2024

ASSET MANAGEMENT PLAN

WATER DISTRIBUTION SYSTEM

The TOWNSHIP of MALAHIDE

A proud tradition, a bright future.

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Definitions, Abbreviations, and Acronyms

ULR	Useful Life Remaining
IJPA	Infrastructure for Jobs and Prosperity Act
KPI	Key Performance Indicator
LOS	Levels of Service
SCADA	Supervisory Control and Data Acquisition System
SFD	Single Family Dwelling
kWh	Kilowatt-hour

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.

INTRODUCTION

OVERVIEW

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

Township's goals and objectives with respect to asset management are identified in the Township's Strategic Asset Management Policy. A major theme within that policy is for the Township's physical assets to be managed in a manner that will support the sustainable provision of municipal services to Township residents.

Through the implementation of the asset management plan, the Township's practice should evolve to provide services at levels proposed within this document. Moreover, infrastructure and other capital assets should be maintained at condition levels that provide a safe and functional environment for its residents. Therefore, the asset management plan, and the progress with respect to its implementation, will be evaluated based on the Township's ability to meet these goals and objectives.

The following assets are included in this asset management plan:

- Watermains;
- Hydrants;
- Water Meters;
- Booster Stations;
- Sample Stations;
- SCADA; and
- Equipment

LEGISLATIVE CONTEXT

ASSET MANAGEMENT

Asset management planning in Ontario has evolved significantly over the past decade. Before 2009, capital assets were recorded by municipalities as expenditures in the year of acquisition or construction. The long-term issue with this approach was the lack of a capital asset inventory, both in the municipality's accounting system and financial statements. As a result of revisions to section 3150 of the Public Sector Accounting Board handbook, effective for the 2009 fiscal year, municipalities were required to capitalize tangible capital assets, thus creating an inventory of assets.

In 2012, the province launched the Municipal Infrastructure Strategy. As part of that initiative, municipalities and local service boards seeking provincial funding were required to demonstrate how any proposed project fits within a detailed asset management plan. In addition, asset management plans encompassing all municipal assets needed to be prepared by the end of 2016 to meet Federal Gas Tax agreement requirements.

To assist in defining the components of an asset management plan, the Province produced a document entitled Building Together: Guide for Municipal Asset Management Plans. This guide documented the components, information, and analysis that were required to be included in municipal asset management plans under this initiative. The province's Infrastructure for Jobs and Prosperity Act, 2015 (IJPA) was proclaimed on May 1, 2016. This legislation detailed principles for evidence-based and sustainable long-term infrastructure planning. IJPA also gave the province the authority to guide municipal asset management planning by way of regulation.

In late 2017, the province introduced O. Reg. 588/17 under IJPA. The intent of O. Reg. 588/17 is to establish a standard format for municipal asset management plans. Specifically, the regulations require that asset management plans be developed that define the current and proposed levels of service, identify the lifecycle activities that would be undertaken to achieve these levels of service, and provide a financial strategy to support the levels of service and lifecycle activities. This plan has been developed to address the requirements of O. Reg. 588/17 utilizing the best information available to the Township at this time.

Watson & Associates Economists Ltd. (Watson) was retained by the Township of Malahide (Township) in 2018 to update the Township's Strategic Asset Management Policy and Asset Management Plan (dated November 29, 2013). In 2022, Township Staff undertook an update of the Watson plan (dated February 20, 2019), ensuring the Township's asset management practices were compliant with Ontario Regulation 588/17.

Due July 1, 2024, O. Reg. 588/17 requires municipal asset management plans to be updated for all capitalized assets. This update should include updated asset inventories, current levels of service, lifecycle activities, and funding strategies. This plan will be a tool for Township staff and Council to use during various decision-making processes, including the annual budgeting and future capital grant applications. This plan will serve as a road map for sustainable infrastructure planning going forward. With this current update to the asset management plan, the intent is to continue compliance with Ontario Regulation 588/17.

WATER

The Ontario Water Resources Act focuses on both groundwater and surface water throughout the province. The Water Resources Act regulates well construction, operation and abandonment in addition to the approval, construction and operation of “water works”.

Ontario’s Environmental Assessment Act generally requires an environmental assessment of any major public or designated private undertaking in order to determine the ecological, cultural, economic and social impact of the project. The Act also establishes a “Class Environmental Assessment” process for planning certain municipal projects. Municipal projects that may be affected include municipal road, water, and sewage and storm water projects. For wastewater projects, the purpose of the municipal class environmental assessment is to ensure that projects will be "undertaken to address problems affecting the operation and efficiency of existing systems, to accommodate future growth of communities, or to address water source contamination problems".

The Sustainable Water and Sewage Systems Act outlines the framework for implementing full cost accounting to ensure long term sustainability of municipal water supplies. The Act requires municipalities to assess the costs of water and to develop plans to charge appropriate rates and generate sufficient revenue to finance capital and operating costs of sewer and water systems.

The Clean Water Act is a major part of the Ontario government's commitment to ensuring that every Ontarian has access to safe drinking water. Protecting water at its source is the first step in the multi-barrier approach to source water protection. By stopping contaminants from getting into sources of drinking water — lakes, rivers and aquifers — we can provide the first line of defence in the protection of our environment and the health of Ontarians. For the first time, communities will be required to create and carry out a plan to protect the sources of their municipal drinking water supplies.

Like the Clean Water Act, the Safe Drinking Water Act was initiated by Justice O’Connor’s inquiry into the Walkerton tragedy in 2000. As a result of the Act, all municipal drinking water systems must obtain an approval from the Director of the Ministry of the Environment in order to operate, and operators must be trained and certified to provincial standards. The Act also provides a framework for testing with legally-binding standards for contaminants in drinking water and the mandatory use of licensed and accredited laboratories for drinking water testing.

PLAN DEVELOPMENT

The asset management plan was developed using a program that leverages the Township's asset management principles as identified within its strategic asset management policy, capital asset database information, and staff input in identifying current and proposed levels of service, as informed by the Council, as well as proposed asset management strategies.

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

Inventory	Compile available information pertaining to the Township's capital assets to be included in the plan, including attributes such as size/material type, useful life, age, accounting valuation and current valuation. Update current valuation, where required, using benchmark costing data or applicable inflationary indices.
State of Local Infrastructure	Define and assess the state of local infrastructure through current asset conditions, based on a combination of Township staff input, existing asset reports, and an asset age-based condition analysis.
Levels of Service	Define and document current levels of service, as well as proposed levels of service, based on discussions with Township Council and staff, and consideration of various background reports.
Lifecycle Activities	Develop a strategy that provides for the activities required to sustain the levels of service discussed above. The strategy summarizes these activities in the forecast of annual capital and operating expenditures required to achieve these level of service outcomes.
Financing Strategy	Develop a financing strategy to support the lifecycle management strategy. The funding strategy informs how the capital and operating expenses arising from the asset management strategy will be funded over the forecast period, and may be accommodated in the annual budget process.
Document	Document the comprehensive Asset Management Plan in a formal report to inform future decision-making and to communicate planning to municipal stakeholders.
Publish	Make the Asset Management Plan and all relevant background information and reports available to the public. The Asset Management Plan, Strategic Asset Management Policy, and relevant reports to Council will be available on the Township's website, in addition to all background information made available upon request.

STATE OF LOCAL INFRASTRUCTURE

This is an analysis of the Township's assets, the current service levels provided by those assets, and the service levels the Township intends to deliver into the future. O. Reg. 588/17 requires that for each asset category included in the asset management plan, the following information must be identified:

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

LEVELS OF SERVICE

Asset management plans must identify the current levels of service being provided for each asset category by July 1st, 2024 per O. Reg. 588/17. For core municipal infrastructure assets (Bridges and Culverts, Roads, Wastewater, and Water), both the qualitative descriptions pertaining to community levels of service, and metrics pertaining to technical levels of service, are prescribed by O. Reg. 588/17. Current community and technical levels of service are based on data from the 2023 data collection period.

Proposed levels of service will need to be identified for each asset category by July 1st, 2025 per O. Reg 588/17. The proposed service levels will require a detailed explanation of why they are appropriate, give options with associated risks in regards to long-term sustainability, explain why they differ from current service levels and whether they are achievable and affordable. The proposed service levels for each asset category have not been included in this version of the plan, to be identified in future versions to maintain compliance with O. Reg. 588/17.

LIFECYCLE MANAGEMENT

Lifecycle management strategies are required to maintain the current and proposed levels of service. A lifecycle management strategy identifies the recommended lifecycle activities required to achieve desired levels of service. Lifecycle activities are the specified actions that can be performed on assets in order to increase service level and extend service life. These actions can be carried out on a planned schedule in a prescriptive manner, or through a reactionary approach where the treatments are only carried out when specified conditions are met. O. Reg. 588/17 requires that all potential lifecycle activity options be presented, with the aim of analyzing these options in search of

identifying the set of lifecycle activities that can be undertaken at the lowest cost to maintain current levels of service or to provide proposed levels of service.

Asset management plans must include a 10-year capital plan that forecasts the lifecycle activities resulting from the lifecycle management strategy. What follows are the lifecycle management strategies for all asset classes contained within this asset management plan, with each section focusing on an individual asset category. Although a considerable amount of effort has been spent on developing lifecycle management strategies informed by observed asset conditions, there are still some assets for which the lifecycle management strategy is age-based. The expenditure forecasts resulting from the lifecycle management strategies for each asset category are also included and have been developed for a 20-year forecast period.

FUNDING STRATEGY

A funding strategy should sustainably fund the lifecycle management strategies of an asset. The funding strategy contained herein focuses on examining how the Township can fund the lifecycle activities required to maintain its assets at the current and/or proposed levels of service. The strategies presented are a suggested approach which should be examined and re-evaluated during the annual budgeting processes to ensure the sustainability of the Township's financial position as it relates to its assets.

