

2025

ASSET MANAGEMENT PLAN

WATER DISTRIBUTION SYSTEM



The **TOWNSHIP** *of*
MALAHIDE



A proud tradition, a bright future.

May, 2025
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EXECUTIVE SUMMARY

Overview

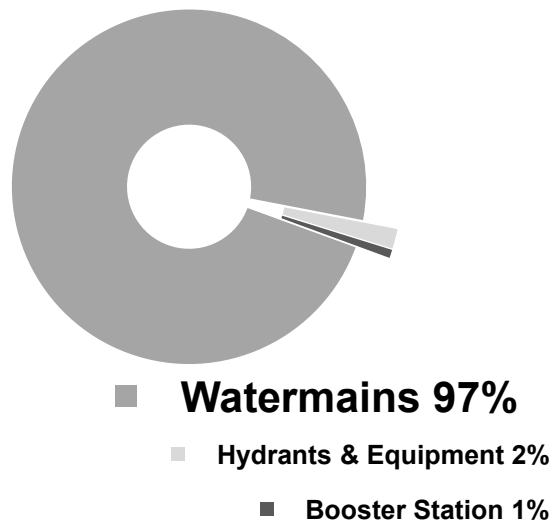
The primary focus of this asset management plan is to manage the Township's physical assets in a manner that will support the sustainable provision of municipal services to Township residents.

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.








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.

State of Infrastructure

Township-owned water assets represent a total current replacement cost of \$54.97 million, broken down as follows:



This is summary of the Township's asset categories and their average current condition state:

	Watermains	22KM	"Very Good"
	Hydrants	47	"Good"
	Meters	650	"Fair"
	Booster Station	1	"Good"
	Sample Stations	12	"Good"
	SCADA	1	"Good"
	Equipment	2	"Very Good"



Levels of Service

A level of service analysis defines performance measures by which service objectives can be evaluated. Services are broken into two attributes, scope and quality. For each service attribute, qualitative community descriptions are outlined along with technical metrics that will be used to measure the community descriptions.

The current scope of municipal services is proposed to remain the same for the 10-year forecast period due to low population growth as reported by

Statistics Canada. This means that where asset-based services are available currently, they are proposed to remain for at least the next 10 years.

The following is a summary of the proposed levels of service described in this plan with regards to water distribution system levels of service (LOS):

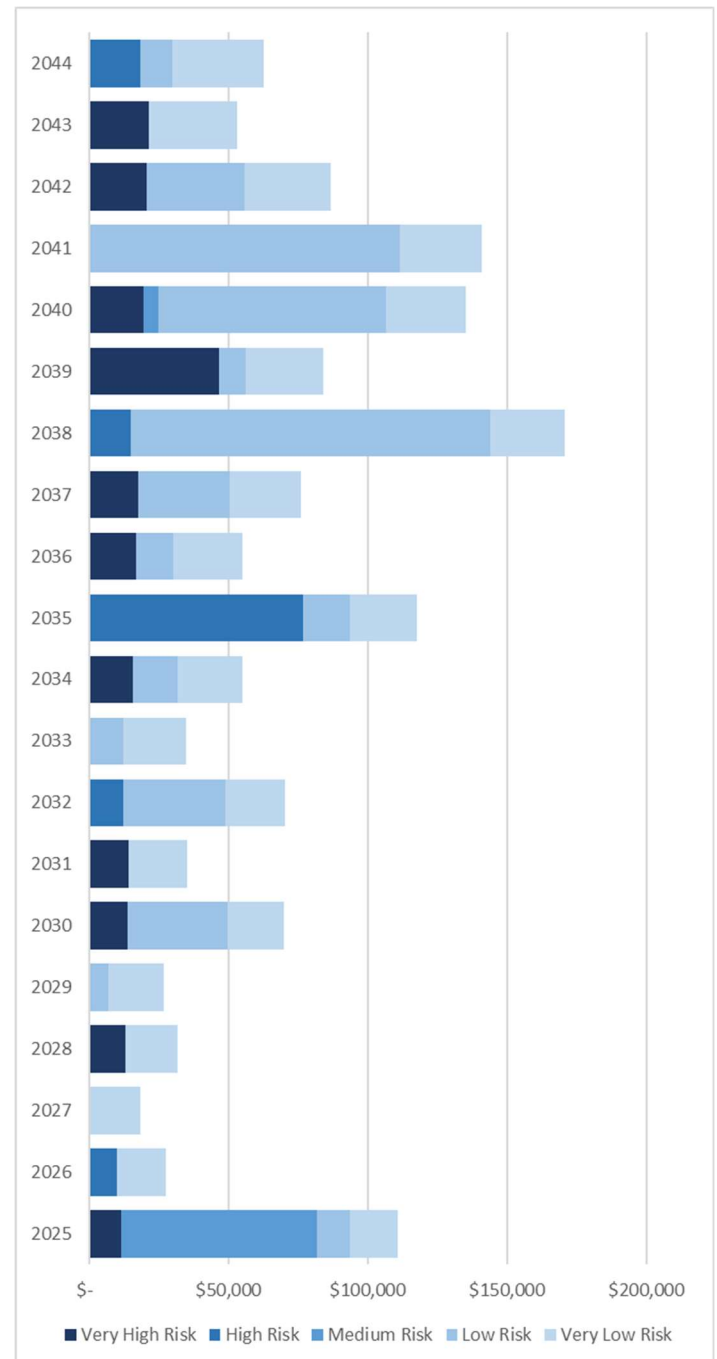
	CURRENT & PROPOSED LOS
SCOPE	Availability Limited to Current Locations
RELIABILITY	No Interruptions Due to Main Breaks & No Boil Water Advisories

