient and sustainable manner, by maintaining our assets.

The Township provides transportation, stormwater, water and wastewater services using over $480.5 million worth of infrastructure assets, including 390 km of roads, over 100 bridges and culverts, 35 km of sidewalks, 160 km of underground pipes, 7 wells, 3 water storage facilities, 6 sewage pumping stations, 2 wastewater treatment plants and a 3-cell treatment lagoon. The assets covered in this AM Plan enable the efficient flow of people and products, protect the community from flooding, provide safe drinking water to the communities of Mount Forest and Arthur, and return treated wastewater back to the environment. In short, these assets provide the foundation on which the community's quality of life is built.

This AM Plan is aligned with the Township's vision and goals for asset management, as defined in the Strategy Asset Management Policy (Policy #009-19), and fulfils the AM Plan development component of initiative P1 defined in the Township's Asset Management Strategy & Road Map (2019). This AM Plan updates the Town's 2013 AM Plan, which included roads, bridges and culverts, and stormwater, water and wastewater pipes. The 2021 AM Plan updates the findings for these asset classes, but also expands the plan to include other asset classes in the Transportation Services, such as sidewalks, traffic signals, and streetlights, as well as linear appurtenances and ponds in the Stormwater Service, and linear appurtenances and vertical assets in the Water and Wastewater Services.

## 1.1 WHAT IS ASSET MANAGEMENT?

Asset Management (AM) is an integrated set of processes and practices that minimize the lifecycle costs of owning, operating, and maintaining assets, at an appropriate level of risk, while continuously delivering established levels of service. The core catalysts for the establishment of an organization-wide Asset Management Program include population change, the impacts of climate change, and the increasing costs associated with providing a range of services to our residents within the context of a challenging municipal funding model.

Asset management planning is the process of making the best possible decisions regarding the building, operation, maintenance, renewal, replacement, and disposition of assets.

AM planning allows us to make informed asset investment decisions, prioritize our investments, improve our financial performance, manage risk, improve organizational sustainability, and improve efficiency and effectiveness.

As explained in the International Infrastructure Management Manual (IIMM), the key elements of asset management are:

1. Providing a defined level of service and monitoring performance;
2. Managing the impact of demand changes (growth as well as decline) through demand management, infrastructure investment, and other strategies;
3. Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet that defined level of service;
4. Identifying, assessing, and appropriately controlling risks; and
5. Having a long-term financial plan which identifies required expenditures and how they will be funded.

## 1.2 ALIGNMENT WITH ONTARIO REGULATION 588/17

This AM Plan aligns with the Township's Corporate AM Policy and fulfils the requirements of Ontario Regulation 588/17 AM Planning for Municipal Infrastructure (O.Reg. 588/17) to report AM financial implications associated with current levels of service for core infrastructure.

Figure 1-1 shows the required sections of the AM Plan down the left column. The columns to the right show O.Reg. 588/17 requirements for current levels of service (centre column) and proposed levels of service (right column). Reporting on current levels of service is required for core assets by July 1, 2022 and for non-core assets by July 1, 2024. Reporting on proposed levels of service for all assets is required by July 1, 2025.

Figure 1-1 Ontario Regulation 588/17 Requirements

| | **Current Levels of Service AMP** July 2022 (core), 2024 (non-core) | **Proposed Levels of Service AMP** July 2025 (core, non-core) |
|---|---|---|
| State of Infrastructure (asset register) | • Inventory of assets, by category<br>• Replacement cost of assets<br>• Average age of assets<br>• Condition of assets<br>• Approach to assessing condition | • Inventory of assets, by category<br>• Replacement cost of assets<br>• Average age of assets<br>• Condition of assets<br>• Approach to assessing condition |
| Levels of Service (performance) | • Current LOS (performance) provided:<br>- To community (qualitative metrics)<br>- By assets (quantitative metrics)<br>• For core assets as per Tables 1 to 5 in O.Reg. 588/17 (as minimum), and as established by City for other assets | • Proposed LOS (performance) for the next 10 years<br>- For community (qualitative metrics)<br>- By assets (quantitative metrics)<br>• And why appropriate based on risk and affordability assessment |
| Lifecycle Management Strategy | • Population & employment forecasts per 2019 Growth Plan<br>• Lifecycle activities needed for each of the next 10 years to:<br>- Meet demand caused by growth or upgrade of existing assets<br>- Maintain the current LOS at least cost and acceptable level of risk | • Population & employment forecasts per 2019 Growth Plan<br>• Lifecycle activities needed for each of the next 10 years to:<br>- Meet demand caused by growth or upgrade of existing assets<br>- Provide proposed LOS at least cost and acceptable level of risk |
| Financing Strategy | • Cost of lifecycle activities needed for each of the next 10 years to:<br>- Meet demand caused by growth or upgrade of existing assets<br>- Maintain the current LOS | • Cost of lifecycle activities needed for each of the next 10 years to:<br>- Meet demand caused by growth or upgrade of existing assets<br>- Provide proposed LOS<br>• Funding projected to be available to undertake needed lifecycle activities<br>• For funding shortfalls which activities will not be funded and associated risks |
| Implementation and Key Assumptions | • Statement on how all State of Infrastructure background information and reports will be made available to the public | • The risks and mitigation strategies associated with implementing the AM Plan<br>• Explanation of key assumptions underlying the AM Plan that have not previously been explained |

## 1.3 RELATIONSHIP WITH OTHER TOWNSHIP ACTIVITIES AND PLANNING DOCUMENTS

This AM Plan is a medium- to long-range planning document that is used to support the Township's goals by providing a rational strategy for proactively and effectively managing the Township's transportation, stormwater, water and wastewater assets. It provides a guide to understanding key items such as:

- The size, replacement value, and condition of Township's asset portfolio
- The current and any proposed future levels of service standards and the Township's performance against them
- The assets that will be needed in the future to support service delivery objectives and mitigate vulnerabilities
- The planned activities to sustain current and future assets throughout their lifecycles at minimal cost, while mitigating vulnerabilities
- The funding sources for planned lifecycle activities
- The steps to improve future iterations of the AM Plan.

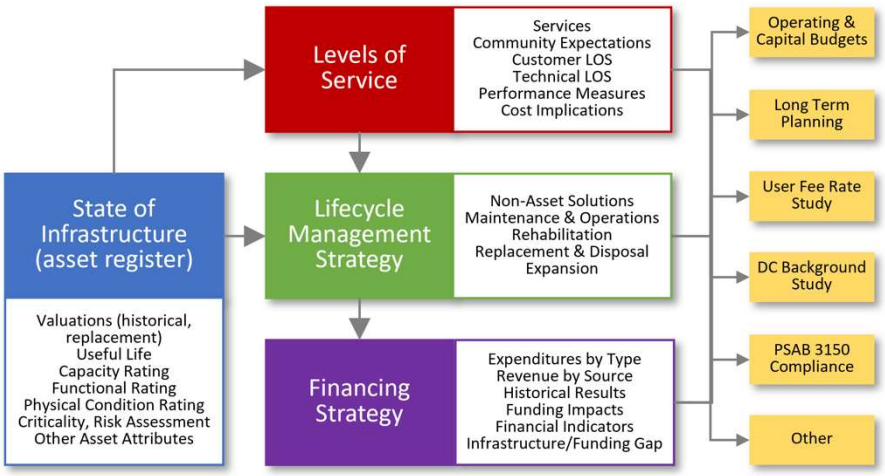
This AM Plan is intended to improve the Township's ability to achieve its corporate goals and objectives in a way that best serves its customers. It provides a rational framework that enables systematic and repeatable processes to manage costs, risks and levels of service for the Township's asset portfolio.

The AM Plan is intended to be read with other Township planning documents, including the Corporate AM Policy, along with the following associated planning documents:

- Council's 2019-2022 Strategic Plan
- Official Plan (County)
- Long-term Master Plans and Technical Updates
- Long Range Financial Plans
- Operating and Capital Budgets
- Water and Wastewater Financial Plan and Rate Study
- Development Charge Background Study
- PSAB 3150 Compliance Process for Tangible Capital Assets (TCA)

The relationship of the AM Plan with other Township documents is shown in Figure 1-2, summarized from the Municipal Finance Officers' Association of Ontario (MFOA) AM Framework.

Figure 1-2 Relationship of AM Plan to Other Township Documents



## 1.4 AM PLAN FRAMEWORK AND METHODOLOGY

The information presented in the AM Plan is based on O.Reg. 588/17 requirements, the Guide for Municipal Asset Management Plans, originally issued by the Ontario Ministry of Infrastructure in 2012, and best-in-class AM practices. This AM Plan was developed by SLBC, Inc. in collaboration with Township staff through:

- Review of background materials available on the Township's web site and provided by the Township's project team including planning documents and budgets
- Workshops with internal stakeholders
- Other interim meetings with the Township's project team
- Numerous data and information transfers
- Review of interim outputs by the Township's project team and other stakeholders, and incorporation of comments into the AM Plan deliverable.

## 1.5 ORGANIZATION OF THE AM PLAN

The remainder of the AM Plan is divided into the following main sections:

### Section 2: Key Concepts in Asset Management

This section explains key concepts in AM along with assumptions made in the AM plan analysis.

### Section 3: Asset Summary

This section provides a snapshot of the overall state of our infrastructure, and the long-term funding needs, divided by service area, specifically Transportation Service, Stormwater Management, Water Service and Wastewater Service.

### Section 4: Asset Detail

This section provides a more detailed summary of each of the assets used by the four major services in this AM Plan, including their replacement costs, condition, average age, and maintenance needs.

### Appendix A: Regulatory Compliance

This appendix lists the requirements of O.Reg. 588/17 and indicates how the AM Plan complies with those requirements for each core asset type.

### Appendix B: Data Sources

This appendix lists the data sources for inventory, condition, age, replacement value and Estimated Useful Life (EUL) data for each asset type included in the AM Plan.

### Appendix C: Glossary

This appendix lists definitions of terminology used in the AM Plan.

## 1.6 PUBLIC POSTING OF AM PLAN

In accordance with the requirements of O.Reg. 588/17, this AM Plan is publicly available at https://wellington-north.com/content/government/departments/finance/, along with the background studies and reports used to develop it.

PHOTO | RURAL AREA - WELLINGTON NORTH

# 2. KEY CONCEPTS IN ASSET MANAGEMENT

# 2 KEY CONCEPTS IN ASSET MANAGEMENT

Asset Replacement Value, estimated useful life, lifecycle maintenance, condition assessments, risk, and levels of service are key concepts in asset management. Understanding the interplay between these concepts is critical to optimizing asset management practices.

## 2.1 REPLACEMENT VALUE

The replacement value is the cost that the Township would incur if it were to replace an asset. Table 2-1 describes and compares methods for estimating replacement value.

Table 2-1 Methods for Estimating Replacement Value

| Method | Description | Comment |
|---|---|---|
| Property Insurance Values | Replacement costs as identified in the most recent insurance contract | Insurance values typically reflect the depreciated value of an asset. For AM planning, the replacement value should instead reflect the expected cost to replace an asset with a new undepreciated one that fulfils the same functional need. |
| Historical Cost Inflation | The historical cost inflated to the current dollar value. | This approach does not capture changes in design and construction standards, nor current market conditions. |
| Current Market Unit Costs | Applying recent acquisition costs to assets. | This approach captures changes in design and construction standards, as well as current market conditions, but is difficult to apply to assets that vary widely in design and specifications, such as buildings and bridges. |
| Asset-specific Engineering Estimates | Replacement costs estimated by external consultants based on site visits, typically conducted as part of a condition assessment. | This approach is particularly applicable to asset types that vary widely in design and specifications, such as buildings and bridges, and also considers current standards and market conditions. However, engineering estimates are the costliest to obtain, of the methods listed. |

The methods used for this AM Plan vary by asset type and asset, depending on the availability of data, and the variation across types. In general, current market unit costs have been applied for asset types with high consistency, such as roads, pipes, hydrants, and maintenance holes. Asset-specific engineering estimates have been applied where this data was available, specifically for bridges, culverts and stormwater ponds. For other assets with high complexity and variability, specifically, vertical assets in the water and wastewater systems, historical costs recorded in the Tangible Capital Asset (TCA) register were inflated and

portioned out to different building and process systems. Further detail on replacement value estimates is provided in Section 4 for assets within each major service.

The replacement value of an asset is a critical calculation for developing the financial models in the Asset Management Plan. The replacement value calculations will be updated on a regular basis to reflect changes in input costs, such as construction materials, parts, and labour. This will provide a more accurate estimate of infrastructure funding needs and will enable the Township to evaluate trends in input costs to better predict future costs.

## 2.2 USEFUL LIFE

The estimated useful life of an asset is an estimate of how long the Township expects to realize the economic benefits of asset ownership. An asset is considered to have exceeded its useful life when it is no longer required (such as technology that becomes obsolete), when it no longer provides the required level of service (such as when a road is too narrow for the growing community), or when it is more cost-effective to replace the asset than to continue to maintain it. The useful life is both a *technical* estimate, and an estimate of future *demand*.

To estimate the *technical* useful life of an asset, we need to account for the construction materials, current condition, anticipated wear and tear over time, and the maintenance requirements for the asset. With this information, we can estimate how long we will be able to use a certain asset or group of assets.

The useful life of an asset can also be impacted by future *demand*. For example, a road may be in good condition and have several years of useful life remaining based on the technical assessment, but it may be in a high-growth area that requires wider roads. We may need to intervene much earlier than the *technical* useful life would suggest. Demand management enables us to predict the impact of various trends on our future asset needs.

## 2.3 CONDITION

Asset condition is assessed on a regular basis, to evaluate whether they are meeting regulatory and service level requirements, and to inform our short- and long-term funding decisions. The condition of various types of assets is collected differently, reflecting the different functions and construction of infrastructure across the Township. Roads are assessed using a modified Pavement Condition Index (PCI), which ranges from a score of 0, indicating a road in need of reconstruction, to a score of 100, which represents a newly constructed road. Bridges, on the other hand, are measured on a Bridge Condition Index, with a range of 0 to 100. Other assets, such as buildings, are rated as either “Good”, “Fair”, or “Poor”, depending on a number of factors. For some assets, condition assessments were not available, and instead, age was used as a proxy for condition. Condition scoring methodology is provided by asset class in Appendix B.

To standardize the condition ratings across asset classes, the Township has established a five-point condition scale, which ranges from Very Poor to Very Good. The five-point scale is described in Table 2-2. The relationship between the five-point scale, asset age and asset condition indices is provided by asset class in Section 4.

Table 2-2 Standardized Condition Ratings

| Scale | | Definition | Summary |
|---|---|---|---|
| Very Good | 1 | The asset is in very good condition, typically new or recently rehabilitated. Maintenance needs should be minimal until the next assessment of the asset. | Fit for the future |
| Good | 2 | The asset is physically sound and is in good condition, with some elements showing general signs of wear that require attention. Maintenance is minimal, and costs associated with maintenance activities fit within the departmental operating budget. Typically, the asset has been used for some time but is still within early to mid-stage of its expected life. | Adequate for now |
| Fair | 3 | The asset shows general signs of deterioration and is performing at a lower level than originally intended. Some components of the asset are becoming physically deficient and component replacement may be necessary. Maintenance requirements and costs are increasing. The asset is in need of either minor capital repairs, or additional maintenance. | In need of attention |
| Poor | 4 | The asset is approaching the end of its useful life and exhibits significant deterioration. Major repairs are required, with significant capital investment. | At risk of failure |
| Very Poor | 5 | The asset is in unacceptable condition with widespread signs of advanced deterioration and has a high probability of failure. Maintenance costs are unacceptable, and rehabilitation is not cost-effective. The asset is in need of major replacement or refurbishment. | Unfit for sustained service |

## 2.4 LEVELS OF SERVICE

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

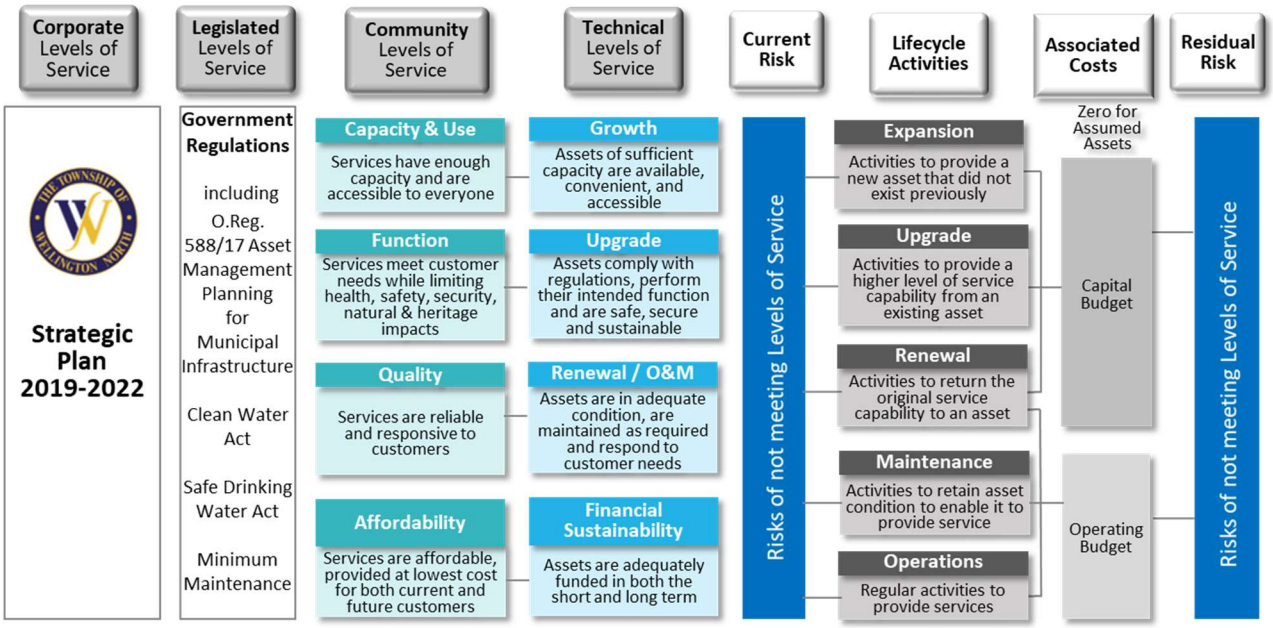
In general, LOS are guided by a combination of customer expectations, legislative requirements, and internal guidelines, policies, and procedures. In many cases, LOS are also implied based on past service delivery, community expectations, and infrastructure system design. Effective asset management requires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

Figure 2-1 shows that Corporate LOS commitments, along with the legislated LOS referenced by them, drive the definition of more specific Community LOS. Community LOS can be categorized as relating to one of the following service attributes:

- Capacity & Use: Assessing whether services have enough capacity and are accessible to the customers
- Function: Assessing whether services meet customer needs while limiting health, safety, security, natural and heritage impacts
- Quality: Assessing whether services are reliable and responsive to customers
- Affordability: Assessing whether services are affordable and provided at the lowest cost for both current and future customers

Community LOS are in turn translated into Technical LOS, where Capacity & Use LOS drive assessment of the Expansion needs; Function LOS drive assessment of Upgrade needs; Quality LOS drive assessment of renewal, operations and maintenance needs; and Affordability LOS drive assessment of Financial Sustainability needs. The risks of failing to achieve the defined Community and Technical LOS are assessed, and life cycle activities are prioritized to address those risks. Life cycle activities may include expansion, upgrade, renewal, maintenance or operational activities, depending on the category of LOS to be addressed. The nature of the life cycle activity determines whether it should be funded as capital or operating, as well as eligible funding sources. As shown in the figure, even after the life cycle intervention, some residual risk may remain.

Figure 2-1 Level of Service Framework




This AM Plan reflects the current levels of service delivered. Future AM Plans will include goals for future levels of service, including assessments of how we will fund changes in service levels. These changes may include enhanced levels of existing services, or the provision of additional services that we are not currently providing.

Community and Technical LOS for each major service are summarized in Section 3 and described in detail in Section 4.

## 2.5 LIFECYCLE MANAGEMENT

The Township's ability to deliver the levels of service outlined in the Asset Management Plan is impacted in large part by:

a) forecast future population growth and the associated need for additional infrastructure to serve it
b) changing functional, legislative and sustainability requirements and the associated need for existing assets to be upgraded to continue to be fit for purpose

c) aging infrastructure and the associated need for operations, maintenance and renewal investments to sustain it
d) available funds and the associated need for assets to be provided at lowest cost for both current and future customers.

To achieve its program objectives, the Township builds new infrastructure assets to meet capacity needs, upgrades assets to meet new functional needs and manages existing assets to meet reliability needs – all with limited funds. Asset lifecycle management strategies are planned activities that enable assets to provide the defined levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost. Asset lifecycle management strategies are typically organized into the categories listed in Table 2-3, and are driven by the Levels of Service (LOS) defined in the previous section.

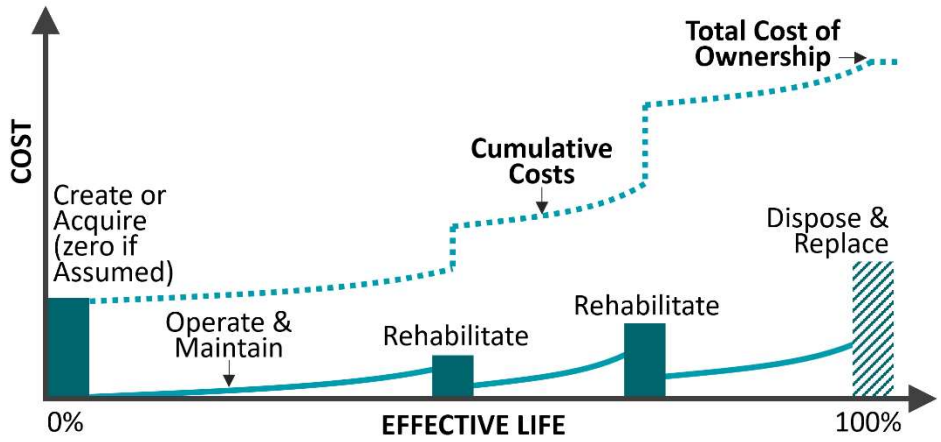
Table 2-3 Asset Lifecycle Management Categories

| Life Cycle Management Category | Description | Examples of Associated Activities |
|---|---|---|
| Operate | Regular activities to support service delivery | Using/running a piece of equipment, cleaning, inspection, sampling |
| Maintain | Activities to retain asset condition to enable it to provide service for its planned life | Routine maintenance, filter changes, lubrication, minor repairs |
| Renew | Activities that return the original service capability of an asset | Overhaul, rehabilitation, replacement |
| Upgrade | Activities to provide a higher level of service capability from an existing asset to achieve better fit for purpose or meet regulatory requirements | Upgrade a boiler to one with higher energy efficiency |
| Expand | Activities to accommodate increased demand, for example by providing a new asset that did not exist previously, or by expanding an existing asset | Construct new watermain, expansion of a facility |

Non-asset solutions are actions or policies that can lower costs, lower demands, or extend asset life (e.g., better integrated infrastructure planning and land use planning, demand management, insurance, process optimization, education of public).

The Township assesses the costs of potential lifecycle activities to determine the lowest lifecycle cost strategy to manage each asset type while still meeting levels of services. The total cost of ownership is the sum of lifecycle activity costs to sustain each asset type over the asset lifecycle. (See Figure 2-2 for conceptual lifecycle cost model.) Sufficient investment of the right type and at the right time minimizes the total cost of ownership for each asset and also prevents other potential impacts (i.e., risks) such as interruption to service delivery or damage to other infrastructure. Operations, maintenance and renewal activities are timed to reduce the risk of service failure from deterioration in asset condition and are part of the total cost of ownership. The conceptual lifecycle model is illustrated in the figure below. Note that although the assets contributed by land developments (when the Township assumes ownership) are provided at no cost to the Township, the costs to sustain them over their lifecycles and to replace them must be paid by the Township.

Figure 2-2 Conceptual Lifecycle Cost Model




The Township uses its understanding of risks of not meeting target levels of service to inform the timing and amount of investments needed in infrastructure assets. The Township aims to provide sufficient service capacity to meet demand and manages the upgrade, operations, maintenance, and renewal of assets to meet defined service levels, including legislated and other corporate requirements.

## 2.6 RISK MANAGEMENT

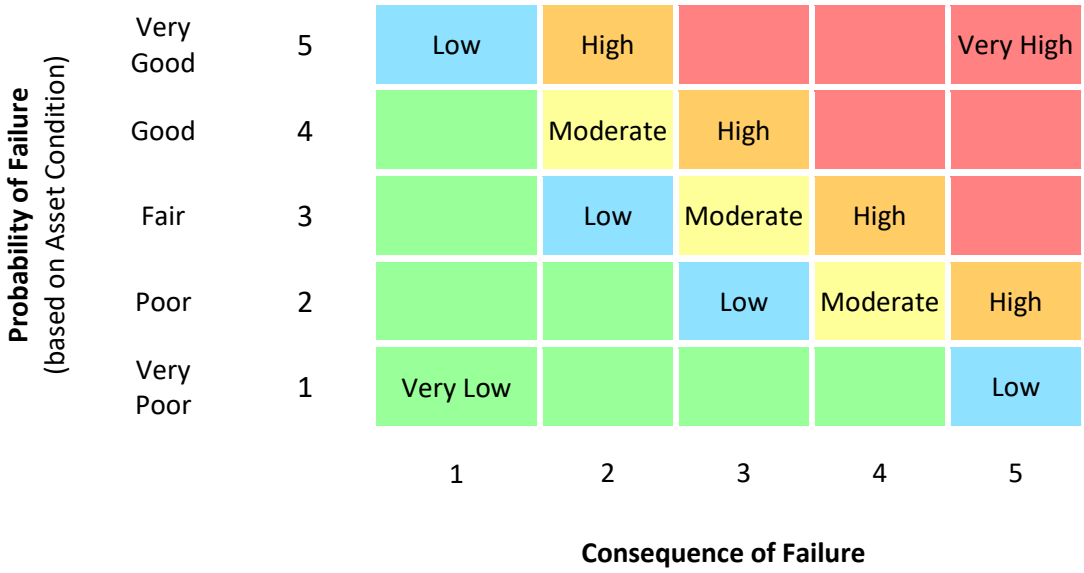
The Township's key asset management principle is to meet service levels and manage risk, while minimizing lifecycle costs. The relative importance of the assets to support service delivery, referred to as asset criticality, is a key driver in selection of the most appropriate asset management strategy for each asset. Critical assets include assets that are key contributors to performance, the most expensive assets in terms of lifecycle costs, and assets that are most prone to deterioration or need ongoing maintenance investment. More critical assets are prioritized for expansion, upgrade, inspection, cleaning, maintenance, and renewal, depending on their current and forecast future performance.

Risk events, such as an asset's failure to have sufficient capacity, function or reliability, are events that may compromise the delivery of the Township's strategic objectives. Lifecycle activities are used to manage the risk of failure by reducing the chance of asset failure to acceptable levels. The importance of assets to the Township meeting its strategic objectives dictate the type and timing of lifecycle activities.

The Township has established an enterprise approach to risk management to better understand and manage the probability of various threat events impacting its ability to deliver levels of services that customers need. Risk management enables Township staff and Council to prioritize activities and allocate resources based on risk-based planning and service delivery to smooth out capital and operating expenditure curves and reduce the overall whole life cost of asset ownership.

As shown in the Risk Matrix in Figure 2-3, risk exposure is a function of Probability of Failure (PoF) and the consequence of failure (CoF), and is ranked Extreme, High, Moderate, Low and Very Low. In general, risk exposure is used to prioritize asset investments and interventions.

Figure 2-3: Proposed Risk Thresholds




**Very Low Risk:** Status Quo no formal response. Risk is documented and will be reviewed periodically.

**Low Risk:** Status Quo. Identify assets that are candidates for "run to failure". Continue with current maintenance and performance / condition monitoring.

**Moderate Risk:** Extend life & monitor threat events. Review maintenance strategies & plans (e.g., predictive, time based). Continue to maintain & monitor performance / condition.

**High Risk:** Extend life & monitor / respond to threat events. Review maintenance strategies & plans (e.g., proactive). Review renewal strategies (NPV options analysis), spares strategy, available redundancy & monitoring programs.

**Very High Risk:** Respond to threat events. Identify capital renewal options, confirm spares strategy & available redundancy, & review monitoring programs.

For the Probability of Failure (PoF) Matrix, a five-point scale was established with related scoring criteria and is shown in Table 2-4. The Table lists the proposed mapping of PoF scores to the three key LOS: (1) Capacity & Use, (2) Function and (3) Quality - Condition/Age. In general, for Quality, the observed condition is the preferred indicator for estimating PoF. If observed condition scores are not available, then age is used. If neither condition nor age data are available, then staff input on PoF is requested based on their knowledge of the asset.

Similarly, a five-point scale was developed for Consequence of Failure (CoF), based on the importance of an asset to the Township's delivery of services or, in technical terms, the potential consequences of the

asset failing and therefore failing to provide the required service levels. Asset criticality is determined based on the degree to which the failure of the asset would impact the following considerations:

- Financial impact considerations such as asset replacement cost, damages to Township or private property and infrastructure, loss of revenue, and fines
- Health & Safety considerations such as degree and extent of injury, from negligible injuries to loss of life
- Availability and Reliability of service delivery, such as disruption of non-essential service to widespread and long-term disruption of essential service
- Environmental considerations, such as length and extent of damages to the natural environment.
- Reputational considerations, such as negative media coverage.

The five consequence types are aligned with the Township's existing Triple Bottom Line decision-making approach (Financial, Health & Safety and Environmental), and incorporates the consideration of Reliability/Availability and Reputational consequences. Redundancy is embedded in the determination of consequence of failure.

Table 2-5 lists the CoF profiles for the five considerations above. For each asset, the CoF is assessed against the five considerations, and averaged.

Risk exposure related to each major service is discussed in Section 3. Details of the risk analysis, including probability and consequence of failure estimates by asset type, are presented in Section 4.

Table 2-4 Probability of Failure Matrix

| Probability of Failure (PoF) | PoF Rating | Event-based PoF Indicator | Quality (Condition and Age) | Capacity and Use | Function |
|---|---|---|---|---|---|
| **Rare** | 1 | An occurrence / situation is not likely to occur within 10 years | Asset is physically sound and is performing its function as originally intended. Asset is new or at the beginning of it's Estimated Useful Life (EUL) (80% life remaining) | Demand corresponds well with actual capacity and no operational problems experienced. Meets current and future capacity needs within planning horizon. | The infrastructure in the system or network meets all program/service delivery needs in a fully efficient and effective manner. (Health, safety, security, legislative etc.) |
| **Unlikely** | 2 | An occurrence / situation is not likely to occur within 5 years but possibly within 10 years | Asset is physically sound and is performing its function as originally intended. Typically, asset has been used for some time but is within mid-stage of its expected life (60 - 79% life remaining). | Demand is within actual capacity and occasional operational problems experienced. | The infrastructure in the system or network meets program/service delivery needs in an acceptable manner. (Health, safety, security, legislative etc.) |
| **Possible** | 3 | An occurrence / situation might occur within 5 years | Asset is showing signs of deterioration and is performing at a lower level than originally intended (40 - 59% life remaining). | Demand is approaching actual capacity and/or operational problems occur frequently. Meets current capacity needs but not future without modifications. | The infrastructure in the system or network meets program/service delivery needs with some inefficiencies and ineffectiveness present. (Health, safety, security, legislative etc.) |
| **Likely** | 4 | An occurrence / situation might occur within 2 years | Asset is showing significant signs of deterioration and is performing to a much lower level than originally intended (20 - 39% life remaining). | Demand exceeds actual capacity and/or significant operational problems are evident. | The infrastructure in the system or network has a limited ability to meet program/service delivery needs. (Health, safety, security, legislative etc.) |
| **Certain** | 5 | An occurrence / situation that is happening, imminent or will probably occur within 1 year | Asset is physically unsound and/or not performing as originally intended. Asset has reached end of life and failure is imminent (19% life remaining). | Demand exceeds actual capacity and/or operational problems are serious and ongoing. Does not meet Current capacity Requirements. | The infrastructure in the system or network is seriously deficient and does not meet program/service delivery needs and is neither efficient nor effective. (Health, safety, security, legislative etc.) |

Table 2-5 Consequence of Failure (Asset Criticality) Ratings

| | C1<br>Insignificant | C2<br>Minor | C3<br>Moderate | C4<br>Major | C5<br>Catastrophic |
|---|---|---|---|---|---|
| ***Financial Impacts*** | Damages, losses (including 3rd party) or fines<br>≤ $5k | Damages, losses (including 3rd party) or fines<br>$5k to $20k | Damages, losses (including 3rd party) or fines<br>$20k to $50k | Damages, losses (including 3rd party) or fines $50K to $200K | Damages, losses (including 3rd party) or fines<br>> $200K |
| ***Health & Safety*** | No obvious potential injury or health impacts | Minor injury likely, requiring minor medical attention | Serious injury likely, resulting in short-term disability or hospitalization | Serious injury or loss of life likely, with potential for long-term hospitalization | Permanent injury and death likely |
| ***Availability/ Reliability*** | Loss of service for a few hours, affecting ≤ 5 people | Loss of service for ≤ 1 day, or affecting 5-20 people | Loss of service for ≤ 1 week, or affecting 20-200 people | Loss of service for > 1 week, or affecting 200-1,000 people | Loss of service is permanent, or affects > 1,000 people |
| ***Environmental*** | Resolved within 1 day | Resolved within 1 week | Resolved within 2 weeks | Resolved within 1 month | Resolution requires >1 month |
| ***Reputational*** | No media interest | Minor local media interest | Moderate local media interest | Intense local media interest | Provincial interest or beyond |

PHOTO | CONSTABLE RICK HOPKINS MEMORIAL BRIDGE, MOUNT FOREST

# 3. INFRASTRUCTURE SUMMARY

# 3 INFRASTRUCTURE SUMMARY

The Township provides transportation, stormwater, water and wastewater services using over $480.5 million worth of infrastructure assets, as shown in Table 3-1. This portfolio of assets includes 390 km of roads, over 100 bridges and culverts, 35 km of sidewalks, 160 km of underground pipes, 7 wells, 3 water storage facilities, 6 sewage pumping stations and 2 wastewater treatment plants.

**Table 3-1 Replacement Value of Assets Across the Four Major Services**

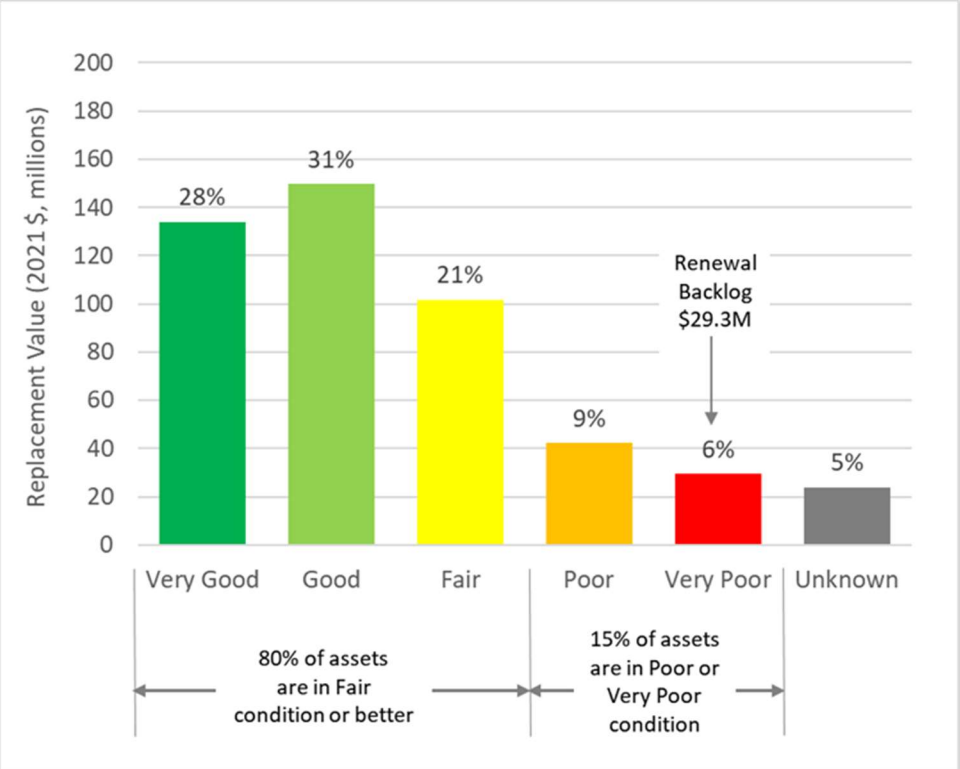
| Service | Replacement Value (2021 $, millions) |
|---|---|
| Transportation | $ 215.0 |
| Stormwater | $ 76.4 |
| Water | $ 74.3 |
| Wastewater | $ 114.9 |
| TOTAL | **$ 480.5** |

As shown in Figure 3-1, 80% ($385.3 million) worth of these assets are considered to be in a "State of Good Repair", meaning that assets are in Fair condition or better, while 15% ($71.5 million) are in Poor or Very Poor condition.

Assets in Very Poor condition are considered due or overdue for renewal. As shown in the Figure, 6% ($29.3 million) of the assets in the four major services fall into this category.

The following sub-sections provide further analysis by major service, beginning with Transportation, followed by Stormwater, Water and Wastewater Services.

**Figure 3-1: Condition Distribution of Assets Across the Four Major Services**



## 3.1 TRANSPORTATION SERVICE

The Township provides local transportation service on 390 km of paved and gravel roads, as well as 102 bridges and culverts. Traffic safety is supported by five signalized intersections, over 1000 warning and regulatory signs, and over 1900 streetlights. The Township also provides 34.6 km of sidewalks to support pedestrian travel and active transportation. The total value of these assets is an estimated $215.0 million. Table 3-2 details the transportation service in terms of inventory quanity and replacement value.

**Table 3-2 Transportation Asset Summary – Inventory and Replacement Value**

| Asset Type | Quantity | Replacement Value (2021 $, millions) |
|---|---|---|
| Roads | 389.8 km | $ 158.2 |
| Bridges & Culverts | 102 structures | $ 38.0 |
| Traffic Signals | 5 signalized intersections | $ 1.6 |
| Traffic Signs | 1094 signs | $ 0.8 |
| Streetlights | 1923 streetlights | $ 8.2 |
| Sidewalks | 34.6 km | $ 8.1 |
| TOTAL | | **$ 215.0** |

### 3.1.1 CONDITION

Figure 3-2 summarizes the transporation asset condition distribution, of which includes the following details:

Ninety-six percent (96% or $206.2 million) of transportation assets are considered to be in a "State of Good Repair", meaning that assets are in Fair condition or better.

Four percent (4% or $7.9 million) are in Poor or Very Poor condition.

Assets in Very Poor condition are due or overdue for repair, are considered to be the Renewal backlog. The Township has a renewal backlog of $4.0 million of transportation assets.

**Figure 3-2: Transportation Asset Summary – Condition Distribution**

### 3.1.2 PERFORMANCE

The Level of Service analysis focused on indicators defined by O.Reg. 588/17 for roads, bridges and culverts. Indicators for sidewalks were also included. The Township has not yet set targets for these indicators. Instead, current performance is being reported as a baseline for future target-setting, when more data will have been collected and analyzed to understand the costs and benefits of different LOS targets.

Although targets have not been established, the Township's road network appears to be performing well. The road network consists of 237 km of gravel roads primarily serving rural areas, as well as 15 km of surface treated and 138 km of paved roads serving the urbanized areas. (Lengths refer to centre-line km.) On average, paved roads are in Good condition, while Surface Treated and Gravel roads are in Fair condition. Overall, 98.6% of the road network is in a State of Good Repair, meaning Fair condition or better.

In terms of transportation structures, the Township's current performance indicates an opportunity to reduce the impacts of load restrictions by renewing two bridges (#21 and #38) and one culvert (#9). Moreover, 13 bridges and culverts are limited to a single lane (having deck width of 6m), and should be monitored for the need for widening.

In addition, there may be an opportunity to improve the sidewalk network by increasing the proportion sidewalks to urban roadsides. Current performance is 65.3%, based on 2013 sidewalk inventory. The Township is also replacing narrow sidewalks to a minimum width of 1.5m to improve accessibility. Based on the 2013 sidewalk inventory, 59.4% (20.5 km) of the Township's sidewalks meet the accessibility standard width of 1.5m. This number is now likely higher, so the inventory and this indicator score should be updated.

### 3.1.3 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the transportation service asset life cycle needs include the following:

- Expansion & Upgrade $ 5.50 million (over ten years)
- Renewal $ 21.06 million (over ten years)
- Operations & Maintenance $ 3.91 million/year in 2022 increasing to
  $ 3.93 million/year in 2031 due to development

Expansion and Upgrade needs include $5.43 million of road network expansions identified in the Development Charges Background Study. Capital projects have been identified in the Township's multi-year Capital Plan to address these needs. Expansion and Upgrade needs also include $70k for sidewalk studies, including collection of sidewalk width and other inventory data to support accessibility planning, as well as sidewalk connectivity study.