O. Reg. 588/17 requires a 10-year capital plan that forecasts the costs of implementing the lifecycle management strategy and the lifecycle activities required therein. The funding strategy in this asset management plan has been developed for a 20-year forecast period, where adequate data allowed, to enable the Township to evaluate the sustainability of its assets over a longer-term horizon. The funding strategy forecast (including both expenditure and revenue sources) was prepared consistent with the Township's departmental budget structure so that it can be used in conjunction with the annual budget process. Various financing options, including reserve funds, debt, and grants were considered. The recommended financing strategy identifies rehabilitation and replacement activities required over the forecast period.

GROWTH

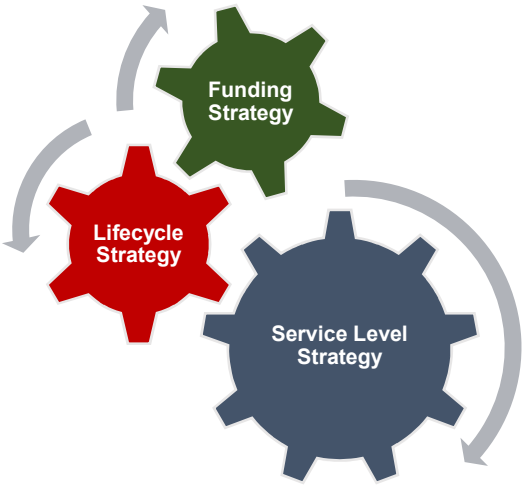
For municipalities with a population of less than 25,000, as reported by Statistics Canada in the most recent official census, assumptions need to be made regarding future changes in population and how those changes will affect asset lifecycle activities required to maintain current levels of service. The 2021 population estimate of the Township of Malahide, as reported by Statistics Canada, was 9,308. This represents an increase of 0.2% from the previous census estimate in 2016. Assuming that growth remains at this

level for the next ten years, the current lifecycle activities outlined in this report will remain sufficient to maintain the current levels of service.

MAINTENANCE AND INTEGRATION

It should be noted, that while this report covers a forecast period of 20 years, the full lifecycle of the Township's assets were considered in the calculations. In this context, the asset management plan should be updated as the strategic priorities and capital needs of the Township change. This can be accomplished in conjunction with specific legislative requirements (i.e. 5-year review of asset management plan under Infrastructure for Jobs and Prosperity Act), as well as the Township's annual budget process. Further integration into other Township financial/planning documents would assist in ensuring the ongoing accuracy of the asset management plan, as well as the integrated financial/planning documents. The asset management plan has been developed to allow linkages to a number of strategic documents, as identified in the Township's Strategic Asset Management Policy. Township staff have the tools available to perform updates to the asset management plan as necessary.

In the future, the asset management plan will continue to be updated by Township staff to more closely integrate with other studies and reports pertaining to Township assets. For example, the strategies identified in this asset management plan should be updated to include the biennial OSIM and Road Needs Study reports. When updating the asset management plan, it should be noted that the state of local infrastructure, proposed levels of service, lifecycle management strategy, and financing strategy are integrated and impact each other. For example, the financing strategy outlines how the asset management strategy will be funded. The lifecycle management strategy illustrates the costs required to maintain expected levels of service at a sustainable level. The proposed levels of service component summarize and link each service area to specific assets contained in the state of local infrastructure section and thus determines how these assets will be used to provide expected service levels.



WATER DISTRIBUTION SYSTEM

STATE OF LOCAL INFRASTRUCTURE

ASSET CLASS SUMMARY

The Township currently owns and manages 22.3 kilometres of water mains, 47 hydrants, 639 water meters, 1 booster station, 12 sample stations, a Supervisory Control and Data Acquisition System (SCADA), and water meter reading equipment, with a 2023 total replacement value totaling approximately $54.9 million. The water provided to this system flows through one of three other systems: Port Burwell Area or Aylmer Area Secondary Water Supply Systems, or the Towns of Aylmer Water System, and is treated at the Elgin Primary Water System.

Table 1 provides a summary of count, age, and replacement value for the current water distribution system assets. The average age of the Township's water distribution system is approximately 15 years. Figure 1 maps the water distribution system to visualize the Township's current asset network.

Table 1

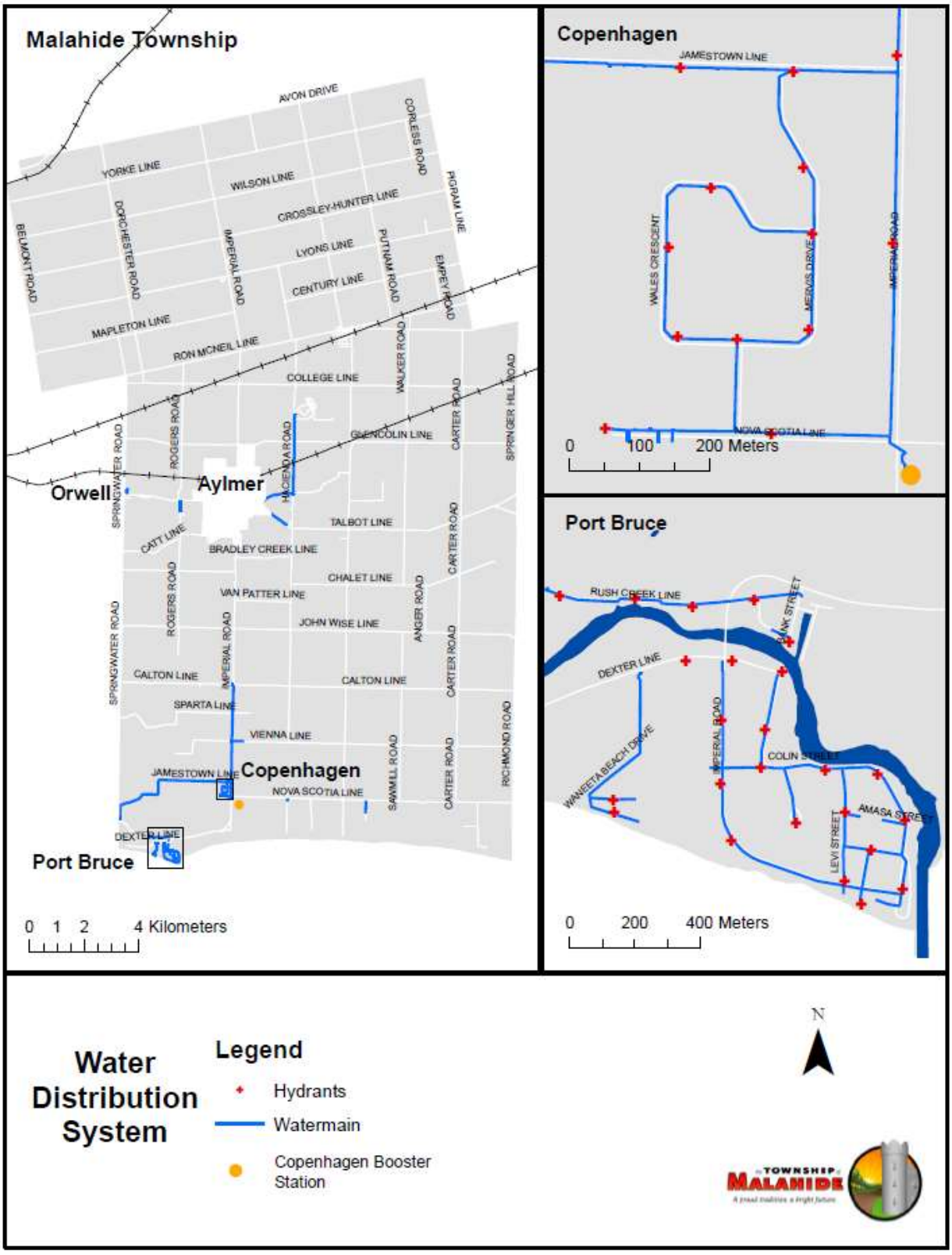
Water Distribution System Infrastructure Summary

Type	Quantity	Average Age	Replacement Cost (2023 $)
Water Mains	22.3 km	25	$53,571,504
Hydrants	47 units	14	$402,780
Water Meters	639 units	12	$397,856
Booster Station	1	10	$389,044
Sample Stations	12	12	$77,128
SCADA	1	6	$59,540
Equipment	6 units	3	$26,304
TOTAL			$54,924,156

ASSET CLASS PERFORMANCE

The performance of the water asset class is currently tracked by energy consumption at the Copenhagen Booster Station. In 2023, the hydro used by the booster station was approximately 58,589 kWh. This represents a 2% increase in hydro consumption from 57,446 kWh in 2022.

Figure 1
Water Distribution System Map



CONDITION

The Township Staff assessed the condition of the water distribution system, applying a condition state for the percentage of useful life remaining for assets. The percentage of useful life remaining is based on a predetermined useful life for water mains, hydrants, water meters, sample stations, for the booster station. To better communicate the condition of the water distribution system, the numeric condition ratings have been segmented into qualitative condition states as summarized in Figure 2.