Lifecycle Management

Municipal assets have many operational and capital activities and treatments performed on them over the course of their useful lives. Should these activities not take place due to financial constraints, there is an associated risk to achieving desired service levels.

Risks have been assessed in terms of the likelihood and impact of asset failures. Lifecycle activities have been forecasted for a period of 20 years in terms of both activity costs and the associated risk.

The following is a forecast of the annual lifecycle costs:



Funding Strategy

A funding strategy should sustainably fund the lifecycle management strategy 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.

Funding sources can include: capital-related reserves, debt financing, and provincial/federal grants. The type and timing of funding sources may affect the general tax-levy rates in the short-term, and ultimately affect long-term financial sustainability.

The Township proposes to fund the asset management program through a combination of grants and capital-related reserves. This means taking advantage of grants as they become available, and strategically building reserves through the general tax levy and through strategic investment.

A summary of the funding strategy is as follows:

Recommendations

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 network of assets.

It is recommended 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 to reflect the current priorities of the Township, and reviewed at least every 5 years.
- That annual reports be made regarding the implementation of proposed service levels.

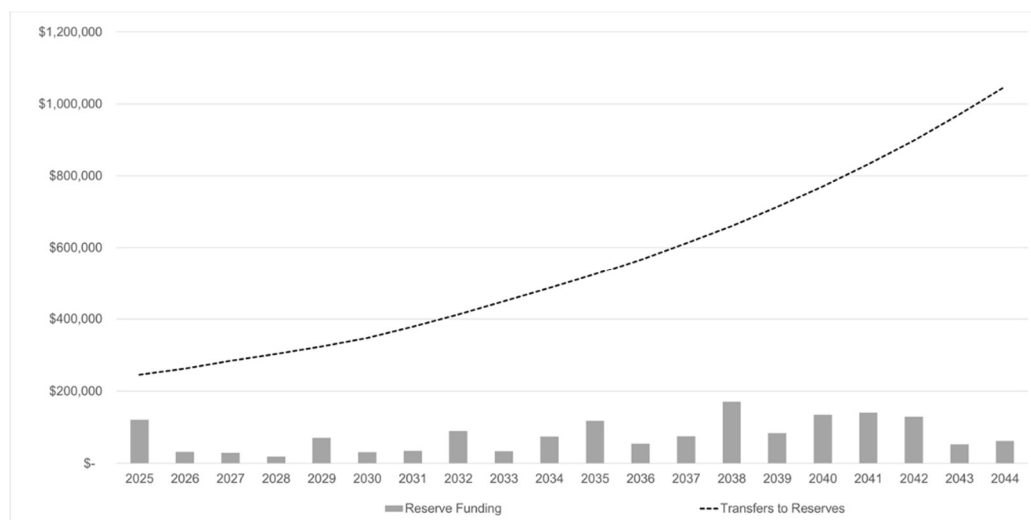


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Definitions, Abbreviations, and Acronyms

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

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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 water provided to this system flows through one of three other systems: Port Burwell Area or Aylmer Area Secondary Water Supply Systems, or the Town of Aylmer Water System, and is treated at the Elgin Primary Water System.