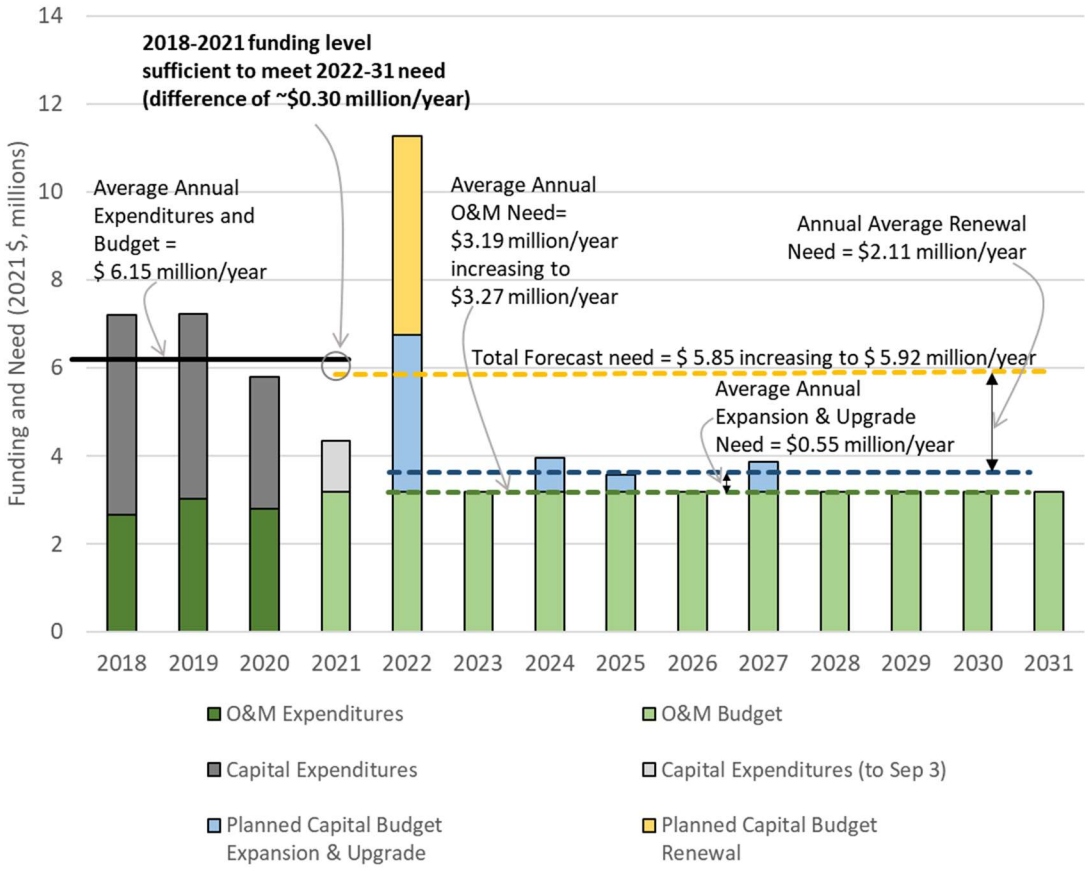
Renewal needs are the largest portion of the transportation service's forecast funding need. Fifty-two percent (52%) of renewal needs are related to rehabilitation of gravel roads, and 30% are related to renewal of bridges and culverts. The remaining 18% are split across other asset types.

Operations and maintenance needs have been estimated based on the 2021 budget, plus an additional $8k each year to accommodate growth of the asset portfolio by an estimated 1km of roads and 0.5km of sidewalks each year.

### 3.1.4 FINANCIAL IMPACT

Figure 3-3 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $6.15 million/year. This level of funding would be sufficient to cover the forecast need of $5.85 million/year for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031). However, the forecast need does not include the cost of re-surfacing paved roads between reconstruction, because the data does not show when resurfacings were last completed. Moreover, the forecast does not include the cost of reconstructing the base of gravel or surface treated roads.

Figure 3-3: Transportation Service – Historical Expenditures and Projected Needs




### 3.1.5 RISK MANAGEMENT

The Township may also prioritize needs based on risk, as discussed in Section 4.1.8, specifically, by prioritizing the $5.4 million of renewal needs (over the next 10 years) that are considered Very High risk. These include:

- $ 0.2 million of road renewal
- $ 3.8 million of bridge and culvert repair and renewal
- $ 0.8 million of traffic signal and systems renewal
- $ 0.6 million of sidewalk renewal

The next priority would be the $1.6 million of renewal needs (over the next 10 years) that are considered High risk, specifically:

- $ 0.2 million of road renewal
- $ 1.2 million of bridge and culvert repair and renewal
- $ 0.1 million of traffic signal renewal
- $ 0.1 million of traffic sign renewal

The expansion and upgrade projects, estimated at $5.5 million, are also considered High priority (risk), specifically:

- $ 5.43 million of network expansion projects, identified in the Development Charges Background Study, and already identified in the Township's Capital Plan
- $ 0.04 million for a sidewalk inventory (including sidewalk width to identify accessibility needs) and condition assessment
- $ 0.03 million for a sidewalk connectivity study

### 3.1.6 CONTINUOUS IMPROVEMENT

For the future iterations of the AM Plan the following data improvements may be considered:

- Asset inventory, cost, age and condition data to be collected include guiderails, retaining walls, fences, community entry features, and street trees.
- Condition data should be updated in accordance with regular condition assessment schedules (see Tech Memo 2: AM Data Readiness). Geo-location should be collected in conjunction with condition data, so that findings may be presented geographically.
- Renewal, reconstruction and resurfacing activities should be recorded by asset (including updating the asset installation year and condition), to enable more accurate prediction of future condition and renewal need.
- All assets should be assigned unique asset IDs, so that asset data can be cross-referenced across data sets.

In addition, to give a fuller picture of the cost of providing this service, vehicles, equipment and buildings dedicated to supporting the transportation service should also be included in this section.

For more accurate estimates of operations and maintenance (O&M) costs, a work order management system is needed to track labour, equipment and material costs associated with specific assets and activities. This work order data will improve the Township's ability to estimate O&M costs associated with growth and changes in service levels.

O.Reg. 588/17 requires that future LOS targets be established in an AM Plan by July 1, 2025, along with life cycle activities and financial plans needed to achieve those targets. In preparation, it is recommended that the Township continue monitoring its current performance with respect to transportation LOS and consider the impacts of potential targets on cost and customer satisfaction.

## 3.2 STORMWATER MANAGEMENT

The Township provides stormwater and drainage management service through a network of stormwater mains, catch basins, maintenance holes and stormwater ponds. The stormwater network is completely separated from the sanitary sewer system. The total value of the stormwater system is an estimated $76.4 million. Table 3-3 details the stormwater management service in terms of inventory quanity and replacement value.

**Table 3-3 Stormwater Asset Summary – Inventory and Replacement Value**

| Asset Type | Quantity | Replacement Value (2021 $, millions) |
|---|---|---|
| Mains | 54.6 km | $ 64.7 |
| Catch Basins | 1091 units | $ 5.5 |
| Maintenance Holes | 463 units | $ 4.9 |
| Stormwater Ponds | 6 ponds | $ 1.3 |
| TOTAL | | **$ 76.4** |

### 3.2.1 CONDITION

Figure 3-4 summarizes the stormwater asset condition distribution, of which includes the following details:

Ninety percent (90% or $68.8 million) of stormwater assets are considered to be in a "State of Good Repair", meaning that assets are in Fair condition or better.

Eight percent (8% or $6.1 million) are in Poor or Very Poor condition.

Assets in Very Poor condition are due or overdue for repair, are considered to be the Renewal backlog. The Township has a renewal backlog of $2.3 million of stormwater assets.

**Figure 3-4: Stormwater Asset Summary – Condition Distribution**

### 3.2.2 PERFORMANCE

The Township of Wellington North spans portions of the following watersheds:

- the Maitland River covering rural areas in the western portion of the Township
- the Saugeen River watershed covering the north-western corner of the Township, including Mount Forest, and
- the Grand River watershed covering two-thirds of the Township to the south and east.

A flood plain map was provided by the Grand River Conservation Authority (GRCA); however, it does not indicate the severity of storm associated with the estimated flood areas. Moreover, similar mapping was not available for the Saugeen or Maitland River watersheds.

For stormwater assets, O.Reg. 588/17 requires municipalities to report the percentage of properties in municipality resilient to a 100-year storm and a 5-year storm. This will require GIS maps showing estimated flood boundaries for 100-year and 5-year storms, overlaid on property line maps. The Township will work to obtain this data for the next update of the AM Plan.

### 3.2.3 LIFE CYCLE MANAGEMENT

Over the next 10 years (2022-2031) the stormwater service asset life cycle needs include the following:

- Expansion & Upgrade $ 0.16 million (over ten years)
- Renewal $ 3.02 million (over ten years)
- Operations & Maintenance $ 38k/year in 2022 increasing to
  $ 42k/year in 2031 due to development

No expansion or upgrade were identified in the Development Charges Background Study for stormwater assets; however, it is likely that stormwater needs are embedded in cost estimates for growth-related road projects. It is recommended that costs specific to stormwater infrastructure be tracked separately from road construction costs, so that the Township can build a better understanding of the costs related to the stormwater system.

To help identify expansion and upgrade needs in the future, it is recommended that the Township commission stormwater studies to obtain the performance metrics required by O.Reg. 588/17, specifically:

- percentage of properties in municipality resilient to a 100-year storm, and
- percentage of the network resilient to a 5-year storm.

It is recommended that $80k be budgeted for this study and should be repeated every 5 years. The total cost over the 10-year AM Plan period is thus $160k. The Township may also consider establishing such a model in-house, in which case staff and software resources would be required.

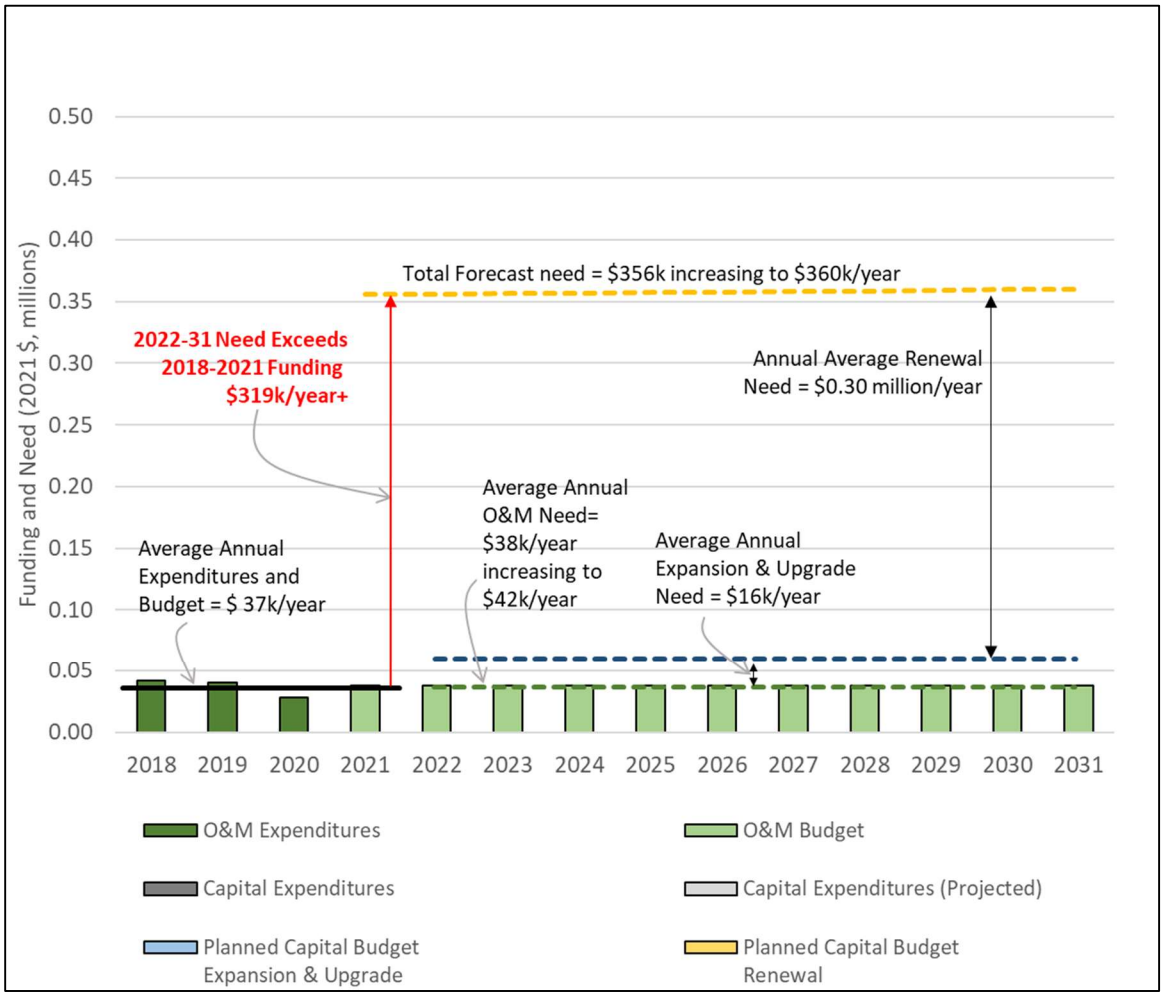
Renewal needs include replacement of 1.2km of steel stormwater mains, along with catch basins and maintenance holes connected to those mains. In addition, the Township's two wet ponds will be due for cleaning prior to 2031.

Operations and maintenance needs have been estimated based on the 2021 budget, plus an additional $0.5k each year to accommodate growth of the asset portfolio by an estimated 0.5km of mains each year.

### 3.2.4 FINANCIAL IMPACT

Figure 3-5 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $37k/year. In contrast, the forecast need for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031) is $356 k/year. This includes the life cycle costs described in the Lifecycle Management section above.

Figure 3-5: Stormwater Service – Historical Expenditures and Projected Needs




### 3.2.5 RISK MANAGEMENT

The Township may also prioritize needs based on risk, for example, prioritizing the $7.1 million of renewal needs (over the next 10 years) that are considered Very High risk, specifically:

- $ 2.0 million of stormwater mains (plus associated catch basins and maintenance holes)

The expansion/upgrade project, consisting of hydraulic analysis (estimated at $0.16 million), is also considered Very High priority (risk), because it is required to enable reporting of O.Reg. 588/17 Level of Service performance metrics.

The next priority would be $0.1 million of renewal of steel mains that are considered High risk.

### 3.2.6 CONTINUOUS IMPROVEMENT

For the future iterations of the AM Plan the following data improvements may be considered:

- Assets inventory, cost, age and condition data to collect for future iterations of the AM Plan include Saugeen Dam, oil-grit separators, inlet and outlet structures and ditches.
- Pipe condition should be assessed using CCTV. Pipes should be prioritized for CCTV by risk exposure.
- Renewal and reconstruction activities should be recorded by asset (including updating the asset installation year and condition), to enable more accurate prediction of future condition and renewal need.
- Geo-location of stormwater assets should be collected, so that findings may be presented geographically.

Vehicles, equipment and buildings dedicated to supporting stormwater management should also be included in this section to give a fuller picture of the cost of providing this service.

Hydraulic models are needed to support O.Reg. 588/17 LOS reporting, including number of properties resilient to a 100-year storm and percentage of the stormwater network resilient to a 5-year storm.

For more accurate estimates of operations and maintenance (O&M) costs, a work order management system is needed to track labour, equipment and material costs associated with specific assets and activities. This work order data will improve the Township's ability to estimate O&M costs associated with growth and changes in service levels.

O.Reg. 588/17 requires that future LOS targets be established in an AM Plan by July 1, 2025, along with life cycle activities and financial plans needed to achieve those targets. In preparation, it is recommended that the Township continue monitoring its current performance with respect to stormwater LOS and consider the impacts of potential targets on cost and risk.

## 3.3 WATER SERVICE

The Township provides water service to approximately 3378 service connections (from 2020 Financial Plan). The Township operates two water systems, one in Arthur and one in Mount Forest. In Arthur, water is drawn from three wells, and transmitted and distributed through a network of 19.7km of mains. Storage is provided by the Charles St. Tower and the Freud (spheroid) Tower. In Mount Forest, water is drawn from four wells, and transmitted and distributed through a network of 37.2km of mains. Storage is provided by a standpipe. The combined value of these two systems is estimated at $74.3 million. Table 3-4 details the water service in terms of inventory quanity and replacement value.

**Table 3-4 Water Asset Summary – Inventory and Replacement Value**

| Asset Type | Quantity | Replacement Value (2021 $, millions) |
|---|---|---|
| Mains | 56.5 km | $ 52.2 |
| Hydrants | 299 units | $ 3.0 |
| Valves | 524 units | $ 2.5 |
| Wells | 7 wells | $ 6.8 |
| Water Storage | 2 towers and 1 standpipe | $ 9.9 |
| TOTAL | | **$ 74.3** |

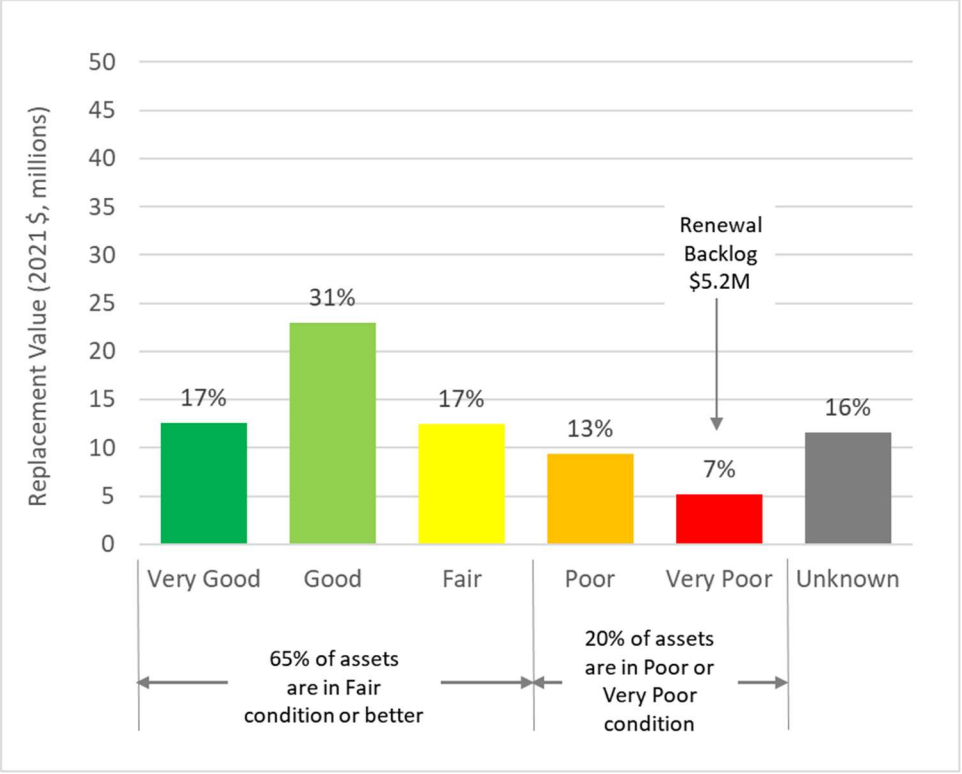
### 3.3.1 CONDITION

Figure 3-6 summarizes the water asset condition distribution, of which includes the following details:

Sixty-five percent (65% or $48.1 million) of water assets are considered to be in a "State of Good Repair", meaning that assets are in Fair condition or better. Twenty-three percent (20% or $14.6 million) are in Poor or Very Poor condition.

Assets in Very Poor condition are due or overdue for repair, are considered to be the Renewal backlog. The Township has a renewal backlog of $5.2 million of water assets.

**Figure 3-6: Water Asset Summary – Condition Distribution**



### 3.3.2 PERFORMANCE

This section presents the Township's Level of Service (LOS) indicators, targets (if defined) and current performance for Water assets. The Township has not yet set targets for these indicators. Instead, current performance is being reported as a baseline for future target-setting, when more data will have been collected and analyzed to understand the costs and benefits of different LOS targets.

For some indicators, the current performance is already optimal. For example, the Township has not recorded any boil water advisories since 2018 (reporting as of June 29, 2021), nor any lost connection-days due to watermain breaks for the same period. On the other hand, there is an opportunity to reduce the incidence of watermain breaks by replacing aged metal pipes. There is also a need to increase water flow to a 200m segment of Cork St. to achieve fire flow.

### 3.3.3 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the water service asset life cycle needs include the following:

- Expansion & Upgrade $ 15.4 million (over ten years)
- Renewal $ 10.44 million (over ten years)
- Operations & Maintenance $ 1.27 million/year

Expansion and upgrade needs include the following:

- Expansion of the water distribution network through installation of wider pipes, as well as installation of new pipe segments.
- Replacement of the two water towers in Arthur with a single new tower
- Development of a new water source to serve Arthur
- Construction of a new water tower and main to serve Mount Forest.

Renewal needs include replacement of aging cast iron pipes in both Arthur and Mount Forest, replacement of thin-walled PVC pipe in Arthur, renewal of components within well facilities and re-coating of the Mount Forest standpipe.

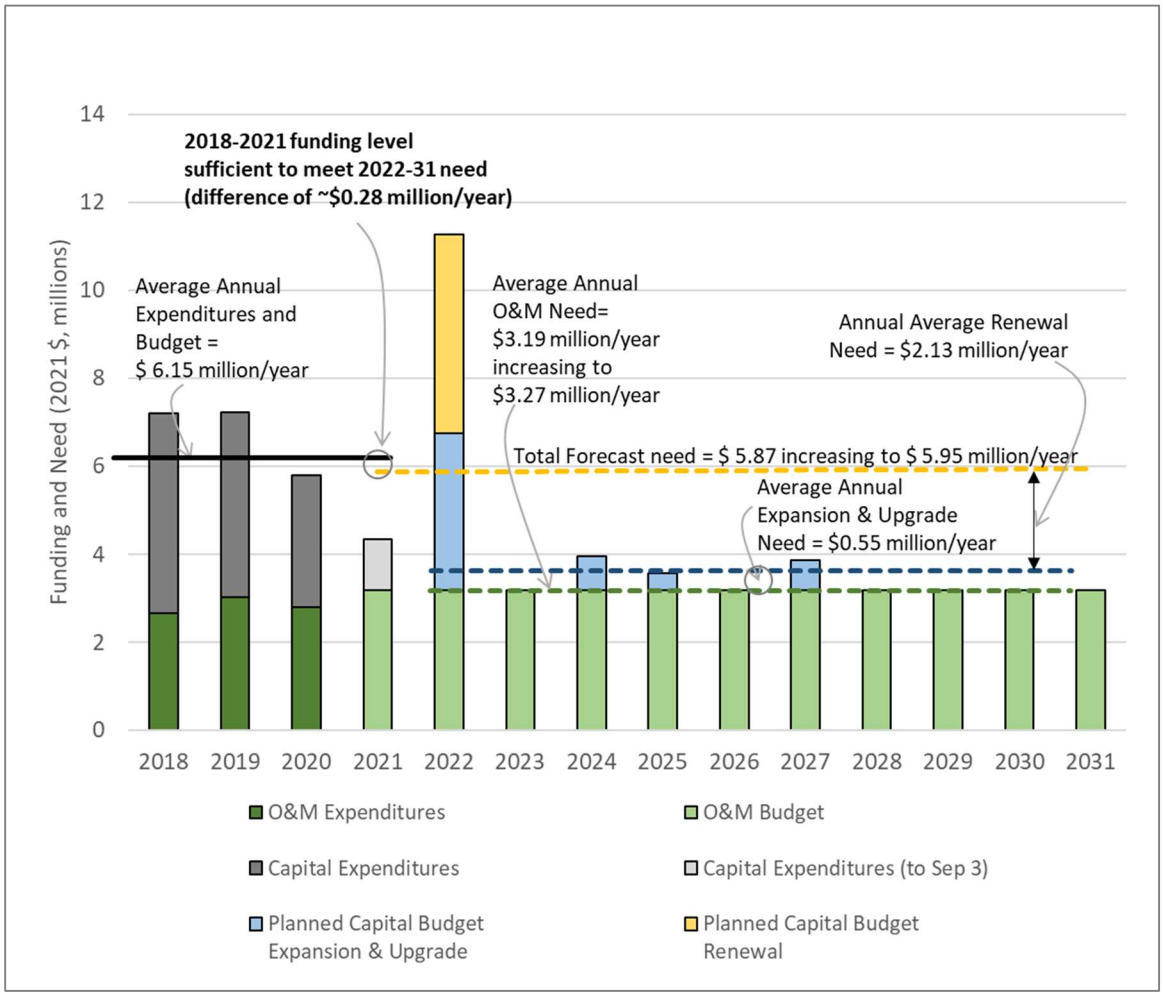
Operations and maintenance funding needs have been estimated based on the 2021 budget amount. That amount can accommodate some growth in the asset portfolio, no additional amounts were added for growth needs.

### 3.3.4 FINANCIAL IMPACT

Figure 3-7 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $1.66 million/year. In contrast, the forecast need for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031) is $3.85 million/year. This includes the life cycle costs described in the Lifecycle Management section above.

Figure 3-7 shows that the average annual capital needs (renewal, upgrade and expansion) for 2022-2031 are more than three times the amount of capital that was delivered annual from 2018-2020. As such, additional staff may be needed to support capital delivery in the future.

Figure 3-7: Water Service – Historical Expenditures and Projected Needs




### 3.3.5 RISK

The Township may also prioritize needs based on risk, specifically by prioritizing the $0.3 million of renewal needs (over the next 10 years) that are considered Very High risk. These needs consist of replacement of aging Cast Iron pipe in Mount Forest.

The following expansion/upgrade projects, are also considered Very High priority, since they are critical to meeting future demand and capacity needs:

- Replacing the Arthur Water Towers with a single new tower - $3.7 million
- Identifying and developing a new water source (well) - $ 3.5 million
- Building an additional water tower and main in Mount Forest - $4.2 million

The next needs to be prioritized would be to renew assets in the High risk (orange) section of the risk map, specifically:

- Replacing $3.6 million of aging Cast Iron pipe in Arthur and Mount Forest
- Re-coating the Mount Forest Standpipe - $0.95 million

The following expansion/upgrade projects, are also considered High priority:

- Expand selected mains and adding new segments in Arthur - $2.0 million
- Expand selected mains and adding new segments in Mount Forest- $2.0 million

### 3.3.6 CONTINUOUS IMPROVEMENT

A flat rate is charged to residential customers, while a metered rated is charged to non-residential users. Meters should be added to the inventory and replaced on a regular basis to ensure billing accuracy. I

Vehicles and equipment dedicated to supporting the water service should also be included in this section to give a fuller picture of the cost of providing this service.

A more detailed inventory of building and process systems and components within vertical assets is needed, including condition, value and criticality. The inventory will improve AM planning and will also be necessary for a future work order planning system.

Renewal, reconstruction and expansion activities should be recorded by asset (including updating the asset installation year and condition), to enable more accurate prediction of future condition and renewal need.

For more accurate estimates of operations and maintenance (O&M) costs, a work order management system is needed to track labour, equipment and material costs associated with specific assets and activities. This work order data will improve the Township's ability to estimate O&M costs associated with growth and changes in service levels.

O.Reg. 588/17 requires that future LOS targets be established in an AM Plan by July 1, 2025, along with life cycle activities and financial plans needed to achieve those targets. In preparation, it is recommended that the Township continue monitoring its current performance with respect to water LOS, and consider the impacts of potential targets on cost, risk and customer satisfaction.

## 3.4 WASTEWATER SERVICE

The Township provides water service to approximately 3258 service connections (from 2020 Financial Plan). The Township operates two wastewater systems, one in Arthur and one in Mount Forest. In Arthur, wastewater is collected and transmitted through a network of 20.9km of mains, with pumping provided by 2 Sewage Pumping Stations (SPS). Sewage is treated at Arthur's Wastewater Treatment Plant and lagoon system. In Mount Forest, wastewater is collected and transmitted through a network of 31.8km of mains, with pumping provided by four SPS. A fifth SPS may be constructed in 2022. Sewage is treated at Mount Forest's Wastewater Treatment Plant. The combined value of these two systems is estimated at $114.9 million. Table 3-5 details the wastewater service in terms of inventory quanity and replacement value.

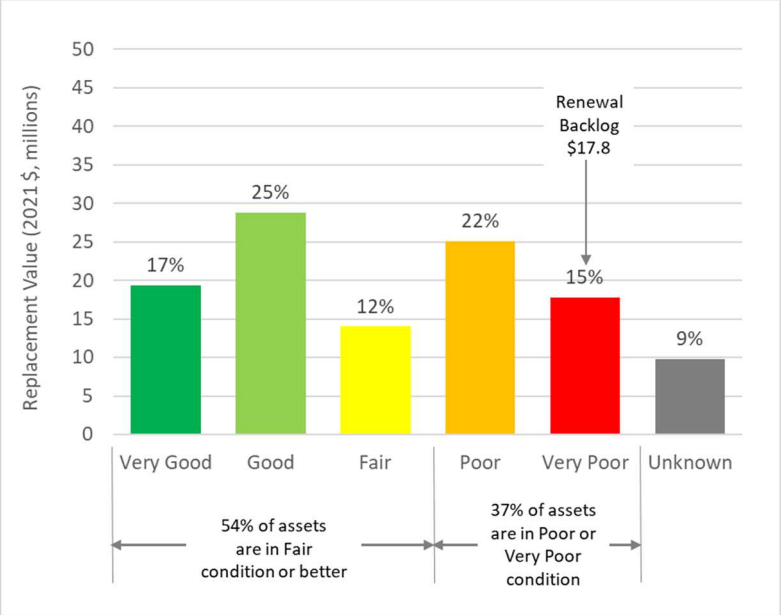
**Table 3-5 Wastewater Asset Summary – Inventory and Replacement Value**

| Asset Type | Quantity | Replacement Value (2021 $, millions) |
|---|---|---|
| Mains | 52.7 km | $ 55.1 |
| Maintenance Holes | 524 units | $ 5.9 |
| Sewage Pumping Stations | 6 facilities | $ 13.3 |
| Wastewater Treatment Plants | 2 facilities | $ 40.5 |
| TOTAL | | **$ 114.9** |

### 3.4.1 CONDITION

Figure 3-8 summarizes the wastewater asset condition distribution, of which includes the following details:

**Figure 3-8: Wastewater Asset Summary – Condition Distribution**




Fifty-four percent (54% or $62.2 million) of wastewater assets are considered to be in a "State of Good Repair", meaning that assets are in Fair condition or better. Thirty-seven percent (37% or $42.9 million) are in Poor or Very Poor condition.

Assets in Very Poor condition are due or overdue for repair, are considered to be the Renewal backlog. The Township has a renewal backlog of $17.8 million of wastewater assets. A large portion of this backlog ($9.5 million) is related to assets at the Arthur wastewater treatment plant, many of which are being renewed as part of the Phase 1 and Phase 2 expansions. Another significant portion ($4.9 million) of the backlog is related to the Arthur lagoon. The remainder consists of $1.7 million of asbestos cement watermain and components of Frederick St., Wells St. and Perth St. Sewage Pumping Stations.

### 3.4.2 PERFORMANCE

This section presents the Township's Level of Service (LOS) indicators and current performance for Wastewater assets. At this time, targets have not yet been set for these indicators. Instead, current performance is being reported as a baseline for future target-setting, when more data will have been collected and analyzed to understand the costs and benefits of different LOS targets.

Although targets have not yet been established, there is an opportunity to improve the proportion of assets in state of good repair (currently quite low at 53%), and to reduce the occurrence of wastewater backups. In addition, Arthur WWTP has been investigating consistent exceedances of Total Ammonia Nitrogen (TAN) occurring since early 2019.

Average monthly E. coli concentrations exceeded compliance limits in December 2019, February 2020 and March 2020. In other words, for the 2019-2020 seasonal 8-month discharge period, colony counts exceeded the limit 3 out of 8 months. These exceedances may require further investigation and mitigation.

Average monthly effluent concentrations at the Mount Forest WWTP have been within ECA limits for all months in the period 2018-2020.

### 3.4.3 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the wastewater service asset life cycle needs include the following:

- Expansion & Upgrade $ 16.5 million (over ten years)
- Renewal $ 34.62 million (over ten years)
- Operations & Maintenance $ 1.36 million/year

Expansion and Upgrade needs include expansion of mains and addition of new pipe segments, as well as expansion and upgrade of the Arthur WWTP.

Renewal needs include replacement of aging wastewater mains and appurtenances, renewal of components within Sewage Pump Stations and Wastewater Treatment Plants, and renewal of the Arthur Lagoon.

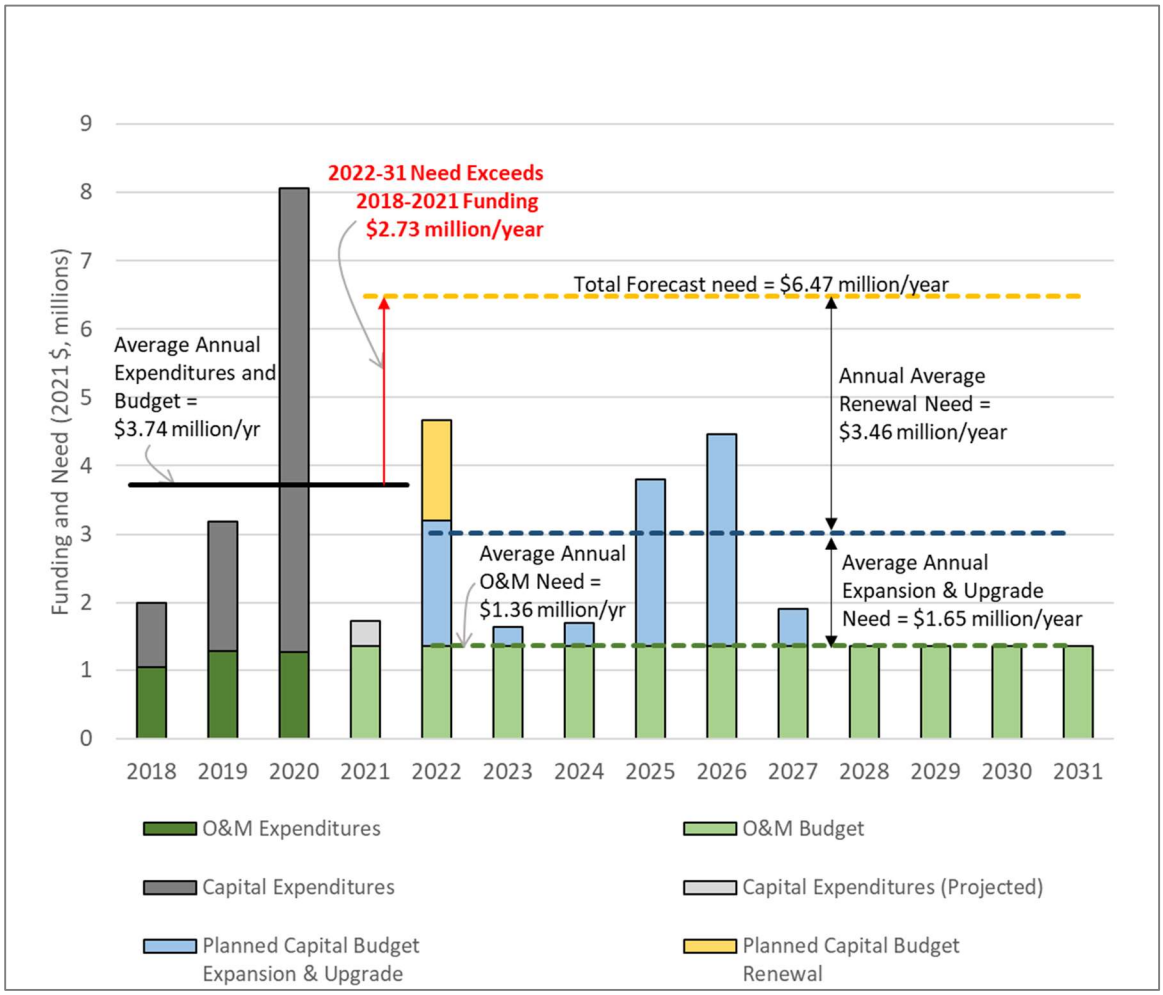
Operations and maintenance funding needs have been estimated based on the 2021 budget amount. That amount can accommodate some growth in the asset portfolio, no additional amounts were added for growth needs.

### 3.4.4 FINANCIAL IMPACT

Figure 3-9 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $3.74 million/year. In contrast, the forecast need for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031) is $6.47 million/year. This includes the life cycle costs described in the Lifecycle Management section above and represents an increase of $2.73 million/year more than the average annual expenditures 2018-20 and budget for 2021.

The peak of capital expenditures in 2020 consisted primarily of Phase 1 of the Arthur Wastewater Treatment Plant Upgrade, on which $5.8 million spent that year.

Figure 3-9: Wastewater Service – Historical Expenditures and Projected Needs




### 3.4.5 RISK

The Township may prioritize needs based on risk, including the following needs identified in the Technical Update:

- Expansion and upgrade of the Arthur WWTP ($10.2 million)
- Expand selected mains and add new segments ($1.7 million in Arthur, $4.6 million in Mount Forest)

In addition, 2.9km of asbestos cement wastewater mains in Arthur are due for renewal and considered Very High risk.

### 3.4.6 CONTINUOUS IMPROVEMENT

A more detailed inventory of building and process systems and components within vertical assets is needed, including condition, value and criticality. The inventory will improve AM planning and will also be necessary for a future work order planning system.

Vehicles and equipment dedicated to supporting the wastewater service should also be included in this section to give a fuller picture of the cost of providing this service.

Renewal, reconstruction and expansion activities should be recorded by asset (including updating the asset installation year and condition), to enable more accurate prediction of future condition and renewal need.

For more accurate estimates of operations and maintenance (O&M) costs, a work order management system is needed to track labour, equipment and material costs associated with specific assets and activities. This work order data will improve the Township's ability to estimate O&M costs associated with growth and changes in service levels.

O.Reg. 588/17 requires that future LOS targets be established in an AM Plan by July 1, 2025, along with life cycle activities and financial plans needed to achieve those targets. In preparation, it is recommended that the Township continue monitoring its current performance with respect to wastewater LOS, and consider the impacts of potential targets on cost, risk and customer satisfaction.

PHOTO | MOUNT FOREST WASTEWATER TREATMENT PLANT

# 4. ASSET DETAILS

# 4 ASSET DETAILS

This section details the assumptions and analysis of AM planning analysis by major service, specifically Transportation Service, Stormwater Management, Water Service and Wastewater Service.

## 4.1 TRANSPORTATION SERVICE

### 4.1.1 INTRODUCTION

Township roads, bridges, culverts, traffic control, streetlights and sidewalks make up the core of the local transportation network, which supports safe and efficient community mobility. The transportation service represents the largest service in terms of replacement costs, necessitating effective asset management practices to ensure that the Township is able to maintain a functional and safe transportation network.

### 4.1.2 INVENTORY

Table 4-1 summarizes the transportation asset inventory, including roads, bridges & culverts, traffic signals & signs, streetlights, and sidewalks, in terms of quantity, unit replacement cost, and total replacement value.

**Table 4-1 Transportation Assets – Inventory and Replacement Value**

| Asset Type | Quantity | Unit Cost (2021 $) | Total Replacement Value (2021 $, millions) |
|---|---|---|---|
| **Roads** | **389.8 km*** | | **$ 158.2** |
| Gravel | 237.0 km* | $60,000/km* | $ 14.2 |
| Surface Treated (LCB) | 15.3 km* | $80,000/km* | $ 1.2 |
| Paved (HCB-Arterial) | 7.9 km* | $153/$m^2$ or $980,500/km* | $ 9.7 |
| Paved (HCB-Collector) | 29.4 km* | $139/$m^2$ or $891,350/km* | $ 32.6 |
| Paved (HCB-Local) | 100.1 km* | $125/$m^2$ or $802,200/km* | $ 100.4 |
| **Bridges & Culverts** | **102 structures** | | **$ 38.0** |
| Bridges | 27 bridges | See Table 4-2 | $ 19.8 |
| Culverts | 75 culverts | See Table 4-3 | $ 18.2 |
| **Traffic Signals** | **5 signalized intersections** | | **$ 1.6** |
| Poles & Heads | 5 units | $200,000 ea. | $ 1.0 |
| Control Systems | 5 units | $100,000 ea. | $ 0.5 |
| Audible Pedestrian Signals | 5 units | $25,000 ea. | $ 0.1 |
| **Traffic Signs** | **1094 signs** | | **$ 0.8** |
| Small (<0.25 $m^2$) | 155 units | $334 ea. | $ 0.05 |
| Medium (0.25 – 0.4 $m^2$) | 661 units | $669 ea. | $ 0.4 |
| Large (>0.4 $m^2$) | 277 units | $1003 ea. | $ 0.3 |
| Unknown | 1 unit | $669 ea. | < $ 0.001 |
| **Streetlights** | **1923 streetlights** | | **$ 8.2** |
| Light fixtures | 1923 units | $4178 ea. | $ 8.0 |
| Poles | 27 units | $6267 ea. | $ 0.2 |
| **Sidewalks** | **34.6 km** | | **$ 8.1** |
| Concrete | 34.2 km | $153/$m^2$ | $ 7.9 |
| Unit pavers | 0.4 km | $250/$m^2$ | $ 0.2 |
| **TOTAL** | | | **$ 215.0** |

** Centre-line km*

Table 4-1 shows that roads are the most significant asset type in the transportation asset portfolio, making up 73.6% of the value of transportation assets. Figure 4-1 shows a map of the roads managed by the Township, including local highways (green), rural (orange) and urban roads (blue). Roads shown in grey represent roads managed by the County and the Province and are included in the map for geographical reference.