Figure 2
Water Distribution System Condition States Defined with Respect to Useful Life

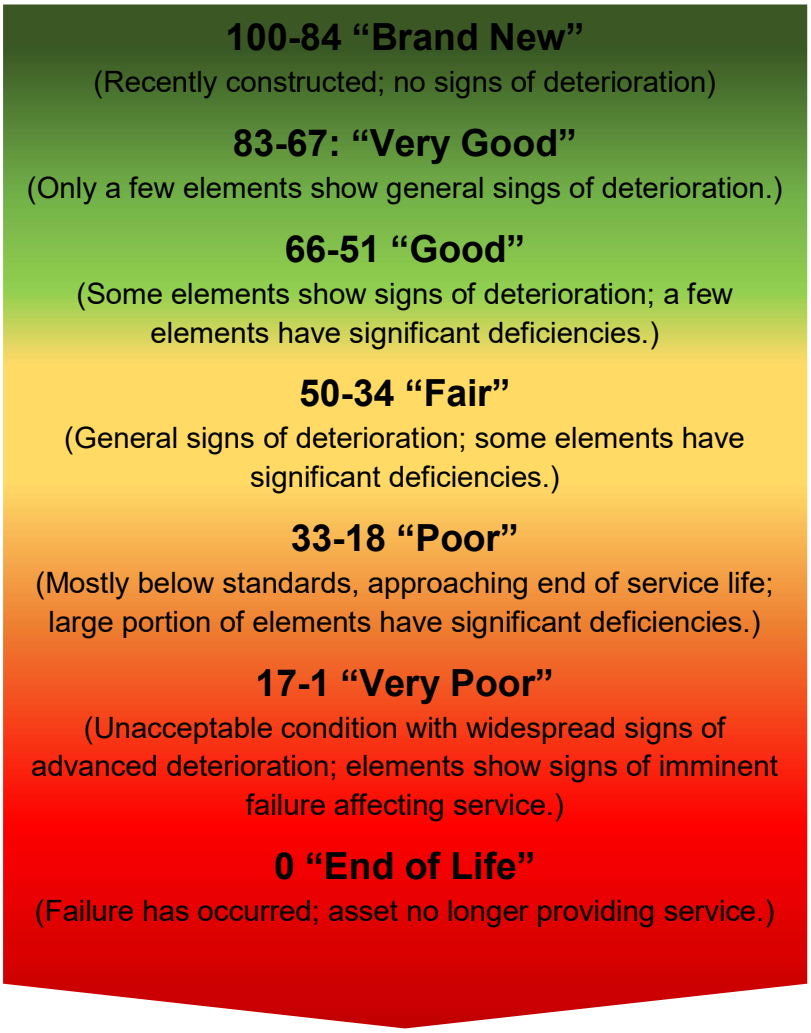


Table 2 examines the average condition rating of water distribution system. The average condition of the assets comes from the percentage of useful life remaining, and is identified for each water asset category. Figure 3 displays the condition ratings within each water asset category. The only assets falling within an “End of Life” condition state rating are a portion of the water meters, which have failed and are awaiting replacement.

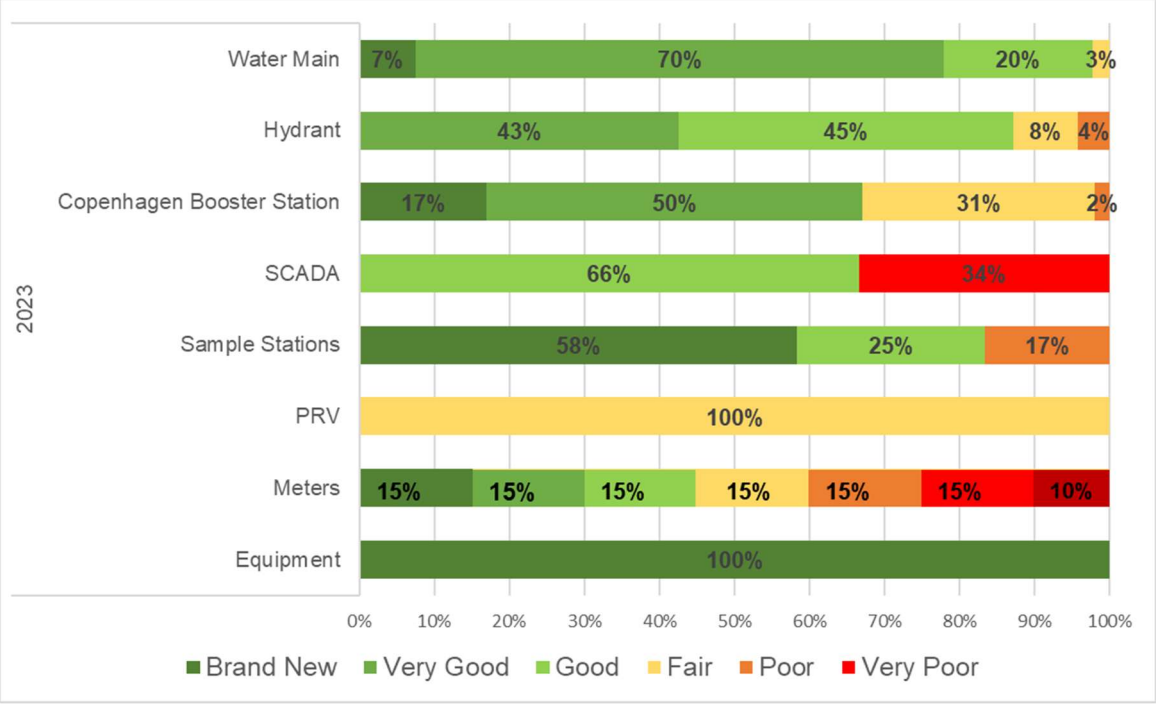
Table 2

Water Distribution System Condition Analysis

Type	Quantity	Average % of Useful Life Remaining (ULR)	Average Condition State
Water Mains	22.4 km	74%	Very Good
Hydrants	47	60%	Good
Meters	650	52%	Good
Booster Station	1	66%	Good
Sample Stations	12	70%	Very Good
SCADA	1	66%	Good
Equipment	1	61%	Good

Figure 3

Water System Asset Component Condition States



LEVELS OF SERVICE

CURRENT LEVELS OF SERVICE

The levels of service currently provided by the Township's water distribution system are a result of the state of local infrastructure identified above. A level of service analysis defines the current levels of service and enables the Township to periodically evaluate these service levels. Water distribution system assets have prescribed levels of service reporting requirements under O. Reg. 588/17. These requirements include levels of service reporting from two different levels, i.e. community levels of service and technical levels of service. Community levels of service objectives describe service levels in terms that customers understand and reflect their scope and quality expectations of the water distribution system. Technical levels of service describe the scope and quality of Township water distribution mains, hydrants, and meters, through performance measures that can be quantified, evaluated, and detail how effectively a municipality provides services.

Table 3 presents the current levels of service, as set by the Township, or as mandated by O. Reg. 588/17, indicated by an asterisk.

Table 3

Water Distribution System - Current Level of Service (2023)

COMMUNITY LEVELS OF SERVICE	TECHNICAL LEVELS OF SERVICE
Watermains are currently in a "very good" condition state on average. 	Average watermain condition:* **74%**

Booster station is in a “good” condition state on average. 	Average booster station condition: **66%**
Areas connected to the water distribution system include: Port Bruce, Waneeta Beach, Copenhagen, Orwell, Candyville, Dunboyne, Dingle College, Grovesend, Ontario Police College, Talbot Line (East & West of the Town of Aylmer)	Percentage of total number of properties connected to the community’s water supply and distribution system: **26%**
Available/adequate fire flow coverage is described as a minimum 90-meter distance from a property to a fire hydrant.	Percentage of total properties with available/adequate fire flow coverage:* **18%**
A boil water advisory is issued when authorities suspect or have confirmed the presence of harmful microorganisms in the drinking water supply. There were no boil water advisory events that took place in 2023.	Number of connection-days per year of boil water advisories compared to the total number of properties connected to the water distribution system:* **0 Days per Year**
There were no service interruptions due to watermain break events that took place in 2023.	Number of connection-days per year due to watermain breaks compared to the total number of properties connected to the water distribution system:* **0 Days per Year**

LIFECYCLE MANAGEMENT

LIFECYCLE ACTIVITIES

This section will detail the lifecycle activities (capital treatments) as prescribed by Township staff. The treatments that the Township currently employs in the management of its water distribution system include:

- Rehabilitation – Replacement of Critical Asset Components; and
- Reconstruction – Replacement of Asset.

Table 4 details the costs for the lifecycle activities listed above. These costs are presented as a percentage of estimated replacement cost or as flat rates per treatment. Rehabilitation of a hydrant involves the replacement of critical internal components. Hydrants are inspected every two years by the Ontario Clean Water Agency (OCWA) who may make recommendations for such rehabilitations. The full replacement of an asset is the costliest treatment and therefore is only recommended after all other rehabilitation treatments have been exhausted.