The following assets are included in this asset management plan:

WATERMAINS 	HYDRANTS 	WATER METERS 
SAMPLE STATIONS 	BOOSTER STATION 	EQUIPMENT & SCADA 

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 (IIPA) was proclaimed on May 1, 2016. This legislation detailed principles for evidence-based and sustainable long-term infrastructure planning. IIPA 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 IIPA. 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, 1990 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, 1990 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, 2002 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, 2006 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, 2002 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.

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.

STATE OF LOCAL INFRASTRUCTURE

SUMMARY

The Township of Malahide monitors the state of its assets to varying degrees. This is an analysis of the Township's assets, the condition of these assets, and the current replacement costs of the assets. 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)

Type	Inventory	Average Age	Replacement Costs	Average Condition	Assessment Approach
Water Mains	22.3 km	25	\$53.6 million	"Very Good"	Age-Triggered Staff & Consultant Inspections
Hydrants	47	17	\$0.4 million	"Good"	Semi-annual Consultant Inspections
Water Meters	639	13	\$0.4 million	"Fair"	Failure-Triggered Staff Inspections
Booster Station	1	8	\$0.4 million	"Good"	Age-Triggered Staff & Consultant Inspections
Sample Stations	12	9	\$0.08 million	"Good"	Age-Triggered Staff & Consultant Inspections
SCADA	1	6	\$0.06 million	"Good"	Age-Triggered Staff Inspections
Equipment	2	4	\$0.02 million	"Very Good"	Age-Triggered Staff Inspections
Total	-	16	\$54.9 million	"Good"	

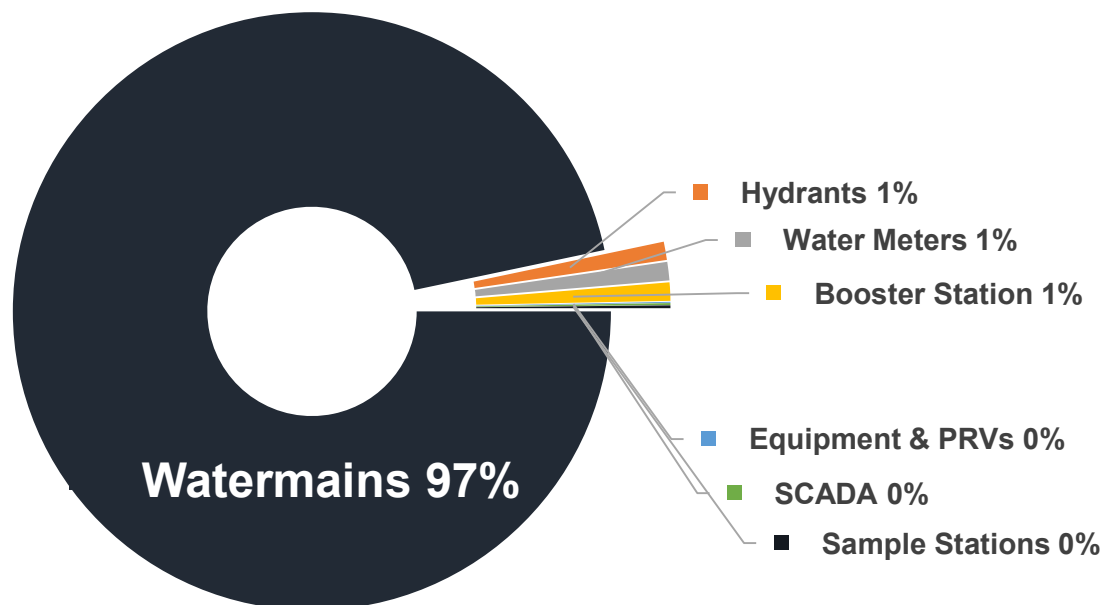
REPLACEMENT COST

An analysis of the current replacement costs for each asset class is necessary to ensure the accuracy of future capital replacement cost forecasts. Replacement costs are defined as costs required to fully replace an asset and may include engineering, acquisition, labour and supplies, etc.

Replacement cost can be calculated or estimated based on historical cost, current market cost, or recent procurements for similar works. Replacement costs may also be dependent on the asset's environment, with proximity of environmentally or culturally sensitive areas, or the impact of inflated component costs, all contributing the overall replacement cost.

For watermains, hydrants and meters, sample stations, equipment, SCADA and PRVs, replacement costs were calculated based on current market value data, as collected through the Township's procurement process. For the booster station, a combination of inflated historical costs, component costs, and current market costs were utilized to determine current replacement costs.

Total replacement costs are estimated at \$54.9 million and are broken down by asset class in the figure below. This graph shows that the largest replacement costs belong to the watermain asset category.