Figure 4-1: Map of Road Network


The next most significant asset type in the transportation portfolio are bridges and culverts. Table 4-2 summarizes the inventory of bridges, including the site number, location, and estimated replacement value. Table 4-3 summarizes the culvert inventory by range of span, including the number of culverts in each span range, the range of replacement values for each culvert, and the total replacement value for each category of spans. The tables show that the Township owns 27 bridges with a total replacement value of $19.8 million and 75 culverts worth $18.2 million.

Table 4-2 Inventory and Replacement Value – Bridges

| Site Number | Location | Estimated Replacement Value (2021 $, thousands) | |
|---|---|---|---|
| 1 | Concession 4 North | $ | 567.6 |
| 5 | Concession 2 | $ | 339.7 |
| 6 | Concession 6 North | $ | 460.1 |
| 8 | Sideroad 3 West | $ | 645.0 |
| 11 | Concession 11 | $ | 434.3 |
| 18 | Concession 2 | $ | 567.6 |
| 20 | Sideroad 7 West | $ | 318.2 |
| 21 | Sideroad 8 East | $ | 1,374.0 |
| 23 | Concession 9 | $ | 361.2 |
| 24 | Concession 9 | $ | 473.0 |
| 25 | Sideroad 8 West | $ | 679.4 |
| 26 | Concession 9 | $ | 756.8 |
| 27 | Sideroad 9 East | $ | 576.2 |
| 28 | Concession 11 | $ | 735.3 |
| 31 | Sideroad 10 West | $ | 847.1 |
| 37 | Line 8 | $ | 305.3 |
| 38 | Sideroad 3 | $ | 408.5 |
| 39 | Line 6 | $ | 507.4 |
| 40 | Line 6 | $ | 365.5 |
| 41 | Sideroad 7 | $ | 318.2 |
| 42 | 2nd Line | $ | 485.9 |
| 496 | Main Street South | $ | 3,857.1 |
| 516 | Queen Street East | $ | 2,807.9 |
| 2026 | Concession 6 South | $ | 223.6 |
| 2038 | Sideroad 7 | $ | 172.0 |
| 2060 | Well Street | $ | 223.6 |
| P1 | Mill Street Pedestrian Bridge | $ | 1,027.7 |
| TOTAL | **27 Bridges** | **$** | **19,838.2** |

Table 4-3 Inventory and Replacement Value – Culverts

| Span Range (m) | Number of Culverts | Replacement Value Range (2021 $, thousands) |
|---|---|---|
| < 2 m | 5 | $ 54.4 – $ 189.0 |
| 2 – 2.9 m | 5 | $ 74.8 – $ 183.6 |
| 3 – 3.9 m | 29 | $ 112.8 – $ 319.0 |
| 4 – 4.9 m | 12 | $ 149.0 – $ 321.3 |
| 5 – 5.9 m | 6 | $ 146.2 – $ 391.0 |
| 6 – 6.9 m | 13 | $ 229.0 – $ 431.8 |
| 7 – 7.9 m | 4 | $ 387.6 – $ 523.6 |
| 8 – 8.9 m | 0 | None |
| 9 m | 1 | $592.3 |
| **TOTAL** | **75** | **$18,160.6** |

For traffic control, the Township owns traffic signals at five signalized intersections. Two of those intersections are located in Arthur, specifically at:

- Smith St. and Frederick St.
- Charles St. and George St.

The remaining three signalized intersections are located in Mount Forest, specifically at:

- Main St. and Wellington St.
- Main St. and Queen St.
- Main St. and Sligo St.

Each set of intersection signals has an estimated replacement value of $325,000, including the cost of the pole, mount, head, control system and audible pedestrian signal. The total value of signals at all five intersections is thus $1.6 million.

Traffic control is also provided by 1,094 signs with an estimated total value of $0.8 million.

Illumination is provided by 1,923 streetlights. All were converted to energy-efficient LED lights in 2019, other than a small number of decorative lights, which have been converted in phases since then. The last set of decorative lights to be converted is a set of 32 in downtown Mount Forest. The total value of the Township's streetlights in $8.2 million.

The Township owns an estimated 34.6km of sidewalks, with an estimated total value of $8.1 million.

### 4.1.3 ESTIMATED USEFUL LIFE

Table 4-4 shows the estimated useful life of each asset class in the transportation portfolio. These values were established based on staff input of the observed life span of assets in the Township, and also align with values seen in peer municipalities.

Table 4-4 Transportation Assets – Estimated Useful Life Values

| Asset Type | Estimated Useful Life (years) |
|---|---|
| **Roads** | |
| Gravel | 20 |
| Surface Treated (LCB) | 20 |
| Paved (HCB-Arterial) | 45 |
| Paved (HCB-Collector) | 45 |
| Paved (HCB-Local) | 45 |
| **Bridges & Culverts** | |
| Bridges | 75 |
| Culverts | 50 |
| **Traffic Signals** | |
| Poles & Heads | 20 |
| Control Systems | 8 |
| Audible Pedestrian Signals | 10 |
| **Traffic Signs** | 15 |
| **Streetlights** | |
| Light fixtures | 25 |
| Poles | 50 |
| **Sidewalks** | |
| Concrete | 50 |
| Unit pavers | 50 |

In general, Estimated Useful Life (EUL) is used for the following:

- To estimate current condition, if observed condition scores are not available
- To estimate remaining life, based on age or estimated age, and
- To forecast life cycle renewal needs.

See Section 4.1.5 for details on how EUL has been used to estimate condition and/or remaining life for each asset type. See Section 4.1.6 for details on how EUL has been used to forecast life cycle renewal needs.

### 4.1.4 CONDITION

As shown in Figure 4-2, 96% of the transportation asset portfolio is in Fair condition or better, while 4% are in Poor condition and only 2% are in Very Poor condition. Assets in Very Poor condition consist of roads ($0.3 million), bridges ($1.0 million), culverts ($1.7 million), signals ($0.8 million), and sidewalks ($0.2 million).

Figure 4-2: Transportation Assets – Overview of Condition Distribution

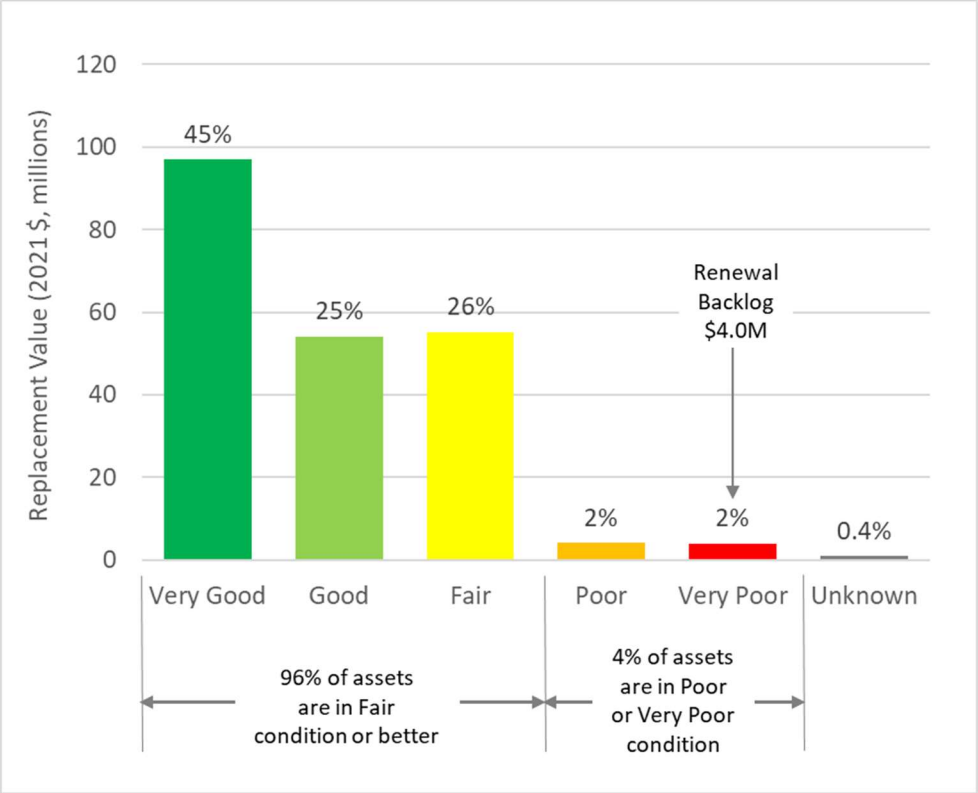



Figure 4-3 shows the road asset condition distribution by replacement value. Roads in Very Poor condition include 1.6 km of gravel road and 200m of paved road, as listed in Table 4-5.

Table 4-5 Assets in Very Poor Condition – Roads

| Type | Road Name | Length (m) | Replacement Cost (2021 $, thousands) |
|---|---|---|---|
| Gravel | Sideroad 30 from 3rd Line to WR 16* | 1,290 | $ 627.0 |
| Gravel | Bristol St. from South Water St. to end (driveway) | 300 | $ 145.8 |
| Paved | Queen St. East from Main St. to Fergus St. South | 200 | $ 249.1 |
| TOTAL | | | $ 1,021.9 |

* Summer use only

Figure 4-3: Detailed Condition Distribution – Roads by Surface Type

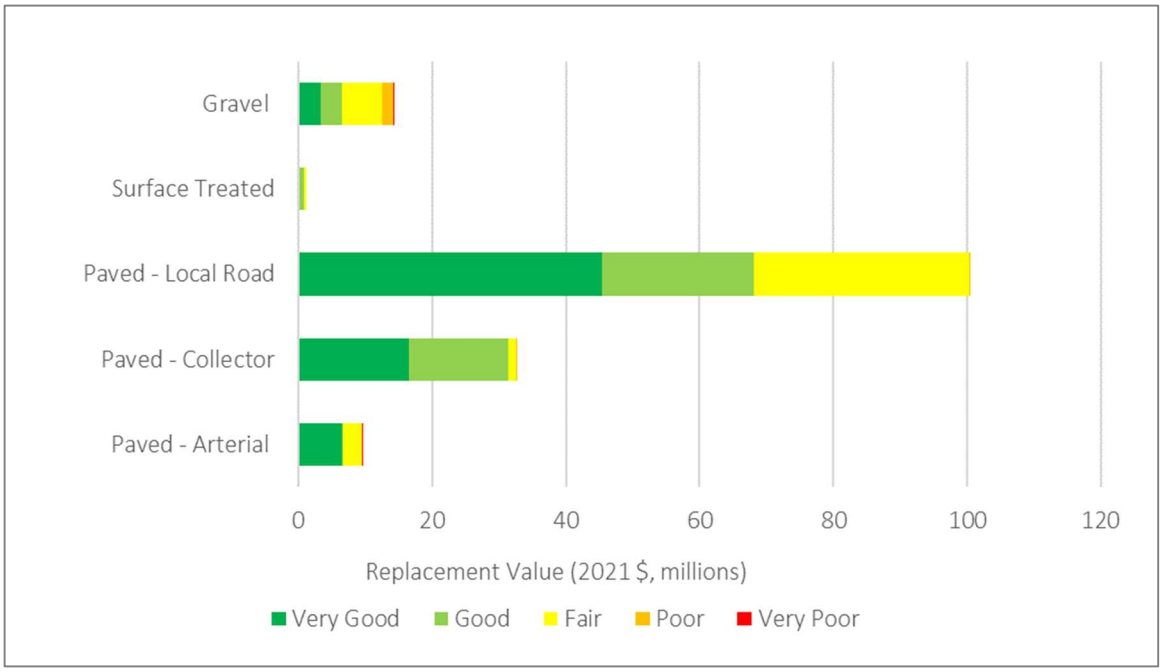



Table 4-6 lists the average Pavement Condition Index and the corresponding condition grade on the 5-point scale for each road type.

Table 4-6 Average Condition by Road Type

| Road Type | Average Pavement Condition Index* | Corresponding Average Condition Score |
|---|---|---|
| Gravel | 7.5 | Fair |
| Surface Treated (LCB) | 7.9 | Fair |
| Paved (HCB-Arterial) | 8.2 | Good |
| Paved (HCB-Collector) | 8.9 | Good |
| Paved (HCB-Local) | 8.0 | Good |

* Averaged over replacement value

Figure 4-4 shows the average age of roads by surface type. Figure 4-5 shows the bridge & culvert condition distribution by replacement value. As shown in the figure, some bridges and culverts are in Very Poor condition. Those are listed in Table 4-7.

Figure 4-4: Average Age – Roads by Surface Type

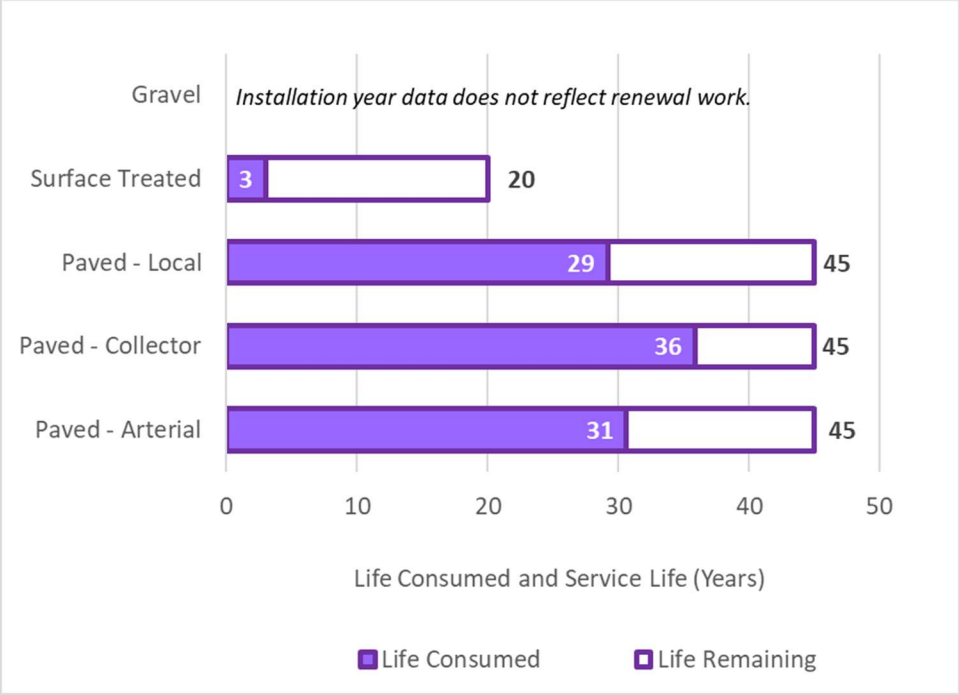



Figure 4-5: Detailed Condition Distribution – Bridges & Culverts

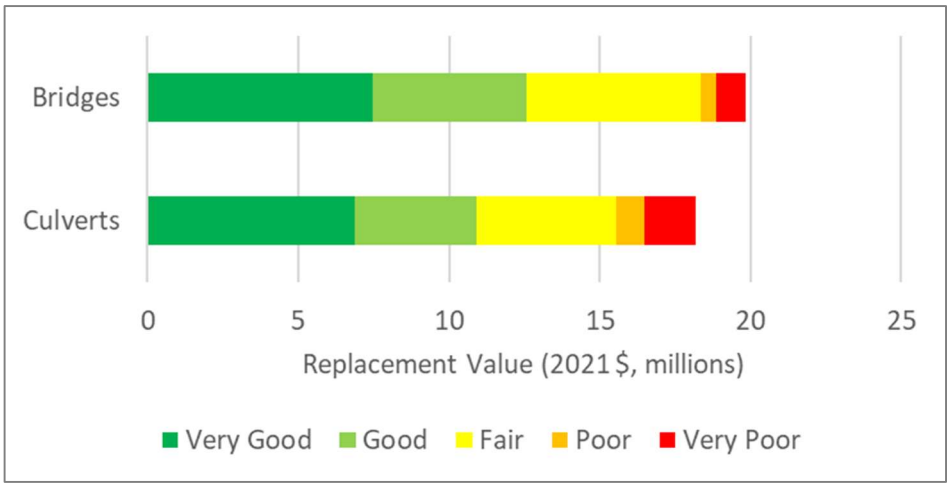


Table 4-7 Assets in Very Poor condition - Bridges & Culverts

| Structure Classification | Site Number | Structure Type | Road Name | Replacement Value (2021 $, thousands) | Estimated Cost of Repairs Needed (2021 $, thousands) |
|---|---|---|---|---|---|
| **Bridge** | 27 | T-Beam | Sideroad 9 East | $ 576.2 | $ 388.5 |
| | 38 | Solid Slab* | Sideroad 3 | $ 408.5 | $ 200.0 |
| **Culvert** | 30 | Rectangular Culvert | Sideroad 10 West | $ 285.6 | $ 57.0 |
| | 2013 | Rectangular Culvert | Concession 9 | $ 153.0 | $ 124.0 |
| | 2020 | Rectangular Culvert | Sideroad 8 East | $ 257.0 | $ 257.0 |
| | 2024 | Rectangular Culvert | Concession 11 | $ 300.0 | $ 300.0 |
| | 2036 | Rectangular Culvert | Line 8 | $ 255.0 | $ 255.0 |
| | 2053 | Arch Culvert | Sideroad 3 East | $ 229.0 | $ 229.0 |
| | 2061 | Rectangular Culvert | Sideroad 7 West | $ 189.0 | $ 189.0 |
| TOTAL | | | | $ 2,653.3 | $ 1,999.5 |

* Has load limit

Figure 4-6 shows the condition distribution for traffic signals, signs, streetlights and sidewalks by replacement value. As shown in the Figure, half of the traffic signal components are in Very Poor condition (based on age) and are thus due for replacement. Those components are listed in Table 4-8. In addition, 777m of sidewalk are in Very Poor condition, and those segments are listed in Table 4-9.

Figure 4-6: Detailed Condition Distribution – Signals, Signs, Streetlights and Sidewalks

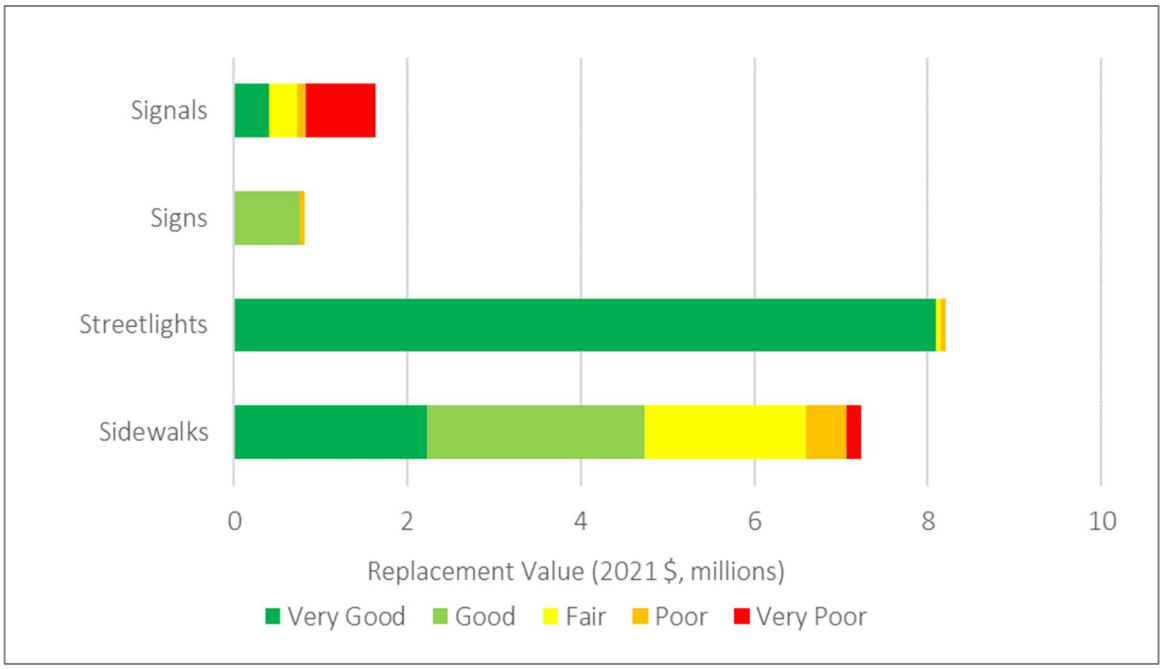


Table 4-8 Assets in Very Poor condition – Traffic Signal Components

| Intersection | Traffic Signal Component | | Replacement Value (2021 $, thousands) |
|---|---|---|---|
| **Arthur:** | | | |
| Smith & Frederick | Signal Structure and Equipment | $ | 200.0 |
| **Mount Forest:** | | | |
| Main & Sligo | Signal Structure and Equipment | $ | 200.0 |
| | Signal Control Software | $ | 100.0 |
| Main & Wellington | Signal Structure and Equipment | $ | 200.0 |
| | Signal Control Software | $ | 100.0 |
| TOTAL | | $ | 800.0 |

Table 4-9 Assets in Very Poor condition – Sidewalks

| Material | Location | | Replacement Value (2021 $, thousands) |
|---|---|---|---|
| **Concrete** | *Sidewalk ID: 347* | $ | 30.9 |
| **Concrete** | *Sidewalk ID: 347* | $ | 32.3 |
| **Concrete** | *Sidewalk ID: 348* | $ | 5.3 |
| **Concrete** | Clarke St | $ | 23.0 |
| **Concrete** | John St | $ | 17.8 |
| **Concrete** | Wellington St E | $ | 34.3 |
| **Concrete** | Wellington St E | $ | 34.9 |
| TOTAL | | $ | 178.4 |

Figure 4-7: Average Age – Transportation Assets (excluding Roads)

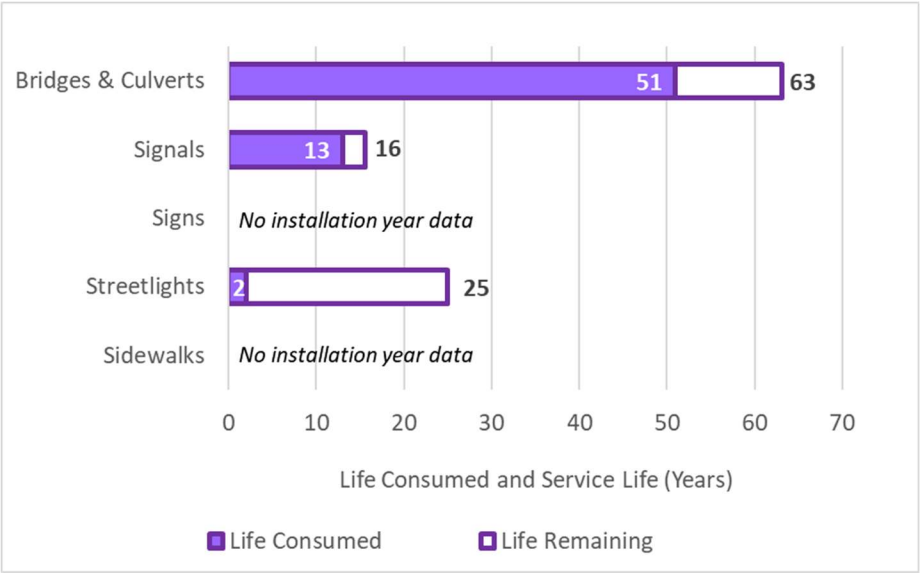



Figure 4-7 shows the average age of the remaining asset types in the transportation service. The figure shows that on average, signals, bridges and culverts are nearing the end of their Estimated Useful Life (EUL); however, as shown in the condition distribution plots, deterioration varies across individual assets and components. The plot also shows that streetlights are two years old, which is consistent with the mass installation of LED streetlights that was conducted in 2019. Installation year data was not available for signs or sidewalks.

### 4.1.5 METHODOLOGY

Table 4-10 lists the sources of condition scores reported in Section 4.1.4, along with the condition scale used in those data sources. As shown in the Table, condition data for roads, bridges and sidewalks were used; however, those condition scores had to be converted to the AM Plan's 5-point scale. The mapping of the Pavement Condition Index (PCI), Bridge Condition Index (BCI) and sidewalk condition index to the AM Plan's 5-point scale are shown in Table 4-11. In addition, descriptions of pavement condition associated the pavement condition scores are provided in Table 4-12, along with example photos in Figure 4-8. Descriptions of bridge condition scores are provided in Table 4-13.

For Traffic Signals, condition was calculated based on age and percent remaining life. The mapping of percent remaining life to the AM Plan's 5-point scale is also shown in Table 4-11. The Expected Useful Life of traffic signal components was listed in Table 4-4.

Table 4-10 Source of Asset Condition Scores

| Asset Type | Source of Condition Score | Condition Scale Used in Source Data |
|---|---|---|
| Roads | 2016 Road Needs Study | Pavement Condition Index (PCI) from 0 to 10 |
| Bridges & Culverts | 2019 Bridge Inspection Report | Bridge Condition Index (BCI) from 0 to 100 |
| Traffic Signals | Based on age and Estimated Useful Life | n/a |
| Traffic Signs | 2021 Sign Inspection Data | Data included the following scores: Good, Fair, Poor |
| Streetlights | 2019 Streetlight Inspection Data | Data included the following scores: Very Good, Good, Fair, Poor |
| Sidewalks | 2013 Sidewalk Inspection Data | Sidewalk Condition Index from 0 to 10 |

For Traffic Signs, the data included three different scores (Good, Fair and Poor). These scores were mapped directly to the AM Plan's 5-point condition scale, resulting in no signs with a score of Very Good or Very Poor. It is assumed that signs that would have received a score of Very Good according to a 5-point scale are bundled with the signs that were scored as Good, and this will not affect AM Plan decision-making, such as calculation of renewal needs. On the other hand, differentiating assets between Poor and Very Poor condition would affect the calculation of renewal needs. The number of signs in Very Poor condition should be small, since these would be identified for immediate replacement by road patrol activities and annual inspections. In any case, it is recommended that a 5-point condition scoring scale be defined with scoring criteria for signs prior to the next condition assessment.

Similarly, for Streetlights, the data included four different scores (Very Good, Good, Fair and Poor), and these were mapped directly to the AM Plan's 5-point condition scale. This resulted in no signs with a score of Very Poor. This may be reasonable since the streetlights were replaced in 2019 during the Township-wide conversion to LED streetlights. Prior to the next streetlight condition assessment, it is recommended that a 5-point condition scoring scale be defined with scoring criteria and included in the assessment contract (if this task is outsourced).

Table 4-11 Condition Scale Conversions by Asset Type – Transportation

| Condition Score | | Pavement Condition Index (PCI) | Bridge Condition Index (BCI) | Sidewalk Condition Index | Traffic Signals % Remaining Life |
|---|---|---|---|---|---|
| Very Good | 1 | >= 9 | 80 – 100 | 10 | 80-100 |
| Good | 2 | 8 – 9 | 70 – 79 | 9 – 9.5 | 60 – 79 |
| Fair | 3 | 6.5 – 8 | 50 – 69 | 8 – 8.5 | 40 – 59 |
| Poor | 4 | 5 – 6.5 | 40 – 49 | 7 – 7.5 | 20 – 39 |
| Very Poor | 5 | 0 – 5 | 0 – 39 | 6 – 6.5 | 0 – 19 |

Table 4-12 Pavement Condition Scores – Descriptions of Condition

| Scale | | Pavement Condition Index | Description |
|---|---|---|---|
| Very Good | 1 | 9 – 10 | The road segment is relatively new, or recently reconstructed. There are no visible cracks and no structural issues. The ride is smooth. |
| Good | 2 | 8.0 – 8.9 | The road segment is starting to exhibit few, if any, signs of surface deterioration, random cracks, and rutting. The ride is relatively smooth. |
| Fair | 3 | 6.5 – 7.9 | The road segment is exhibiting signs of surface deterioration, random cracks, rutting, and some patching of surface defects. The ride is becoming rough. |
| Poor | 4 | 5.5 – 6.4 | The road segment shows signs of deterioration, cracks, rutting, and patching of surface defects that occurs over 50 percent of the surface. Some structural issues are starting to show. The ride is uncomfortable. |
| Very Poor | 5 | 0 – 5.4 | The road segment is reaching the end of its useful life. There are significant structural issues with large visible cracks, rutting and patching surface defects that occurs over 75 percent of the surface. The road is difficult to drive at the posted speed limit. |

Figure 4-8: Pavement Condition Scores – Photo Examples of Condition

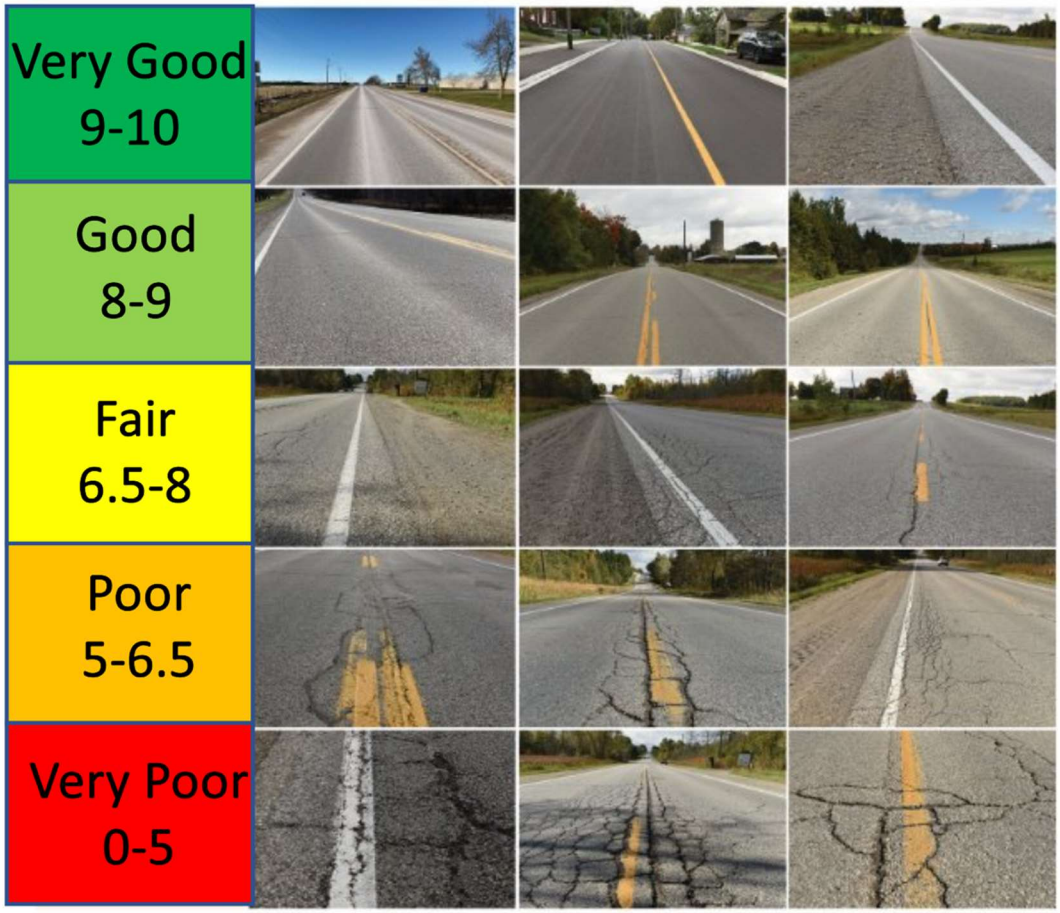



Table 4-13 Bridge Condition Index scores and Associated Work Descriptions

| Scale | Bridge Condition Index | Service Level |
|---|---|---|
| Very Good | 80 – 100 | Structure condition is as constructed, with no visible deterioration |
| Good | 70 – 79 | Minor defects are visible, but these do not affect overall performance and would not normally trigger remedial action. E.g. Light corrosion, light scaling, narrow cracks in concrete. |
| Fair | 50 – 69 | Medium defects are visible and may trigger preventive maintenance and remedial action. E.g. Medium corrosion with up to 5% section loss, medium cracks in concrete. |
| Poor | 40 – 49 | Medium defects are visible, requiring. E.g. Medium corrosion with up to 10% section loss, medium cracks in concrete. |
| Very Poor | 0 - 39 | Severe defects are visible, affecting the overall performance of the structure. E.g. severe corrosion with over 10% section loss, spalling, delaminations. |

### 4.1.6 LEVELS OF SERVICE

This section presents the Township's Level of Service (LOS) indicators and current performance for Transportation assets. Community LOS are presented in Table 4-14, and Technical LOS are presented in Table 4-15. LOS targets have not yet been set; however, it is expected that the Township monitor performance, to support future target-setting. O.Reg. 588/17 requires proposed targets to be reported in the AM Plans for all services by July 1, 2025.

Although targets have not been established, the current performance indicates opportunity to reduce the impacts of load restrictions by renewing two bridges (#21 and #38) and one culvert (#9). Moreover, 13 bridges and culverts are limited to a single lane (deck width is 6m) and should be monitored for the need for widening.

In addition, there may be an opportunity to improve the sidewalk network by increasing the proportion sidewalks to urban roadsides. Current performance is 65.3%, based on 2013 sidewalk inventory. The Township is also replacing narrow sidewalks to a width of 1.5m to improve accessibility. Based on the 2013 sidewalk inventory, 59.4% (20.5 km) of the Township's sidewalks meet the minimum width of 1.5m. This number is now likely higher, so the inventory and this indicator score should be updated.

Table 4-14 Transportation Assets – Community Levels of Service

| Service Attribute | Community Level of Service Indicator | Performance |
|---|---|---|
| Capacity | ROADS<br>Description, which may include maps, of the road network in the municipality and its level of connectivity.* | The Township's road network consists of 237centre-line km of gravel roads primarily serving rural areas, as well as surface treated and paved roads serving the urbanized areas.<br>See Figure 4-1 for a map of the road network and jurisdiction of roads within Wellington North. |
| | BRIDGES & CULVERTS<br>Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).* | The Township's 102 bridges and culverts support vehicular traffic, including heavy and emergency vehicles, with the following exceptions: Heavy transport and heavy emergency vehicles prohibited on<br>- Structure 9 on Sideroad 3 East (limit 18 tonnes)<br>- Structure 21 on Sideroad 8 East (limit 12 tonnes)<br>- Structure 38 on Sideroad 3 (limit 26 tonnes)<br><br>In terms of pedestrian facilities, two bridges in Mount Forest have sidewalks integrated into their decks.<br><br>Thirteen bridges are considered single lane bridges, since they have a deck or road surface of less than 6m (Structures 30, 38, 41, 2002, 2005, 2012, 2020, 2040, 2046, 2053, 2054, 2056 and 2060). |
| Function | No community LOS defined | |
| Quality | ROADS<br>Description or images that illustrate the different levels of road class pavement condition.* | See Table 4-12 and Figure 4-8. |
| | BRIDGES & CULVERTS<br>Description or images of the condition of bridges and how this would affect use of the bridges.* | See Table 4-13. |
| | Description or images of the condition of culverts and how this would affect use of the culverts.* | See Table 4-13. |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

Table 4-15 Transportation Assets – Technical Levels of Service

| Service Attribute | Technical Level of Service Indicator | Performance | | |
|---|---|---|---|---|
| Capacity | ROADS<br>Number of lane-kilometers of each of arterial roads, collector roads and local roads as a proportion of square kilometers of land area of the municipality.* | Road Type | Lane-km | As proportion of land area** (lane-km/km$^2$) |
| | | Gravel | 474.1 | 0.90 |
| | | LCB | 30.5 | 0.06 |
| | | HCB – Local | 200.3 | 0.38 |
| | | HCB – Collector | 58.9 | 0.11 |
| | | HCB – Arterial | 15.8 | 0.03 |
| | BRIDGES & CULVERTS<br>Percentage of single-lane bridges | 13%<br>(13 of 102 structures) | | |
| | SIDEWALK<br>Sidewalk length as a proportion of length of urban roadside | 65.3%<br><br>Sidewalk length: 34.5 km<br><br>Roads with Urban Roadside:<br>26.4 centreline-km, therefore total urban roadside: 52.8 km | | |
| Function | SIDEWALK<br>Percentage of Sidewalks meeting accessibility standard width of 1.5 m | 59.4% or 20.5 km, based on 2013 data<br><br>(32.3% or 11.2 km are less than 1.5m wide, and 8.3% or 2.9 km have unknown width) | | |
| Quality | ROADS<br>Average pavement condition index value for paved and unpaved roads.* | Paved: 8.22 – Good<br>Surface Treated (LCB): 7.86 – Fair<br>Gravel: 7.51 – Fair | | |
| | % Road assets in state of good repair (Fair condition or better) | 98.6% | | |
| | BRIDGES & CULVERTS<br>Percentage of bridges in the municipality with loading or dimensional restrictions.* | 3%<br>(3 of 102 structures, with restrictions due to condition deterioration) | | |
| | Average bridge condition index value for bridges & structural culverts.* | Bridges: 71.8 – Good<br>Structural Culverts: 70.3 – Good | | |
| | % Bridge and Culvert assets in state of good repair<br>(Fair condition or better) | 90% | | |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

** Surface area of Township is 526.21 km$^2$.

### 4.1.7 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the transportation service asset life cycle needs include the following:

- Expansion & Upgrade $ 5.50 million (over ten years)
- Renewal $ 21.06 million (over ten years)
- Operations & Maintenance $ 3.91 million/year in 2022 increasing to $ 3.93 million/year in 2031 due to development

The following sub-sections provide details on the needs in each of these categories.

#### Expansion & Upgrade Needs

The Township's population is expected to grow by 37% from 12,490 in 2016 to 17,085 in 2036, and employment is expected to grow by 32% from 7,070 in 2016 to 9,320 in 2036 (see Wellington County 2019 Official Plan). To support this growth, the following network expansion needs were identified in the Township's Development Charges Background Study to support growth:

- Wells St. from Domville St. to Eliza St. ($2.05 million, future year depending on development)
- Macauley St. from Wells St. to Eliza St. ($0.68 million, 2027)
- Queen St. – Highway 89 Connecting Link from Sligo Rd. to Dublin St. ($1.29 million, funded in 2021 for construction in 2022)
- Cork St. reconstruction from Waterloo St. to Princess St. ($0.24 million, 2020)
- London Rd. from Durham St. to Wellington St. ($0.78 million, 2024)
- Coral Lea Dr. construction ($0.29 million, 2025)
- Industrial Park Internal Road from Coral Lea Dr. to Industrial Dr. ($0.11 million, 2025)

These projects, totaling **$5.43 million**, have been identified in the Township's multi-year Capital Plan, and are listed above with the amount of funding allocated or planned, as well as the budget year of allocation. Two of the projects (Queen St.-Highway 89 Connecting Link and Cork St. reconstruction) were allocated funding in prior budget years (2018 and 2020, respectively), while the remainder are expected to be funded in the future budget years indicated. Timing of future year projects is approximate and will be adjusted based on development need.

In addition to these expansion projects, the Township is monitoring traffic congestion levels in the north end of Mount Forest, around Mount Forest Dr. and Highway 6 (Main St.).

Regarding the sidewalk network, the Level of Service (LOS) metrics (see Table 4-15) indicated that 65.3% of the Township's urban roadsides are served by sidewalks. A connectivity study is needed to identify and prioritize urban locations where additional sidewalks may be needed. The estimated cost of the connectivity study is **$30k**.

Similarly, the LOS metrics in Table 4-15 showed that 59.4% of sidewalks meet the accessibility standard width of 1.5m; however, this finding is based on data from 2013, and several sidewalk segments have been widened since then. An updated sidewalk inventory is needed to identify and prioritize sidewalk segments for widening. This data collection effort may be done in conjunction with regular sidewalk condition assessment. The estimated cost of the inventory data collection and condition assessment is **$40k**. Processes should be implemented to update the inventory as sidewalks are installed, widened and renewed.

## Renewal Needs

Table 4-16 lists the Township's projected renewal needs by asset type to 2031. The total renewal need to 2031 is $21.06. Fifty-two percent (52%) of this cost consists of gravel road rehabilitation, while another 30% consists of bridge and culvert renewals. The remaining 18% is split across the other asset types.

Gravel roads are assumed to have an Estimated Useful Life (EUL) of 20 years. With a portfolio of 237km of gravel roads, on average 11.85km would require renewal (re-building and re-shaping) every year; however, the Township currently renews 2km of gravel road per year. This suggests there may be a backlog of gravel roads requiring renewal.

For paved roads, the Township resurfaces rural paved roads every 20 years and urban paved roads every 15 years; however, it was not known from the available data where on this life cycle each paved segment sat. Specifically, the data included only condition score, but not the resurfacing history. As such, the renewal needs for paved roads listed in Table 4-16 include only reconstruction needs, based on the assumption that the condition score reflects the condition of both the surface and the base. For future AM Plans, it is recommended that the Township track reconstruction and resurfacing activities, to enable more accurate prediction of which activity will be needed in which year.

For each renewal need, Table 4-16 lists Probability of Failure (PoF), Consequence of Failure (CoF) and resulting Risk Exposure ratings to support prioritization of activities. Prioritization for Risk Management is discussed in detail in Section 4.1.8.