Table 4

Water Distribution System Treatment Costs

Treatment	Applies To	Cost (%)
Rehabilitation (Component Replacement)	Hydrants, Booster Station, SCADA	100% of Component Cost
Replacement	All	100% of Replacement Cost

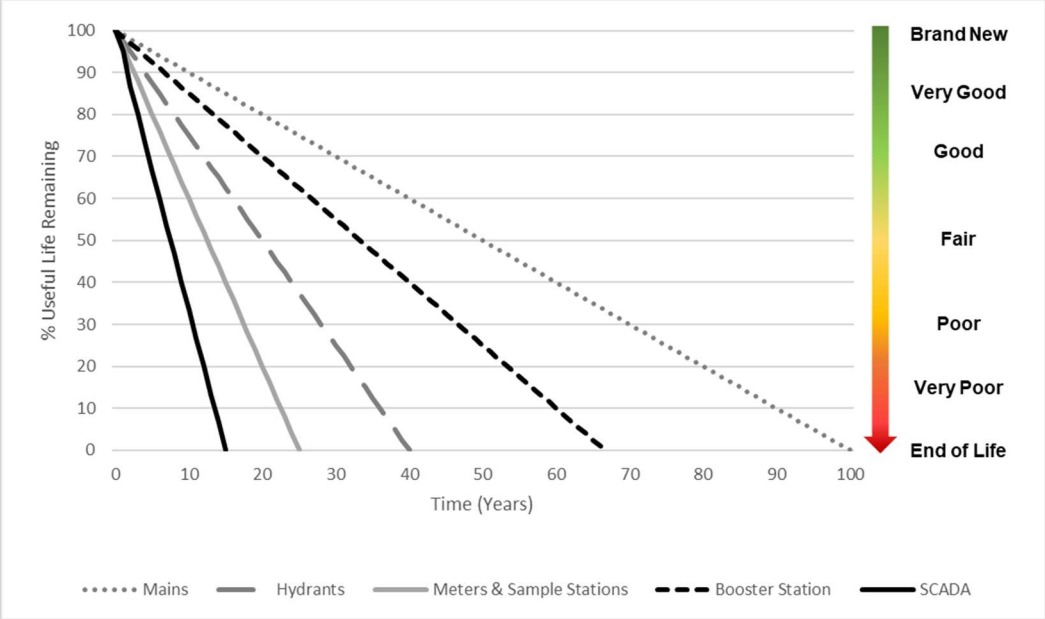
DEGRADATION PROFILES

Assets deteriorate over time, eventually reaching a point where they have no remaining service life left. However, the path each asset takes in reaching its end of life differs, even for assets of the same type. A condition rating identifies where along the path any particular asset lays, or in other words, how long an asset has left before it reaches its end of life. Therefore, condition and service life are linked, and can be plotted graphically to visually represent the degradation curve of an asset.

Figure 4 presents the degradation profile for the full replacement of water distribution system assets that has been developed based on a straight-line approach per manufacturer recommendations. Through the process of conducting condition assessments, the Township will be able to collect data to further refine the degradation profile.

Figure 4

Water Distribution System - Degradation Profile



DECISION CRITERIA

Table 5 presents the decision criteria—developed through discussions amongst Township staff—for triggering specific asset treatments. When the decision criteria for a given asset are met, the corresponding treatment is eligible to be applied. When a treatment is applied, the percentage of useful life remaining of the asset is improved by the amount specified in the "Gain to Condition" column, but not to exceed the amount listed in the "Maximum Condition Threshold" column.

Table 5

Water Distribution System Treatment Decision Criteria

Asset Type	Treatment	%ULR Range	Gain to Condition	Maximum Threshold
Water Mains	Replacement	20-0	+100	100
Hydrants	Rehabilitation	20-10	+100	99
	Replacement	20-10	+100	100
Meters & Sample Stations	Replacement	0	+100	100
Booster Station	Rehabilitation	60-30	+45	75
	Replacement	10-0	+100	100
SCADA	Rehabilitation	20-10	+100	100
Equipment	Replacement	10-0	+100	100

EXPECTED LIFECYCLE AND ASSOCIATED RISK

Combining the treatments, degradation profiles, and decision criteria presented herein results in a complete lifecycle management strategy. Figure 5, 6, and 7 present illustrative examples of the expected lifecycles for water mains, hydrants, and meters and sample stations, respectively. Figure 8 presents the expected lifecycle for the component-based booster Station and Figure 9 presents the lifecycle for the component-based SCADA system. Other water distribution system equipment assets are to be replaced on an as-needed basis, as such, the lifecycle strategy has not been depicted visually.

The dashed, vertical lines represent points of intervention in the representative asset's expected life. The lifecycle path of the asset is represented by the solid lines, following the degradation profile presented above. Finally, the dotted line demonstrates the expected lifecycle of an asset were it to not receive any treatments over the course of its service life.

Ensuring these schedules are adhered to will result in the overall asset continuing to provide current levels of service and will minimize the risk of failure. In addition to the age-based approach to condition assessments, enhanced reviews will be conducted on assets as they approach the forecasted treatment/replacement periods. The enhanced reviews will consider the condition of individual asset components as well as environmental factors, and other risks. Reviewing these associated risks will ensure that the recommended treatment or replacement period reflects all elements of the asset and the level of service it provides.

The lifecycle strategy for watermains is a replacement prior to the asset degrading to a point where the risk of failure becomes statistically more likely to occur. For example, a watermain will continue to degrade from a ULR of 100% to a ULR of 20% at which time it will be triggered for replacement. If the replacement does not occur, the water main will continue to degrade from the URL of 20% to the URL of 0% in a condition state of "very poor". Water mains are triggered for replacement at 20% useful life remaining to minimize the risk of failure which could cause a significant threat to public safety.

The lifecycle strategy as defined for hydrants is a combination of a preservation and replacement strategy, which means that an asset will receive a rehabilitation treatment before its eventual replacement. If budgetary constraints prevent a hydrant rehabilitation from occurring as it becomes due, the asset will continue to degrade to a point that it needs to be replaced.

Figure 5

Lifecycle Strategy – Water Mains

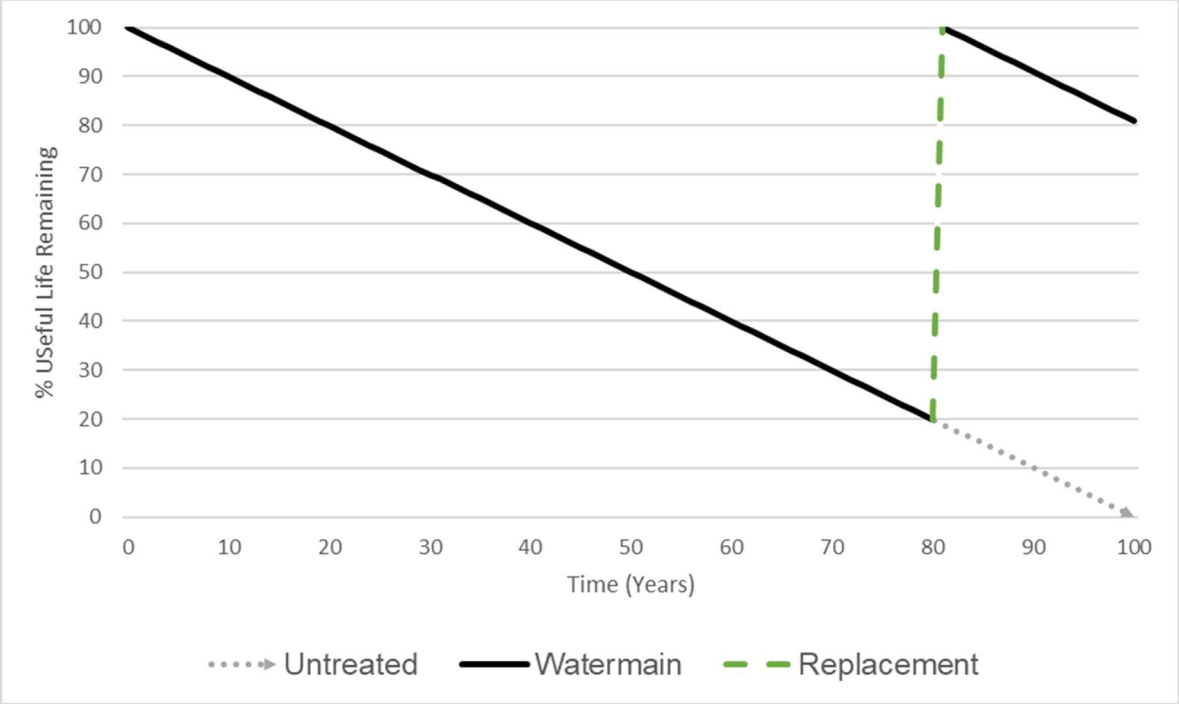
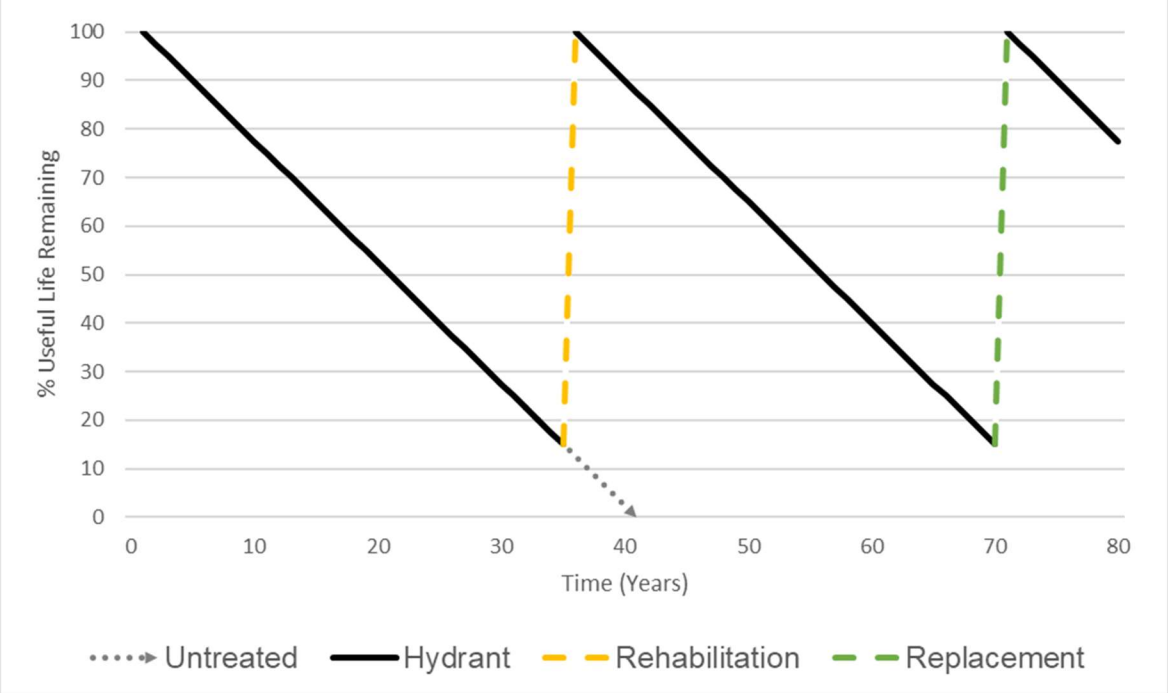