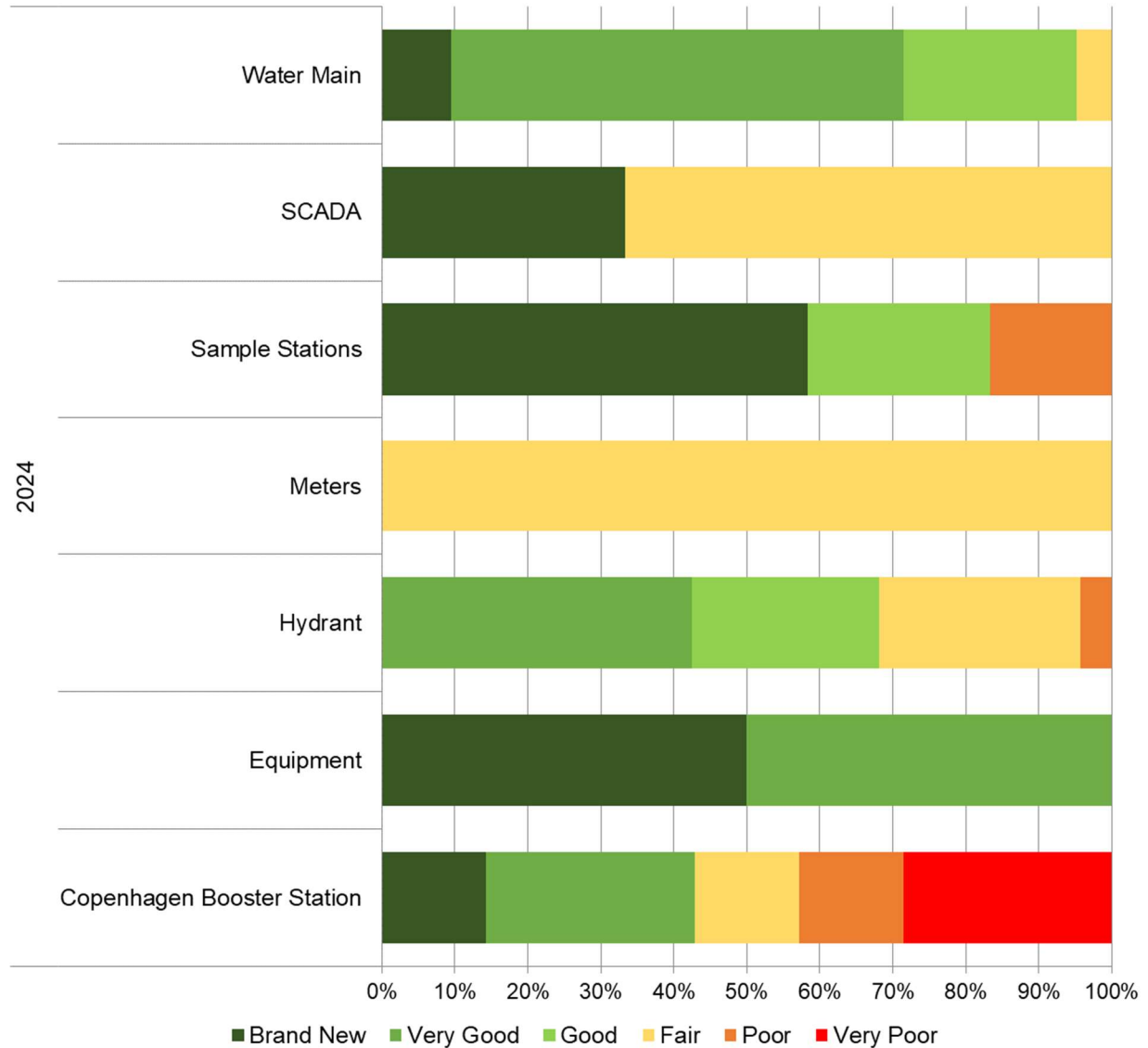
CONDITION ASSESSMENT

As assets age, their condition degrades which can ultimately impact service delivery. The processes adopted for assessing the condition of assets will allow the municipality to gain valuable ongoing insight into the levels of service being provided and will guide long-term investment planning for new and existing infrastructure. Asset condition is routinely assessed through well-defined processes to identify operational repairs, maintenance program planning, as well as capital renewal needs. The information is also used for reporting on the state of infrastructure. Periodic inspections and condition assessment processes for all major assets are well defined. Asset-specific inspection and condition assessment approaches are described in the State of Infrastructure Summary section above.