Table 4-16 Transportation Service Asset Renewal Practices & Needs to 2031

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Roads – Paved | Reconstruct at 45 years<br>(also resurface rural paved roads every 20 years, urban paved roads every 15 years) | **$ 0.25 million** of reconstruction will be required for paved road segments by 2031.<br>The road segments are as follows:<br>**Community of Mount Forest**<br>1) Queen St. E. from Main St. to Fergus St. S. (203m) | 5 | 5 | Very High | 2021 | $ 249 |
| Roads – Surface Treated | Reconstruct at 20 years | **$ 1.02 million** of reconstruction will be required for surface treated (LCB) road segments by 2031. The road segments are as follows: | | | | | |
| | | 2) Line 12 (5,482 m) from WR 14 to WR 16 | 4 | 3 | High | 2026 | $ 439 |
| | | 3) Line 8 (1,842 m) from WR 16 Sideroad 13 | 3 | 3 | Moderate | 2030 | $ 147 |
| | | 4) Line 4 (833 m) from Sideroad 13 to West of CA Access Road | 3 | 3 | Moderate | 2030 | $ 216 |
| | | 5) Sideroad 7 East (2,732 m) from Conc 4 N to Conc 2 | 3 | 3 | Moderate | 2030 | $ 219 |
| Roads – Gravel | Reshape and top up gravel at 20 years | **$ 10.91 million** of reshaping and topping up will be required for gravel | | | | | |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| | | roads by 2031. The road segments are as follows: | | | | | |
| | | 6) Sideroad 8 West (1,357 m) from Concession 6S to Concession 7 | 4 | 3 | High | 2022 | $ 81 |
| | | 7) Sideroad 25 (1,104 m) from Sideroad 18 to 1st Line | 4 | 3 | High | 2022 | $ 66 |
| | | 8) Sideroad 30 (1,286 m) from 3rd Line to WR 16 | 5 | 2 | High | 2018 (beyond end of life) | $ 77 |
| | | 9) 1st Line (3,071 m) Sideroad 30 to Sideroad 25 | 4 | 2 | High | 2022 | $ 184 |
| | | 10) Sideroad 7 (5,477 m) from Line 4 to Line 8 | 4 | 2 | High | 2022 | $ 329 |
| | | 11) Sideroad 9 West (445 m) from Concession 9 to end | 4 | 2 | High | 2022 | $ 27 |
| | | 12) Sideroad 3 (5,474 m) from Line 6 to Line 10 | 4 | 2 | High | 2022 | $ 328 |
| | | 13) Sideroad 2 East (2,772 m) from WR 14 to Concession 2 | 4 | 2 | High | 2022 | $ 166 |
| | | 14) Bristol St. (299 m) from South Water St. to end | 4 | 2 | High | 2018 (beyond end of life) | $ 18 |
| | | 15) East-West Luther Townline (2,744 m) from Line 12 to WR 15 | 4 | 2 | High | 2022 | $ 165 |
| | | 16) Sideroad 10 West (1,602 m) from Concession 4 South to end | 4 | 2 | High | 2022 | $ 96 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Roads – Gravel (continued) | Reshape and top up gravel at 20 years | 17) Sideroad 30 (1,271 m) from 1st Line to 2nd Line | 4 | 2 | High | 2022 | $ 76 |
| | | 18) Sideroad 4 (2,833 m) from WR 6 to Concession 11 | 4 | 2 | High | 2022 | $ 166 |
| | | 19) East-West Luther Townline (5,469 m) from Line 4 to WR 109 | 3 | 3 | High | 2026 | $ 328 |
| | | 20) Concession 4 South (1,618 m) from Hwy 9 to Sideroad 10 W | 3 | 3 | High | 2026 | $ 97 |
| | | 21) 2nd Line (5,326 m) from WR 109 to Sideroad 25 | 3 | 3 | High | 2026 | $ 320 |
| | | 22) 3rd Line (4,476 m) from WR 109 to Sideroad 25 | 3 | 3 | High | 2026 | $ 269 |
| | | 23) Baseline Jones (1,208 m) from 300m south of Hwy 6 to end | 3 | 3 | High | 2026 | $ 72 |
| | | 24) Line 4 (1,015 m) from west of CA Access Road to E/W Luther Townline | 3 | 3 | High | 2026 | $ 61 |
| | | 25) Lovers Lane (1,563 m) from Mid to WR 6 | 3 | 3 | High | 2026 | $ 94 |
| | | 26) Sally St. (1,845 m) from Sideroad 2 West to Sideroad 3 | 3 | 3 | High | 2026 | $ 111 |
| | | 27) Sideroad 10 West (2,480 m) from Concession 4 South to Hwy 6 | 3 | 3 | High | 2026 | $ 149 |
| | | 28) Sideroad 13 (2,715 m) from Line 2 to Line 4 | 3 | 3 | High | 2026 | $ 163 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Roads – Gravel (continued) | Reshape and top up gravel at 20 years | 29) Sideroad 18 (1,972 m) from Hwy 6 to Sideroad 25 | 3 | 3 | High | 2026 | $ 118 |
| | | 30) Sideroad 2 East (2,772 m) from Concession 2 to Concession 4 N | 3 | 3 | High | 2026 | $ 164 |
| | | 31) Sideroad 2 East (4,777 m) from Concession 6 North to Hwy 6 | 3 | 3 | High | 2026 | $ 287 |
| | | 32) Sideroad 2 West (2,048 m) from Sally St. to Hwy 6 | 3 | 3 | High | 2026 | $ 123 |
| | | 33) Sideroad 25 (9,452 m) from 1st Line to WR 109 | 3 | 3 | High | 2026 | $ 567 |
| | | 34) Sideroad 6 East (5,652 m) from Hwy 6 to Concession 2 | 3 | 3 | High | 2026 | $ 339 |
| | | 35) Sideroad 7 (2,723 m) from Line 2 to Line 4 | 3 | 3 | High | 2026 | $ 163 |
| | | 36) Sideroad 8 West (2,709 m) from Concession 7 to Concession 9 | 3 | 3 | High | 2026 | $ 163 |
| | | 37) Sideroad 5 East (1,236 m) from Concession 4 N to Concession 6 N | 3 | 3 | High | 2026 | $ 74 |
| | | 38) Sideroad 5 West (2,768 m) from WR 6 to Concession 11 | 3 | 3 | High | 2026 | $ 166 |
| | | 39) Sideroad 4 (2,833 m) from Concession 11 to Hwy 6 | 3 | 2 | Moderate | 2026 | $ 170 |
| | | 40) Sideroad 3 (420 m) from WR 109 to end | 3 | 2 | Moderate | 2026 | $ 25 |
| | | 41) Sideroad 6 West (3,175 m) from Concession 9 to Hwy 6 | 3 | 2 | Moderate | 2026 | $ 191 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Roads – Gravel (continued) | Reshape and top up gravel at 20 years | 42) Sideroad 9 West (6,901 m) from Hwy 6 to Concession 9 | 3 | 2 | Moderate | 2026 | $ 414 |
| | | 43) Silver St. (124 m) from Mill St. to Bentley St. | 3 | 2 | Moderate | 2026 | $ 7 |
| | | 44) SR 41 Southgate (970 m) from Bend to Sligo Rd. East | 3 | 2 | Moderate | 2026 | $ 58 |
| | | 45) Sideroad 3 (5,473 m) from Line 2 to Line 6 | 3 | 2 | Moderate | 2026 | $ 328 |
| | | 46) Page St. (79 m) from Dublin St. to end | 3 | 2 | Moderate | 2026 | $ 5 |
| | | 47) Gordon St. (251 m) from Eliza St. to end | 3 | 2 | Moderate | 2026 | $ 15 |
| | | 48) 5th Line (2,757 m) from WR 109 to Sideroad 25 | 3 | 2 | Moderate | 2026 | $ 165 |
| | | 49) Aryshire St. (213 m) from Clyde St. to Oxford St. | 3 | 2 | Moderate | 2026 | $ 13 |
| | | 50) Sideroad 13 (2,753 m) from WR 109 to Line 2 | 3 | 2 | Moderate | 2026 | $ 165 |
| | | 51) Sideroad 13 (5,686 m) from Line 4 to end | 3 | 2 | Moderate | 2026 | $ 341 |
| | | 52) Sideroad 15 (2,754 m) from WR 109 to Line 2 | 3 | 2 | Moderate | 2026 | $ 162 |
| | | 53) Concession 4 North (7,390 m) from Hwy 89 to Sideroad 6 E | 2 | 3 | Moderate | 2030 | $ 443 |
| | | 54) 1st Line (3,132 m) from WR 109 to Sideroad 30 | 2 | 3 | Moderate | 2030 | $ 188 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Roads – Gravel (continued) | Reshape and top up gravel at 20 years | 55) Concession 6 South (4,369 m) from Sideroad 8 to WR 109 | 2 | 3 | Moderate | 2030 | $ 262 |
| | | 56) Concession 8 (3700 m) from Hwy 89 to Sideroad 3 E | 2 | 3 | Moderate | 2030 | $ 222 |
| | | 57) Durham St. East (200 m) from 200m west of Church St. N to Church St. N | 2 | 3 | Moderate | 2030 | $ 11 |
| | | 58) Line 12 (5,447 m) from WR 16 to E/W Luther Townline | 2 | 3 | Moderate | 2030 | $ 327 |
| | | 59) Preston St. North (483 m) from Domville St. to Smith St. | 2 | 3 | Moderate | 2030 | $ 29 |
| | | 60) Sideroad 3 East (12,522 m) from WR 14 to Hwy 6 | 2 | 3 | Moderate | 2030 | $ 751 |
| | | 61) Sideroad 5 West (2,727 m) Concession 11 to Concession 9 | 2 | 3 | Moderate | 2030 | $ 164 |
| | | 62) Sideroad 7 (2,751 m) from WR 109 to Line 2 | 2 | 3 | Moderate | 2030 | $ 165 |
| | | 63) Victoria St. (139 m) from Sligo Rd. West to end | 2 | 3 | Moderate | 2030 | $ 8 |
| | | 64) Conestoga St. South (72 m) from Smith St. to end | 2 | 2 | Low | 2030 | $ 4 |
| | | 65) London Rd. South (302 m) from Albert St. to end | 2 | 2 | Low | 2030 | $ 18 |
| | | 66) Oxford St. (217 m) from Ayrshire St. to end | 2 | 2 | Low | 2030 | $ 13 |
| | | 67) Sideroad 13 (2,738 m) from Hwy 89 to Line 12 | 2 | 2 | Low | 2030 | $ 164 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Roads – Gravel (continued) | Reshape and top up gravel at 20 years | 68) Sideroad 15 (2,717 m) from Line 2 to Line 4 | 2 | 2 | Low | 2030 | $ 163 |
| | | 69) Sideroad 3 (2,728 m) from Line 10 to Line 12 | 2 | 2 | Low | 2030 | $ 164 |
| | | 70) Sideroad 6 East (249 m) from Concession 2 to end | 2 | 2 | Low | 2030 | $ 15 |
| Bridges & Culverts | Repair and renew based on biennial condition assessments | **$ 6.39 million** of repairs and renewals required by 2030. See Bridge Condition Reports for details. | Varies | Varies | Varies | Varies (2022-2031) | $ 6,385 |
| Traffic Signals – Structure and Equipment | Replace at 20 years | **$ 0.80 million** of replacements required by 2031: | | | | | |
| | | • Smith & Frederick | 5 | 3 | Very High | 2022 | $ 200 |
| | | • Main & Wellington | 5 | 3 | Very High | 2022 | $ 200 |
| | | • Main & Sligo | 5 | 3 | Very High | 2022 | $ 200 |
| | | • Main & Queen | 3 | 3 | Moderate | 2030 | $ 200 |
| Traffic Signals – Controller Software | Replace at 8 years | **$ 0.80 million** of replacements required by 2031: | | | | | |
| | | • Smith & Frederick | 4 | 3 | High | 2023, 2031 | $ 200 |
| | | • Charles & George | 1 | 3 | Very Low | 2029 | $ 100 |
| | | • Main & Wellington | 5 | 3 | Very High | 2022, 2030 | $ 200 |
| | | • Main & Queen | 1 | 3 | Very Low | 2028 | $ 100 |
| | | • Main & Sligo | 5 | 3 | Very High | 2022, 2030 | $ 200 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Traffic Signals – Audible Pedestrian Signals | Replace at 10 years | **$ 0.13 million** of replacements required by 2031:<br>• Smith & Frederick<br>• Charles & George<br>• Main & Wellington<br>• Main & Queen<br>• Main & Sligo | <br>3<br>3<br>3<br>3<br>3 | <br>3<br>3<br>3<br>3<br>3 | <br>Moderate<br>Moderate<br>Moderate<br>Moderate<br>Moderate | <br>2025<br>2026<br>2025<br>2026<br>2026 | <br>$ 25<br>$ 25<br>$ 25<br>$ 25<br>$ 25 |
| Traffic Signs | Replace at 15 years | **$ 0.06 million** of replacements required by 2031 (1,122 signs) | 4 | 3 | High | 2031 | $ 60 |
| Streetlights – Poles | Replace at 50 years | **$ 0.06 million** of replacements (9 poles) required by 2031 | 4 | 2 | Moderate | Varies (2022-2031) | $ 56 |
| Streetlights – Fixtures | Replace at 50 years | No replacements required by 2031, since most were replaced in 2011 as part of LED upgrade. | n/a | n/a | n/a | n/a | n/a |
| Sidewalks | Replace at 50 years (or with road reconstruction) | **$ 0.64 million** of replacements required by 2031, including:<br>• 777 m in Very Poor condition<br>• 1,992 m in Poor condition | <br>5<br>4 | <br>3<br>3 | <br>Very High<br>High | <br>2026<br>2031 | <br>$ 351<br>$ 458 |
| **TOTAL RENEWAL NEED (2022-31)** (excludes needs that will be funded by operating) | | **$ 21.06 million** | | | | | |

### Operations & Maintenance Needs

Operations and Maintenance (O&M) costs include day-to-day costs associated with running and overseeing the transportation system. This includes labour, energy, materials and services for winter snow clearing, sidewalk inspection, road patrol, pothole filling, preventive maintenance and other activities. O&M activities are funded by the Township's operating budget.

Figure 4-9 shows the operating expenditures for 2018-20, as well as the 2021 budget. Table 4-17 lists the activities conducted using operating budget, along with general frequencies. The Township indicated that the 2021 budget is sufficient for the current activities and network size. However, the transportation network grows each year due to assumption of developer-constructed assets, as well as construction and installation of new assets by the Township. These new assets require additional funds for operations and maintenance.

Figure 4-9: Operating Expenditures 2018-20 and 2021 Budget – Transportation Service

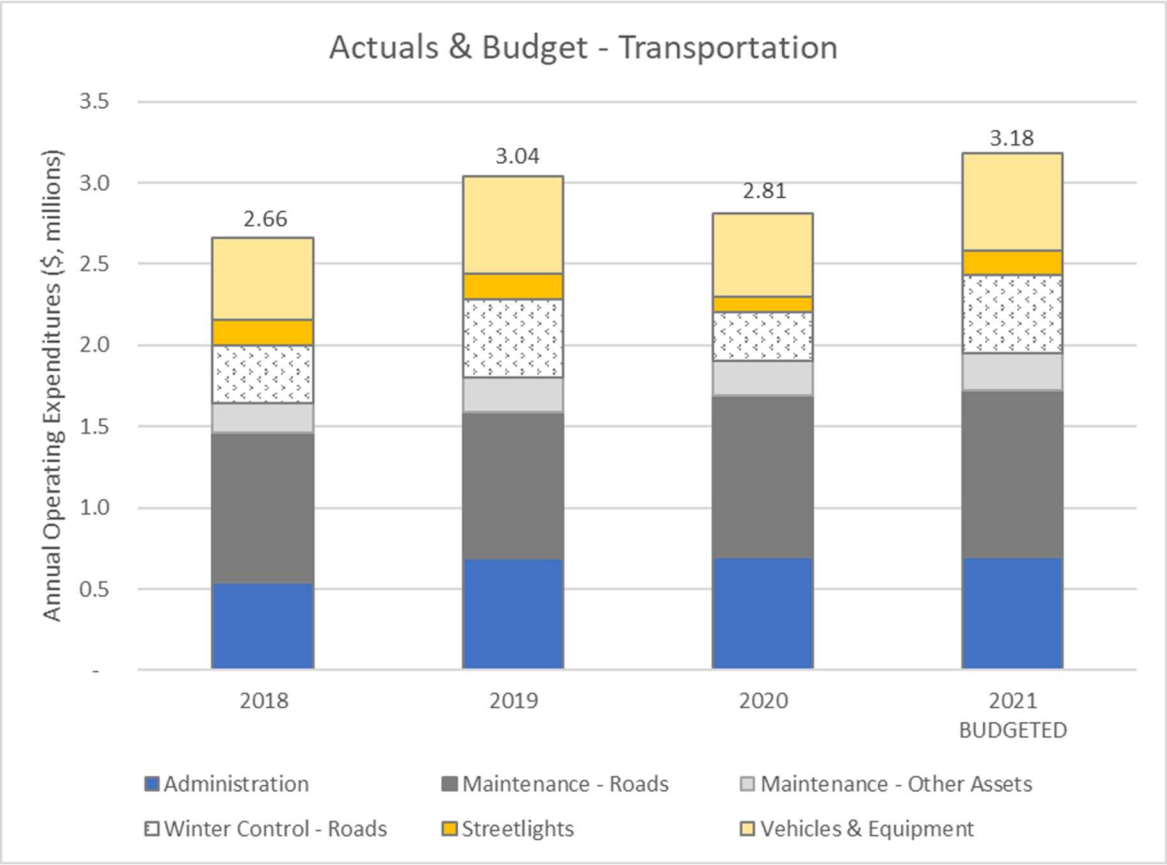


Table 4-17 Operating Activities and Frequencies – Transportation Service

| Asset Type | Activity | Frequency |
|---|---|---|
| Roads – Paved | Crack sealing | Township is currently testing the approach, and may expand the program if results are positive |
| | Pot-hole filling | As-needed, based on complaints |
| | Winter control | Based on Maintenance Standard requirements |
| | Road Patrol | Based on Maintenance Standard requirements |
| | Sweeping (only urban) | In spring to clean up after winter,<br>then once every 2-3 weeks in downtown areas |
| Roads – LCB | Winter control, Road Patrol | Based on Maintenance Standard requirements |
| Roads - Gravel | Winter control | Based on Maintenance Standard requirements |
| | Calcium treatment | Once per year |
| | Maintenance gravel | Every 2 years on heavier travelled roads<br>Every 3 years on less travelled roads |
| | Roadside mowing | Twice a year (rural) |
| | Brushing – remove trees & branches | 1 week/year (prioritized by need) |
| | Ditching | 2 weeks/year – prioritized by need/complain |
| Bridges and Culverts | Inspection | Every 2 years, per regulation |
| Traffic Signals | Conflict monitoring software test | Twice per year |
| | Physical inspection (structure) | Once per year |
| | Road Patrol inspection | Per Maintenance Standard requirements (by road class) |
| Traffic Signs | Retro-reflectivity Inspection | Once per year |
| | Road Patrol inspection | Per Maintenance Standard requirements (by road class) |
| Streetlights | Road Patrol inspection | Per Maintenance Standard requirements (by road class) |
| Sidewalks | Inspection and trip ledge removal | Once per year |
| | Mud jacking | As needed |
| | Condition Assessment | Every 5 years |

It is estimated that the Township assumes 1 km of road per year and 0.5 km of sidewalks per year. As shown in Table 4-18, the resulting annual increase in operating budget need is $8,171/year. Based on this rate of increase, Table 4-19 shows that the estimated operating budget need increases from $3.19 million in 2022 to $3.26 million in 2031.

Table 4-18 Growth Impacts on Operating Budget Need – Transportation Service

| Asset Type | Inventory in 2021 | Estimated Annual Assumptions | % of 2021 Inventory | Operating Budget needed for Full Inventory (2021 $) | Estimated Annual Increase in Operating Need due to Assumptions (2021 $) |
|---|---|---|---|---|---|
| Roads | 390 km | 1 km | 0.26 % | $ 2,971,190* | $ 7,618 |
| Sidewalks | 34.5 km | 0.5 km | 1.45 % | $ 38,112 | $ 552 |
| Total | | | | | $ 8,171 |

* Includes all cost categories from Figure 4-9, excluding sidewalks.

Table 4-19 Projected Operating Budget Need including Estimated Growth Impacts – Transportation Service

| Year | Projected Operating Budget Need (2021 $) |
|---|---|
| 2022 | $ 3,191,572 |
| 2023 | $ 3,199,743 |
| 2024 | $ 3,207,913 |
| 2025 | $ 3,216,084 |
| 2026 | $ 3,224,255 |
| 2027 | $ 3,232,426 |
| 2028 | $ 3,240,596 |
| 2029 | $ 3,248,767 |
| 2030 | $ 3,256,938 |
| 2031 | $ 3,265,109 |

The Township is aiming to implement a work order management system in the coming years. This system will enable a more detailed understanding of the O&M costs associated with specific activities and assets, which will improve the O&M needs estimate for future iterations of the AM Plan.

### 4.1.8 RISK

Improvements to asset and system capacity, function and condition are often limited by available funding and resources. It thus becomes necessary to prioritize asset investments and improvements based on risk exposure. Probability of Failure is approximated based on asset condition, while Consequence of Failure is estimated based on expected impact of an asset failure, as shown in Table 4-20. Table 4-21 shows the number of bridges and culverts by CoF rating.

Table 4-20 Transportation Assets – Consequence Ratings

| Asset Type | Assumptions | Consequence Category of Highest Concern | Attributes | CoF |
|---|---|---|---|---|
| **Roads** | Road surface defects may cause vehicle damage, loss of vehicle control, injury or loss of life. | Health & Safety | MS Class 2 | 5 |
| | | | MS Class 3 | 4 |
| | | | MS Classes 4 & 5 | 3 |
| | | | MS Class 6 | 2 |
| **Bridges & Culverts** | Serious injury or loss of life likely if a structure fails | Health & Safety | Span >8m | 5 |
| | | | Span >6m, ≤8m | 4 |
| | | | Span >3m, ≤6m | 3 |
| | | | Span ≤3 m | 2 |
| **Traffic Signals** | Increased likelihood of traffic collision and/or and thus serious injury or loss of life<br>Inefficiency of travel | Health & Safety | ALL | 4 |
| **Traffic Signs** | Increased likelihood of traffic collision and/or and thus serious injury or loss of life | Health & Safety | ALL | 3 |
| **Streetlights** | Vehicle headlights and streetlights nearby will still be in use | Health & Safety | ALL | 2 |
| **Sidewalks** | Poor condition results in uneven surface leading to trips and falls<br>Injury claims from trips and falls | Health & Safety<br>Financial | ALL | 3 |

Table 4-21 Number of Bridge & Culvert Assets by CoF Rating

| CoF Rating | Span (m) | Number of Structures |
|---|---|---|
| 2 | <=3 | 15 |
| 3 | 3-6 | 46 |
| 4 | 6-8 | 18 |
| 5 | >8 | 23 |

Based on those CoF ratings, Figure 4-10 shows the risk exposure mapping for road assets that require renewal within the next ten years. Assets with Very High risk were listed in the renewal needs table, Table 4-16 paved roads # 1, 2, 3 and gravel roads # 7, 8, 9. There were no improvement needs specified for capacity or function, other than to continue monitoring congestion levels in the north end of Mount Forest (around Main St / Highway 6).

Figure 4-10: Road Assets – Risk Exposure Map

Renewals required by 2031 (in 2021 $) $ 12.2 millions

| PoF | | | | | |
|---|---|---|---|---|---|
| 5 | - | $ 0.1 | - | $ 0.2 | - |
| 4 | - | $ 1.5 | $ 0.1 | - | - |
| 3 | - | $ 2.2 | $ 4.3 | - | - |
| 2 | - | $ 0.5 | $ 3.2 | - | - |
| 1 | - | - | - | - | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

Figure 4-11 shows the risk exposure mapping for bridge and culvert repair and replacement work required within the next ten years. Assets with Very High risk are listed in Table 4-22.

Figure 4-11: Bridge & Culvert Assets – Risk Exposure Map

Repair/renewal required by 2031 (in 2021 $) $ 6.7 millions

| PoF | | | | | |
|---|---|---|---|---|---|
| 5 | - | $ 0.4 | $ 0.7 | $ 0.3 | $ 0.6 |
| 4 | - | $ 0.5 | $ 0.3 | - | $ 0.1 |
| 3 | - | $ 0.0 | $ 0.6 | $ 0.4 | $ 2.2 |
| 2 | - | - | $ 0.1 | $ 0.1 | $ 0.1 |
| 1 | - | $ 0.4 | $ 0.0 | - | $ 0.0 |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

Table 4-22 Bridge & Culvert Assets – Very High-Risk Renewal and Repair Needs (from Bridge Inspection Data)

| Type | Structure Number | Location | Span Length (km) | Recommended Timing | Estimated Repair Cost (2021 $) |
|---|---|---|---|---|---|
| Bridges | 18 | Concession 2 | 11.4 | 2025 – 2029* | $ 144,000 |
| | 20 | Sideroad 7 West | 9.2 | 2025 – 2029* | $ 59,000 |
| | 21** | Sideroad 8 East | 16.5 | Immediate | $ 1,374,000 |
| | 23 | Concession 9 | 9.1 | Immediate | $ 141,000 |
| | 27 | Sideroad 9 East | 15.2 | Immediate | $ 388,500 |
| | 28 | Concession 11 | 15.3 | 2025 – 2029* | $ 100,000 |
| | 38** | Sideroad 3 | 13.6 | Immediate | $ 200,000 |
| | 39 | Line 6 | 12.2 | Immediate | $ 240,000 |
| | 40 | Line 6 | 9.1 | Immediate | $ 176,000 |
| | 41 | Sideroad 7 | 9.2 | Immediate | $ 500 |
| | P1 | Mill Street Pedestrian Bridge | 55.48 | Immediate | $ 51,000 |
| Culverts | 12 | Concession 11 | 9 | Immediate | $ 2,000 |
| | 30 | Sideroad 10 West | 6.1 | 2025 – 2029* | $ 57,000 |
| | 2013 | Concession 9 | 4.8 | 2025 – 2029* | $ 124,000 |
| | 2024 | Concession 11 | 3.6 | Immediate | $ 300,000 |
| | 2036 | Line 8 | 3.1 | Immediate | $ 255,000 |
| | 2053 | Sideroad 3 East | 6.6 | 2025 – 2029* | $ 229,000 |
| TOTAL | | | | | $ 3,841,000 |

* 2019 Bridge Inspection Data recommended repair/replacement within 6-10 years.

** Has load limit

Figure 4-12 shows the risk exposure mapping for traffic signal assets that require replacement within the next ten years. The specific replacements required were listed in the renewal needs table, Table 4-16. Some assets require replacement twice during the 10-year planning period (2022-2031). Table 4-23 lists the assets with Very High risk, which should be prioritized for replacement. There are no capacity or function needs to be addressed for traffic signals.

Figure 4-12: Traffic Signal Assets – Risk Exposure Map

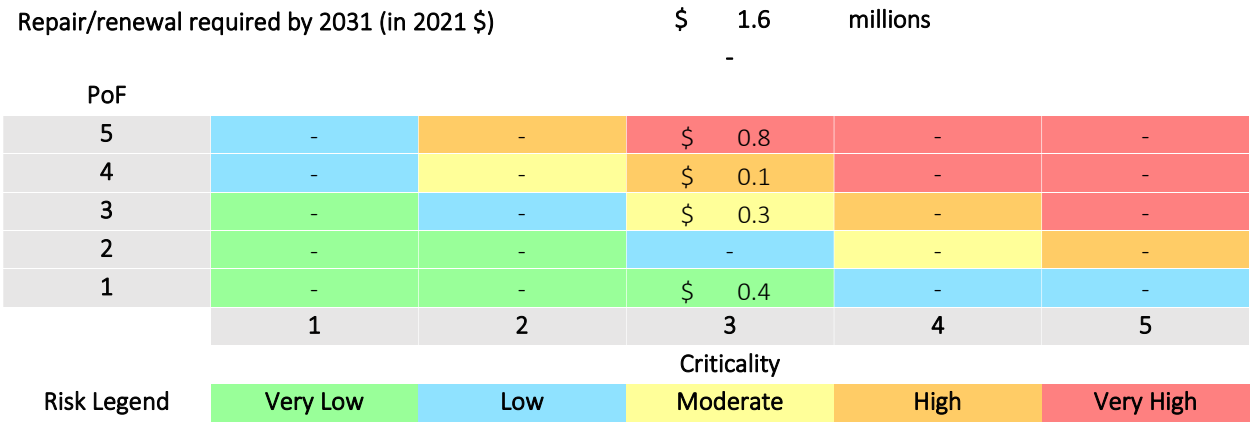
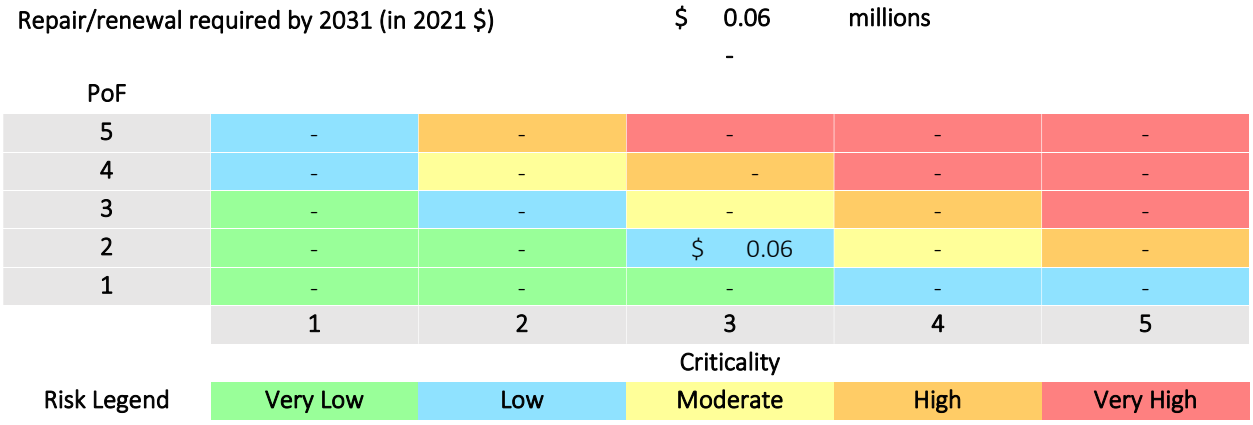



Table 4-23 Traffic Signal Assets – Very High-Risk Asset(s)

| Location | Type | Replacement Value (2021 $) |
|---|---|---|
| Smith & Frederick | Signal Structure and Equipment | $ 200,000 |
| Main & Wellington | Signal Structure and Equipment | $ 200,000 |
| Main & Sligo | Signal Structure and Equipment | $ 200,000 |
| Main & Wellington | Signal Control Software | $ 100,000 |
| Main & Sligo | Signal Control Software | $ 100,000 |

Figure 4-13 shows the risk exposure mapping for traffic sign assets that require renewal within the next ten years. As was explained in Section 4.1.7, 1,122 signs will require replacement by 2031, costing an estimated $ 60k. There are no capacity or function needs to be addressed for traffic signals.

Figure 4-13: Sign Assets – Risk Exposure Map



Streetlights do not require renewal in the next ten years, because they were converted to LED in 2019, and have an Estimated Useful Life (EUL) 50 years. However, in terms of function need, there are 32 decorative lights in Mount Forest that require upgrade to LED. The upgrade will result in energy cost savings, and should thus be treated as High priority.

Figure 4-14 shows the risk exposure mapping for sidewalk assets that require renewal within the next ten years. As was explained in Section 4.1.7, approximately 2,768m of sidewalk will require replacement by 2031, costing an estimated $ 0.64 million.

In addition, the condition data collected in 2013 is due for update. This effort may be combined with collection of sidewalk inventory data, including sidewalk width. This will enable the Township to determine where sidewalks need to be widened to the accessibility standard of 1.5m. This data may also support a sidewalk connectivity study, which is needed to determine the adequacy of the pedestrian network. The sidewalk data collection should be considered High priority, since the data will improve asset investment decision-making. The connectivity study may be considered Moderate priority and should be conducted after the sidewalk inventory data collection.

Figure 4-14: Sidewalk Assets – Risk Exposure Map

| Repair/renewal required by 2031 (in 2021 $) | | | $ 0.64 | | |
|---|---|---|---|---|---|
| PoF | | | | | |
| 5 | - | - | - | $ 0.18 | - |
| 4 | - | - | - | $ 0.46 | - |
| 3 | - | - | - | - | - |
| 2 | - | - | - | - | - |
| 1 | - | - | - | - | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

Sidewalk segments with Very High-risk exposure are listed in Table 4-24. Since this risk rating is based on 2013 condition data, some segments may have already been renewed, while other segments may have deteriorated. Condition should be validated prior to scheduling work.

Table 4-24 Sidewalk Assets – Very High-Risk Asset(s)

| Location | Length (m) | Condition / Probability of Failure | Consequence of Failure | Risk Exposure | Replacement Value (2021 $) |
|---|---|---|---|---|---|
| *Section 347* | 134 | Very Poor / 5 | 4 | Very High | $ 30,901 |
| *Section 347* | 140 | Very Poor / 5 | 4 | Very High | $ 32,258 |
| *Section 348* | 23 | Very Poor / 5 | 4 | Very High | $ 5,265 |
| Clarke Street | 100 | Very Poor / 5 | 4 | Very High | $ 23,045 |
| John Street | 78 | Very Poor / 5 | 4 | Very High | $ 17,816 |
| Wellington St. East | 149 | Very Poor / 5 | 4 | Very High | $ 34,297 |
| Wellington St. East | 152 | Very Poor / 5 | 4 | Very High | $ 34,880 |
| Georgina St | 244 | Poor / 4 | 4 | Very High | $ 55,982 |
| Eliza St | 17 | Poor / 4 | 4 | Very High | $ 3,933 |
| Eliza St | 31 | Poor / 4 | 4 | Very High | $ 7,160 |
| *Section 323* | 352 | Poor / 4 | 4 | Very High | $ 80,847 |
| Leonard Street | 136 | Poor / 4 | 4 | Very High | $ 31,249 |
| Charles Street East | 31 | Poor / 4 | 4 | Very High | $ 7,017 |
| Charles Street East | 133 | Poor / 4 | 4 | Very High | $ 30,497 |
| *Section 348* | 35 | Poor / 4 | 4 | Very High | $ 7,954 |
| Clarke Street | 96 | Poor / 4 | 4 | Very High | $ 22,017 |
| King Street West | 73 | Poor / 4 | 4 | Very High | $ 16,749 |
| King Street East | 150 | Poor / 4 | 4 | Very High | $ 34,505 |
| Main Street North | 298 | Poor / 4 | 4 | Very High | $ 68,503 |
| Main Street North | 299 | Poor / 4 | 4 | Very High | $ 68,631 |
| Birmingham St. West | 98 | Poor / 4 | 4 | Very High | $ 22,619 |
| TOTAL | 2,768 | | | | $ 636,125 |

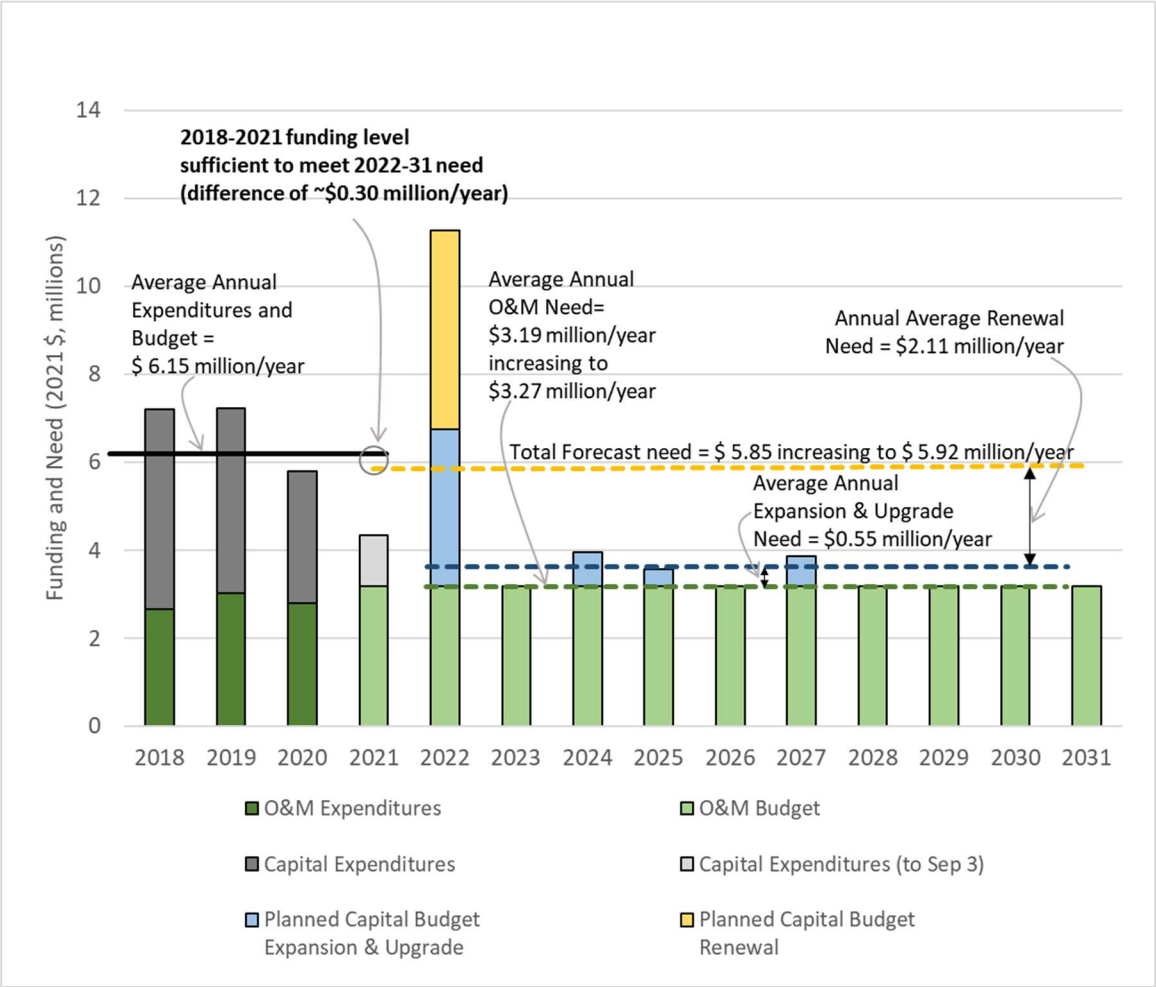
### 4.1.9 FINANCIAL IMPACT

Figure 4-15 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $6.15 million/year. This level of funding would be sufficient to cover the forecast need of $5.85 million/year for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031). However, the forecast need does not include the cost of re-surfacing paved roads between reconstruction, because the data does not show when resurfacings were last completed. Moreover, the forecast does not include the cost of reconstructing the base of gravel or surface treated roads.

The forecast need includes the life cycle costs described in Section 4.1.7, specifically:

- Expansion & Upgrade $ 5.50 million (over ten years)
- Renewal $ 21.06 million (over ten years)
- Operations & Maintenance $ 3.91 million/year in 2022 increasing to $ 3.93 million/year in 2031 due to development

Figure 4-15: Historical Expenditures and Projected Needs – Transportation Service




The Township may prioritize needs based on risk, as discussed in Section 4.1.8. Specifically, prioritizing the $5.4 million of renewal needs (over the next 10 years) that are considered Very High risk, specifically:

- $ 0.2 million of road renewal
- $ 3.8 million of bridge and culvert repair and renewal
- $ 0.8 million of traffic signal and systems renewal
- $ 0.6 million of sidewalk renewal

The next priority would be the $1.6 million of renewal needs (over the next 10 years) that are considered High risk, specifically:

- $ 0.2 million of road renewal
- $ 1.2 million of bridge and culvert repair and renewal
- $ 0.1 million of traffic signal renewal
- $ 0.1 million of traffic sign renewal

The expansion and upgrade projects, estimated at $5.5 million, are also considered High priority (risk), specifically:

- $ 5.43 million of network expansion projects, identified in the Development Charges Background Study, and already identified in the Township's Capital Plan
- $ 0.04 million for a sidewalk inventory (including sidewalk width to identify accessibility needs) and condition assessment
- $ 0.03 million for a sidewalk connectivity study

# 4.2 STORMWATER NETWORK

## 4.2.1 INTRODUCTION

The stormwater management system protects public and private property from flooding by conveying runoff from rain storms. The stormwater system includes storm sewers, catch basins, maintenance holes and storm ponds.

## 4.2.2 INVENTORY

The Township maintains 42.5 km of storm sewer pipes, 1554 related point assets, such as catch basins and maintenance holes and 6 stormwater ponds. The inventory of stormwater assets has an estimated replacement value of $76.4 million, as shown in Table 4-25, which summarizes the stormwater asset inventory, including mains, catch basins, maintenance holes, and ponds in terms of quantity, and total replacement value.