Figure 6

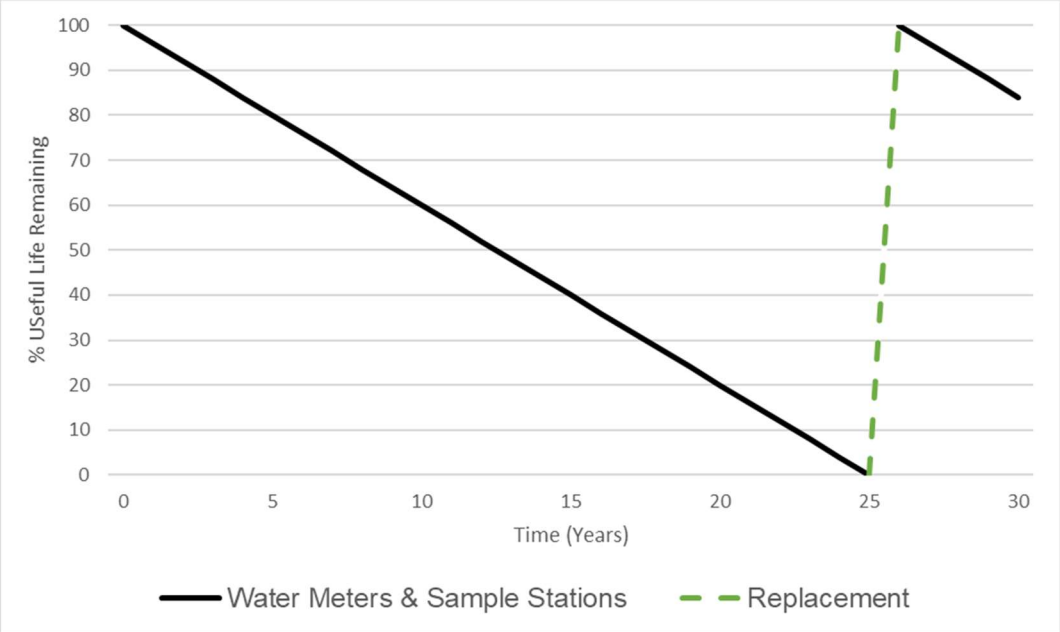
Lifecycle Strategy – Hydrants



The lifecycle strategy for water meters, and sample stations is to replace them when they have failed. While this strategy is simple—and may not appear to be significantly different from an age-based replacement strategy—because it is informed by the failure of an asset this strategy results in less accurate forecasting. As the individual asset's condition is degraded over time, the timing of the eventual replacement could vary significantly from one asset to another due to unique internal and environmental factors. For example, if the environment in which a meter resides causes it to degrade faster or slower than the expected average, then the eventual replacement at the time of failure will be different than an average age-based approach. Water meter efficacy is monitored on a regular basis with a superficial review being done monthly and a more in-depth review being undertaken on a quarterly basis.

Figure 7

Lifecycle Strategy – Meters and Sample Stations



The lifecycle strategies for the booster station and SCADA will be to address individual components of the asset in a combination of rehabilitation and replacement strategy. If budgetary constraints prevent a component replacement from occurring as it becomes due, the asset will continue to degrade to a point that it needs to be replaced. Individual components will have specific replacement schedules and contribute to an overall asset condition. For example, Booster Station component useful life remaining percentages are weighted based on risk of failure, to form an overall useful life remaining for the asset. The components with the highest risk of failure (i.e. electrical system, check valves) will contribute larger gains to the overall asset condition than lower risk components that are included in the lifecycle strategy (i.e. individual pumps, PRVs).

Figure 8

Lifecycle Strategy – Booster Station

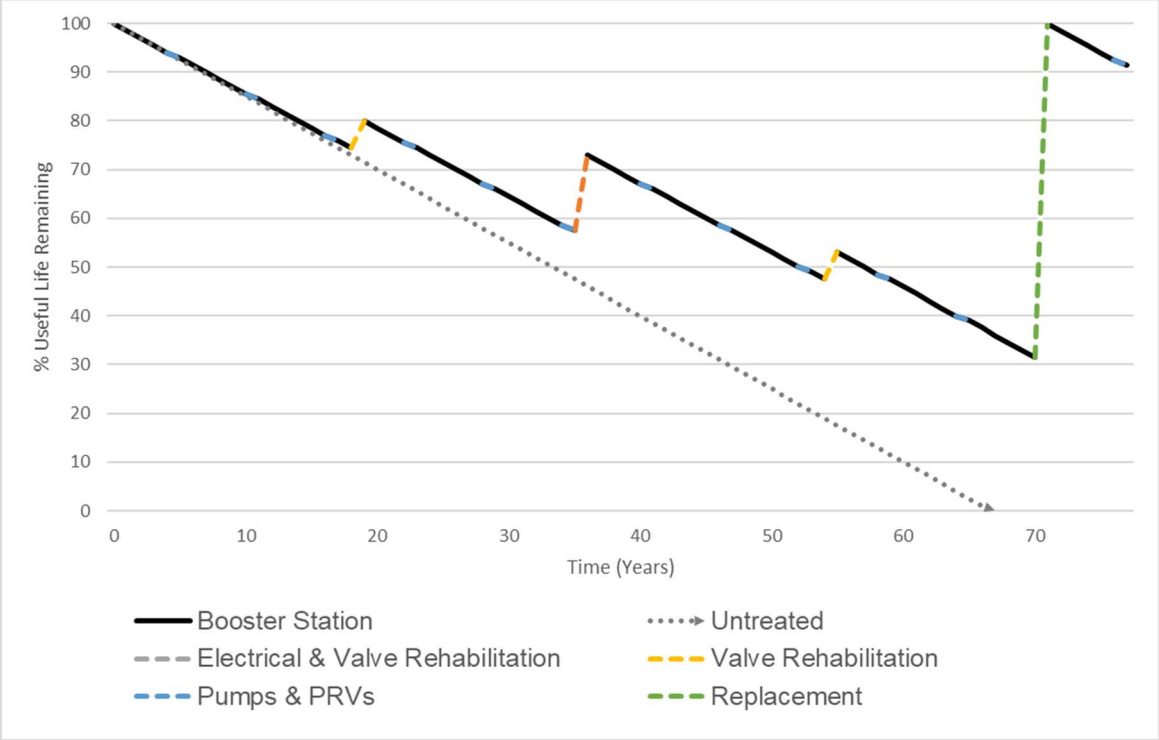
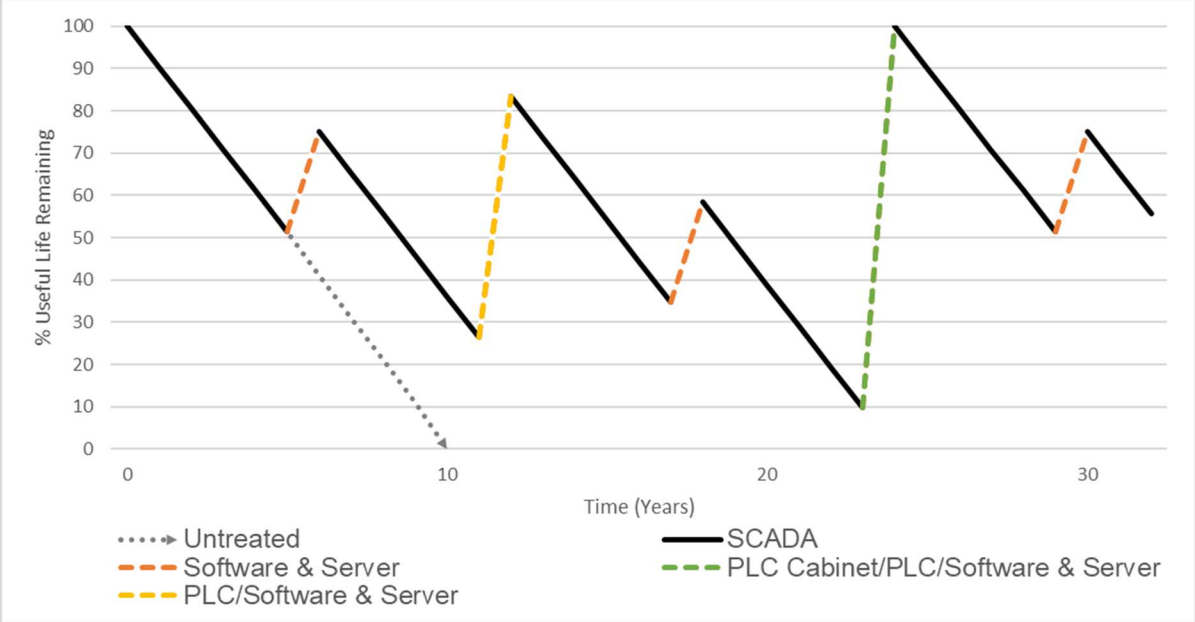


Figure 9

Lifecycle Strategy – SCADA



NETWORK FORECASTS

COST FORECASTS

The lifecycle replacement activities planned for current guiderail assets are projected to cost approximately $1,480,600 over the 20-year forecast period.

Figure 10 presents the 20-year expenditure forecast that results from following the lifecycle management strategy detailed above. This forecast illustrates the annual expenditures without any consideration to budgetary constraints. Over the 20-year forecast period, the average annual expenditure would be approximately $74,029.