In the absence of formal condition assessment information, condition is derived from the age and lifespan of the asset. While asset age may provide some limited context to the functional state of an asset, an assessed physical condition is a better measure of where an asset is in its lifecycle. The Township's Asset Management Plan provides a physical condition status rating for each asset category. This physical condition rating is provided on a scale of "Brand New", being a perfect condition, to "End of Life, indicating an asset at the end of its service life.

Brand New	Recently constructed with no signs of deterioration.
Very Good	Only a few elements show general signs of deterioration.
Good	Some elements show signs of deterioration and a few elements with significant deficiencies.
Fair	General signs of deterioration with some elements showing significant deficiencies.
Poor	Approaching end of service life, with a large portion of elements showing significant deficiencies.
Very Poor	Widespread signs of advanced deterioration with elements showing signs of imminent failure affecting service.
End of Life	Failure has occurred and the asset is no longer providing service.

The municipality's water distribution system assets are at varying stages in their lifespans and have varying conditions. Based upon analysis of asset condition using 2023 to 2024 data, asset conditions have been maintained, indicating the municipality is keeping pace with investing in the rehabilitation of its assets. Analysis undertaken for the 2025 AMP, using 2024 data only, indicates condition assessments as follows:



LEVELS OF SERVICE

OVERVIEW

Municipal services are guided by Corporate and Council strategic master plans and policies. The Township of Malahide Strategic Plan 2023-2033 outlines the service expectations of the municipality, and the guiding values and priorities that will move the community towards the desired vision.

THE VISION	"A Township defined by its rural character, close-knit community, and good quality of life."
THE MISSION	<ul style="list-style-type: none"> ✓ To provide essential services that are timely, cost-effective, easy to access and aligned with policies. ✓ To provide affordable cultural and recreational activities aligned with community needs. ✓ To provide information that promotes understanding and participation.
VALUES & PRIORITIES	<ul style="list-style-type: none"> ✓ Long-Term View ✓ Community Engagement ✓ Responsible Growth ✓ Maximize Utilization of Assets ✓ Establish, Document, & Implement Service Levels
RESULTS	<ul style="list-style-type: none"> ✓ Long-term, affordable solution to water infrastructure ✓ New Opportunities to Participate in Services ✓ Easy Access to More Relevant Information
METRICS	Community & Technical Service Level Metrics

CURRENT LEVELS OF SERVICE

A levels of service analysis defines the levels of service being provided by a municipality and enables the municipality to periodically evaluate these service levels. Core assets (Roads, Bridges & Structural Culverts, Municipal Drinking Water Assets, and Wastewater 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 describe service levels in terms that residents understand and reflect their scope and quality expectations of assets. Technical levels of service describe the scope and quality or reliability of assets through performance measures that can be quantified, evaluated, and detail how effectively a municipality provides services.

For each service attribute, qualitative metrics can be best described as community descriptions and the associated technical metrics should be a method of measuring the community descriptions in a consistent and reliable way. Technical metrics may differ by asset category based on data availability. Current levels of service must be based on data collected in the previous two-year period, this plan uses data collected from the 2023-2024 period.

In order to better communicate service levels please refer to Appendix D: Service Levels. Below is a summary of the current scope and reliability of municipal water distribution system services.

CURRENT SCOPE OF SERVICE

RESTRICTED AVAILABILITY

The municipal drinking water availability is restricted to specific geographic areas.

CURRENT RELIABILITY OF SERVICE

NO INTERRUPTIONS

There were no interruptions in service due to watermain breaks and no issuances of boil water advisories.

PROPOSED LEVELS OF SERVICE

Proposed levels of service must also 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 levels of service must be forecasted for a minimum ten-year period, from the date of the plan publication.

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 current and proposed 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 level of service will be sufficient for the forecasted period.

The current service levels and lifecycle funding strategy will be maintained as the proposed service levels. Proposing to maintain current levels of service is appropriate for the Township of Malahide because they reflect historical and forecasted trends in the scope and reliability of municipal asset services. These trends have been based on current lifecycle activities, that have been developed as the lowest cost options, and have been forecasted into an achievable and affordable funding strategy with the lowest risk to long-term sustainability.

Please refer to the subsequent Lifecycle Strategy section for more information on specific activities and the risks associate with failing to perform these activities. Proposed service levels are described as annual targets for the 2025-2044 forecasted period. For more detailed description of the performance measures for both current and proposed levels of service, please refer to Appendix D: Levels of Service. Below is a summary of the proposed scope and quality of services provided by municipal assets.