Table 4-25 Stormwater Assets – Inventory and Replacement Value

| Asset Type | Arthur Quantity | Mount Forest Quantity | Replacement Value (2021 $, millions) |
|---|---|---|---|
| **Stormwater Mains** | **12.1 km** | **42.5 km** | **$ 64.7** |
| Concrete | 10.1 km | 29.4 km | $ 44.9 |
| PVC | 1.1 km | 6.6 km | $ 9.7 |
| Steel | 0.4 km | 5.4 km | $ 8.7 |
| Other/Unknown* | 0.4 km | 1.0 km | $ 1.4 |
| **Stormwater Appurtenances** | | | **$ 10.4** |
| Catch Basins | 413 units | 678 units | $ 5.5 |
| Maintenance Holes | 174 units | 289 units | $ 4.9 |
| **Storm Ponds** | | | **$ 1.3** |
| Wet | 2 units | | $ 0.7 |
| Dry | 4 units | | $ 0.6 |
| TOTAL | | | $ 76.4 |

* 634m polyethylene, 376m unknown material, 33m asbestos cement

## 4.2.3 REPLACEMENT VALUE

Replacement values for stormwater mains and appurtenances were estimated based on unit costs reflecting current market conditions, as listed in Table 4-26. These unit costs include all costs associated with installation of the asset, including engineering, construction administration, inspections, permits, utility relocation, taxes and contingencies.

For mains, the unit costs include the costs of the associated service leads, any required fittings, and sub-base, since these elements would be replaced with any main replacement. It is further assumed that storm sewer main replacements will be done in conjunction with other renewals in the same right-of-way, so granular and pavement costs are not included in the unit cost, as these would be included in road

replacement cost. Moreover, Township staff have indicated that future main replacements will be guided by the following:

- Pipes with diameter less than 150mm will be replaced with a diameter of 150mm
- All pipes will be replaced with polyvinyl chloride (PVC)

As such, the unit costs listed in Table 4-26 reflect these replacement guidelines, which will result in a future network composed of PVC stormwater mains.

Table 4-26 Stormwater Assets – Unit Costs

| Asset Type | Size (diameter in mm) | Unit Cost (2021 $) |
|---|---|---|
| Pipes (PVC) | 75 | $ 375/ m |
| | 100 | $ 556/ m |
| | 125 | $ 656/ m |
| | 150 | $ 863/ m |
| | 200 | $ 913/ m |
| | 250 | $ 1,044/ m |
| | 300 | $ 1,163/ m |
| | 350 | $ 1,325/ m |
| | 375 | $ 1,375/ m |
| | 400 | $ 1,481/ m |
| | >= 400 | $ 1,992/ m |
| Catch Basins | 100 – 300 | $ 3,750/ unit |
| | 400 – 800 | $ 5,014/ unit |
| | 900 – 1200 | $ 6,824/ unit |
| | 1450 | $ 8,750/ unit |
| Maintenance Holes | 500 | $ 3,750/ unit |
| | 600 | $ 4,375/ unit |
| | 800 | $ 5,750/ unit |
| | 900 | $ 7,125/ unit |
| | 1000 | $ 8,500/ unit |
| | 1200 | $ 9,805/ unit |
| | 1500 | $ 17,270/ unit |
| | 1800 | $ 20,543/ unit |
| | 2400 | $ 37,534/ unit |

Table 4-27 includes the location and replacement value of each stormwater pond, based on external engineering cost estimate for each pond.

Table 4-27 Stormwater Assets – Pond Replacement Values

| Pond Type | Street Name | Replacement Value (2021 $) |
|---|---|---|
| Wet | Schmidt Drive | $ 400,000 |
| | Irwin Lytle Drive | $ 250,000 |
| Dry | Ruby's Crescent | $ 250,000 |
| | Owen Road | $ 50,000 |
| | Connery Road | $ 50,000 |
| | Ronnie's Way | $ 250,000 |

### 4.2.4 ESTIMATED USEFUL LIFE

Estimated useful life values of stormwater assets are listed in Table 4-28. As shown in the Table, different useful life values have been applied to existing stormwater main materials. Uniform useful life values have been applied to maintenance holes (75 years), catch basins (75 years), dry ponds (40 years) and wet ponds (20 years). These useful life values, along with age, were used to estimate condition of water assets.

Table 4-28 Stormwater Assets – Useful Life

| Asset | Estimated Useful Life (Years) |
|---|---|
| **Storm Network (Pipes)** | |
| Asbestos Cement | 70 |
| Concrete | 90 |
| PVC | 90 |
| Steel | 60 |
| Corrugated Steel Pipe | 60 |
| Polyethylene | 90 |
| **Storm network (structures)** | |
| Catch Basins | 75 |
| Maintenance Holes | 75 |
| **Storm Ponds** | |
| Wet | 20 |
| Dry | 40 |

### 4.2.5 CONDITION

Asset condition was determined based on percent remaining useful life, calculated from each asset's estimated useful life and current age. Asset condition scores were assigned based on the mapping of condition and remaining life shown in Table 4-29. As shown in the Table, condition was linearly mapped to the remaining life, with each score representing a 20% of the asset's life.

Table 4-29 Stormwater Assets – Age-based Condition Index

| Condition Score | | % Useful Life Remaining |
|---|---|---|
| **Very Good** | **1** | 80 – 100 |
| **Good** | **2** | 60 – 79 |
| **Fair** | **3** | 40 – 59 |
| **Poor** | **4** | 20 – 39 |
| **Very Poor** | **5** | 0 – 19 |

The condition distribution of stormwater mains is shown in Figure 4-16. The figure shows that 1.2 km of steel mains are in Very Poor condition based on age and are thus due for replacement. Specifically, 2.7 km of asbestos cement mains and 148m of steel mains are in Very Poor condition. Another 2.0 km of mains (concrete, steel and asbestos cement) are in Poor condition.

Figure 4-16: Stormwater Pipes – Condition by Replacement Value

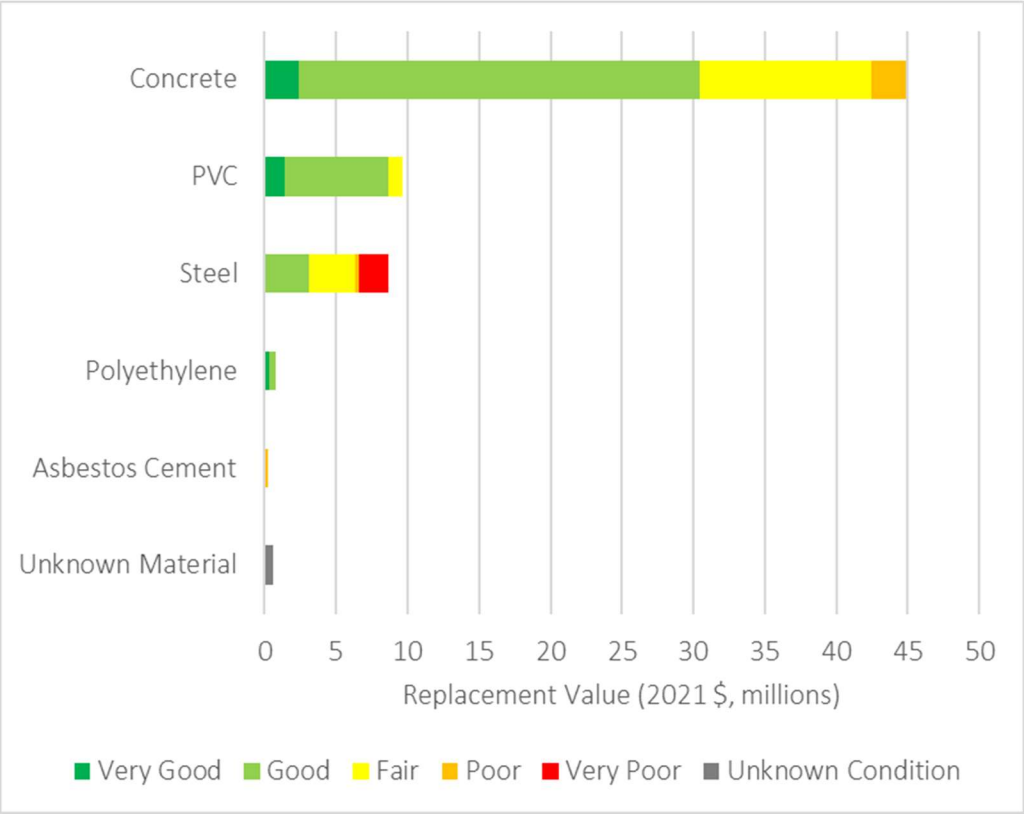


Figure 4-17 shows the average age of stormwater pipes by material. The Figure shows that Asbestos Cement (AC) pipes are farthest along in their life; however, as was shown in Figure 4-16, there is only a small amount of AC pipe in the stormwater network (33m). The remaining types of pipe are about one third through their life cycle, other than steel pipes, which are on average, just over halfway through their life cycle.

Figure 4-17: Average Age – Stormwater Pipes by Material

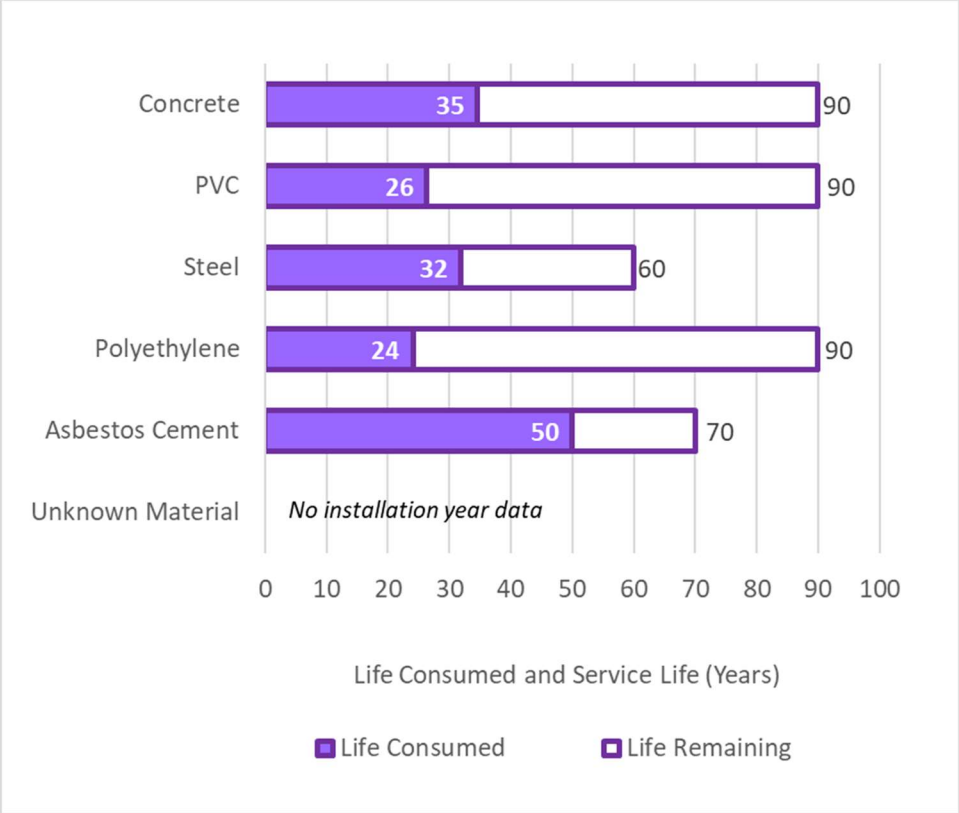


Figure 4-18 depicts the condition distribution by replacement value for stormwater appurtenances and ponds. The Figure shows that the wet pond at Irwin Lytle, which was installed in 1991, is overdue for cleaning. It is recommended that the capacity be checked to confirm this need.

Figure 4-18: Stormwater Appurtenances and Ponds – Condition by Replacement Value

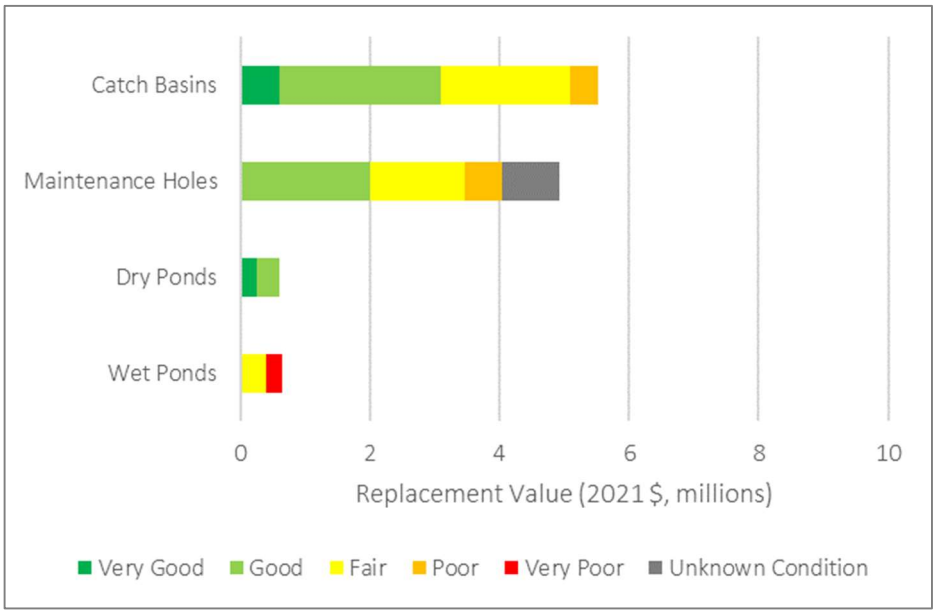
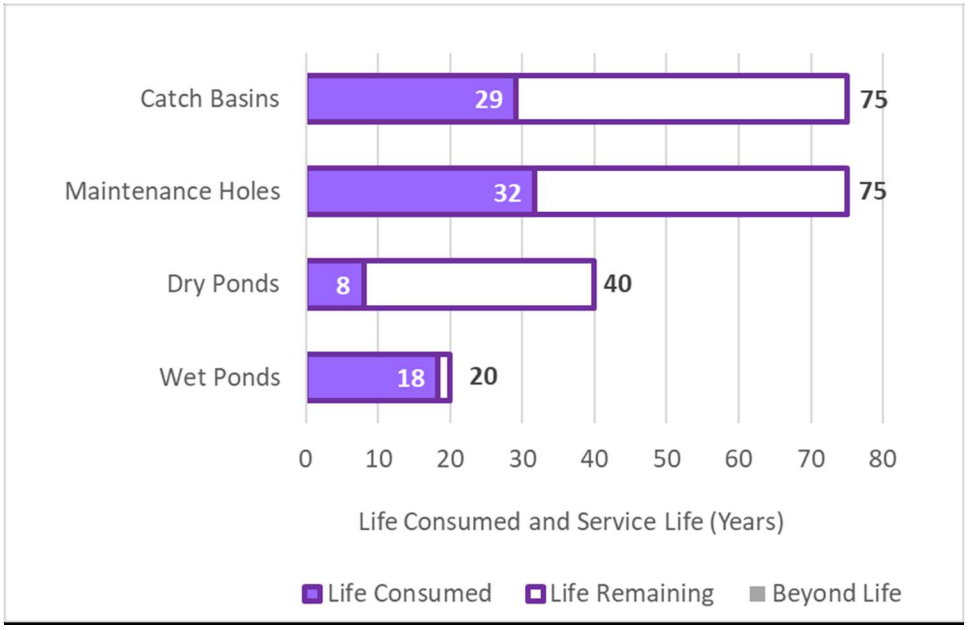



Figure 4-19 shows the average age of the stormwater appurtenances and ponds. The figure shows that wet ponds are on average, two years away from their Estimated Useful Life (EUL). They will require cleaning to re-capture capacity.

Figure 4-19: Average Age – Stormwater Appurtenances and Ponds



### 4.2.6 LEVELS OF SERVICE

This section presents the Township's Level of Service (LOS) indicators and current performance for Stormwater assets. Community LOS are presented in Table 4-30, and Technical LOS are presented in Table 4-31 Targets have not been established for these indicators, and in some cases, data was not available to report current performance.

Table 4-30 Stormwater Assets – Community Levels of Service

| Service Attribute | Community Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| **Capacity** | Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.* | See Flood Emergency Map in Figure 4-20 | No formal target | No data |
| **Function** | No indicators defined. | | | |
| **Quality** | No indicators defined. | | | |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

Table 4-31 Stormwater Assets – Technical Levels of Service

| Service Attributes | Technical Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| **Capacity** | Percentage of properties in municipality resilient to a 100-year storm.* | No data | No formal target | No data |
| | Percentage of the municipal stormwater management system resilient to a 5-year storm.* | No data | No formal target | No data |
| **Function** | No indicators defined. | | | |
| **Quality** | % Assets in state of good repair (Fair condition or better) | 90% | No formal target | None |

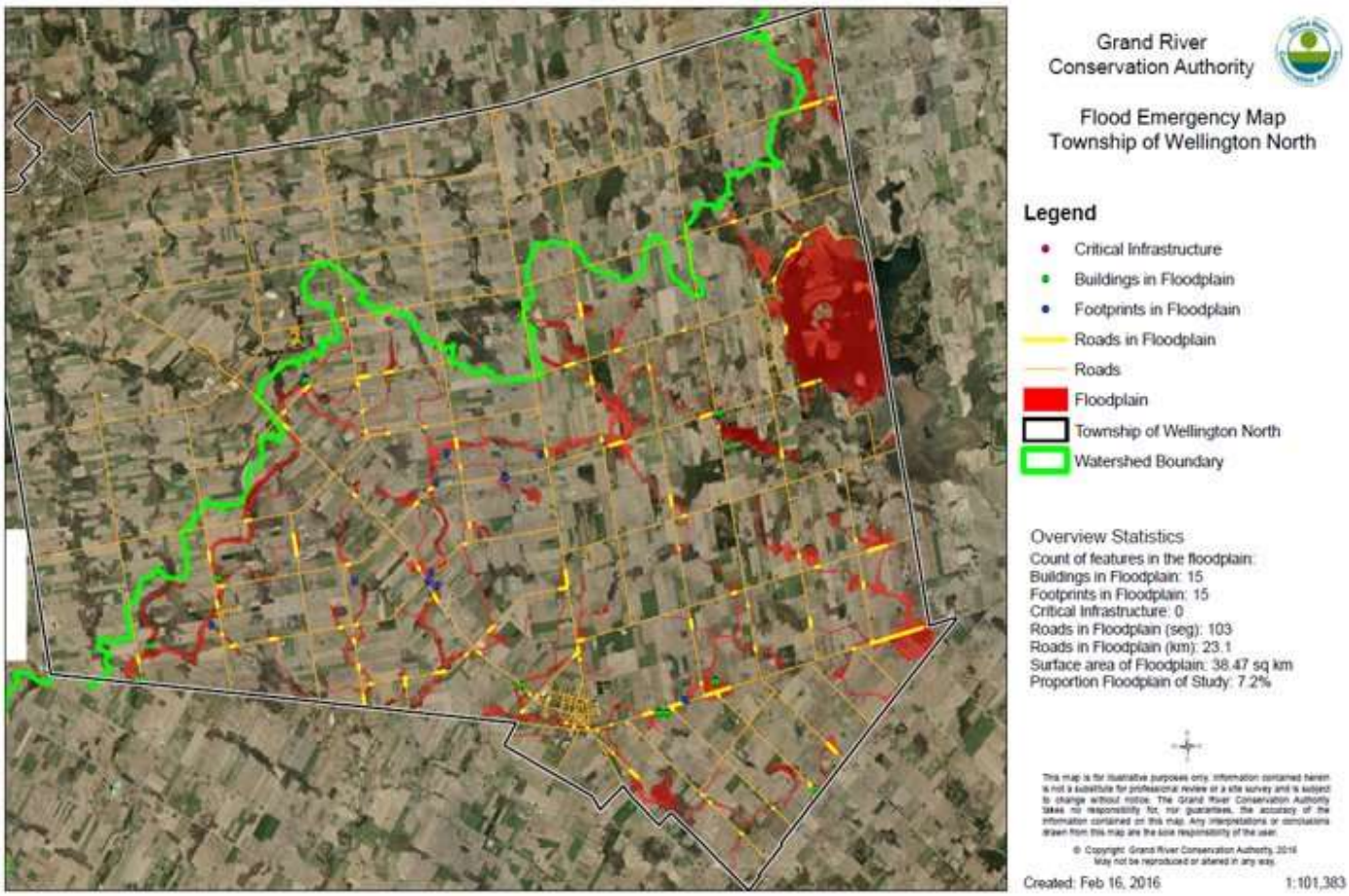
* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

The Township of Wellington North spans portions of the following watersheds:

- the Maitland River covering rural areas in the western portion of the Township
- the Saugeen River watershed covering the north-western corner of the Township, including Mount Forest, and
- the Grand River watershed covering two-thirds of the Township to the south and east.

A flood plain map was provided by the Grand River Conservation Authority (GRCA); however, similar data was not available for the Saugeen or Maitland River watersheds. The flood plain map from GRCA (see Figure 4-20) shows the areas prone to flooding within the Grand River watershed. According to the data, 15 buildings were in the flood plain (as of 2016).

Figure 4-20: Stormwater Management – Flood Emergency Map for Grand River Watershed




O.Reg. 588/17 requires municipalities to report the percentage of properties in municipality resilient to a 100-year storm. This will require maps showing estimated flood boundaries for 100-year, overlaid on property line maps. O.Reg. 588/17 also requires municipalities to report the percentage of the network resilient to a 5-year storm. A stormwater hydraulic analysis is needed to determine this value. The Township will work to obtain the required performance values for the next update of the AM Plan.

### 4.2.7 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the stormwater service asset life cycle needs include the following:

- Expansion & Upgrade $ 0.16 million (over ten years)
- Renewal $ 3.02 million (over ten years)
- Operations & Maintenance $ 38k/year in 2022 increasing to
  $ 42k/year in 2031 due to development

The following sub-sections provide details on the needs in each of these categories.

#### Expansion & Upgrade Needs

The Township's population is expected to grow by 37% from 12,490 in 2016 to 17,085 in 2036, and employment is expected to grow by 32% from 7,070 in 2016 to 9,320 in 2036 (see Wellington County 2019 Official Plan). This growth will likely increase the amount of non-permeable surface area within the Township; however, no expansion or upgrade needs were identified in the Development Charges Background Study for stormwater assets; however, it is likely that stormwater needs are embedded in cost estimates for growth-related road projects. It is recommended that costs specific to stormwater infrastructure be tracked separately from road construction costs, so that the Township can build a better understanding of the costs related to the stormwater system.

To help identify expansion and upgrade needs in the future, it is recommended that the Township commission stormwater studies to obtain the performance metrics required by O.Reg. 588/17, specifically:

- percentage of properties in municipality resilient to a 100-year storm, and
- percentage of the network resilient to a 5-year storm.

It is recommended that **$80k** be budgeted for this study and should be repeated every 5 years. The total cost over the 10-year AM Plan period is thus $160k. The Township may also consider establishing such a model in-house, in which case staff and software resources would be required.

#### Renewal Needs

Table 4-32 lists the Township's projected renewal needs by asset type to 2031, totaling **$3.02 million**.

Table 4-32 Stormwater Service Asset Renewal Practices & Needs to 2031

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Stormwater Mains | Replace at end of life (60 years for steel, 70 years for Asbestos Cement, 90 years for other pipe materials) | **$2.08 million** (1.2 km) of steel mains: | | | | | |
| | | • Birmingham St. 350m | 5 | 2,3,4 | Very High, High, Moderate. | 2030 | $ 500 |
| | | • Church St. 119m | 5 | 3,4 | Very High, High | 2030 | $ 201 |
| | | • Cork St. 74m | 5 | 4 | Very High | 2030 | $ 147 |
| | | • Newfoundland St. 193m | 5 | 4 | Very High | 2030 | $ 385 |
| | | • Queen St. 497m | 5 | 3,4 | Very High, High | 2030 | $ 850 |
| Catch Basins | Replace with Mains | Throughout the system, there is on average one catch basin for every 39m of stormwater main.<br>There will thus be approximately 31 catch basics to be replaced with 1,200m of mains.<br>The escalated unit cost for a 900-1200mm catch basin is $6,824. The total renewal cost for 31 catch basins is thus $155,430 (**$ 0.16 million**). | 1-4 (renewal driven by renewal of mains) | 2 | Very Low to Moderate | With mains | $ 155 |
| Maintenance Holes | Replace with Mains | Throughout the system, there is on average one maintenance hole for every 92m of stormwater main. | 1-4 (renewal driven by | 2 | Very Low to Moderate | With mains | $ 127 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| | | There will thus be approximately 13 maintenance holes to be replaced with 1,200m of mains.<br>The escalated unit cost for a 1200mm catch basin is $9,805. The total renewal cost for 13 maintenance holes is thus $127,464 (**$ 0.13 million**). | renewal of mains) | | | | |
| Dry Ponds | Clean at 40 years | No cleaning (renewal) needs to 2031. | n/a | | | | |
| Wet Ponds | Clean at 20 years | Both wet ponds require cleaning by 2031 at an estimated cost of **$0.65 million**.<br>• Schmidt Dr.<br>• Irwin Lytle | <br>3<br>5 | <br>3<br>1 | <br>Moderate<br>Low | <br>2030<br>2011 (overdue for cleaning) | <br>$ 400<br>$ 250 |
| **TOTAL RENEWAL NEED (2022-31)** (excludes needs that will be funded by operating) | | **$ 3.02 million** | | | | | |

## Operations & Maintenance Needs

Operations and Maintenance (O&M) costs include day-to-day costs associated with running and overseeing the stormwater system. This includes pond inspection, catch basin cleaning, and street sweeping, as well as preventive maintenance, minor repairs and reporting. O&M activities are funded by the Township's operating budget.

Figure 4-21 shows the operating expenditures for 2018-20, as well as the 2021 budget. These amounts reflect only the labour charges associated stormwater service activities, since most other overhead costs are captured under the transportation service. In the past three years, $42k, $40k and $28k (2018-2020, respectively) have been spent on stormwater activities. The budgeted amount for 2021 is $37k.

Figure 4-21: Operating Expenditures 2018-20 and 2021 Budget – Stormwater Service

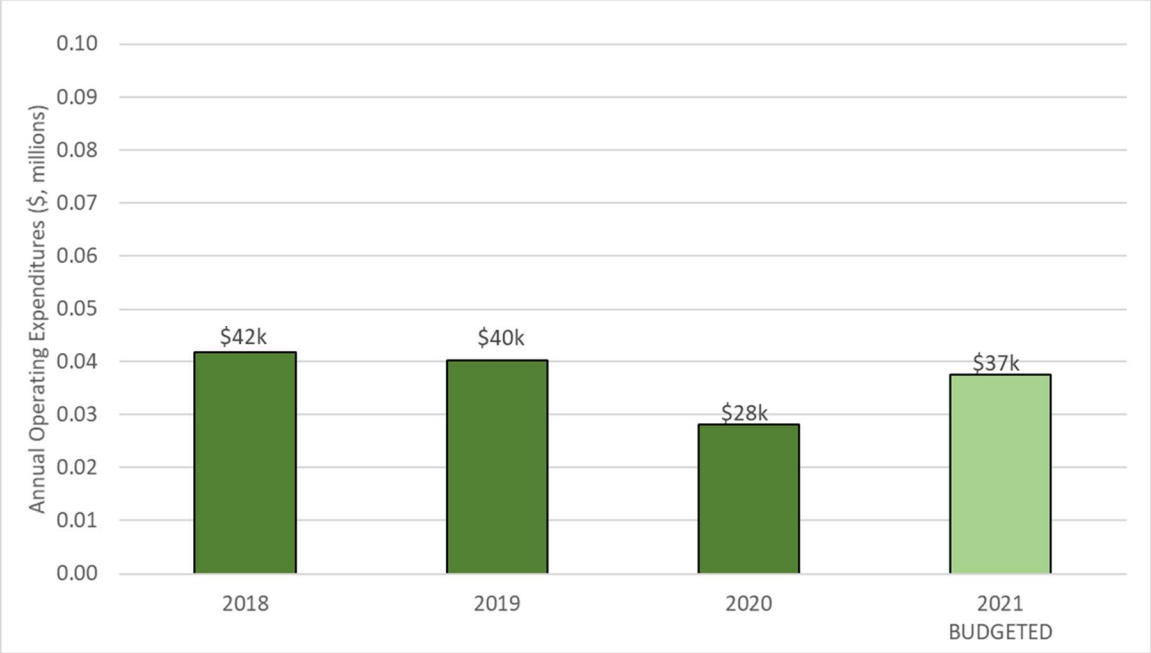


Table 4-33 lists the activities conducted using operating budget, along with general frequencies. The Township indicated that the 2021 budget is sufficient for the current activities and network size. However, the stormwater network grows each year due to assumption of developer-constructed assets, as well as construction and installation of new assets by the Township. These new assets require additional funds for operations and maintenance.

Table 4-33 Operating Activities and Frequencies – Stormwater Service

| Asset Type | Activity | Frequency |
|---|---|---|
| Stormwater Mains | CCTV prior to renewal<br>Flushing | Prior to renewal (no cycle)<br>As needed |
| Catch Basins | Inspection<br>Cleaning<br>Sump cleanout | Annual<br>Annual<br>Annual (spring) |
| Maintenance Holes | Inspection | Annual |
| Ponds | Cleaning | Every 40 years for dry ponds<br>Every 20 years for wet ponds |
| Dam | Condition Assessment | Informal, but generally every 5 years* |

* The dam is owned by the Township, but the Saugeen Valley Conservation Authority is the operating authority. They execute the condition assessment (usually through an external consultant), then invoice the Township. Timing is not formalized.

It is estimated that the Township assumes 0.5 km of stormwater main per year. As shown in Table 4-34, the resulting annual increase in operating budget need is $450/year. Based on this rate of increase, Table 4-35 shows that the estimated operating budget need increases from $38k in 2022 to $42k in 2031.

Table 4-34 Growth Impacts on Operating Budget Need – Stormwater Service

| Asset Type | Inventory in 2021 | Estimated Annual Assumptions | % of 2021 Inventory | Operating Budget needed for Full Inventory (2021 $) | Estimated Annual Increase in Operating Need due to Assumptions (2021 $) |
|---|---|---|---|---|---|
| Stormwater Mains | 42.5 km | 0.5 km | 1.2 % | $ 37,447 | $ 450 |

Table 4-35 Projected Operating Budget Need including Estimated Growth Impacts – Stormwater Service

| Year | Projected Operating Budget Need (2021 $) |
|---|---|
| 2022 | $ 37,896 |
| 2023 | $ 38,346 |
| 2024 | $ 38,795 |
| 2025 | $ 39,244 |
| 2026 | $ 39,694 |
| 2027 | $ 40,143 |
| 2028 | $ 40,593 |
| 2029 | $ 41,042 |
| 2030 | $ 41,491 |
| 2031 | $ 41,941 |

### 4.2.8 RISK

Improvements to asset and system capacity, function and condition are often limited by available funding and resources. It thus becomes necessary to prioritize asset investments and improvements based on risk exposure. Probability of Failure is approximated based on asset condition, while Consequence of Failure is estimated based on expected impact of an asset failure, as shown in Table 4-36.

Table 4-36 Consequence of Failure Ratings – Stormwater Assets

| Asset Type | Assumptions | Consequence Category of Highest Concern | Attributes | CoF |
|---|---|---|---|---|
| Mains | Unplanned failure will result in damage to a pipe segment, road and Right-of-Way (RoW) assets, and may also damage private assets. Impacts are higher with greater flow, and thus pipe diameter.<br><br>Other potential impacts (however, these will be managed, and CoF will likely not exceed Financial CoF):<br><br>Traffic and pedestrian safety may be compromised.<br><br>Water service may be reduced or shut off in the area during the repair. Redundancy has not been considered in these CoF ratings.<br><br>Environmental impacts are minimal for a leakage of stormwater. | Financial Impacts | 0 to < 200 mm diameter | 2 |
| | | | 200 to < 400 mm diameter | 3 |
| | | | 400 to < 800 mm diameter | 4 |
| | | | >= 800 mm diameter | 5 |
| Catch Basins | Failure of catch basins may lead to damage of private vehicles, and associated liability. | Financial Impacts | ALL | 2 |
| Maintenance Holes | Failure of maintenance holes may lead to damage of private vehicles, and associated liability. | Financial Impacts | ALL | 2 |
| Ponds | Ponds fail when they accumulate silt to the point where their capacity to contain flood water is limited. This results in damage to public and private assets. | Financial Impacts | Dry Ponds (drains to road) | 3 |
| | | | Wet Pond - Schmidt Dr. | 3 |
| | | | Wet Pond - Irwin Lytle (no buildings nearby) | 1 |

Based on those CoF ratings, Figure 4-22 shows the risk exposure mapping for stormwater assets that require renewal within the next ten years. As listed in Table 4-32 in Section 4.2.7, these assets are steel mains that were installed in 1970. Their theoretical end-of-life is 2030 and should be renewed in coordination with other corridor capital works.

Figure 4-22: Stormwater Main Assets – Risk Exposure Map

| Renewals required by 2031 (in 2021 $) | $ 2.1 | | | | |
|---|---|---|---|---|---|
| PoF | | | | | |
| 5 | - | $ 0.1 | $ 0.4 | $ 1.6 | - |
| 4 | - | - | - | - | - |
| 3 | - | - | - | - | - |
| 2 | - | - | - | - | - |
| 1 | - | - | - | - | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

Catch basins and maintenance do not require risk-based prioritization, because they are generally replaced with the associated stormwater main. These costs should thus be added to any stormwater main replacement projects.

Dry ponds do not currently require prioritization analysis, since they do not require intervention (cleaning) within the next 10 years. However, the Township's two wet ponds are due for cleaning. The cleaning activities are shown in the risk map in Figure 4-23. Irwin Lytle pond appears in the Low (blue) risk exposure cell, because it is overdue for cleaning (probability of failure = 5), but the consequences of overflow are insignificant, since no buildings would be affected. Schmidt Dr. pond appears in Moderate (yellow) risk exposure. It will be due for cleaning in 2030.

Figure 4-23: Stormwater Wet Ponds – Risk Exposure Map

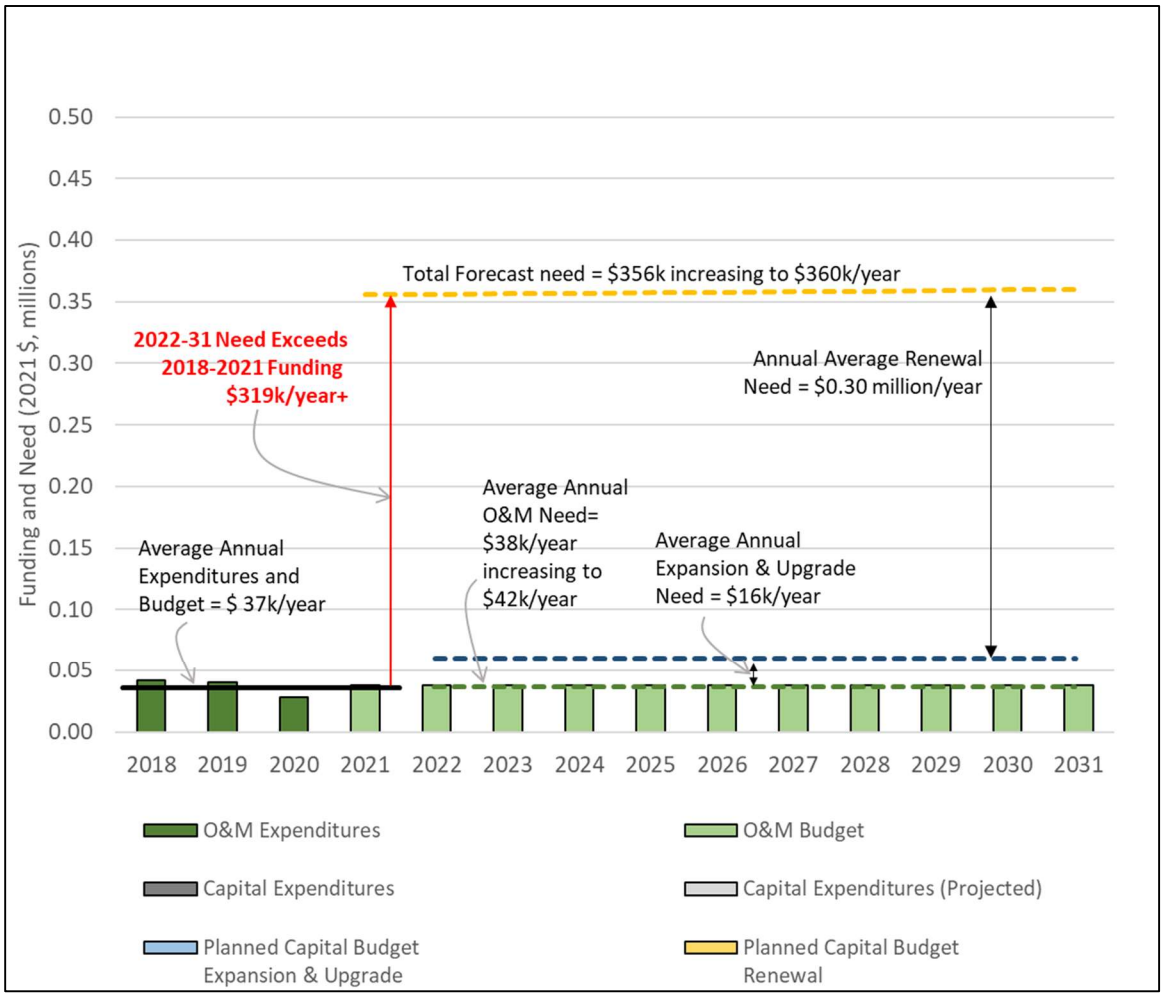
| Total value of assets in 2021 $, millions | $ 0.7 | | | | |
|---|---|---|---|---|---|
| PoF | | | | | |
| 5 | $ 0.3 | - | - | - | - |
| 4 | - | - | - | - | - |
| 3 | - | - | $ 0.4 | - | - |
| 2 | - | - | - | - | - |
| 1 | - | - | - | - | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

### 4.2.9 FINANCIAL IMPACT

Figure 4-24 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $37k/year. In contrast, the forecast need for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031) is ten-fold that amount, at $356k/year, primarily due to assets reaching the end of their service life. This includes the life cycle costs described in Section 4.2.7, specifically:

- Expansion & Upgrade $ 0.16 million (over ten years)
- Renewal $ 3.02 million (over ten years)
- Operations & Maintenance $ 38k/year in 2022 increasing to $ 42k/year in 2031 due to development

Figure 4-24: Historical Expenditures and Projected Needs – Stormwater Service




The Township may also prioritize needs based on risk, as discussed in Section 4.2.8. Specifically, prioritizing the $7.1 million of renewal needs (over the next 10 years) that are considered Very High risk, specifically:

- $ 2.0 million of stormwater mains (plus associated catch basins and maintenance holes)

The expansion/upgrade project, consisting of hydraulic analysis (estimated at $0.16 million), is also considered Very High priority (risk), because it is required to enable reporting of O.Reg. 588/17 Level of Service performance metrics.

The next priority would be another $0.1 million of renewal of steel mains that are considered High risk.

# 4.3 WATER SERVICE

## 4.3.1 INTRODUCTION

Water service in the Township is provided by two separate water systems, one serving the community of Mount Forest and the other serving the community of Arthur. The Mount Forest water system comprises four drilled bedrock well supplies, a 2,080 $m^3$ elevated water storage standpipe complete with a booster pumping station, and a water distribution network that delivers water to 2,110 homes and 239 Industrial/Commercial/Institutional (ICI) properties. The Arthur water system comprises three bedrock wells, two elevated towers and a distribution system that service to 918 homes and 111 ICI properties, according to year 2020 Township records. Both systems are single pressure zones, pressurized by their respective elevated towers. Each system also provides fire protection to their service areas.

## 4.3.2 INVENTORY

The municipal water network is comprised of water mains, hydrants, mainline valves, water towers, supply wells and well houses. Table 4-37 summarizes the water service inventory in terms of quantity and replacement value.

Table 4-37 Water Assets – Inventory and Replacement Value

| Asset Type | Arthur Quantity | Mount Forest Quantity | Replacement Value (2021 $, millions) |
|---|---|---|---|
| **Mains** | **19.7 km** | **36.8 km** | **$ 52.2** |
| Polyvinyl Chloride (PVC) | 18.0 km | 20.33 km | $ 36.3 |
| Cast Iron | 0.9 km | 4.8 km | $ 4.6 |
| Ductile Iron | 0.8 km | 10.1 km | $ 9.9 |
| Other* | -- | 1.6 km | $ 1.4 |
| **Hydrants** | 112 units | 187 units | $ 3.0 |
| **Valves** | 175 units | 349 units | $ 2.5 |
| **Wells** | 3 wells | 4 wells | $ 6.8 |
| **Water Towers** | 2 towers | 1 standpipe | $ 9.9 |
| **TOTAL** | | | **$ 74.3** |

** "Other" category includes polyethylene and copper, as well as mains listed with unknown material type.*

## 4.3.3 REPLACEMENT VALUE

Replacement values for watermains and appurtenances were estimated based on unit costs reflecting current market conditions, as listed in Table 4-38. These unit costs include all costs associated with installation of the asset, including engineering, construction administration, inspections, permits, utility relocation, taxes and contingencies.