The expenditure forecast includes a capital inflation factor of 3.5% annually, which aligns closely with the historical 20-year annual average rate of inflation as witnessed in Statistics Canada's Building Construction Price Index. The forecast also includes a 20% estimated cost for engineering, environmental assessments, and geotechnical studies, etc., for major projects.

Figure 10

Water Distribution System Expenditure Forecast

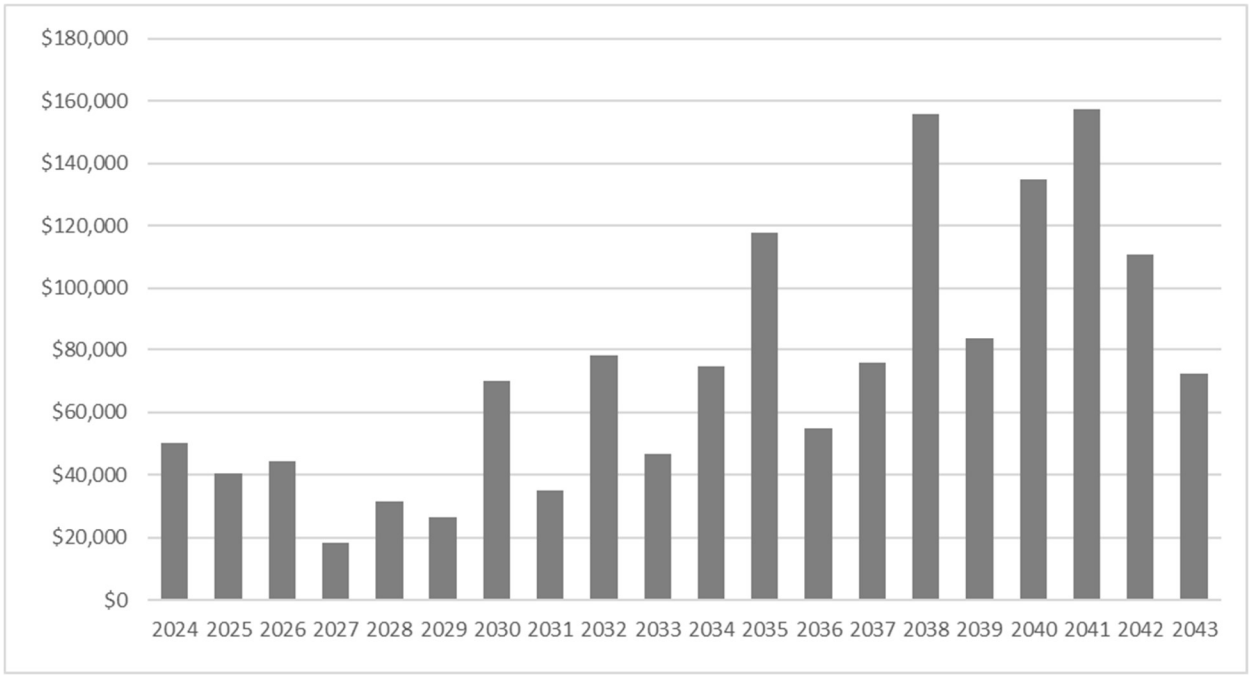


Table 6 details the capital expenditure forecast for water distribution system assets over the 20-year forecast period. This itemized expenditure forecast is based on the current lifecycle activities identified this plan.

Table 6

Water Distribution System Expenditure Forecast ($)

Assets	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Watermains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water meters	16,471	17,048	17,644	18,262	18,901	19,563	20,247	20,956	21,689	22,449	23,234	24,048	24,889	25,760	26,662	27,595	28,561	29,561	30,595	31,666
Hydrants	-	-	-	-	-	-	21,806	-	23,360	12,089	-	-	13,403	-	129,217	-	61,520	111,428	16,475	-
Booster Station	16,906	11,494	-	-	12,744	6,885	13,652	14,129	-	-	23,843	-	16,781	17,369	-	56,149	24,830	-	20,628	21,350
Sample Stations	14,000	-	-	-	-	-	-	-	-	-	-	-	-	32,843	-	-	-	-	-	-
PRV	-	12,000	-	-	-	-	14,252	-	-	-	-	16,927	-	-	-	-	20,104	-	-	-
SCADA	3,000	-	9,727	-	-	-	-	-	-	12,376	-	76,712	-	-	-	-	-	16,296	-	-
Equipment	-	-	-	-	-	-	-	-	13,286	-	7,820	-	-	-	-	-	-	-	-	19,397
Misc. Studies	-	-	17,000	-	-	-	-	-	20,000	-	20,000	-	-	-	-	-	-	-	43,000	-
Total	**50,377**	**40,542**	**44,372**	**18,262**	**31,645**	**26,448**	**69,958**	**35,085**	**78,335**	**46,913**	**74,897**	**117,686**	**55,073**	**75,972**	**155,879**	**83,744**	**135,015**	**157,285**	**110,699**	**72,413**

CONDITION FORECASTS

Figure 11 displays the average annual condition forecast for watermains that results from executing the lifecycle activities as set forth in the lifecycle management strategy over the 20-year forecast period. The average condition trend of watermains is expected to move from a “Very Good” condition state to a “Good” condition state by 2030. Lifecycle activity expenditures are not projected within the 20-years forecast period.

Figure 11

Condition Forecast – Watermains

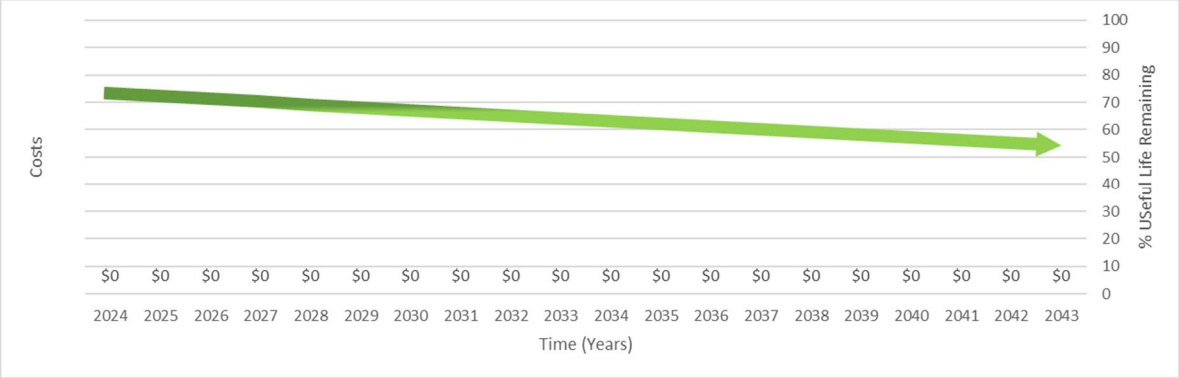


Figure 12 displays the condition forecast for hydrants that results from executing the lifecycle activities as set forth in the lifecycle management strategy over the 20-year forecast period. The average condition trend of hydrants is expected to move from a “Good” condition state to a “Fair” condition state by 2028. Large expenditures are projected for 2038-2041 for the replacement of hydrants on Imperial Road, Hacienda Road, and in Copenhagen, which will increase average the condition.

Figure 12

Condition Forecast - Hydrants

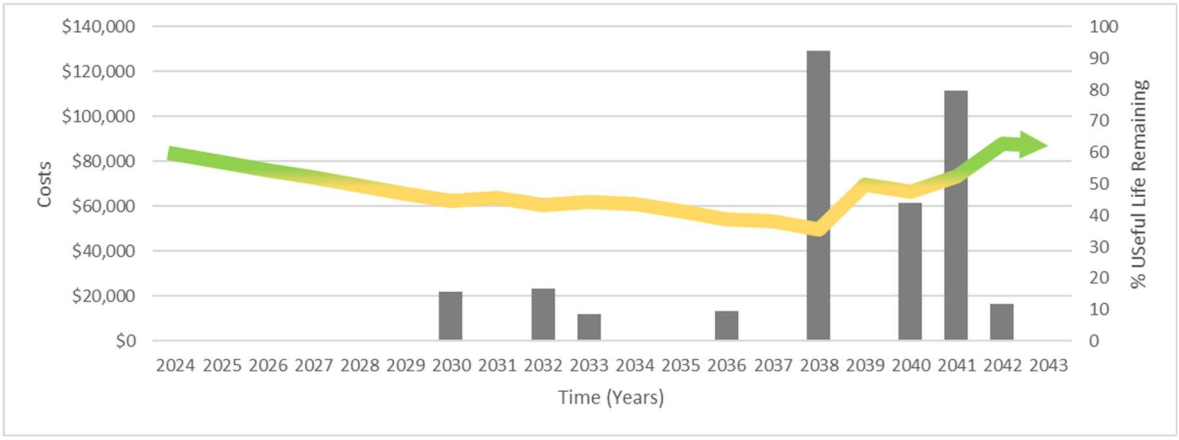


Figure 13 displays the condition forecast for water meters and sample stations that results from executing the lifecycle activities as set forth in the lifecycle management strategy over the 20-year forecast period. The average condition trend of water meters and sample stations is expected to move from a “Good” condition state to a “Fair” condition state by 2037. A large expenditure is projected for 2037 for the replacement of 3 sample stations which will increase average the condition.