PROPOSED SCOPE OF SERVICE

RESTRICTED AVAILABILITY

The water distribution system will continue to be restricted to specific geographic areas due to the low projected growth in the municipality.

PROPOSED RELIABILITY OF SERVICE

NO INTERRUPTIONS

The municipality will strive to ensure there are no interruptions in service due to watermain breaks and no issuances of boil water advisories.

LIFECYCLE MANAGEMENT STRATEGY

OVERVIEW

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. Please refer to Appendix E: Detailed Cost Forecasts for more information.

There are risks inherent with any lifecycle strategy regarding restrictive funding sources. A lifecycle strategy may include activities to be performed that are reliant on previous activities having been performed. With municipal funding sources being restrictive, and with the priority for limited resources being placed on legislative compliance, there may be trade-offs between competing lifecycle activity investments that require strategic consideration. The risk of not completing lifecycle activities at the time of need could result in degraded asset performance, a shorter useful life for assets, and sacrificing long-term sustainability for short-term needs.

LIFECYCLE ACTIVITIES

This section pertains to the lifecycle activities that the Township currently employs in the management of its asset network. These capital lifecycle treatment activities require significant investment over time; therefore, ongoing operation and maintenance plans are essential to ensure that capital asset investment is optimized. A successful operation and

maintenance plan will enable assets to meet service level expectations from the community.

The operation and maintenance plan activities required to maintain current service levels are outlined in the table below.

Asset	Operations & Maintenance Plan
Watermains	Maintenance activities include day-to-day monitoring to detect and undertake repairs to fittings.
Hydrants	Periodic maintenance activities include operating and lubricating hydrants twice a year to keep them in good working condition to achieve the maximum life expectancy.
Water Meters	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. The only maintenance activity conducted on water meters is the as-needed replacement of frost plates.
Booster Station	Maintenance activities include general repair of components as needed including the replacement of pump impellers biennially, and performance is monitored.
Sample Stations	Maintenance activities include periodic operation and repair of stations to keep them in good working condition to achieve the maximum life expectancy.
SCADA	Maintenance activities include periodic maintenance such as disc inspections, and program upgrades and backups conducted by a third-party consultant.
Equipment	Equipment maintenance includes routine cleanings, and as needed component repair.
PRV	There is no maintenance conducted separate from capital replacements.

The capital lifecycle activities required to maintain current service levels include a combination of rehabilitation, renewal, component replacement, and total replacement. The capital lifecycle activity process begins when a treatment activity is triggered by a condition threshold as a result of either its age or as a result of an inspection. The triggered activity is reviewed by a combination of staff, operational consultants, and/or by engineering consultants to determine its relevance for that specific asset at that specific time. If the need is significant and the risk to service interruption is high, the activity moves to a more detailed level of scope and budget definition so that it can be included in the budgetary decision-making process.

The capital lifecycle activity treatments required to maintain current service levels are outlined in the table below.

Asset Class	Capital Lifecycle Activity Treatments
Watermains	Lifecycle activities for watermains include the total replacement of watermain sections as the assets are approaching the end of their lifecycle. This may be forecasted based on age and confirmed closer to replacement dates through detailed condition assessments. 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. Water mains are triggered for replacement to minimize the risk of failure which could cause a significant threat to public safety.
Hydrants	Lifecycle activities for hydrants include a rebuilding of the internal components and a full replacement at the end of their lifecycle. 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.
Water Meters	Lifecycle activities for water meters include only the replacement of a water meter triggered upon failure of the asset. Due to the lower risk associated with meter failures, meters are replaced at that time. 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. Therefore an average number of failures is forecasted annually.