For watermains, the unit costs include the costs of the associated service leads, curb stops at the property line, any required fittings, and sub-base, since these elements would be replaced with any watermain replacement. It is further assumed that watermain replacements will be done in conjunction with other renewals in the same right-of-way, so granular and pavement costs are not included in the unit cost, as these would be included in road replacement cost. Moreover, Township staff have indicated that future watermain replacements will be guided by the following:

- Pipes with diameter less than 150mm will be replaced with a diameter of 150mm
- All pipes will be replaced with polyvinyl chloride (PVC)

As such, the unit costs listed in Table 4-38 reflect these replacement guidelines, which will result in a future network composed of PVC watermains.

For mainline valves, valves of unknown type were assumed to be gate valves.

Hydrant costs include the cost of the hydrant and hydrant valve, but not the lead, since the cost of the lead is included with the watermain. Installation costs are also included with the hydrant cost.

Table 4-38 Water Assets – Unit Costs

| Asset Type | Size (diameter in mm) | Unit Cost (2021 $) |
|---|---|---|
| Mains | <150 | $ 863 /m |
| | 152.4 | $ 863 /m |
| | 200 | $ 913 /m |
| | 250 | $ 1,044 /m |
| | 300 | $ 1,163 /m |
| | 400 | $ 1,481 /m |
| | 600 | $ 2,638 /m |
| Gate Valve | 12 | $ 63 / unit |
| | 32 | $ 94 / unit |
| | 38 | $ 94 / unit |
| | 50 | $ 1,063 / unit |
| | 100* | $ 2,188 / unit |
| | 150 | $ 3,125 / unit |
| | 200 | $ 5,125 / unit |
| | 250 | $ 8,938 / unit |
| | 300 | $ 12,000 / unit |
| Ball Valve | 50 | $ 313 / unit |
| | 150 | $ 938 / unit |
| | 250 | $ 1,563 / unit |
| | 300 | $ 1,875 / unit |
| Air Control Valve | 300 | $ 21,250 / unit |
| Backflow Device | 150 | $ 7,500 / unit |
| | 300 | $ 15,000 / unit |
| Fire Hydrant | -- | $ 10,000 / unit |
| Yard Hydrant | -- | $ 5,000 / unit |

* Also applied to gate valves of unknown size

For vertical facilities in the water system, the overall value of each facility was estimated by inflating the purchase values from the TCA registry, and escalating by 25% to allow for costs of design, engineering, construction contract administration, taxes and contingency. Table 4-39 lists the resulting replacement value of each vertical facility.

Table 4-39 Vertical Water Facilities – Replacement Costs Inflated and Escalated from TCA

| Asset Type | Name | Replacement Value (2021 $, millions) |
|---|---|---|
| Arthur Wells | Well 7B & Wellhouse | $ 0.9 |
| | Wells 8A/8B & Wellhouse | $ 2.0 |
| Mount Forest Wells | Well 3 & Wellhouse | $ 1.9 |
| | Well 4 & Wellhouse | $ 0.5 |
| | Well 5 & Wellhouse | $ 0.6 |
| | Well 6 & Wellhouse | $ 0.8 |
| Arthur Water Towers | Charles St. Tower | $ 1.1 |
| | Spheroid Tower | $ 3.6 |
| Mount Forest Standpipe | Standpipe & Booster Pump Station | $ 5.2 |

For wells and wellhouses, the facility replacement value was then portioned out to different building and process systems based on proportions seen in similar facilities. Table 4-40 shows the resulting replacement values by facility system for wells in Arthur, and Table 4-41 shows the same for wells in Mount Forest. The proportions applied are an estimate, used to separate the facility into systems with different expected service life values and different consequences of failure. For future AM Plans, these replacement values should be updated with engineering estimates based on visual inspections.

Table 4-40 Arthur Wells – Replacement Costs by Facility System

| Facility System | Proportion of Facility Value | Replacement Value (2021 $, 1000s) | |
|---|---|---|---|
| | | Well 7B & Wellhouse | Wells 8A/8B & Wellhouse |
| Site Works | 7% | $ 64.4 | $ 142.8 |
| Building Structural | 9% | $ 82.8 | $ 183.5 |
| Building Architectural | 8% | $ 73.6 | $ 163.2 |
| Building Electrical & Mechanical | 14% | $ 128.8 | $ 285.5 |
| Process Electrical | 39% | $ 358.9 | $ 795.4 |
| Process Mechanical | 9% | $ 82.8 | $ 183.5 |
| Process Piping | 11% | $ 101.2 | $ 224.3 |
| Process Instrumentation & Controls | 3% | $ 27.6 | $ 61.2 |
| TOTAL | 100% | $ 920.2 | $ 2,039.4 |

Table 4-41 Mount Forest Wells – Replacement Costs by Facility System

| Facility System | Proportion of Facility Value | Replacement Value (2021 $, thousands) | | | |
|---|---|---|---|---|---|
| | | Well 3 & Wellhouse | Well 4 & Wellhouse | Well 5 & Wellhouse | Well 6 & Wellhouse |
| Site Works | 7% | $ 131.2 | $ 37.3 | $ 44.4 | $ 52.7 |
| Building Structural | 9% | $ 168.6 | $ 47.9 | $ 57.1 | $ 67.8 |
| Building Architectural | 8% | $ 149.9 | $ 42.6 | $ 50.7 | $ 60.3 |
| Building Electrical & Mechanical | 14% | $ 262.3 | $ 74.6 | $ 88.8 | $ 105.5 |
| Process Electrical | 39% | $ 730.7 | $ 207.8 | $ 247.4 | $ 293.8 |
| Process Mechanical | 9% | $ 168.6 | $ 47.9 | $ 57.1 | $ 67.8 |
| Process Piping | 11% | $ 206.1 | $ 58.6 | $ 69.8 | $ 82.9 |
| Process Instrumentation & Controls | 3% | $ 56.2 | $ 16.0 | $ 19.0 | $ 22.6 |
| TOTAL | 100% | $ 1,873.6 | $ 532.7 | $ 634.3 | $ 753.3 |

The Arthur water towers and Mount Forest standpipe were assumed to comprise only Process Structural systems, with a uniform service life and consequence of failure applied to each facility as a whole. As such, the replacement values were not divided into facility systems.

### 4.3.4 ESTIMATED USEFUL LIFE

Estimated useful life values of water assets are listed in Table 4-42. As shown in the Table, different useful life values have been applied to existing watermain materials, as well as for different facility systems of wells. Uniform useful life values have been applied to hydrants (75 years), mainline valves (60 years) and water towers (100 years). These useful life values, along with age, were used to estimate condition of water assets.

Table 4-42 Water Assets – Useful Life

| Asset Type | Estimated Useful Life (Years) |
|---|---|
| Mains | |
| PVC | 90 |
| Cast Iron | 90 |
| Ductile Iron | 90 |
| Polyethylene | 90 |
| Copper | 80 |
| Unknown Material | 90 |
| Hydrants | 75 |
| Valves | 60 |
| Wells | |
| Site Works | 25 |
| Building Structural | 75 |
| Building Architectural | 37 |
| Building Electrical & Mechanical | 25 |
| Process Electrical | 25 |
| Process Mechanical | 25 |
| Process Piping | 37 |
| Process Instrumentation & Controls | 15 |
| Water Towers | 100 |

### 4.3.5 CONDITION

Asset condition was determined based on percent remaining useful life, calculated from each asset's estimated useful life and current age. Asset condition scores were assigned based on the mapping of condition and remaining life shown in Table 4-43. As shown in the Table, condition was linearly mapped to the remaining life, with each score representing a 20% of the asset's life. However, for hydrants and valves, the minimum condition score assigned is Fair. This assumes that there are no hydrants or mainline valves in Poor or Very Poor condition, because these assets are regularly inspected and repaired as needed to ensure that they remain in working condition. Specifically, hydrants are inspected at least once per year, and mainline valves exercised once every 3 years.

Table 4-43 Water Assets – Age-based Condition Index

| Condition Score | | % Useful Life Remaining | |
|---|---|---|---|
| | | Mains<br>Yard Hydrants<br>Wells & Well houses<br>Water Towers<br>Standpipe | Fire Hydrants<br>Valves |
| Very Good | 1 | 80 – 100 | 80 – 100 |
| Good | 2 | 60 – 79 | 60 – 79 |
| Fair | 3 | 40 – 59 | 0 – 59 |
| Poor | 4 | 20 – 39 | n/a |
| Very Poor | 5 | 0 – 19 | n/a |

The condition distribution of watermains is shown in Figure 4-25 for Arthur. The Figure shows that most of the mains in Arthur are PVC, which are in Fair condition or better; however, condition could not be estimated for about half of the PVC mains due to missing installation year data. In addition, approximately 890 m ($0.8 million) of Cast Iron pipes are in Very Poor condition.

Figure 4-26 shows the average age of these pipes by material (assets with unknown installation year have been omitted). This Figure shows that on average, Cast Iron pipes are within one year of their service life, and are thus due for replacement.

Figure 4-25: Condition Distribution - Arthur Watermains

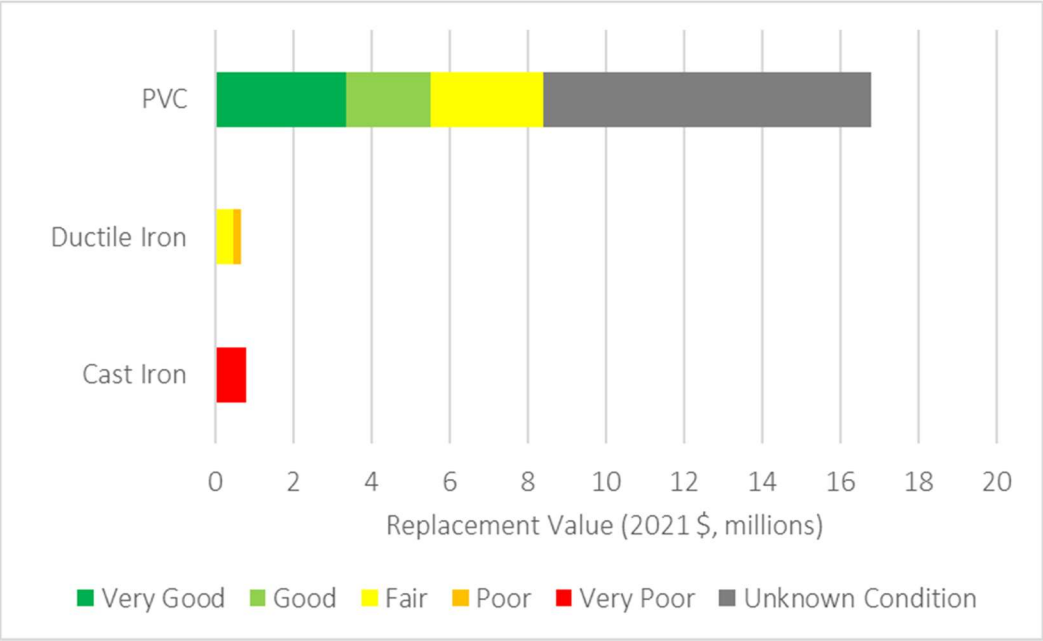
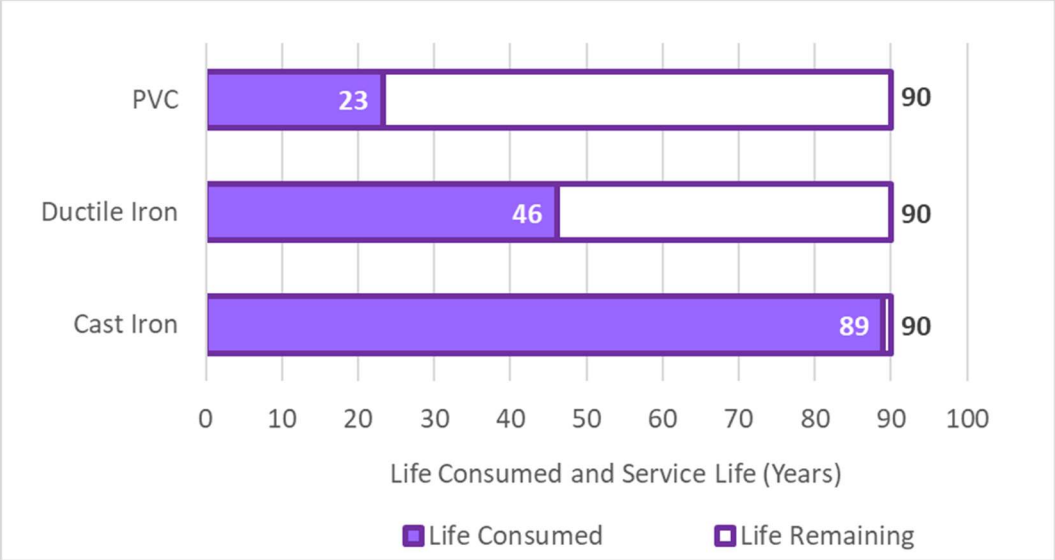



Figure 4-26: Average Age – Arthur Watermains



The condition distribution of watermains in Mount Forest is shown in Figure 4-27. The Figure shows that, similar to Arthur, most of the mains in Mount Forest are PVC, which are mostly in Good or Very Good condition. Approximately 7.0 km ($6.32 million) of ductile iron watermain in Mount Forest are in Poor condition.

Figure 4-28 shows the average age of these pipes by material (assets with unknown installation year have been omitted). This Figure shows that on average, Cast Iron pipes are within one year of their service life, and are thus due for replacement.

In Mount Forest, there are approximately 12km of PVC mains, 10km of cast iron mains and 10.5km of ductile iron mains, along with a small amount of polyethylene and copper mains. There are also 3.8km of mains of unknown material. The PVC mains in Mount Forest are all in Good or Very Good condition, based on age. Cast iron and ductile iron mains are in worse condition, with 4,164m ($3.33 million) of cast iron pipe in Very Poor condition, and 6,952m ($6.32 million) of ductile iron pipe in Poor condition.

Figure 4-27: Condition Distribution – Mount Forest Watermains

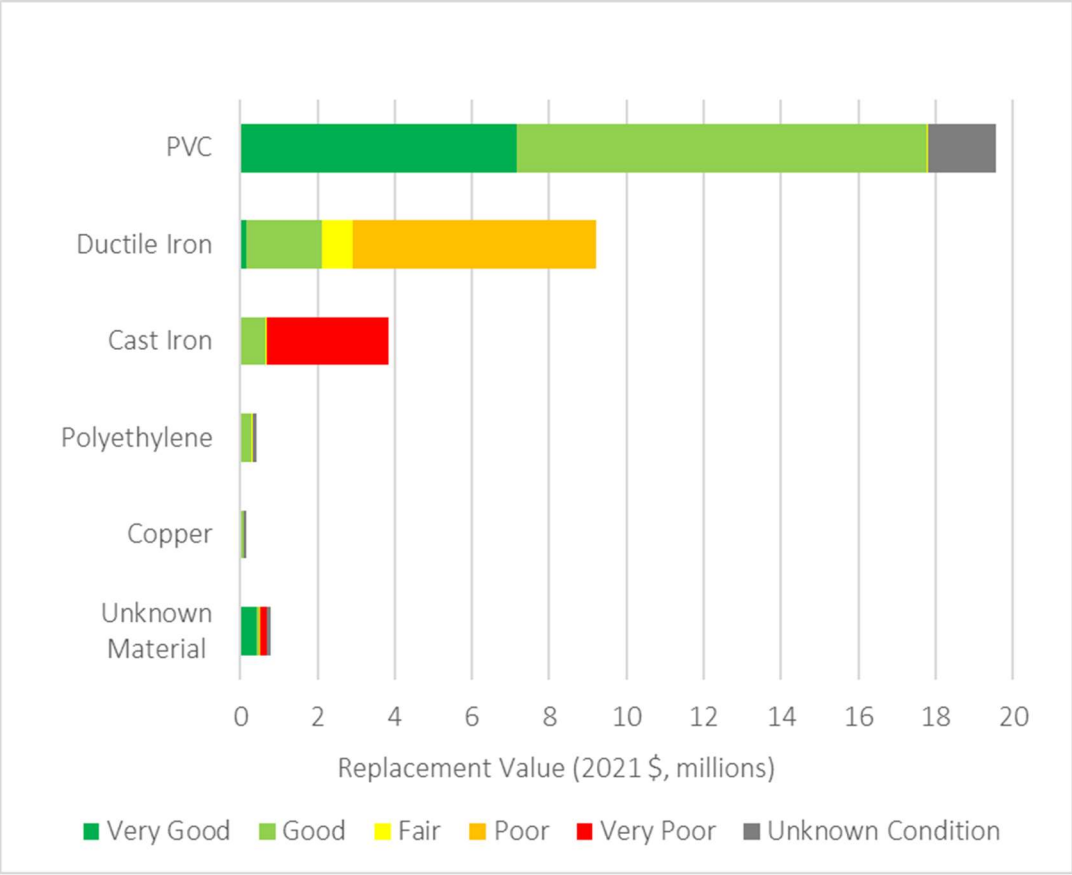



Figure 4-28 shows the average age of these Mount Forest watermains by material (assets with unknown installation year have been omitted). This Figure shows that on average, Cast Iron pipes are within ten years of their service life, and will thus require replacement within the next ten years. Ductile iron mains are past half of their service life, while watermains of other materials are generally around one third into their service life.

Figure 4-28: Average Age – Mount Forest Watermains

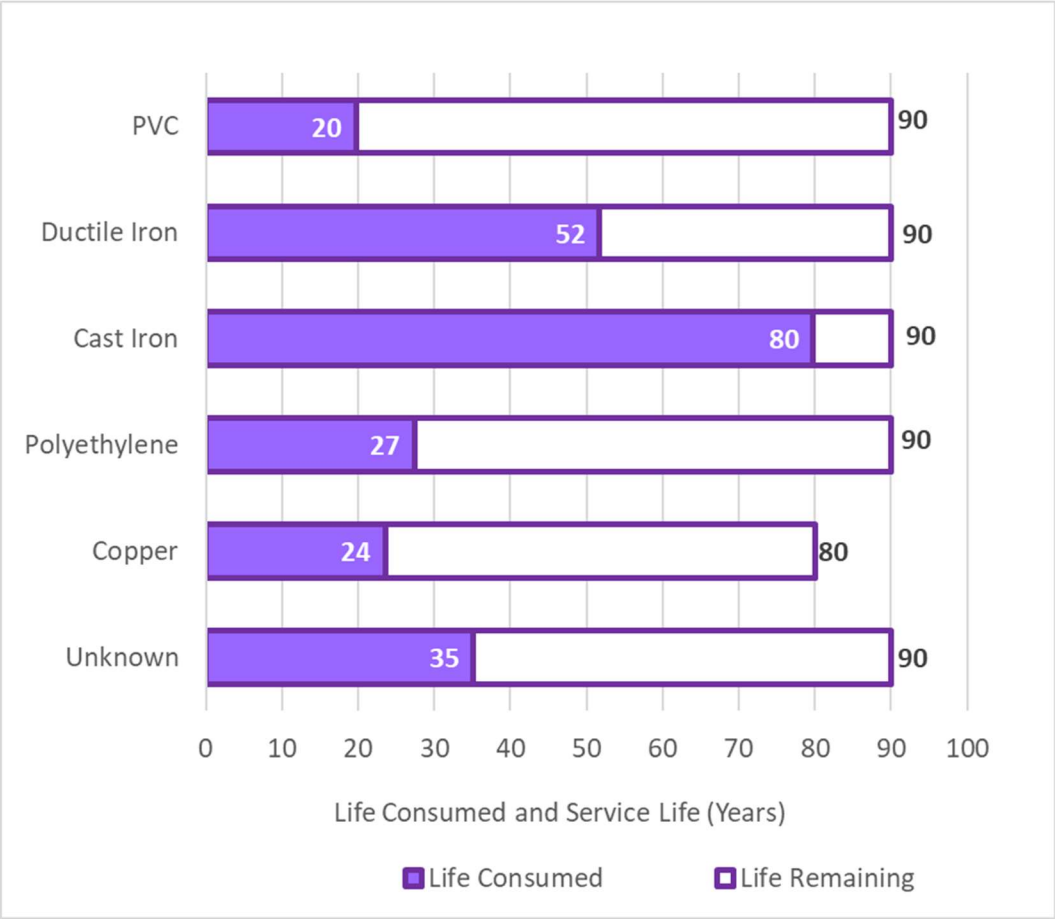


Figure 4-29 shows the condition distribution of Water Valves and Hydrants by Replacement Value in Arthur and Mount Forest (MF). All of these assets are estimated to be in Fair condition or better, because they are regularly inspected and repaired. A large number of these assets are reported as having unknown condition, due to missing installation year data, specifically, 10 hydrants in Arthur with an estimated replacement value totaling $100,000, and 118 valves and 54 hydrants in Mount Forest with an estimated replacement value of over $1.0 million.

Figure 4-29: Water Valves and Hydrants – Condition Distribution

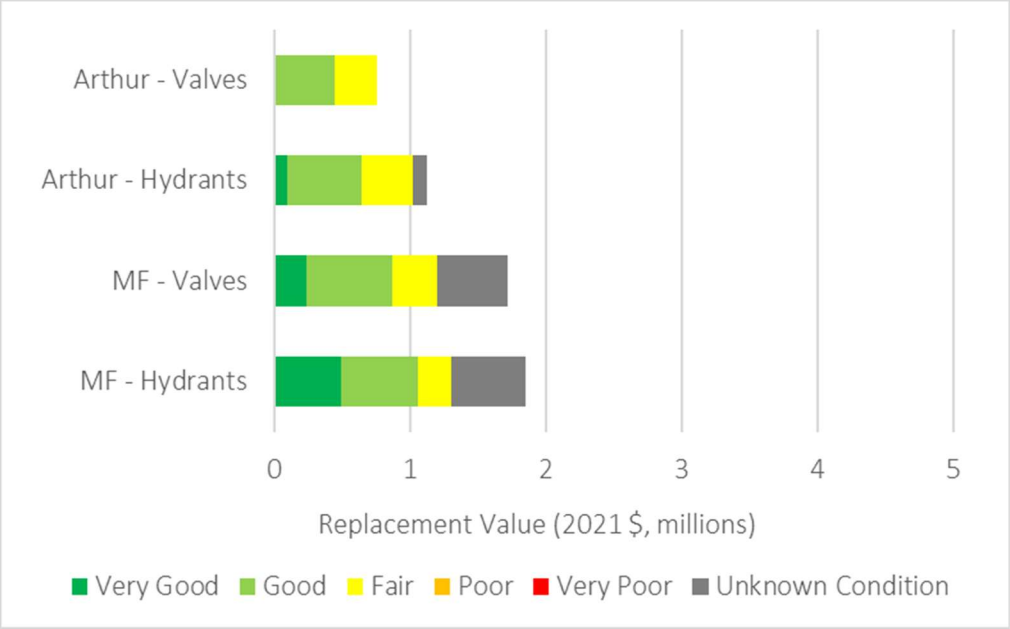
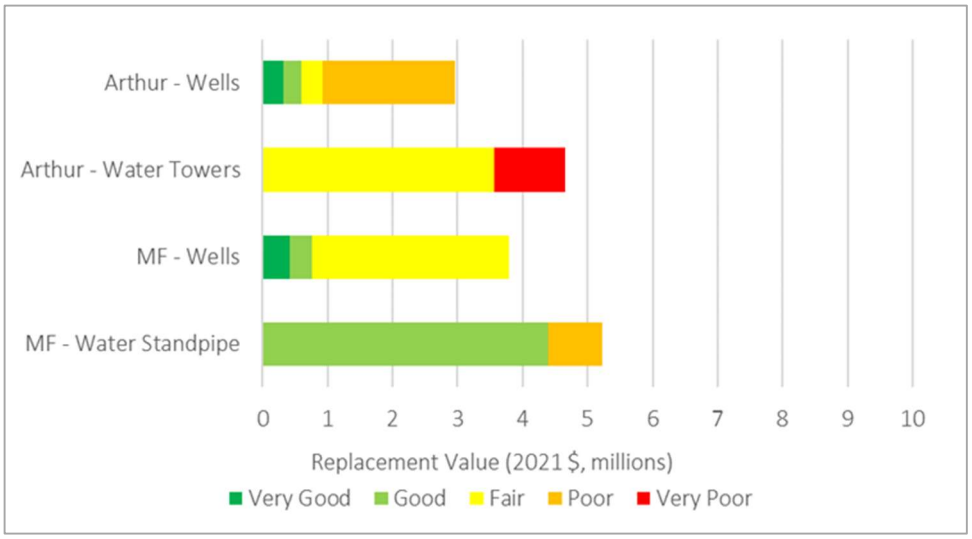



Figure 4-30 shows the condition distribution of Vertical Water Facilities by replacement value. The Figure shows that the Charles St. Water Tower is nearing the end of its service life, and based on age, is considered to be in Very Poor condition.

Figure 4-30: Water Vertical Facilities – Condition by Replacement Value




In the category of Water Towers in the Arthur water system, the Charles St. Tower, which was built in 1932, is nearing its 100-year estimated useful life, and is showing as $1.1 million of assets in Very Poor condition. The Spheroid Water Tower was built in 1967, and is considered in Fair condition, with an estimated replacement value of $3.6 million. Photos of the two towers are shown in Figure 4-31.

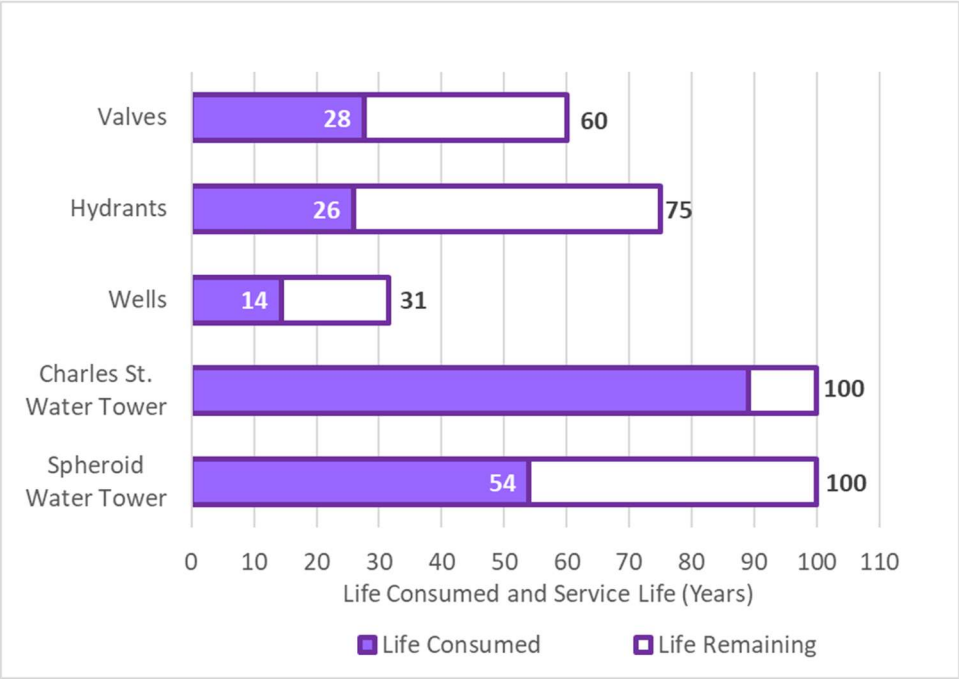
Figure 4-31: Water Towers serving the Arthur Community


In June 2021, the Township approved a decision to replace both towers with a single new tower at the north end of Arthur. The estimated cost of the new tower is $3.7 million, excluding costs of potential need for watermain extension and looping. The new tower will increase the current water storage capacity of 1,364 $m^3$ to 2,000 $m^3$ and will thus accommodate planned development to the year 2045.

The Mount Forest Standpipe is also in Poor condition, and the Township recently decided to rehabilitate it at a cost of $950,000. Township has also decided to build a new water tower at the north end of Mount Forest to increase existing storage capacity from 2,000 $m^3$ to 2,420 $m^3$. It is estimated that the new water tower will cost approximately $4.2 million.

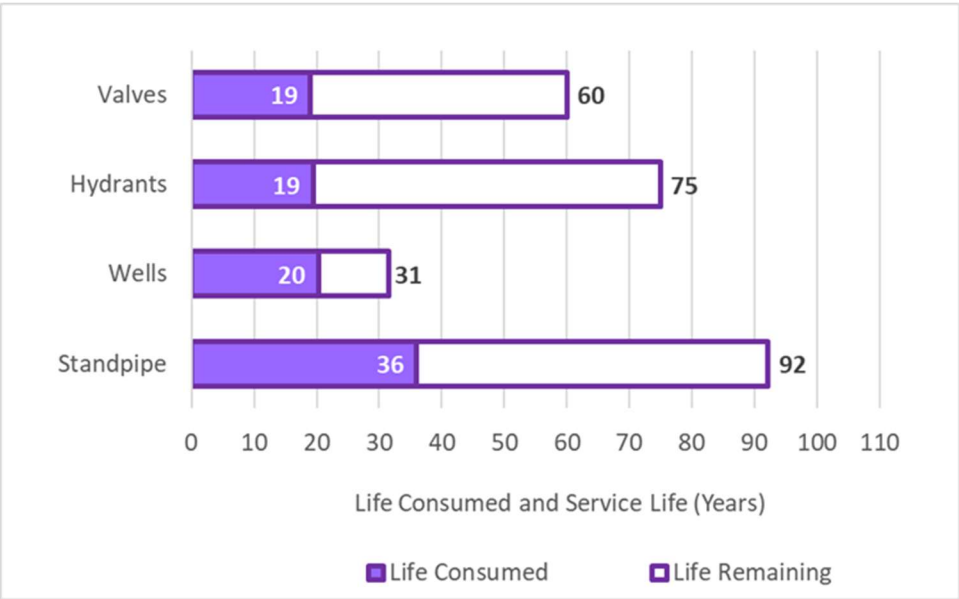
Figures 4-32 shows the average age of valves, hydrants, wells and water towers in the Arthur water system. On average, these asset types are all within their Estimated Useful Life (EUL); however, the Charles St. water tower will reach its theoretical end-of-life in 2032.

Figure 4-32: Average Age – Arthur Water System Appurtenances and Vertical Assets




Figures 4-33 shows the average age of valves, hydrants, wells and the standpipe in the Mount Forest water system. On average, these asset types are all within their Estimated Useful Life (EUL).

Figure 4-33: Average Age – Mount Forest Water System Appurtenances and Vertical Assets



### 4.3.6 LEVELS OF SERVICE

This section presents the Township's Level of Service (LOS) indicators and current performance for Water assets. Community LOS are presented in Table 4-44, and Technical LOS are presented in Table 4-45. The Tables show that for many indicators, targets have not yet been set. For these indicators, current performance is being reported as a baseline for future target-setting, when more data has been collected and analyzed to understand the costs and benefits of different LOS targets.

For some indicators, the current performance is already optimal. For example, the Township has not recorded any boil water advisories since 2018 (reporting as of June 29, 2021), nor any lost connection-days due to watermain breaks for the same period. On the other hand, there is an opportunity to reduce the incidence of watermain breaks by replacing aged metal pipes. There is also a need to increase water flow to a 200m segment of Cork St. to achieve fire flow.

Table 4-44 Water Assets – Community Levels of Service

| Service Attribute | Community Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| Capacity | Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.* | In general, properties within the urbanized areas of Mount Forest and Arthur are connected to the municipal water system, with the exception of some older farm properties.<br><br>Rural areas within the Township are not connected. | No formal target | None |
| | Description, which may include maps, of the user groups or areas of the municipality that have fire flow * | All properties connected to the Arthur water system have adequate fire flow.<br><br>Of properties connected to the Mount Forest water system, all have adequate fire flow, except 6 properties along Cork St. (~200m stretch from Waterloo St. to Princess St.), which require more flow. | All connected properties | 6 properties along Cork St. |
| Function | Description of boil water advisories (BWA).** | No BWA for years 2018-2021 (as of June 29, 2021). | 0 BWA | Target achieved |

| Service Attribute | Community Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| Quality | Description of unplanned service interruptions due to watermain breaks.** | Unplanned service interruptions due to watermain breaks have occurred in the following numbers since 2018:<br>• 2018: 1<br>• 2019: 5<br>• 2020: 2<br>• 2021: 3 (as of June 29, 2021)<br>All breaks have been related to aging metal pipes and frost heave.<br><br>None of the breaks resulted in water outages to any customers. | No formal target | None |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

** These LOS Indicator have been adapted from the O.Reg. 588/17 reporting requirement for "Description of boil water advisories and service interruptions", specifically, to split BWA from other service interruptions, and to focus service interruptions on unplanned interruptions due to watermain breaks.

Table 4-45 Water Assets – Technical Levels of Service

| Service Attributes | Technical Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| Capacity | % properties connected to the municipal water system* | 66.3%<br><br>Total properties in Township: 5,140<br><br>Properties connected to municipal water system = 3,410 | No formal target | None |
| | % of properties where fire flow is available* | 66.2%<br><br>Total properties in Township: 5,140<br><br>Properties connected to municipal water system = 3,404 | All connected properties | None |

| Service Attributes | Technical Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| Function | # 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 | 0 | None |
| Quality | # of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system* | 0 | 0 | None |
| | % Assets in state of good repair (Fair condition or better) | 65% | No formal target | None |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

### 4.3.7 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the water service asset life cycle needs include the following:

- Expansion & Upgrade $ 15.4 million (over ten years)
- Renewal $ 10.44 million (over ten years)
- Operations & Maintenance $ 1.27 million/year

The following sub-sections provide details on the needs in each of these categories.

#### Expansion & Upgrade Needs

The population in Arthur is expected to grow from an estimated 2,410 in 2020 to 4,115 in 2036 and 4,460 in 2041 (see Water and Sanitary Systems Technical Study – Arthur, 2020). The population in Mount Forest is expected to grow from an estimated 5,678 in 2020 to 8,135 in 2036 and 8,440 in 2041 (see Mount Forest Servicing Technical Update, 2021). Expansion and upgrade needs for both water systems were identified in Technical Updates to the Master Plans, completed in 2020 for Arthur and in 2021 for Mount Forest. In June 2021, Council provided direction to pursue specific alternatives from both reports. The following is a summary of the expansion and upgrade needs, totaling **$15.4 million**, based on the Technical Update reports and direction provided by Council in June 2021:

*Arthur Water System*

- Expand selected mains and add new segments - $2.0 million
- Replace both Water Towers with a single new tower - $3.7 million
- Identify and develop a new water source (well) - $3.5 million

*Mount Forest Water System*

- Expand selected mains and add new segments - $2.0 million
  includes expansion of
  - Cork St. main from Waterloo St. to Princess St. to support fire flow

- Dublin St. from Princess Anne St. to Queen St.
- Prince Charles St. from Dublin St. to Arthur St.
- Queen St. from Parkside Dr. to Main St.
- Sligo Rd. from Church St. to Byeland Dr.
- York St. from Queen St. to Peel St.

- Building an additional water tower and main - $4.2 million
  (This alternative is associated with a separate renewal need of to re-coat the existing Mount Forest standpipe at a cost of $0.95 million.)

### Renewal Needs

Table 4-46 lists the Township's projected renewal needs by asset type to 2031. The total renewal need to 2031 is **$10.44 million**. This includes the need to replace cast iron pipes and thin-walled PVC, as recommended in the Technical Update reports, the need to replace hydrants attached to mains that are being replaced, the need to renew components of wells (electrical, mechanical and instrumentation), and the need to re-coat the Mount Forest standpipe.

For each renewal need, Table 4-46 lists Probability of Failure (PoF), Consequence of Failure (CoF) and resulting Risk Exposure ratings to support prioritization of activities. Prioritization for Risk Management is discussed in detail in Section 4.3.8.

Table 4-46 Water Service Asset Renewal Needs to 2031

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Watermains | Replace at end of life, in coordination with corridor works | **Arthur (<u>$2.03 million</u>)**<br>Replace 900m of Cast Iron pipes, which are at end of life:<br>• Edward St. (260m) from Frederick St. to Charles St.<br>• Frederick St. West (140m) from Edward St. to George St.<br>• Walton St. (175m) from Clark St. to Tucker St.<br>• Clark St. (350m) from Domville St. to ~165 Clark St. | 5 | 2 | High | 2022 | $767 |
| | | Replace 1470m of thin-walled PVC pipes (as recommended in 2021 Technical Update):<br>• Domville St. (430m) from Preston St. to Conestoga (this segment also requires stormwater infrastructure)<br>• Adelaide St. (250m) from Clark St. to Conestoga St.<br>• Bellefield St. (350m)<br>• Lynwood St. (220m)<br>• Eastview Drive (220m) | 3 | 2 | Low | Moderate | $1,268 |
| | | **Mount Forest (<u>$2.99 million</u>)**<br>Replace 4,334m of Cast Iron pipes, which are at end of life (replace with minimum diameter of 150mm): | | | | | |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| | | • Grant St. (64m) from Main St. S to Parkside Dr. | 5 | 4 | Very High | 2022 | $60 |
| | | • Birmingham St. (324m) from Normanby St. W to Main St. N | 5 | 3 | Very High | 2022 | $237 |
| | | • Birmingham St. (447m) from Queen St. to Normanby St. W<br>• Birmingham St. (6m) from Main St. N to Fergus St. N<br>• Byeland Dr. (487m) from Sligo Rd. E to Egremont St. N<br>• Dublin St. (12m) from Martin St. north 12m<br>• Durham St. (381m) from Main St. N to Church St. N<br>• Egremont St. (128m) from Byeland Dr. to Durham St. E<br>• Fergus St. (602m) from Sligo Rd. E to Wellington St. E<br>• John St. (215m) from Queen St. W to Wellington St.<br>• King St. (306m) from Main St. S to Egremont St. S<br>• Murphy St. (115m) from Main St. S to 115m E of Main St. S<br>• Peel St. (266m) from Queen St. E to North Water St.<br>• South Water St. (602m) from Main St. S to SW end of South Water St. | 5 | 2 | High | 2022 | $2,696 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| | | • Wellington St. (141m) from Fergus St. to Egremont St. S<br>• York St. (128m) from Peel St. to Queen St. E<br>• North Water St. (110m) from Peel St. to Main St. S | 5 | 1 | Moderate | 2022 | $ 49 |
| Hydrants | Replace with mains | **$0.34 million** for hydrants along mains that require replacement. On average, the two systems have one hydrant per 175m of mains. Hydrant replacement need will thus be:<br>**Arthur**<br>• 5 hydrants for 900m of CI pipe<br>• 8 hydrants for 1,460m of thin-walled PVC pipe<br>**Mount Forest**<br>• 22 hydrants for 4,334m of CI pipe | 3<br>3<br>3 | 2<br>2<br>2 | Low<br>Low<br>Low | With main<br>With main<br>With main | $ 50<br>$ 80<br>$ 220 |
| Valves | Replace with mains | Include in cost (contingency) of mains | n/a | | | | none |
| Wells | Replace at end of life | **$2.13 million** for Arthur Well 7B and Wells 8A/8B:<br>• Electrical, mechanical, site works<br>• Instrumentation and controls<br>**$2.00 Million** for Mount Forest Wells 3, 4, 5 and 6: | 4<br>3 | 1<br>1 | Low<br>Very Low | 2029<br>2030 | $ 2,042<br>$ 89 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| | | • Electrical, mechanical, site works<br>• Instrumentation and controls | 3<br>3 | 1<br>1 | Very Low<br>Very Low | Varies<br>2030 | $ 1,887<br>$ 114 |
| Water Towers | Replace at end of life | In Arthur, both water towers will be replaced by a single new tower with larger capacity. This is treated as an Expansion need. As such, the Spheroid and Charles St. towers will be decommissioned. | n/a | | | | none |
| | Re-coat | The Mount Forest standpipe requires re-coating at an estimated cost of **$0.95 million**. | 4 | 3 | Very High | 2060 | $ 950 |
| **TOTAL RENEWAL NEED (2022-31)** (excludes needs that will be funded by operating) | | **$ 10.44 million** | | | | | |

### Operations & Maintenance Needs

Operations costs include day-to-day costs associated with running and overseeing the water system. This includes labour, electricity and program delivery costs, such as providing underground locates, and promoting water conservation. Maintenance activities include inspection, preventive maintenance and minor repairs. Operations and Maintenance (O&M) activities are both funded by the Township's operating budget.

Figure 4-34 shows the operating expenditures for 2018-20, as well as the 2021 budget. Some of the activities supported by this budget are listed in Table 4-47. The Township estimates that the 2021 budget is sufficient for the current activities and network size. Moreover, the Township believes its current budget can absorb some growth assets, which are added to the portfolio each year through ownership assumption or construction. As such, the 2021 budget amount will be taken as representative of the annual operating budget need for the period 2022-2031.

In the next few years, the Township is working toward implementing a work order management system, which will provide detailed information on operations and maintenance costs associated with different assets and activities. This will provide a more reliable basis for calculating the operating cost impact of growth assets.