Figure 13

Condition Forecast – Water Meters/Sample Stations

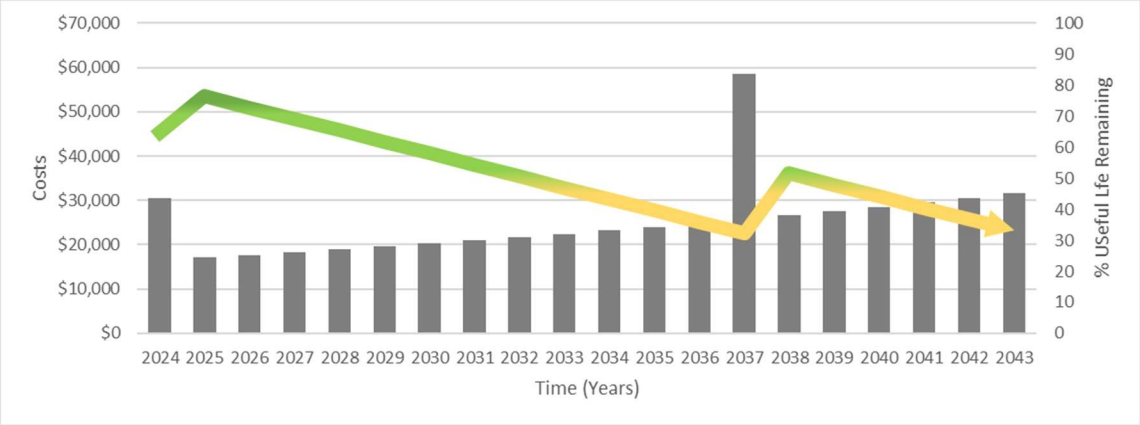


Figure 14 displays the condition forecast for the booster station that results from executing the lifecycle activities as set forth in the lifecycle management strategy over the 20-year forecast period. The average condition trend of the booster station is expected to move from a “Good” condition state to a “Poor” condition state by 2032. A large expenditure is projected for 2039 for an electrical rehabilitation which will increase the average condition, and as a result, prolong the life of the asset beyond the end of the forecast period.

Figure 14

Condition Forecast - Booster Station

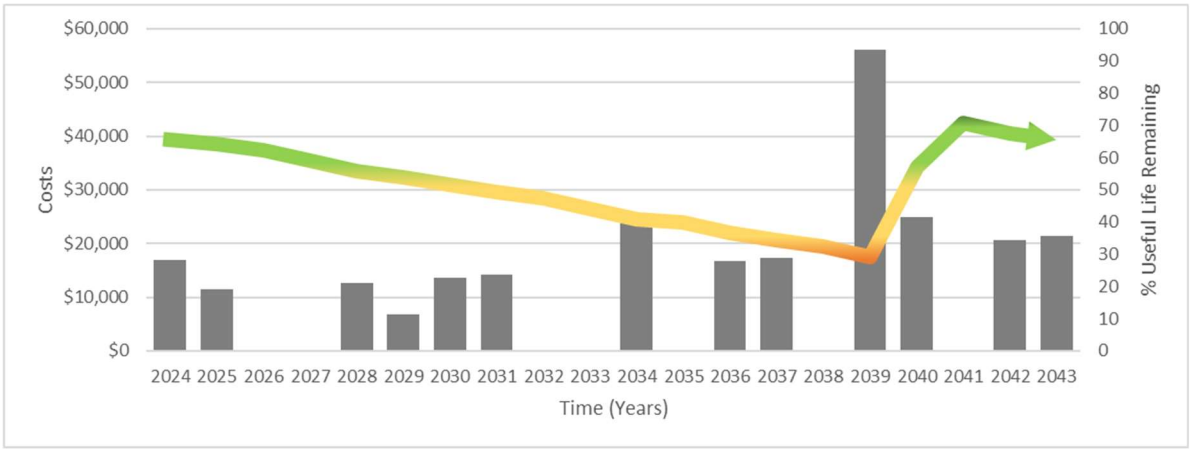


Figure 15 displays the condition forecast for the SCADA network that results from executing the lifecycle activities as set forth in the lifecycle management strategy over the 20-year forecast period. The average condition trend of the SCADA network is expected to move from a “Good” condition state to a “Poor” condition state by 2031. A large expenditure is projected for 2035 for the replacement of both the PLC and the PLC Cabinet, which will increase the average condition, and as a result, prolong the life of the asset beyond the end of the forecast period.

Figure 15

Condition Forecast - SCADA

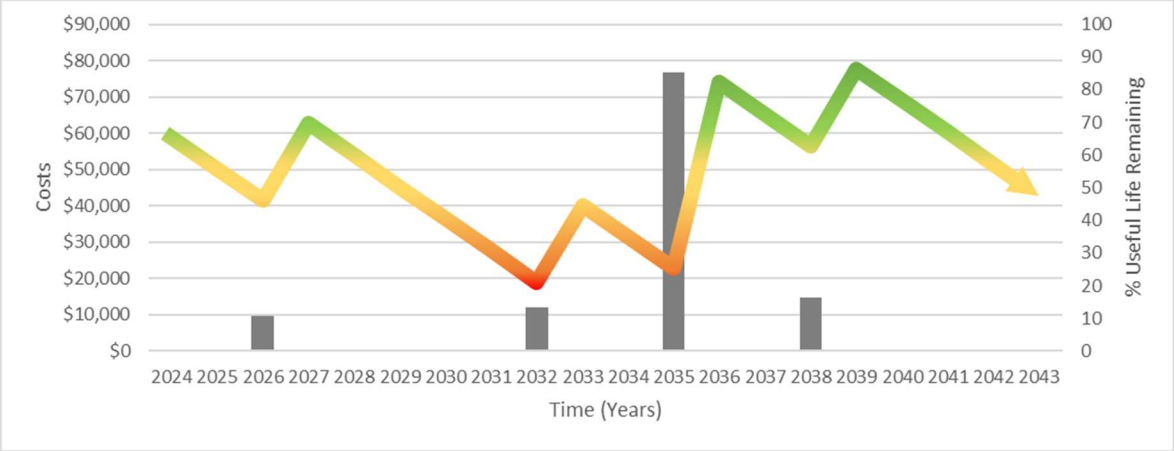
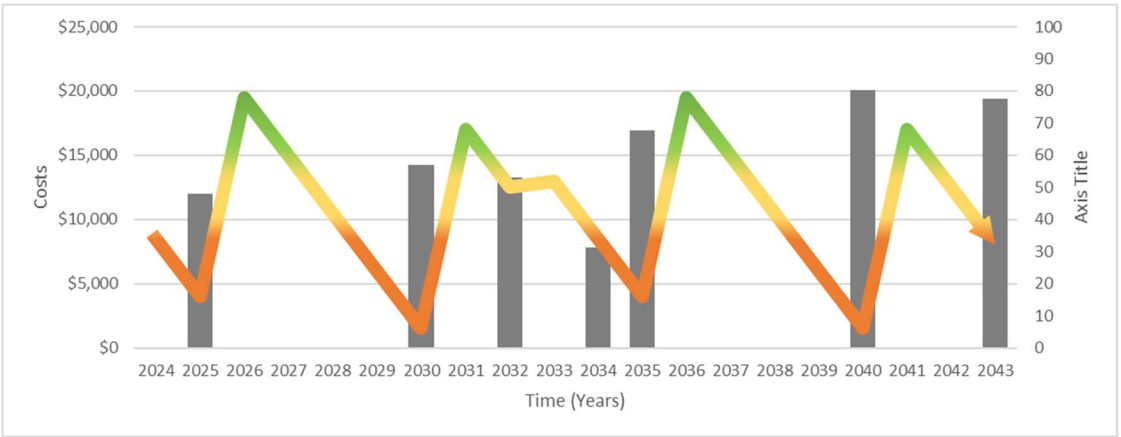


Figure 16 displays the condition forecast for other equipment assets that results from executing the lifecycle activities as set forth in the lifecycle management strategy over the 20-year forecast period. The average condition trend of the other equipment assets is expected to move from a “Poor” condition state to a “Good” condition state with each equipment asset replacement.

Figure 16

Condition Forecast – Equipment Assets



FUNDING STRATEGY

FUNDING SOURCES

The following summarizes the recommended strategies to fund the asset lifecycle costs identified for the wastewater collection system assets. These funding forecasts were based on the funding sources identified in the Township's 2024 budget. Table 7 presents these funding strategies.

The lifecycle costs required to sustain established levels of service are being funded through reserves. The Township will be dependent upon maintaining healthy capital reserves/reserve funds in order to provide the remainder of the required lifecycle funding over the forecast period. This will require the adjustment of amounts being transferred to these capital reserves during the annual budget process. Provincial/Federal grant funding has not been included in the forecast for wastewater works as there are no available grants at this time, and debt financing is not required, the financing strategy does not include debt financing over the forecast period.

Table 7

Water Distribution System Funding Forecast ($Millions)

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Capital Costs	$0.05M	$0.04M	$0.04M	$0.02M	$0.03M	$0.03M	$0.07M	$0.04M	$0.08M	$0.05M	$0.07M	$0.12M	$0.06M	$0.08M	155,879	$0.08M	$0.14M	$0.16M	$0.11M	$0.07M
% Grant Funding	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Debt Funding	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Reserve Funding	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Operating Costs	$0.85M	$0.89M	$0.92M	$0.96M	$1.00M	$1.03M	$1.06M	$1.10M	$1.13M	$1.16M	$1.20M	$1.23M	$1.27M	$1.31M	$1.35M	$1.39M	$1.43M	$1.47M	$1.52M	$1.56M
Revenue	$1.06M	$1.11M	$1.17M	$1.23M	$1.29M	$1.35M	$1.41M	$1.47M	$1.54M	$1.60M	$1.67M	$1.75M	$1.82M	$1.91M	$1.99M	$2.08M	$2.18M	$2.29M	$2.37M	$2.46M
Transfer to Reserves	$0.21M	$0.22M	$0.24M	$0.27M	$0.29M	$0.32M	$0.34M	$0.38M	$0.41M	$0.44M	$0.47M	$0.51M	$0.55M	$0.60M	$0.64M	$0.70M	$0.75M	$0.81M	$0.85M	$0.89M
Reserve Balance	$0.46M	$0.69M	$0.96M	$1.29M	$1.66M	$2.08M	$2.52M	$3.06M	$3.63M	$4.30M	$5.03M	$5.80M	$6.74M	$7.77M	$8.83M	$10.11M	$11.48M	$12.98M	$14.68M	$16.59M
User Fee Impact	**4.0%**	**5.0%**	**5.0%**	**4.9%**	**4.9%**	**5.0%**	**4.4%**	**4.5%**	**4.3%**	**4.3%**	**4.4%**	**4.4%**	**4.5%**	**4.5%**	**4.6%**	**4.6%**	**4.7%**	**4.7%**	**3.7%**	**3.7%**

FUNDING SHORTFALL

This funding strategy has been developed to be fully funded by reserves, and therefore no funding shortfall has been identified. However, this means that if identified user fee increases are not implemented at expected amounts then shortfalls may present themselves if current service levels are maintained.