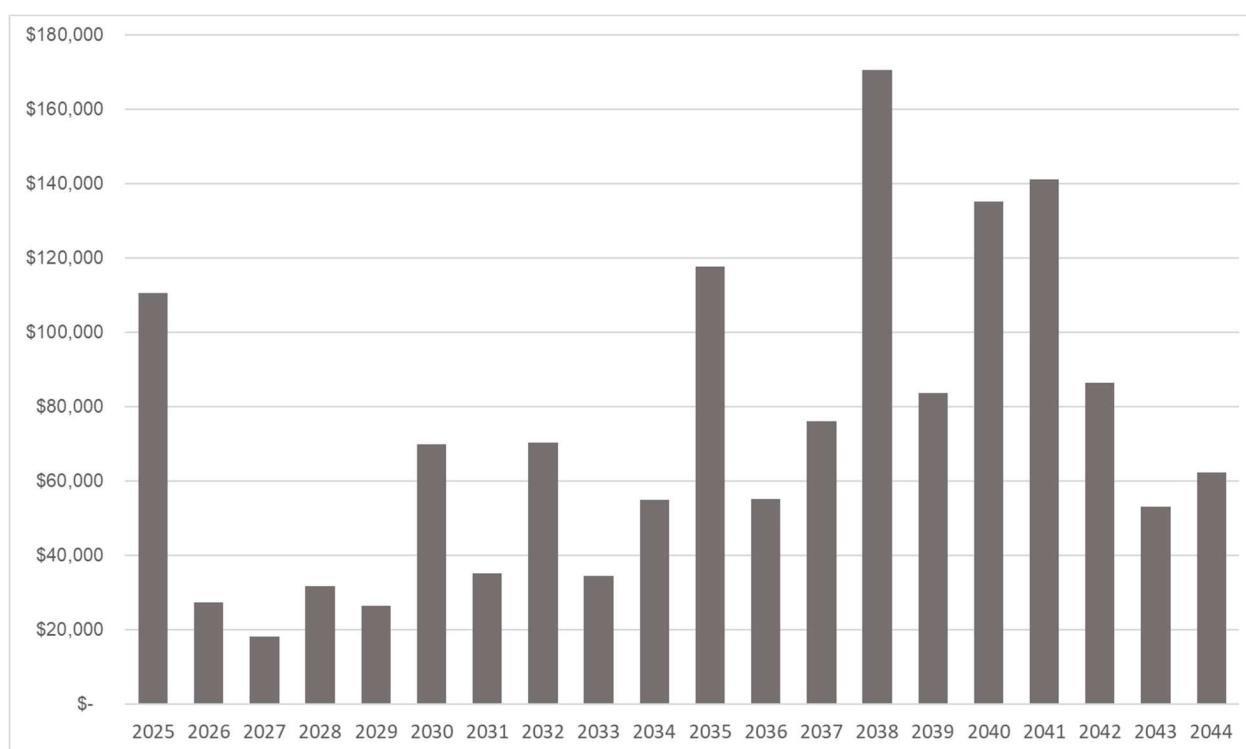
Booster Station	Lifecycle activities for the booster station includes only component rehabilitations and replacements at the end of their lifecycle. Total station reconstruction is not included in this plan as further investigation into servicing needs is required. This strategy is intended to replace the common high-level components of an asset that deteriorate over time. It is assumed that by replacing these components over time, and through continual maintenance activities of the asset as a whole, the overall condition of an asset will remain in fair or better condition. This implies that the core structural and sub-structural components of the facility will not degrade appreciably. If circumstances arise in which a reconstruction is deemed necessary, then the outputs of this strategy would need to be modified in light of these changes. As some examples, a building's capacity could be deemed insufficient for servicing needs or some event could harm the structural or sub-structural elements of a building, both of which could necessitate the reconstruction or relocation of an asset. In such cases, the existing capital plans for these assets would need to be readdressed through an update to this asset management plan.
Sample Stations	Lifecycle activities for sample stations include the total replacement of the asset upon reaching the end of its lifecycle.
SCADA	Lifecycle activities for SCADA includes the upgrade of components only.
Equipment	Lifecycle activities for equipment assets includes only an eventual replacement when the asset begins to show signs of failure.
PRVs	Lifecycle activities for PRV assets includes only an eventual replacement at the end of the 5-year lifecycle.

LIFECYCLE ACTIVITY COST FORECAST

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, in order to maintain current levels of service during the forecast period. This plan has been developed for a 20-year forecast period. Outline in the figure below is the overall activity cost forecast for the municipality by asset class. Please refer to Appendix E: Detailed Cost Forecasts for a breakdown of activity costs per year per asset class.

The expenditure forecast includes a capital inflation factor of 3.5% annually, which aligns 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.

The lifecycle replacement activities planned for water distribution system assets are projected to cost approximately \$1.4 million over the 20-year forecast period, with an average annual expenditure of \$70,000, following the lifecycle management strategy as outlined. There are also costs forecasted for the undertaking of third-party consultant rate studies and asset condition assessments. A summary of the lifecycle activity costs for the 20-year forecast period is outlined below.



LIFECYCLE ACTIVITY RISK ASSESSMENT

The 20-year capital forecast above represents the recommended lifecycle activities necessary to maintain assets which will provide services at the desired level. Recognizing that municipal funding is limited, there will always be risks present with the sustainability of services. The goal is to reduce or minimize these risks whenever/wherever they are present through responsible asset management. Risks be calculated related to the possible failure of an asset by assessing the likelihood or Probability of Failure (POF) of an asset and by the effect or Consequence of Failure (COF) of an asset.