Figure 4-34: Operating Expenditures 2018-20 and 2021 Budget – Water Service

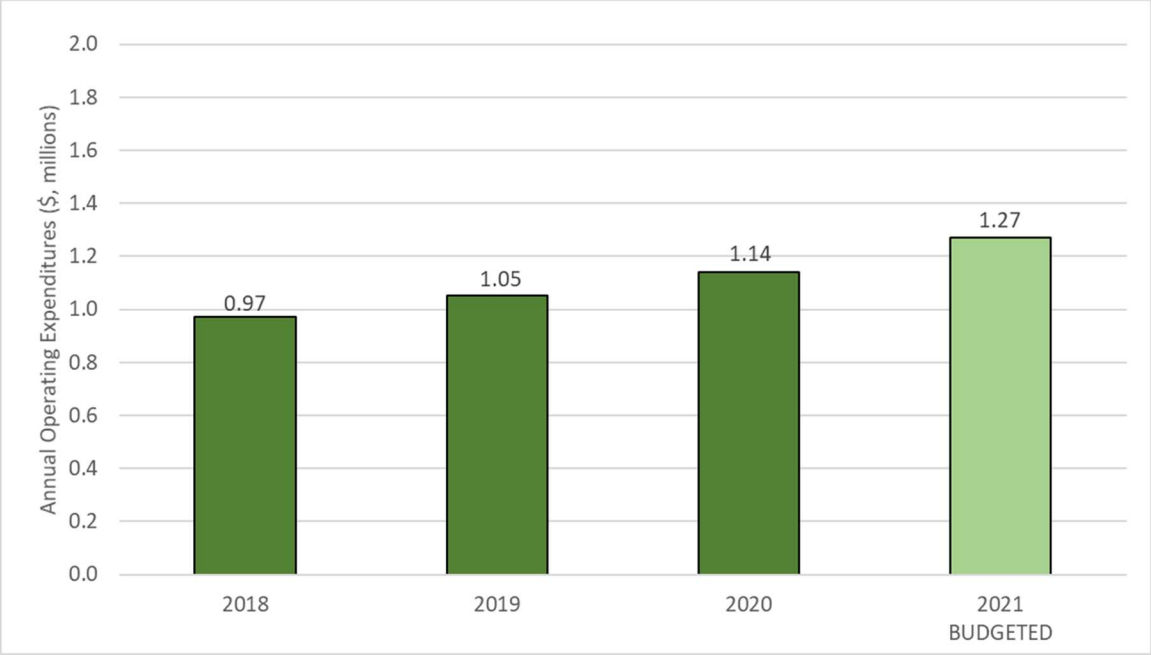


Table 4-47 Operating Activities and Frequencies – Water Service

| Asset Type | Activity | Frequency |
|---|---|---|
| Watermains | Inspection<br>Watermain flushing | When uncovered<br>Weekly, as weather and time permits |
| Hydrants | Inspection and Flushing | Annually |
| Valves | Inspection and Exercising | Every 3 years |
| Wells & Well Houses | Condition Assessment of Building<br>Condition Assessment of below grade<br>Maintenance (e.g. cleaning chlorine analyzers, cleaning injector tips, alarm testing) | Every 5 years<br>Every 10 years<br>Monthly |
| Water Towers & Standpipe | Condition Assessment<br>Draining & Filling | Every 3 years (last done in 2020, except for Charles St. Tower, which was assessed in 2021)<br>Usually completed during assessment |

### 4.3.8 RISK

Improvements to asset and system capacity, function and condition are often limited by available funding and resources. It thus becomes necessary to prioritize asset investments and improvements based on risk exposure. Probability of Failure is approximated based on asset condition, while Consequence of Failure is estimated based on expected impact of an asset failure, as shown in Table 4-48.

Table 4-48 Consequence of Failure Ratings – Water Assets

| Asset Type | Assumptions | Consequence Category of Highest Concern | Attributes | CoF |
|---|---|---|---|---|
| Watermains | Unplanned failure will result in damage to a pipe segment, road and Right-of-Way (RoW) assets, and may also damage private assets. Impacts are higher with greater flow, and thus pipe diameter. | Financial Impacts | 0 to < 200 mm diameter | 2 |
| | | | 200 to < 300 mm diameter | 3 |
| | | | 300 to < 500 mm diameter | 4 |

| | | | | |
|---|---|---|---|---|
| | Other potential impacts (however, these will be managed, and CoF will likely not exceed Financial CoF):<br><br>Traffic and pedestrian safety may be compromised.<br><br>Water service may be reduced or shut off in the area during the repair. Redundancy has not been considered in these CoF ratings.<br><br>Environmental impacts are minimal for a temporary spill of treated water. | | >= 500 mm diameter | 5 |
| **Fire Hydrants** | If a hydrant fails, a neighbouring hydrant will be used. This could cause delay in the event of emergency, but system has redundancy. Also, rarity of emergency is embedded in this score.<br><br>It is assumed that if a hydrant fails, only the hydrant itself is damaged, and no damage occurs to other RoW assets or private property. | H&S Impacts | ALL | 2 |
| **Valves** | Valves fail by getting stuck, and must be replaced, along with a new pipe segment (sleeve). The CoF of 2 reflects the financial consequence.<br><br>Other types of consequences are minimal (safety, availability, environmental). | Financial Impacts | ALL | 2 |

Based on those CoF ratings, Figure 4-35 shows the risk exposure mapping for watermain assets that require renewal within the next ten years. As listed in Table 4-46 in Section 4.3.7, these assets include cast iron mains, which were installed in the 1930's in both Arthur and Mount Forest. Their theoretical end-of-life is 2022, and should be renewed in coordination with other corridor capital works.

The Figure also includes 1.46km of thin-walled PVC pipe in the Arthur water system. These have not reached theoretical end-of-life yet, but the 2021 Technical Update recommended that these be replaced when an opportunity arises in conjunction with other corridor works. These segments are shown in the Risk map with PoF = 3 and CoF = 2 (moderate risk).

Figure 4-35: Watermain Assets – Risk Exposure Map

| Assets requiring repair / replacement by 2031 (in 2021 $) | 5.4 | millions |
|---|---|---|

| PoF | | | | | |
|---|---|---|---|---|---|
| 5 | $ 0.05 | $ 3.46 | $ 0.24 | $ 0.06 | - |
| 4 | - | - | - | - | - |
| 3 | - | $ 1.26 | - | - | - |
| 2 | - | - | - | - | - |
| 1 | - | - | - | - | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

It is expected that hydrants and valves will be replaced with their associated mains and would not be replaced based on their individual condition. As such, risk-based prioritization is not applied to those assets. Between replacements, these assets are inspected and exercised (annually for hydrants, every three years for valves).

For assets in vertical facilities, consequence of failure is calculated based on:

- the criticality of the facility to the overall system
- the criticality of the component to the facility

The overall CoF for the component is the lower those two values.

For Facility CoF, all wells are assigned a value of Facility CoF of 1, because each system is served by multiple wells, and failure of a single well will not affect service. In contrast, the Mount Forest standpipe and Arthur Spheroid tower are critical to their respective water systems, and thus have been assigned Facility CoF = 5. The Charles St. water tower, however, is smaller, and its failure would not affect the service. As such, it has a Facility CoF of 1.

Table 4-49 shows the Component CoF ratings applied, based on the negative impact of component failure on service delivery. The overall CoF for each component was then calculated as the lower of the Component CoF and the Facility CoF. As such, for all wells, as well as for the Charles St. Tower, each component had an overall CoF of 1 since the Facility CoF was 1.

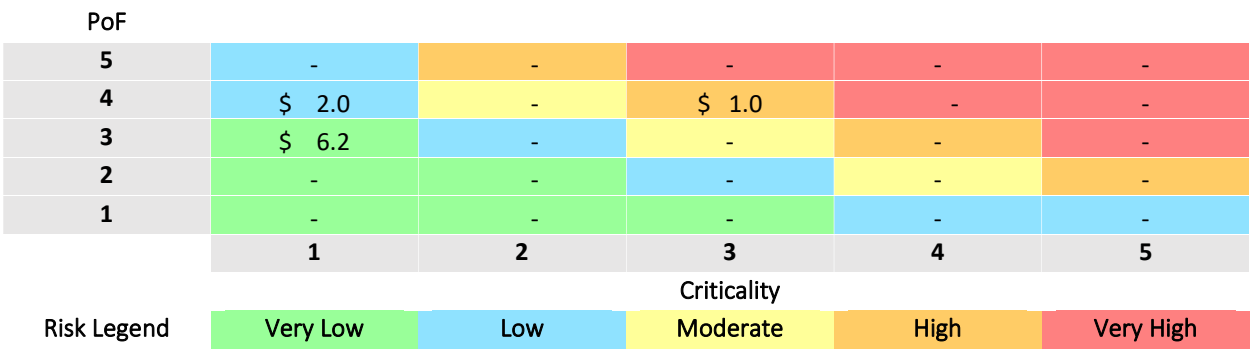
In contrast, for the Spheroid tower and the Mount Forest Standpipe, Overall CoF was equivalent to Component CoF, because the Facility CoF was 5.

Table 4-49 Consequence of Failure Ratings – Components of Water Vertical Assets

| Facility System | Component CoF |
|---|---|
| Site Works | 3 |
| Building Structural | 4 |
| Building Architectural | 2 |
| Building Mechanical & Electrical | 4 |
| Process Electrical | 3 |
| Process Mechanical | 3 |
| Process Piping | 3 |
| Instrumentation & Controls | 4 |

Based on those CoF ratings, Figure 4-36 shows the risk exposure mapping for vertical facility assets that require renewal within the next ten years. As listed in Table 4-46 in Section 4.3.7, these assets include electrical, mechanical, site works, instrumentation and controls at all wells, as well as the need for re-coating the Mount Forest Standpipe.

Figure 4-36: Water Vertical Facility Assets – Risk Exposure Map



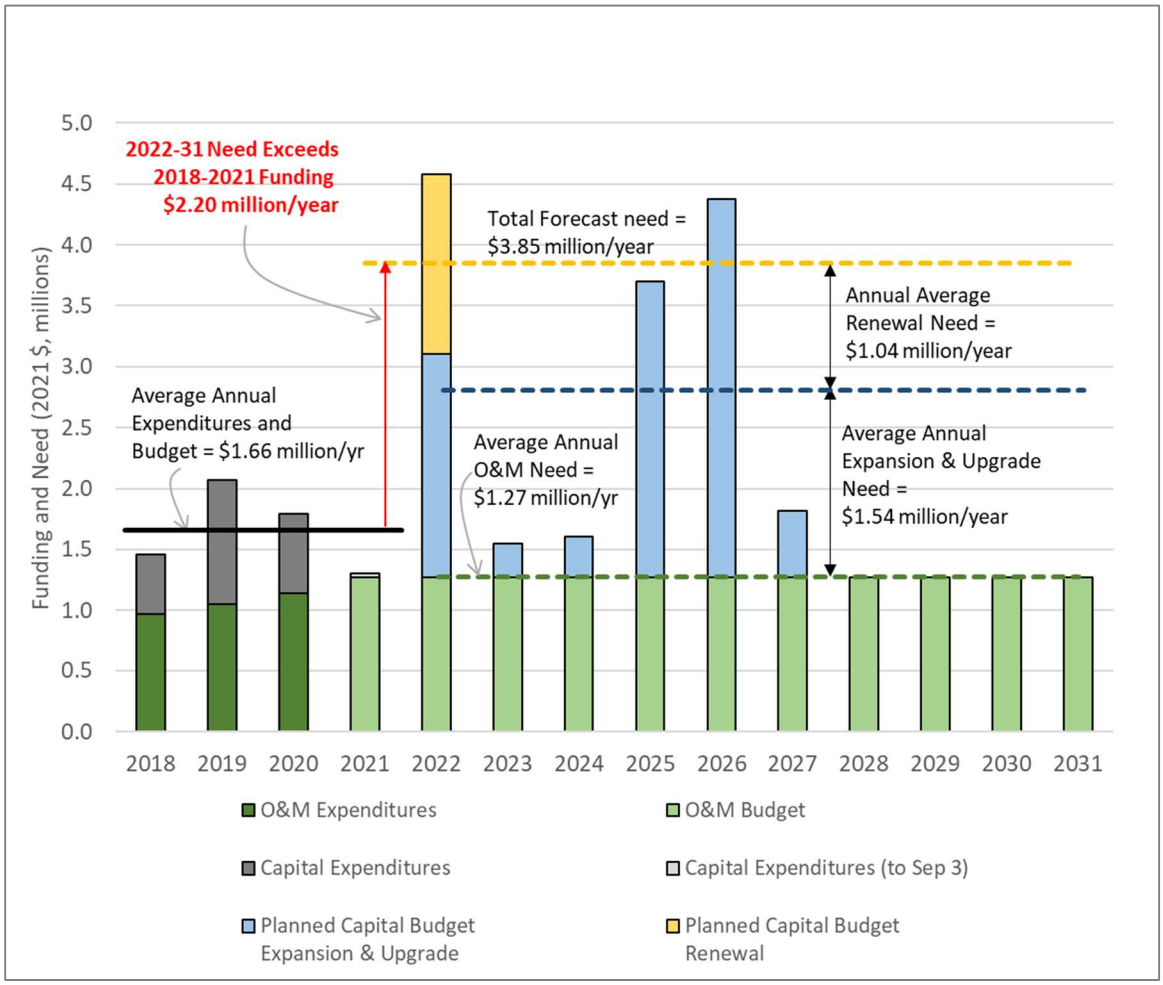
### 4.3.9 FINANCIAL IMPACT

Figure 4-37 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $1.66 million/year. In contrast, the forecast need for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031) is $3.85 million/year. This represents an increase of $2.20 million/year, and includes the life cycle costs described in Section 4.2.7, specifically:

- Expansion & Upgrade $ 15.4 million (over ten years)
- Renewal $ 10.44 million (over ten years)
- Operations & Maintenance $ 1.27 million/year

The Township may also prioritize needs based on risk, as discussed in Section 4.3.8. Specifically, prioritizing the $0.3 million of renewal needs (over the next 10 years) that are considered Very High risk. These needs consist of replacement of aging Cast Iron pipe in Mount Forest.

Figure 4-37: Historical Expenditures and Projected Needs – Water Service




The following expansion/upgrade projects, are also considered Very High priority, since they are critical to meeting future demand and capacity needs:

- Replacing the Arthur Water Towers with a single new tower - $3.7 million
- Identifying and developing a new water source (well) - $ 3.5 million

- Building an additional water tower and main in Mount Forest - $4.2 million

The next needs to be prioritized would be to renew assets in the High risk (orange) section of the risk map, specifically:

- Replacing $3.6 million of aging Cast Iron pipe in Arthur and Mount Forest
- Re-coating the Mount Forest Standpipe - $0.95 million

The following expansion/upgrade projects, are also considered High priority:

- Expand selected mains and adding new segments in Arthur - $2.0 million
- Expand selected mains and adding new segments in Mount Forest- $2.0 million

Figure 4-37 shows that the average annual capital needs (renewal, upgrade and expansion) for 2022-2031 are more than three times the amount of capital that was delivered annual from 2018-2020. As such, additional staff may be needed to support capital delivery in the future.

# 4.4 WASTEWATER SERVICE

## 4.4.1 INTRODUCTION

Wastewater service in the Township is provided by two separate wastewater systems, one serving the community of Mount Forest and the other serving the community of Arthur. Both systems include a dedicated sanitary sewer/forcemain collection network. The Mount Forest system includes four sewage pumping stations (SPS) and a wastewater treatment plant (WWTP), while the Arthur system includes two sewage pumping stations (SPS), a wastewater treatment plant (WWTP) and an effluent storage lagoon facility. The Mount Forest network services 2,250 connections, and the Arthur network 1008 service connections, according to Township records (2020).

## 4.4.2 INVENTORY

The municipal wastewater service is comprised of sewer mains, maintenance holes, valves, SPS and WWTP. Table 4-50 summarizes the wastewater service inventory in terms of quantity and replacement value. Data sources and assumptions are listed in Appendix C.

Table 4-50 Wastewater Assets – Inventory and Replacement Value

| Asset Type | Arthur Quantity | Mount Forest Quantity | Replacement Value (2021 $, millions) |
|---|---|---|---|
| **Mains** | **20.9 km** | **31.8 km** | **$ 55.1** |
| PVC | 8.8 km | 19.5 km | $ 30.4 |
| Asbestos Cement | 9.7 km | 1.1 km | $ 10.1 |
| Concrete | 1.9 km | 0.5 km | $ 4.3 |
| Other/Unknown | 0.5 km* | 10.7 km** | $ 10.4 |
| **Maintenance Holes** | 227 units | 374 units | $ 5.9 |
| **Valves** | -- | 3 units | $ 0.01 |
| **Sewage Pumping Stations** | 2 facilities | 4 facilities | $ 13.3 |
| **WWTP** | 1 facility | 1 facility | $ 40.5 |
| **TOTAL** | | | **$ 114.9** |

* 0.5km pipes of unknown material

** 430m clay pipes, 110m polyethylene pipes and 10.15km pipes of unknown material

## 4.4.3 REPLACEMENT VALUE

Replacement values for sewer mains and appurtenances were estimated based on unit costs reflecting current market conditions, as listed in Table 4-51. These unit costs include all costs associated with installation of the asset, including engineering, construction administration, inspections, permits, utility relocation, taxes and contingencies.

For mains, the unit costs include the costs of the associated service leads, any required fittings, and sub-base, since these elements would be replaced with any main replacement. It is further assumed that sewer main replacements will be done in conjunction with other renewals in the same right-of-way, so granular and pavement costs are not included in the unit cost, as these would be included in road replacement cost. Moreover, Township staff have indicated that future main replacements will be guided by the following:

- Pipes with diameter less than 150mm will be replaced with a diameter of 150mm
- All pipes will be replaced with polyvinyl chloride (PVC)

As such, the unit costs listed in Table 4-51 reflect these replacement guidelines, which will result in a future network composed of PVC mains.

Table 4-51 Wastewater Assets – Unit Costs

| Asset Type | Size (mm) | Unit Cost (2021 $) |
|---|---|---|
| Mains | 100 | $ 556 |
| | 150 | $ 863 |
| | 152.4 | $ 863 |
| | 200 | $ 913 |
| | 250 | $ 1,044 |
| | 300 | $ 1,163 |
| | 350 | $ 1,325 |
| | 375 | $ 1,403 |
| | 400 | $ 1,481 |
| | 450 | $ 1,763 |
| | 500 | $ 2,044 |
| | 600 | $ 2,638 |
| Maintenance Holes | 1200 | $ 9,805 |
| Valves | 75 | $ 1,375 |
| | 100 | $ 2,188 |
| | 250 | $ 8,938 |

For vertical facilities in the wastewater system, the overall value of each facility was estimated by inflating the purchase values from the TCA registry and escalating by 25% to allow for costs of design, engineering, construction contract administration, taxes and contingency. Table 4-52 lists the resulting replacement value of each vertical facility.

Table 4-52 Wastewater Facilities – Replacement Values

| Facility Type | Name | Replacement Value (2021 $, millions) |
|---|---|---|
| Mount Forest Sewage Pumping Station (SPS) | Cork St. SPS | $ 4.1 |
| | Durham St. SPS | $ 3.4 |
| | North Water St. SPS | $ 3.6 |
| | Perth St. SPS | $ 0.2 |
| Mount Forest WWTP | -- | $ 23.2 |
| Arthur SPS | Frederick St. SPS | $ 1.6 |
| | Wells St. SPS | $ 0.4 |
| Arthur WWTP & Lagoons | -- | $ 17.3 |

For SPS, the facility replacement value was then portioned out to different building and process systems based on proportions seen in other process facilities. Table 4-53 shows the resulting replacement values by facility system for SPS in Arthur, and Table 4-54 shows the same for SPS in Mount Forest. The proportions applied are an estimate, used to separate the facility into systems with different expected service life values and different consequences of failure. For future AM Plans, these replacement values should be updated with engineering estimates based on visual inspections.

Table 4-53 Arthur Sewage Pumping Stations – Replacement Costs by Facility System

| Facility System | Proportion of Facility Value | Replacement Value (2021 $, 1000s) | |
|---|---|---|---|
| | | Frederick St. SPS | Wells St. SPS |
| Site Works | 7% | $ 111.9 | $ 30.5 |
| Building Structural | 9% | $ 143.9 | $ 39.2 |
| Building Architectural | 8% | $ 127.9 | $ 34.9 |
| Building Electrical & Mechanical | 14% | $ 223.9 | $ 61.0 |
| Process Electrical | 39% | $ 623.6 | $ 170.0 |
| Process Mechanical | 9% | $ 143.9 | $ 39.2 |
| Process Piping | 11% | $ 175.9 | $ 47.9 |
| Process Instrumentation & Controls | 3% | $ 48.0 | $ 13.1 |
| TOTAL | **100%** | **$ 1,599.0** | **$ 435.8** |

Table 4-54 Mount Forest Sewage Pumping Stations – Replacement Costs by Facility System

| Facility System | Proportion of Facility Value | Replacement Value (2021 $, thousands) | | | |
|---|---|---|---|---|---|
| | | Cork St. SPS | Durham St. SPS | North Water St. SPS | Perth St. SPS* |
| Site Works | 7% | $ 288.8 | $ 235.7 | $ 254.5 | |
| Building Structural | 9% | $ 371.3 | $ 303.1 | $ 327.2 | |
| Building Architectural | 8% | $ 330.0 | $ 269.4 | $ 290.8 | |
| Building Electrical & Mechanical | 14% | $ 577.5 | $ 471.5 | $ 509.0 | |
| Process Electrical | 39% | $ 1,608.8 | $ 1,313.5 | $ 1,417.8 | $ 25.3 |
| Process Mechanical | 9% | $ 371.3 | $ 303.1 | $ 327.2 | $ 25.3 |
| Process Piping | 11% | $ 453.8 | $ 370.5 | $ 400.0 | $ 38.8 |
| Process Instrumentation & Controls | 3% | $ 123.8 | $ 101.0 | $ 109.1 | $ 43.9 |
| TOTAL | **100%** | **$ 4,125.0** | **$ 3,367.9** | **$ 3,635.4** | **$ 161.1** |

* Assumed to be process equipment only, without a building.

The facility replacement value was also portioned out to different building and process systems For wastewater treatment facilities, as shown in Table 4-55 for the WWTP in Arthur, and Table 4-56 for the WWTP in Mount Forest. Table 4-55 also shows how the construction costs from different expansion events at the Arthur WWTP were allocated across different systems.

Table 4-55 Arthur WWTP – Replacement Costs by Facility System

| Facility System | Proportion of Facility Value | Portion Constructed in 1990 | Spare Pump Purchased in 2017 | TOTAL |
|---|---|---|---|---|
| Site Works | 7% | $ 865.6 | | $ 865.6 |
| Building Structural | 9% | $ 1,112.9* | | $ 1,112.9 |
| Building Architectural | 8% | $ 989.3 | | $ 989.3 |
| Building Electrical & Mechanical | 14% | $ 1,731.2 | | $ 1,731.2 |
| Process Electrical | 39% | $ 4,822.6 | | $ 4,822.6 |
| Process Mechanical | 9% | $ 1,112.9 | $ 7.5 | $ 1,120.4 |
| Process Piping | 11% | $1,360.2** | | $ 1,360.2 |
| Process Instrumentation & Controls | 3% | $ 371.0*** | | $ 371.0 |
| Lagoons | | $ 4,934.7 | | $ 4,934.7 |
| TOTAL | 100% | $ 17,300.3 | $ 7.5 | $ 17,307.9 |

* Roof replaced in 2014, replacement value unchanged

** Replaced in 2020, replacement value unchanged

*** Replaced in 2015, replacement value unchanged

Table 4-56 Mount Forest WWTP – Replacement Costs by Facility System

| Facility System | Proportion of Facility Value | Replacement Value (2021 $, thousands) WWTP |
|---|---|---|
| Site Works | 7% | $ 1,624.3 |
| Building Structural | 9% | $ 2,088.4 |
| Building Architectural | 8% | $ 1,856.4 |
| Building Electrical & Mechanical | 14% | $ 3,248.9 |
| Process Electrical | 39% | $ 9,049.9 |
| Process Mechanical | 9% | $ 2,088.4 |
| Process Piping | 11% | $ 2,552.5 |
| Process Instrumentation & Controls | 3% | $ 696.1 |
| TOTAL | 100% | $ 23,204.9 |

* Assumed to be process equipment only, without a building.

### 4.4.4 ESTIMATED USEFUL LIFE

Estimated useful life values of wastewater assets are listed in Table 4-57. As shown in the Table, different useful life values have been applied to existing sewer main materials, as well as for different building and process systems within vertical facilities. Uniform useful life values have been applied to maintenance holes (75 years), mainline valves (50 years) and lagoons (50 years). These useful life values, along with age, were used to estimate condition of wastewater assets.

Table 4-57 Wastewater Assets – Useful Life

| Asset Type | Estimated Useful Life (Years) |
|---|---|
| **Mains** | |
| PVC | 90 |
| Asbestos Cement | 70 |
| Concrete | 90 |
| Clay | 80 |
| Cast Iron | 80 |
| Ductile Iron | 60 |
| Steel | 60 |
| Unknown Material | 80 |
| **Maintenance Holes** | 75 |
| **Valves** | 50 |
| **Sewage Pumping Stations & WWTP** | |
| Site Works | 25 |
| Building Structural | 75 |
| Building Architectural | 37 |
| Building Electrical & Mechanical | 25 |
| Process Electrical | 25 |
| Process Mechanical | 25 |
| Process Piping | 37 |
| Process Instrumentation & Controls | 15 |
| **Lagoons** | 50 |

### 4.4.5 CONDITION

Asset condition was determined based on percent remaining useful life, calculated from each asset's estimated useful life and current age. Asset condition scores were assigned based on the mapping of condition and remaining life shown in Table 4-58. As shown in the Table, condition was linearly mapped to the remaining life, with each score representing a 20% of the asset's life.

Table 4-58 Wastewater Assets – Age-based Condition Index

| Condition Score | | % Useful Life Remaining |
|---|---|---|
| **Very Good** | 1 | 80 – 100 |
| **Good** | 2 | 60 – 79 |
| **Fair** | 3 | 40 – 59 |
| **Poor** | 4 | 20 – 39 |
| **Very Poor** | 5 | 0 – 19 |

The condition distribution of sewer mains is shown in Figure 4-38 for Arthur. In Arthur, asbestos cement mains have reached or are reaching end-of-life, including 1.8km of asbestos cement mains are in Very Poor condition. Concrete mains are in Fair and Poor condition, and PVC mains are generally in Good condition.

Figure 4-39 shows the average age of Arthur Wastewater mains by material.

Figure 4-38: Condition by Replacement Value – Arthur Wastewater Mains

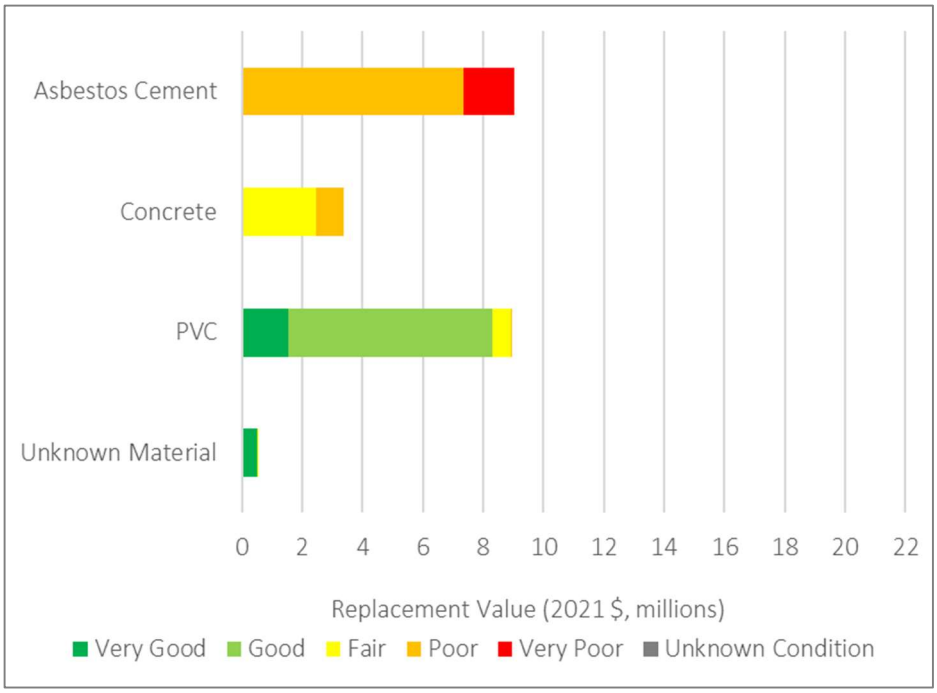



Figure 4-39: Average Age – Arthur Wastewater Mains

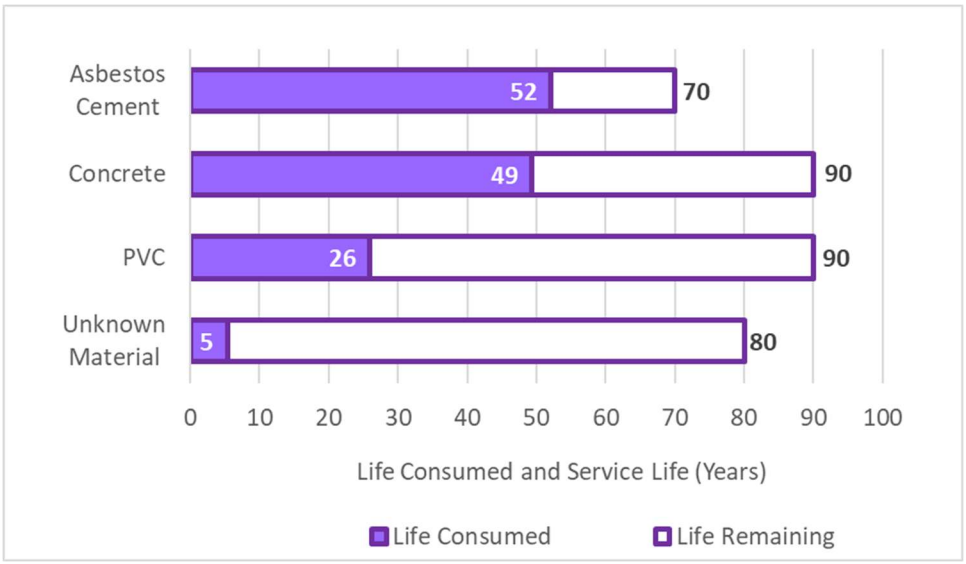



Figure 4-40 shows the condition distribution of wastewater mains In Mount Forest. The Figure shows that most sewer mains are PVC and are in Good or Very Good condition. Approximately 880m of asbestos cement mains are in Poor condition. Figure 4-41 shows the average age of Mount Forest Wastewater mains by material.

Figure 4-40: Condition by Replacement Value – Mount Forest Wastewater Mains

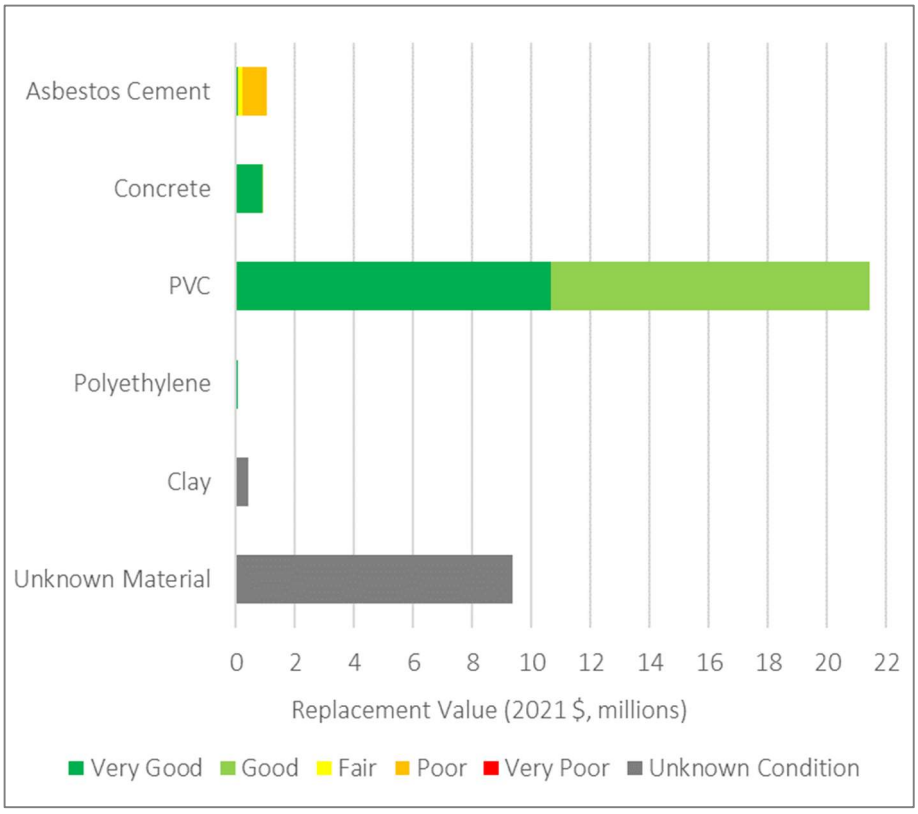



Figure 4-41: Average Age – Mount Forest Wastewater Mains

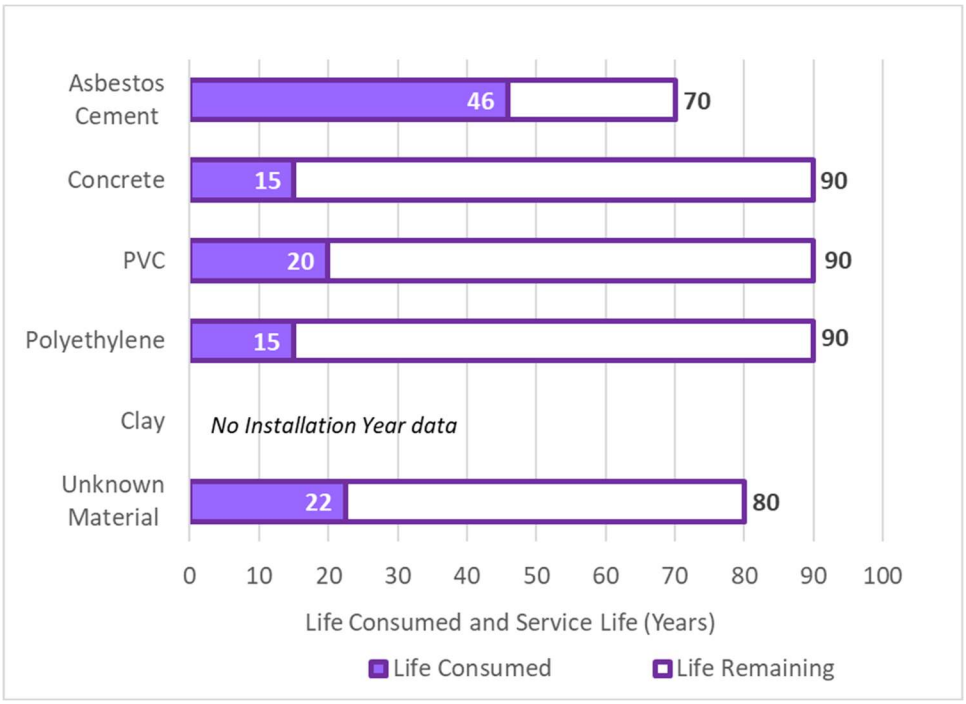


Figure 4-42 shows the condition distribution by replacement value for wastewater maintenance holes. All maintenance holes are in fair condition or better, because they are regularly inspected, and repaired as needed.

Figure 4-42: Wastewater Maintenance Holes – Condition by Replacement Value

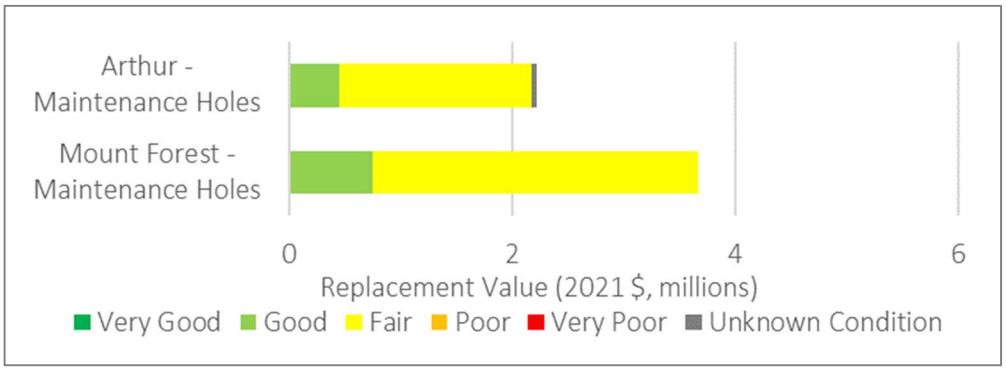
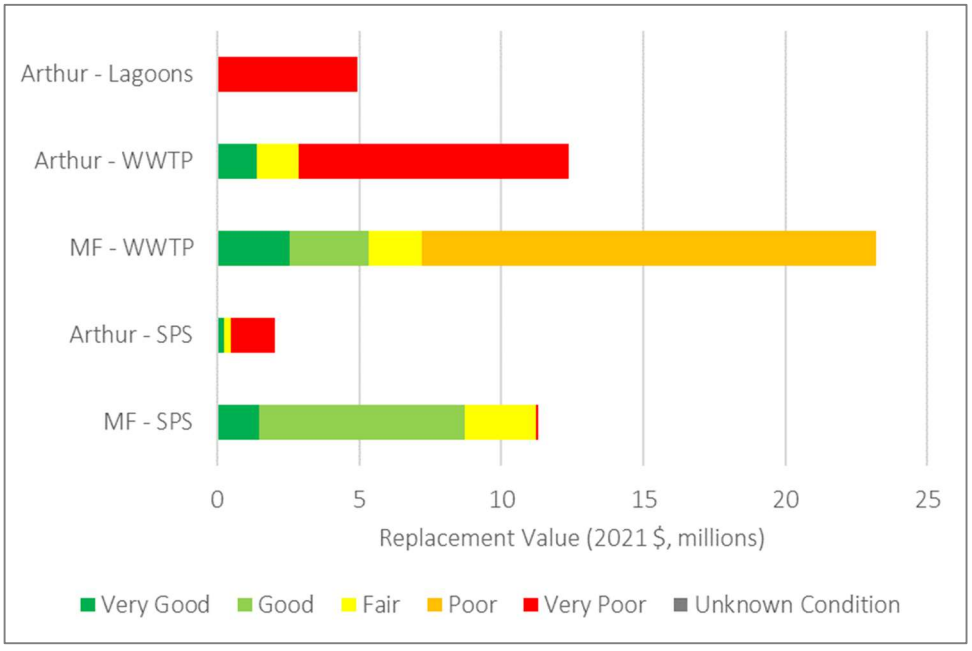



Figure 4-43 shows the condition distribution by replacement value for vertical wastewater facilities. The figure shows that the Arthur Lagoons and some of the systems that were installed in the 1990s are due for replacement (i.e. are in Very Poor condition), specifically, the site services, electrical and mechanical systems (building and process). Phase 1 upgrades to the Arthur WWTP will address most of these needs.

At the Mount Forest WWTP, the electrical and mechanical systems, which were installed in 2001, will be due for replacement in approximately 2026.

Figure 4-43: Vertical Wastewater Facilities – Condition by Replacement Value




At Perth St. SPS, the site services, electrical and mechanical systems are estimated to be in Very Poor condition, based on age, and are thus due for replacement.

The average age of wastewater assets (excluding mains) is shown in Figure 4-44 for the Arthur wastewater system and Figure 4-45 for the Mount Forest Wastewater system.