USER FEE IMPACT

While the annual funding requirement may fluctuate, it is important for the Township to implement a consistent, yet increasing, annual investment in capital so that the excess annual funds can accrue in capital reserve funds. In 2022, an in-depth analysis of user fees was completed by Watson & Associates Economists Ltd. The adopted report has guided the asset management plan for the water distribution systems.

A 5% annual increase in fixed user fee rates was recommended by the Water Rate Study 2022, for the forecast period of 2022-2032. The funding strategy identified in Table 7 presents a 20-year funding forecast that is based solely on capital reserves. As such, it is recommended that the same annual increase of 5% as proposed in the Water Rate Study 2022, be continued over the 20-year forecast period. This will allow the Township of Malahide to maintain the reserves necessary to fund water distribution system asset lifecycle activities and maintain current service levels.

FUNDING STRATEGY

Figure 17 and 18 presents the 20-year funding strategy and the resulting reserve balance for the expenditure forecast detailed above. The lifecycle rehabilitation and renewal activities planned for the water distribution system are projected to cost, on average, approximately $74,029 per year over the forecast period. The funding strategy for these costs is to finance from reserves. There will be an annual increase to the transfer to reserves from operating, as well as investment income, which will allow for the reserve balance to sufficiently fund expenditures during and beyond the forecast period.

Reserve investments are projected to earn an additional 7% in investment interest annually, increasing the overall reserve balance and contributing to future infrastructure projects.

Figure 17

Water Distribution System Funding Strategy

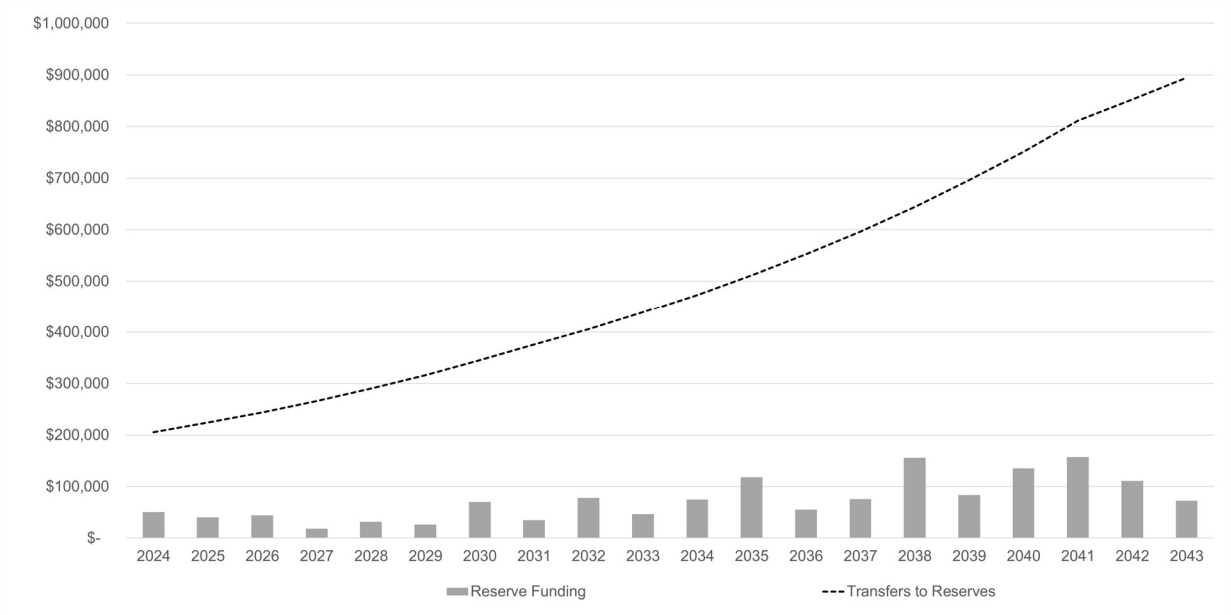
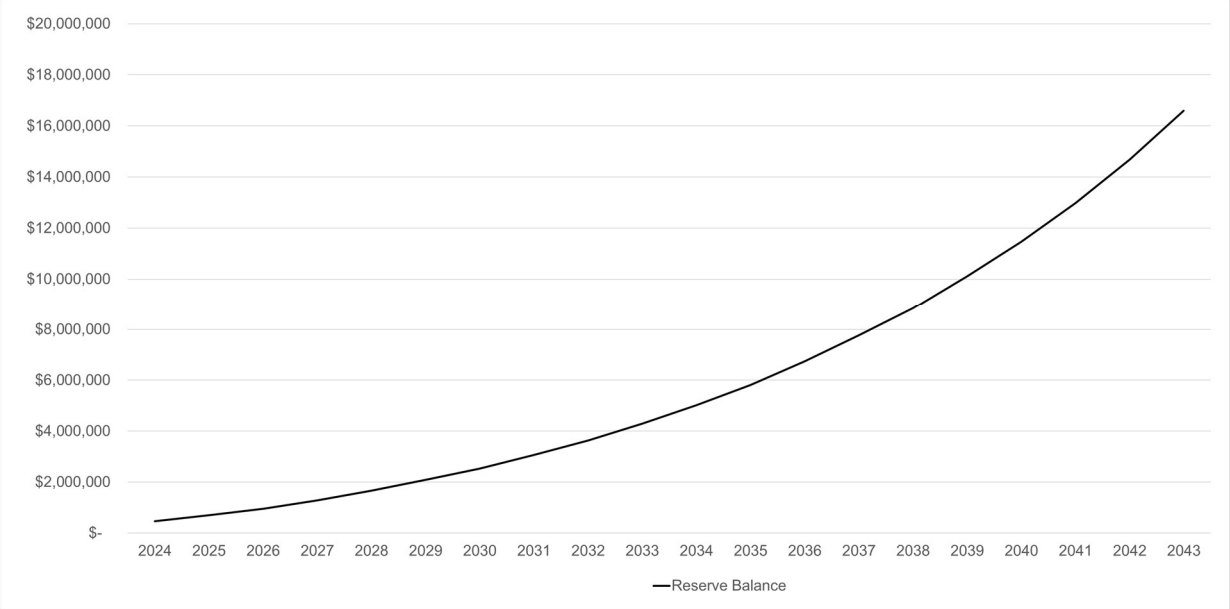


Figure 18

Water Distribution System Reserve Strategy



RECOMMENDATIONS

CURRENT CONSIDERATIONS

The following recommendations have been provided for consideration:

- That the Township of Malahide Water Distribution System Asset Management Plan be received and endorsed by Council;
- That consideration of this Asset Management Plan be made as part of the annual budgeting process to ensure sufficient capital funds are available to fund the Asset Management Plan; and
- That this Asset Management plan be updated as needed over time to reflect the current priorities of the Township.

Substantial investment in capital will be required over the forecast period, and through the recommendations provided in the funding strategy, proactive steps would be taken to sustainably fund the Township's water distribution system network of assets.

Funding has been recommended to meet the annual lifecycle funding target, which identifies the long-term annual investment level necessary to meet the current levels of service. This funding takes the form of transfers to capital reserves, and is reflected in the sizeable positive balances reached in the final years of the forecast period.

FUTURE IMPROVEMENTS

Areas of future enhancement to the Township's asset management plan have been noted, and a summary of these improvements has been listed below:

- Levels of Service - Images that illustrate the different condition states of assets can be helpful in communicating levels of service to stakeholders. A number of representative condition sample images could be provided for each asset category. The Township should seek to provide additional images in future iterations of this asset management plan.

- Proposed Levels of Service – This plan only includes an analysis of the current levels of service being provided by the municipal water distribution system. In future versions of this plan, proposed level of service options should be included along with an explanation of why they would be appropriate for the municipality, and an examination of the funding levels that would be required to implement them.

- Water Condition Assessments: The condition assessment of water assets was largely based on age-based degradation models. Future improvements to these plans should include a more detailed condition review and inspection program. More detail regarding condition assessments is especially important for assets that have been componentized. Componentized assets require an enhanced level of review of the costs of lifecycle activities required by individual components.

- Age-Based Assets – Modified Remaining Useful Life: The lifecycle needs for a number of the Township's asset categories and are currently assessed based on asset age. In the future, it would be beneficial for the Township to assign a remaining useful life to these various assets, based on observed condition and performance. This would enable the Township to more accurately plan for required interventions, such as replacements, based on observed asset characteristics.

- Growth-Related Capital: This plan does not currently include the costs associated with the lifecycle activities and maintenance of expansionary capital. Future updates to this plan should incorporate the expected costs of the acquisition, rehabilitation, and replacement of these assets to more fully explore the sustainability of the Township's network of assets. Examining these growth-related capital needs and their impacts on the financing strategy will provide for a comprehensive assessment of the sustainability of the Township's overall asset management system.