Figure 4-44: Average Age – Arthur Wastewater Assets (excluding mains)

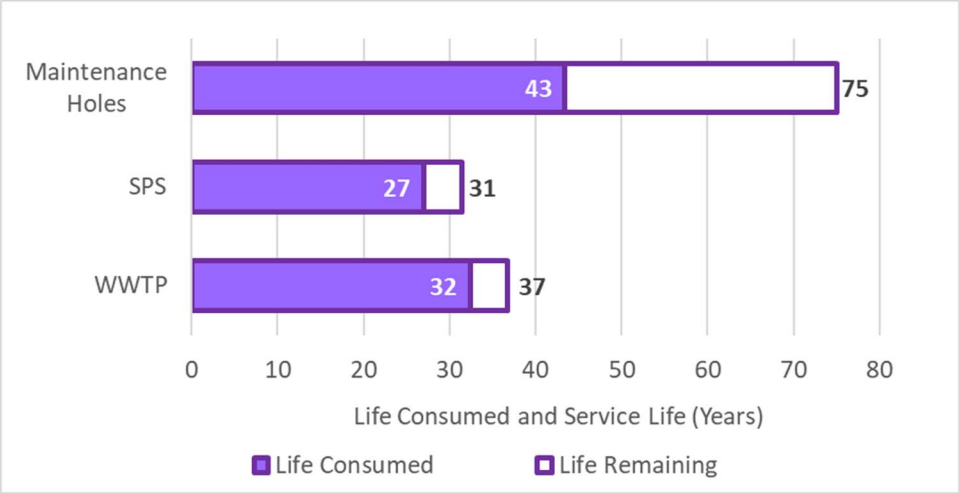
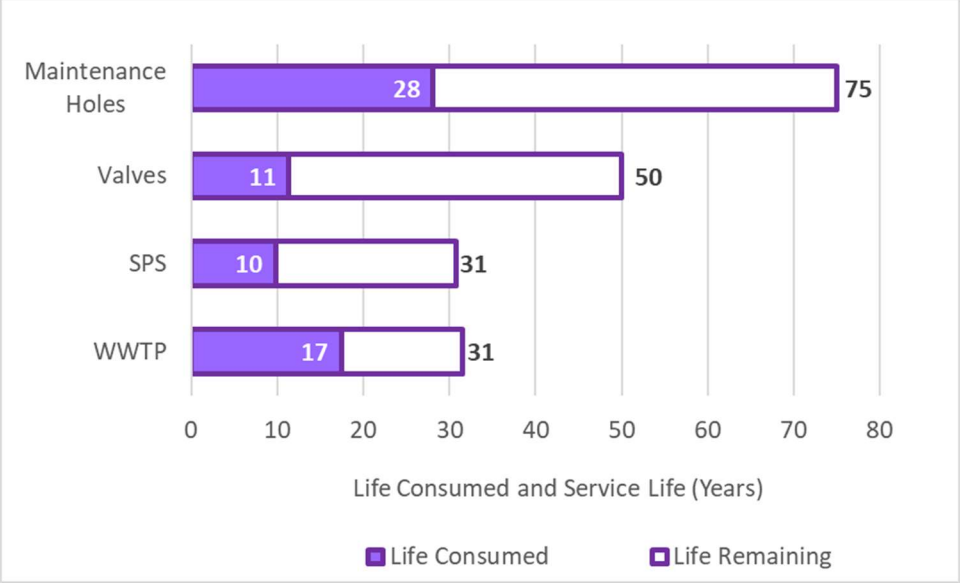



Figure 4-45: Average Age – Mount Forest Wastewater Assets (excluding mains)




### 4.4.6 LEVELS OF SERVICE

This section presents the Township's Level of Service (LOS) indicators, targets (if defined) and current performance for Wastewater assets. Community LOS are presented in Table 4-59, and Technical LOS are presented in Table 4-60. These tables include LOS indicators, on which O.Reg. 588/17 requires municipalities to report.

The Tables show that at this time, targets have not yet been set for these indicators. Instead, current performance is being reported as a baseline for future target-setting, when more data will have been collected and analyzed to understand the costs and benefits of different LOS targets.

Although targets have not yet been set, there is an opportunity to improve the proportion of assets in state of good repair, which is currently quite low at 52%, to reduce the occurrence of wastewater backups, and to reduce inflow and infiltration. In addition, Arthur WWTP has been investigating consistent exceedances of Total Ammonia Nitrogen (TAN) occurring since early 2019.

Average monthly E. coli concentrations exceeded compliance limits in December 2019, February 2020 and March 2020. In other words, for the 2019-2020 seasonal discharge period, colony counts exceeded the limit 3 out of the 8 months of discharge. These exceedances may require further investigation and mitigation.

In April 2020, a singular Total Suspended Solids (TSS) effluent exceedance occurred due to bottom solids being drawn from the Arthur storage lagoon, leading to higher than normal influent TSS concentrations being ran through the plant. This was a one-time event, where the intent was to lower the water levels in the storage lagoon for future maintenance and upgrades. Discharge was ceased shortly after the confirmed exceedance.

Average monthly effluent concentrations at the Mount Forest WWTP have been within ECA limits for all months in the period 2018-2020.

Table 4-59 Wastewater Assets – Community Levels of Service

| Service Attribute | Community Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| Capacity | Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system. | In general, properties within the urbanized areas of Mount Forest and Arthur are connected to the municipal wastewater system, with the exception of some older farm properties.<br><br>Rural areas within the Township are not connected. | No formal target | None |
| Function | Description of how Stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. | Inflow (e.g. Maintenance Hole covers), and infiltration (e.g. sanitary pipe joints and cracks permitting groundwater in) | No formal target | None |
| | Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to Stormwater infiltration. | New sanitary sewer services are designed/engineered according to the Municipal Servicing Standard. | No formal target | None |
| Quality | Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. | Mount Forest WWTP and Arthur WWTP both use extended aeration, sand filtration, chemical | No formal target | None |

| Service Attribute | Community Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| | | phosphorous removal and UV treatment.<br>Mount Forest WWTP discharges into the Saugeen River, while Arthur WWTP discharges to the Conestoga River.<br><br>Effluent meets ECA requirements. For the period January 2018-June 2021, there has been one effluent violation, which occurred in 2020. | | |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

Table 4-60 Wastewater Assets – Technical Levels of Service

| Service Attributes | Technical Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| Capacity | % of properties connected to the municipal wastewater system* | 64.0%<br><br>Total properties in Township: 5,140<br><br>Properties connected to municipal water system = 3,290 | No formal target | None |
| Function | No indicators defined | | | |
| Quality | # of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.* | Wastewater backups in municipal system since 2018**:<br>• 2018: 4<br>• 2019: 2<br>• 2020: 2<br>• 2021: 5 (as of June 29, 2021)<br><br>No connection-days were lost due to these backups. | No formal target | None |

| Service Attributes | Technical Level of Service Indicator | Performance | Target | Gap |
|---|---|---|---|---|
| | # of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system.* | Mount Forest WWTP had no effluent violations 2018-2020.<br><br>For Arthur WWTP the number of months by exceedance types are:<br>• 2018: none<br>• 2019: 7 months of TAN exceedances, 1 month of E.Coli exceedance<br>• 2020: 4 months of TAN exceedances, 1 month of TSS exceedance, 2 months of E.Coli exceedance<br><br>Compared 1032 service connections in the Arthur network, the annual ratios of exceedances in Arthur are:<br>• 2018: 0<br>• 2019: 0.0078<br>• 2020: 0.0068 | No formal target | None |
| | % Assets in state of good repair (Fair condition or better) | 54% | No formal target | None |

* Reporting on this LOS Indicator is mandated by O.Reg. 588/17.

** Counts exclude backups that were found to be in the property owner's system

O.Reg. 588/17 includes several LOS indicators specific to combined sewers (stormwater and wastewater); however, since the Township does not have a combined system, these LOS indicators have been excluded from Table 4-59 and 4-60. Excluded indicators are as follows:

- Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.
- Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.
- # of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system

### 4.4.7 LIFECYCLE MANAGEMENT

Over the next 10 years (2022-2031) the wastewater service asset life cycle needs include the following:

- Expansion & Upgrade $ 16.5 million (over ten years)
- Renewal $ 34.62 million (over ten years)
- Operations & Maintenance $ 1.36 million/year

The following sub-sections provide details on the needs in each of these categories.

#### Expansion & Upgrade Needs

The population in Arthur is expected to grow from an estimated 2,410 in 2020 to 4,115 in 2036 and 4,460 in 2041 (see Water and Sanitary Systems Technical Study – Arthur, 2020). The population in Mount Forest is expected to grow from an estimated 5,678 in 2020 to 8,135 in 2036 and 8,440 in 2041 (see Mount Forest Servicing Technical Update, 2021). Expansion and upgrade needs for both wastewater systems were identified in Technical Updates to the Master Plans, completed in 2020 for Arthur and in 2021 for Mount Forest. In June 2021, Council provided direction to pursue specific actions from both reports. The following is a summary of the expansion and upgrade needs, totaling **$16.5 million**, based on the Technical Update reports and direction provided by Council in June 2021:

*Arthur Wastewater System*

- Expand selected mains and add new segments - $1.7 million
- Expand and upgrade the WWTP - $10.2 million

*Mount Forest Wastewater System*

- Expand selected mains and add new segments - $4.6 million

#### Renewal Needs

Table 4-61 lists the Township's projected renewal needs by asset type to 2031. The total renewal need to 2031 is **$34.62 million**. This includes the need to replace aging asbestos cement pipes along with associated maintenance holes, and the need to renew components of wells (e.g. electrical, mechanical and instrumentation).

For each renewal need, Table 4-61 lists Probability of Failure (PoF), Consequence of Failure (CoF) and resulting Risk Exposure ratings to support prioritization of activities. Prioritization for Risk Management is discussed in detail in Section 4.4.8.

Table 4-61 Wastewater Service Asset Renewal Needs to 2031

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Wastewater Mains | Replace at end of life, in coordination with corridor works | **$9.95 million** of mains to be replaced:<br>• Replace 2.9km of Asbestos Cement pipe in Arthur (see Technical Update for details) | Varies | Varies | Varies | 2033 | $2,700 |
| | | • Replace mains identified in Mount Forest Technical Update | Varies | Varies | Varies | Varies | $ 7,246 |
| Maintenance Holes | Replace with mains | **$1.16 million** for maintenance holes along mains that require replacement. The two systems have approximately one maintenance hole per 90m of mains. Replacement need for maintenance holes will thus be:<br>• 32 maintenance holes for 2.9km of main replacements in Arthur | Varies | Varies | Varies | Varies | $ 314 |
| | | • 86 maintenance holes for the $7,246k pipe replacements in Mount Forest (length of pipe unknown) | Varies | Varies | Varies | Varies | $ 843 |
| Sewage Pump Stations (SPS) | Replace components at end of life | **$1.87 million** for renewal of SPS and their components:<br>• Renew site works, architectural, electrical, mechanical, instrumentation and controls at Frederick St. SPS & Wells St. SPS | Varies | Varies | Varies | Varies | $ 1,628 |
| | | • Renew instrumentation and controls at Cork St. SPS | 2 | 4 | Moderate | 2030 | $ 123 |
| | | • Renew process structural, electrical, instrumentation and controls at Perth St. SPS | 5 | 3 | Very High | 2020 | $ 122 |

| Asset Class | Renewal Needs | Renewal Needs to 2031 | Probability of Failure in 2021 | Consequence of Failure | Risk Exposure | Year of End of Life | Replacement Cost (2021 $, thousands) |
|---|---|---|---|---|---|---|---|
| Wastewater Treatment Plants | Replace components at end of life | **$21.64 million** for renewal of WWTP and their components: | | | | | |
| | | • Components at Arthur Wastewater Treatment Plant (WWTP) will require renewal by 2031; however, it is assumed that these components will be replaced in the WWTP expansion project. | n/a | | | | none |
| | | • Renew Lagoons | 5 | 5 | Very High | 2025 | $4,934 |
| | | • Renew site works, architectural, electrical and mechanical at Mount Forest WWTP | 4 | 3-4 | Very High/ High | 2026 | $ 16,011 |
| | | • Renew instrumentation and controls at Mount Forest WWTP | 4 | 4 | Very High | 2030 | $ 696 |
| **TOTAL RENEWAL NEED (2022-31)** (excludes needs that will be funded by operating) | | **$ 34.62 million** | | | | | |

### Operations and Maintenance

Operations costs include day-to-day costs associated with running and overseeing the wastewater system. This includes labour, electricity and program delivery costs, such as providing underground locates, and promoting water conservation. Maintenance activities include inspection, preventive maintenance and minor repairs. Operations and Maintenance (O&M) activities are both funded by the Township's operating budget.

Figure 4-46 shows the operating expenditures for 2018-20, as well as the 2021 budget. Some of the activities supported by this budget are listed in Table 4-62. The Township estimates that the 2021 budget is sufficient for the current activities and network size. Moreover, the Township believes its current budget can absorb some growth assets, which are added to the portfolio each year through ownership assumption or construction. As such, the 2021 budget amount will be taken as representative of the annual operating budget need for the period 2022-2031.

In the next few years, the Township is working toward implementing a work order management system, which will provide detailed information on operations and maintenance costs associated with different assets and activities. This will provide a more reliable basis for calculating the operating cost impact of growth assets.

Figure 4-46: Operating Expenditures 2018-20 and 2021 Budget – Wastewater Service

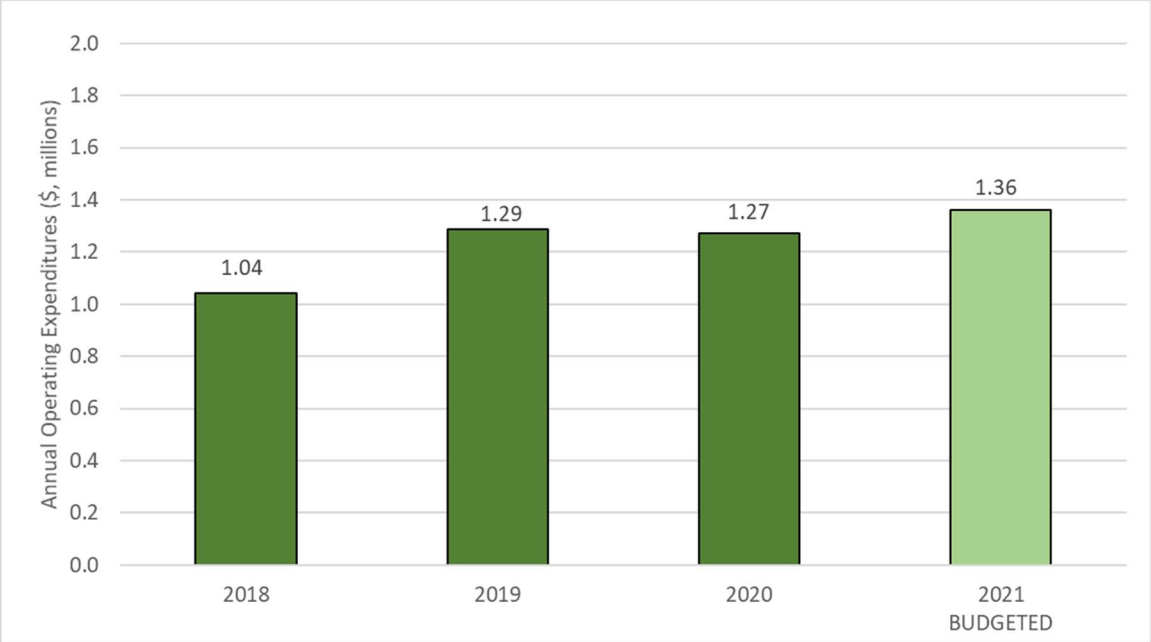


Table 4-62 Operating Activities and Frequencies – Wastewater Service

| Asset Type | Activity | Frequency |
|---|---|---|
| Wastewater mains | Inspection<br>Flushing<br>CCTV | Every 5 years<br>Every 3 years<br>Prior to capital projects |
| Maintenance Holes | Condition Assessment | Every 3 years |
| Valves | Inspection and Exercising | Every 3 years |
| Sewage Pump Stations | Condition Assessment | Every 2 years |
| Treatment Plants | None – awaiting plant handover from OCWA | |
| Lagoon | Condition Assessment | Annually |

### 4.4.8 RISK

Improvements to asset and system capacity, function and condition are often limited by available funding and resources. It thus becomes necessary to prioritize asset investments and improvements based on risk exposure. Probability of Failure is approximated based on asset condition, while Consequence of Failure is estimated based on expected impact of an asset failure, as shown in Table 4-63.

Table 4-63 Consequence of Failure Ratings – Wastewater Assets

| Asset Type | Assumptions | Consequence Category of Highest Concern | Attributes | Consequence of Failure |
|---|---|---|---|---|
| Mains | Unplanned failure will result in environmental contamination, damage to a pipe segment, road and Right-of-Way (RoW) assets, and may also damage private assets. Impacts are higher with greater flow, and thus pipe diameter.<br><br>Other potential impacts (however, these will be managed, and CoF will likely not exceed Financial CoF): | Environmental & Financial (equal CoF) | 0 to < 300 mm diameter | 3 |
| | | | 300 to < 400 mm diameter | 4 |
| | | | >= 400 mm diameter | 5 |

| | | | | |
|---|---|---|---|---|
| | Traffic and pedestrian safety may be compromised.<br><br>Wastewater service may be reduced or shut off in the area during the repair. Redundancy has not been considered in these CoF ratings. | | | |
| **Maintenance Holes** | Failure of maintenance holes may lead to damage of private vehicles, and associated liability. | Financial | ALL | 2 |
| **Valves** | Valves fail by getting stuck, and must be replaced, along with a new pipe segment (sleeve).<br>The CoF of 3 reflects the financial consequence, and assumes replacement is more costly for wastewater valves than water valves.<br><br>Other types of consequences are minimal (safety, availability, environmental). | Financial | ALL | 3 |

Based on those CoF ratings, Figure 4-47 shows the risk exposure mapping for wastewater mains in Arthur. The assets that are considered Very High risk are listed Table 4-64, and consist of asbestos cement mains.

Figure 4-47: Wastewater Main Assets, Arthur – Risk Exposure Map

| Total value of assets in 2021 $, millions | | | $ 21.9 | | |
|---|---|---|---|---|---|
| PoF | | | | | |
| 5 | - | - | $ 1.2 | $ 0.4 | - |
| 4 | - | - | $ 7.2 | $ 1.0 | $ 0.0 |
| 3 | - | - | $ 3.1 | - | - |
| 2 | - | - | $ 5.8 | $ 0.9 | $ 0.1 |
| 1 | - | - | $ 2.0 | $ 0.1 | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

Table 4-64 Wastewater Main Assets, Arthur – Very High-Risk Asset(s)

| Location | Type | Length (m) | Replacement Value (2021 $) |
|---|---|---|---|
| Lagoon | Asbestos Cement | 384 | $ 363,400 |
| Gordon Ave | Asbestos Cement | 441 | $ 421,050 |
| Eliza St | Asbestos Cement | 27 | $ 24,638 |
| Smith St | Asbestos Cement | 563 | $ 505,638 |
| Wells St W | Asbestos Cement | 137 | $ 118,163 |
| Waste Pond | Asbestos Cement | 278 | $ 290,163 |
| Conestoga St N | Asbestos Cement | 20 | $ 17,250 |
| George St | Asbestos Cement | 378 | $ 343,375 |
| Easement | Asbestos Cement | 214 | $ 195,275 |
| Clarke St | Asbestos Cement | 150 | $ 136,875 |
| Walton St | Asbestos Cement | 70 | $ 63,875 |
| Adelaide St | Asbestos Cement | 100 | $ 91,250 |
| Bellfield Cres | Asbestos Cement | 81 | $ 73,913 |

Figure 4-48 shows the risk exposure mapping for wastewater mains in Mount Forest. The figure shows that none of these assets are considered Very High risk.

Figure 4-48: Wastewater Main Assets, Mount Forest – Risk Exposure Map

| | | |
|---|---|---|
| Total value of assets in 2021 $, millions | | $ 33.3 |
| | With known condition | $ 23.5 |
| | With unknown condition | $ 9.8 |

| PoF | | | | | |
|---|---|---|---|---|---|
| 5 | - | - | - | - | - |
| 4 | - | - | $ 0.8 | - | - |
| 3 | - | - | $ 0.2 | - | - |
| 2 | - | - | $ 4.6 | $ 3.6 | $ 2.7 |
| 1 | - | - | $ 8.0 | $ 2.4 | $ 1.3 |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

It is expected that maintenance holes will be replaced with their associated mains and would not be replaced based on their individual condition. As such, risk-based prioritization is not applied to those assets. Between replacements, these assets are inspected every three years and repaired as needed.

For assets in vertical facilities, consequence of failure is calculated based on:

- the criticality of the facility to the overall system
- the criticality of the component to the facility

The overall CoF for the component is the lower those two values.

For Facility CoF, all Sewage Pump Stations and Wastewater Treatment Plants have been assigned a value of 5. Table 4-65 shows the Component CoF ratings applied, based on the negative impact of component failure on service delivery. The overall CoF for each component was then calculated as the lower of the Component CoF and the Facility CoF. As such, overall CoF was equivalent to Component CoF, because the Facility CoF was 5 for all wastewater vertical facilities.

Table 4-65 Vertical Wastewater Assets, Building & Process Systems – CoF Ratings

| Facility System | CoF |
|---|---|
| Site Works | 3 |
| Building Structural | 4 |
| Building Architectural | 2 |
| Building Mechanical & Electrical | 4 |
| Process Structural | *3 |
| Process Electrical | *3 |
| Process Mechanical | *3 |
| Process Piping | *3 |
| Instrumentation & Controls | 4 |

**Redundancy designed into systems*

Based on those CoF ratings, Figure 4-49 shows the risk exposure mapping for vertical facility assets in both Arthur and Mount Forest, that require renewal within the next ten years. Assets were listed in Table 4-61 in Section 4.4.7. Table 4-66 lists the assets in the Very High-risk category.

Figure 4-49: Vertical Wastewater Assets – Risk Exposure Map

Assets requiring renewal by 2031 (in 2021 $) $ 33.4 millions

| PoF | | | | | |
|---|---|---|---|---|---|
| 5 | - | $1.2 | $8.0 | $2.0 | $4.9 |
| 4 | - | - | $12.8 | $3.2 | - |
| 3 | - | - | - | $0.4 | - |
| 2 | - | - | - | $0.9 | - |
| 1 | - | - | - | - | - |
| | 1 | 2 | 3 | 4 | 5 |
| | | | Criticality | | |
| Risk Legend | Very Low | Low | Moderate | High | Very High |

Table 4-66 Vertical Wastewater Assets – Very High-Risk Asset(s)

| Facility | System | Replacement Value (2021 $) |
|---|---|---|
| Frederick SPS | Building Site Works | $ 111,930 |
| Frederick SPS | Building Elec/Mech | $ 223,860 |
| Frederick SPS | Process Electrical | $ 623,610 |
| Frederick SPS | Process Mechanical | $ 143,910 |
| Wells SPS | Building Site Works | $ 30,505 |
| Wells SPS | Building Elec/Mech | $ 61,010 |
| Wells SPS | Process Electrical | $ 169,957 |
| Wells SPS | Process Mechanical | $ 39,221 |
| Arthur WWTP | Building Site Works | $ 865,594 |
| Arthur WWTP | Building Elec/Mech | $ 1,731,189 |
| Arthur WWTP | Process Electrical | $ 4,822,598 |
| Arthur WWTP | Process Mechanical | $ 1,112,907 |
| Lagoons | Lagoons | $ 3,947,770 |
| Perth SPS | Building Site Works | $ 27,837 |
| Perth SPS | Process Structural | $ 25,300 |
| Perth SPS | Process Electrical | $ 25,300 |
| Mount Forest WWTP | Building Elec/Mech | $ 3,248,687 |

The following expansion needs, identified in the Technical Updates, should also be considered Very High risk:

- Expansion and upgrade of the Arthur WWTP ($10.2 million)
- Expand selected mains and add new segments ($1.7 million in Arthur, $4.6 million in Mount Forest)

### 4.4.9 FINANCIAL IMPACT

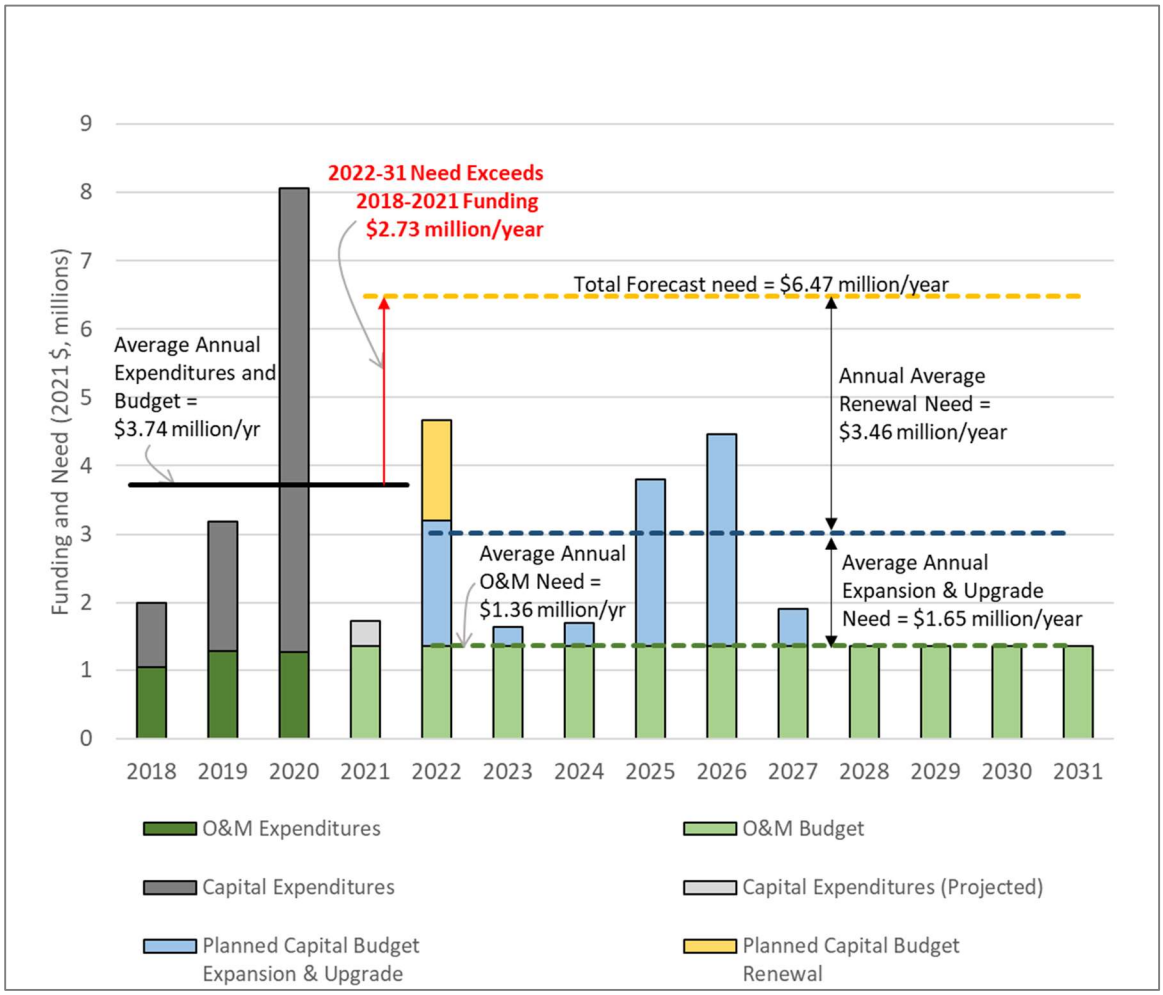
Figure 4-50 shows that for the period 2018-2021, the expenditures (and budget, in the case of 2021) averaged $3.74 million/year. The peak of capital expenditures in 2020 consists primarily of $5.8 million spent on Phase 1 of the Arthur Wastewater Treatment Plant Upgrade.

The forecast need for O&M, renewal, expansion and upgrade funding for the next ten-year period (2022-2031) is $6.47 million/year. This represents an increase of $2.73 million/year, and includes the life cycle costs described in Section 4.4.7, specifically:

- Expansion & Upgrade $ 16.5 million (over ten years)
- Renewal $ 34.62 million (over ten years)
- Operations & Maintenance $ 1.36 million/year

The Township may also prioritize needs based on risk, as discussed in Section 4.4.8. Specifically, prioritizing the expansion, upgrade and renewal needs (over the next 10 years) that are considered Very High risk.

Figure 4-50: Historical Expenditures and Projected Needs – Wastewater Service



# APPENDIX A: REGULATORY COMPLIANCE

The following chart represents the Township's position with respect to the asset management requirements identified in O.Reg. 588/17 for Core Assets for July 1, 2022 (current Levels of Service).

Table A-1 Regulatory Compliance

| Plan Section | O.Reg. 588/17 Compliance Practices (Current LOS) | Roads | Bridges | Storm water | Water | Waste water |
|---|---|---|---|---|---|---|
| State of Local Infrastructure | For each asset category, the AM Plan provides | | | | | |
| | • a summary of the assets, | Table 4-1 | Tables 4-2 and 4-3 | Table 4-25 | Table 4-37 | Table 4-50 |
| | • the replacement cost of the assets, | Table 4-1 | Table 4-1 | Table 4-25 | Table 4-37 | Table 4-50 |
| | • the average age of the assets, | Figure 4-4 | Figure 4-7 | Figures 4-17 and 4-19 | Figures 4-26, 4-28, 4-32, 4-33 | Figures 4-39, 4-41, 4-44, 4-45 |
| | • the condition of the assets, | Figure 4-3 | Figure 4-5 | Figure 4-16 and 4-18 | Figures 4-27, 4-29 and 4-30 | Figures 4-38, 4-40, 4-42, 4-43 |
| | • the approach to assessing condition of assets. | Section 4.1.5 | Section 4.1.5 | Section 4.3.5 | Section 4.4.5 | Section 4.5.5 |
| Levels of Service | For each asset category, the AM Plan provides the current LOS being provided. For core assets, the 2020 AM provides the qualitative community descriptions and technical metrics as required by O.Reg. 588/17, and the current performance. | Community LOS: Table 4-14<br>Technical LOS: Table 4-15 | Community LOS: Table 4-14<br>Technical LOS: Table 4-15 | Community LOS: Table 4-30<br>Technical LOS: Table 4-31 | Community LOS: Table 4-44<br>Technical LOS: Table 4-45 | Community LOS: Table 4-59<br>Technical LOS: Table 4-60 |
| Asset Management Strategy | A description of assumptions regarding future changes in population or economic activities, and how these will affect asset life cycle needs. | Section 4.1.7 | Section 4.1.7 | Section 4.2.7 | Section 4.3.7 | Section 4.4.7 |
| | For each asset category, the AM Plan provides the lifecycle activities that would need to be | Table 4-16 | Table 4-16 | Table 4-32 | Table 4-46 | Table 4-61 |

| Plan Section | O.Reg. 588/17 Compliance Practices (Current LOS) | Roads | Bridges | Storm water | Water | Waste water |
|---|---|---|---|---|---|---|
| | undertaken to maintain the current LOS for each of the next 10 years, based on risk and lowest lifecycle cost analyses. | | | | | |
| Background Information | The AM Plan indicates how the background information and reports upon which the state of infrastructure section within AM Plan is based will be made available to the public. | Section 1.6 | Section 1.6 | Section 1.6 | Section 1.6 | Section 1.6 |

# APPENDIX B: DATA SOURCES

### Table B-1 Data Sources – Transportation Assets

<table>
<tr><th rowspan="2">Asset Type</th><th colspan="5">Data Source</th></tr>
<tr><th>Inventory</th><th>Condition</th><th>Age (Installation Year)</th><th>Replacement Value</th><th>Service Life</th></tr>
<tr><td>Roads</td><td colspan="3">Road Needs Study 2016</td><td>Unit costs aligned with peer municipalities and validated with Township staff</td><td>Value aligned with peer municipalities and validated with Township staff</td></tr>
<tr><td>Bridges & Culverts</td><td colspan="5">Bridge Condition Inspection 2019</td></tr>
<tr><td>Traffic Signals</td><td colspan="2">Township Staff knowledge</td><td rowspan="4">Unit costs aligned with peer municipalities and validated with Township staff</td><td rowspan="4">Value aligned with peer municipalities and validated with Township staff</td></tr>
<tr><td>Traffic Signs</td><td colspan="2">Sign Inspection Data 2021</td><td>No data</td></tr>
<tr><td>Streetlights</td><td colspan="2">Streetlight Inspection Data 2019</td><td>Township Staff knowledge (LED conversion)</td></tr>
<tr><td>Sidewalks</td><td colspan="2">Sidewalk Inspection 2013</td><td>No data</td></tr>
</table>

### Table B-2 Data Sources – Stormwater Assets

<table>
<tr><th rowspan="2">Asset Type</th><th colspan="5">Data Source</th></tr>
<tr><th>Inventory</th><th>Condition</th><th>Age (Installation Year)</th><th>Replacement Value</th><th>Service Life</th></tr>
<tr><td>Mains</td><td rowspan="3">Fixed Asset Register</td><td rowspan="3">Based on age and linear deterioration over service life</td><td rowspan="3">Fixed Asset Register</td><td rowspan="3">Unit costs aligned with peer municipalities and validated with Township staff</td><td rowspan="3">Value aligned with peer municipalities and validated with Township staff</td></tr>
<tr><td>Catch Basins</td></tr>
<tr><td>Maintenance Holes</td></tr>
<tr><td>Stormwater Ponds</td><td colspan="3">Township Staff knowledge</td><td colspan="2">Estimate from engineering consulting firm (obtained by Township staff)</td></tr>
</table>

Table B-3 Data Sources – Water Assets

| Asset Type | Data Source | | | | |
|---|---|---|---|---|---|
| | Inventory | Condition | Age (Installation Year) | Replacement Value | Service Life |
| Arthur:<br>Mains<br>Hydrants<br>Valves | Triton GIS data (developed for Technical Update) | Based on age and linear deterioration over service life | Triton GIS data (developed for Technical Update) | Unit costs aligned with peer municipalities and validated with Township staff | Value aligned with peer municipalities and validated with Township staff |
| MF:<br>Mains | Fixed Asset Register | | Fixed Asset Register | | |
| MF:<br>Hydrants<br>Valves | BM Ross GIS data (developed for Technical Update) | | BM Ross GIS data (developed for Technical Update) | | |
| Wells | Fixed Asset Register | | Fixed Asset Register | Installation cost from Fixed Asset Register, inflated to 2021 $ | By building system, service life values aligned with peer municipalities and validated with Township staff |
| Water Storage | | | | | |

Table B-4 Data Sources – Wastewater Assets

| Asset Type | Data Source | | | | |
|---|---|---|---|---|---|
| | Inventory | Condition | Age (Installation Year) | Replacement Value | Service Life |
| Arthur: Mains Maintenance Holes | Fixed Asset Register | Based on age and linear deterioration over service life | Fixed Asset Register | Unit costs aligned with peer municipalities and validated with Township staff | Value aligned with peer municipalities and validated with Township staff |
| MF: Mains | BM Ross GIS data (developed for Technical Update) | | BM Ross GIS data (developed for Technical Update) | | |
| MF: Maintenance Holes | Fixed Asset Register | | Fixed Asset Register | | |
| Arthur: Sewage Pump Stations | Fixed Asset Register | Based on age and linear deterioration over service life | Fixed Asset Register | Frederick St. SPS: Estimate from Cima (obtained by Township staff)<br><br>Wells St. SPS: Installation cost from Fixed Asset Register, inflated to 2021 $ | By building system, service life values aligned with peer municipalities and validated with Township staff |
| MF: Sewage Pump Station | | | | Installation cost from Fixed Asset Register, inflated to 2021 $ | |
| Arthur: Wastewater Treatment Plant and Lagoon | | | | Estimate from Cima (obtained by Township staff) | |
| MF: Wastewater Treatment Plant | | | | Installation cost from Fixed Asset Register, inflated to 2021 $ | |

# APPENDIX C: GLOSSARY OF TERMS

**Asset –** An asset is an item, thing, or entity that has potential or actual value to the Township. Examples include: bridges, roads, pipes and buildings.

**Asset Management –** The coordinated activities of an organization to realize value from its assets. It is an integrated set of processes and practices that minimize lifecycle costs of owning, operating, and maintaining assets, at an acceptable level of risk, while continuously delivering established levels of service.

**Asset Management Plan –** A document that states how a group of assets is to be managed over a period of time. Asset management Plans describe the following for all asset groups:

- The condition, characteristics, and values of the assets;
- Expected Levels of Service;
- Action Plan to ensure assets are providing the Level of Service;
- Financial Strategies to implement the Action Plans.

O.Reg. 588/17 requires Asset Management Plans to be reviewed every five years. Some information within the plan, such as the condition assessment of some assets, characteristics, and asset values, may be updated and reported on more frequently than that.

**Asset Inventory –** List of assets owned by the Township.

**Capital Budget –** A multi-year financial plan for the construction, acquisition and financing of capital works. A capital budget should provide for the planning of future financial resources required to finance projects.

**Capital Expenditure** – Any significant expenditure incurred to acquire, improve or rehabilitate land, buildings, engineering structures, facilities, machinery or equipment, and all associated items to bring the foregoing into function operation. The work typically confers a benefit lasting beyond one year (and as such is non-recurring in nature) and results in the acquisition or extension of the life of a fixed asset. Capital expenditures also include the cost of studies undertaken in connection with acquiring land or constructing infrastructure and facilities.

**Capitalization –** The practice of spreading the cost of an asset over its useful life.

**Components** – Specific parts of an asset having independent physical or functional identity, and having specific attributes such as different life expectancy, maintenance regimes, risk, or criticality. Complex assets, such as buildings, are often broken down into components for asset management purposes, to reflect the differing needs of various components.

**Condition** – The physical state of the asset.

**Condition-Based Preventative Maintenance** – Preventative maintenance initiated as a result of an asset reaching a specific condition. Differs from age-based preventative maintenance, which schedules maintenance based on asset age and may not accurately reflect the maintenance needs of the asset.

**Condition Assessment** – The inspection, assessment, measurement, and interpretation of the resultant data, to indicate the condition of a specific asset or component, so as to determine the need for preventative or remedial action.

Corrective Maintenance – Activities undertaken to return an asset to working order after a deficiency has been identified. These activities are typically unplanned or reactive in nature.

Critical Assets – Those assets that are likely to result in a more significant financial, environmental, and social impact should they fail. The maintenance of these assets is a priority. Risk assessment piece.

Decision Support System – A Decision Support System assists in business and capital planning, project prioritization, and tracking the overall performance of County assets. County decision support system includes FMW, etc.; feeding into capital program via specialized programmes (Work Tech);

Deterioration Curve – The rate at which an asset approaches the end of its useful life, represented by a curve. With no intervention (e.g. repair or rehabilitation), the rate of deterioration increases as assets near the end of their useful life. The deterioration curve differs for each asset class and can differ for assets within the same class, based on usage, construction materials, weather, etc.

Geographic Information System (GIS) – A computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. It can show many different kinds of data on one map. This enables people to more easily see, analyze, and understand patterns and relationships.

Levels of Service – Describe the outputs or objectives that an organization or activity intends to deliver to customers. This includes commonly measured attributes such as quality, reliability, responsiveness, sustainability, timeliness, accessibility, and cost.

Lifecycle – The cycle of activities that an asset goes through over its useful life. These activities can be categorized into the following broad categories: planning, design, construction, acquisition, operation, maintenance, rehabilitation, renewal, and disposal

Lifecycle Cost – The total cost of an asset throughout its useful life. This includes costs related to planning, design, construction, acquisition, operation, maintenance, rehabilitation, renewal, and disposal.

Likelihood – The probability of an event occurring. (Risk)

Maintenance – Actions required to keep an asset as near to its original condition as possible in order to provide service over its useful life. Includes both corrective and preventative maintenance but excludes renewal or replacement.

Mitigation – Measures taken in advance of negative events or disasters, to reduce their impacts.

Operating Budget – Provides for the day-to-day expenditures of a municipality for items such as salaries, wages, benefits, heat, hydro, maintenance of buildings and infrastructure, etc., whereas the capital budget plans for the acquisition or rehabilitation of capital assets.

Preventative Maintenance – Activities undertaken on a regular basis to ensure and asset is able to provide the expected service. These activities are typically planned and are intended to reduce the likelihood of failure or breakdown.

Rehabilitation / Refurbishment – Work to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modifications. Generally, involves repairing the asset to deliver its original levels of service without resorting to significant upgrading or renewal.

Remaining Useful Life – The time remaining until an asset ceases to provide the required service levels.

Renewal – The restoration of the service potential of the asset. Asset renewal is required to sustain service beyond the original life of the asset. Asset renewal prolongs the useful life of the asset. Type of betterment.

Repair – Action to restore an item to its previous condition after failure or damage.

Replacement – The complete replacement of an asset that has reached the end of its useful life.

Replacement Cost - The cost that would be incurred to replace the asset with a new modern equivalent asset (not a second hand one) with the same economic benefits (gross service potential).

Reserve – A reserve is an allocation of accumulated net revenue set aside for a designated purpose. Funds held in a reserve can be utilized at the discretion of Council. Reserves do not earn interest on their own, although interest may be allocated to reserves if desired.

Reserve Fund – A reserve fund is established based on a statutory requirement or defined liability payable in the future and is usually prescriptive as to the basis for collection and use of monies in the fund. All earnings derived from reserve fund investments form part of the reserve fund. There are two types of reserve funds: discretionary reserve funds and obligatory reserve funds.

- Discretionary reserve funds: established whenever Council wishes to set aside a certain portion of any year's revenues to finance a future expenditure for which it has the authority to spend money, or to provide for a specific contingent liability.
- Obligatory reserve funds: created whenever a statute or legislation requires that revenue received for special purposes is to be segregated from the general revenues of the municipality. Obligatory reserve funds are created solely for the purpose prescribed for them.

Residual Value – The amount the entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal.

Risk – The relationship between the likelihood of an event happening, and the consequences of that event.

Risk Management – The process of identifying and assessing risks, identifying and evaluating actions that can be taken to reduce risk, and implementing the appropriate actions to mitigate risk.

Risk Tolerance – The capacity to accept a level of risk, dependent on the likelihood and severity of consequences, and the existence of other priorities that require more immediate investment.

Strategic Risk – The risk of a change occurring that impedes the County's ability to achieve its overarching strategic goals.

Tangible Capital Asset: Non-financial assets having physical substance that:

- Are held for use in the production or supply of goods and services, for rental to others, for administrative purposes, or for the development, construction, maintenance, or repair of other tangible capital assets;
- Have useful economic lives extending beyond one year;
- Are to be used on a continual basis;
- Are not for sale in the ordinary course of operations.

**Useful Life –** See Estimated Useful Life

**User Fee** – Fee or charge to individuals or groups and/or businesses for the provision of a service, activity or product, or for conferring certain rights and privileges, which grant authorization or special permission to a person, or group of persons to access County-owned resources (including property) or areas of activity.