The Probability of Failure of an asset is basically defined as the likelihood that the asset will fail in the near future. The best indicator of possible failure is the asset's current condition. This is why it is important that conditional assessments on assets are completed on a regular basis, especially for higher-value assets and assets critical to the delivery of services. Other indicators that should be factored into the Probability of Failure are the current age and the expected lifespan of an asset.

The Consequence of Failure is a much more complicated factor to measure with differing perspectives regarding the consequence of a service interruption. In order to counteract these biases, several service factors were considered such as health & safety, environmental consideration, legal & regulatory compliance, liability, service usage, and strategic goals. Asset COF was then weighted based on the relative importance of each service provided. The resulting asset risk factor can easily be compared across all asset classes which allows for prioritizing of asset lifecycle costs across various services.

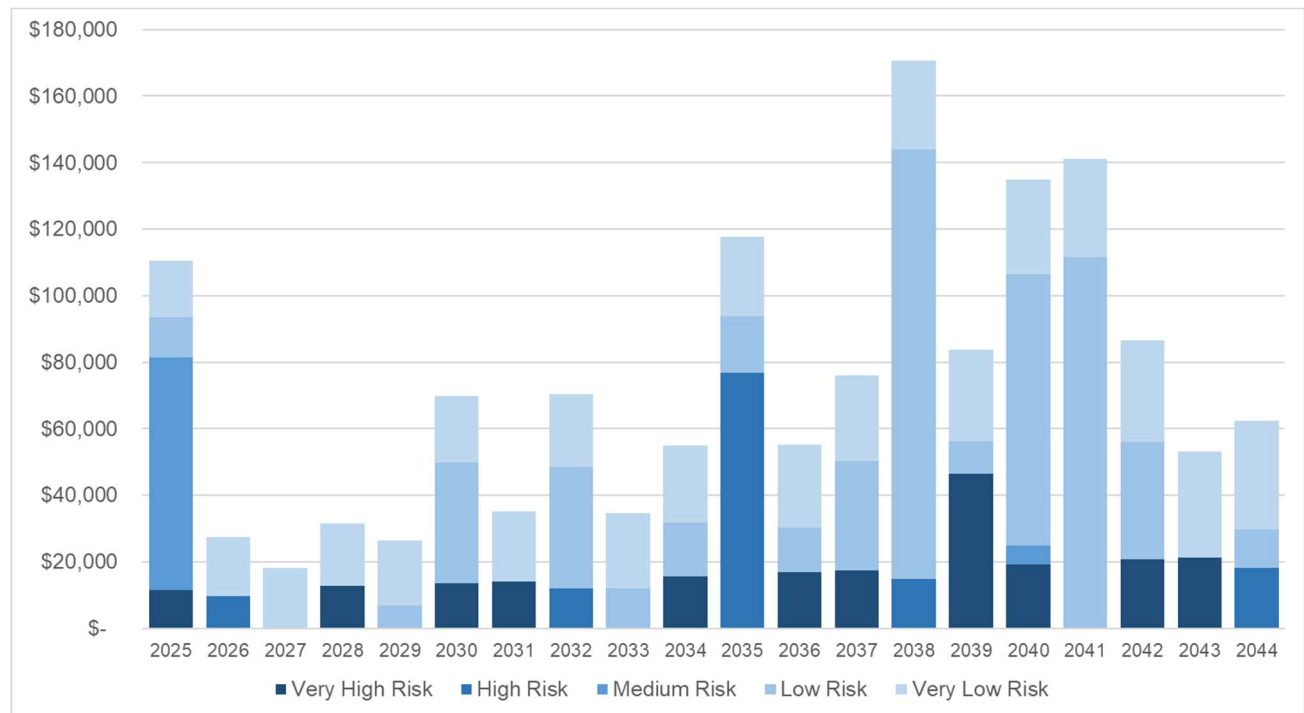
The scale being utilized for risk assessments throughout this AMP is shown below:

Very High Risk	High probability of failure, resulting in a complete service interruption, affecting a large number of users.
High Risk	High probability of failure, resulting in a partial service interruption, affecting a large number of users.
Medium Risk	Medium probability of failure, resulting in a partial service interruption, affecting a limited number of users.
Low Risk	Low probability of failure, resulting in partial service interruption, affecting a limited number of users.
Very Low Risk	Low probability of failure, resulting in a very small service interruption affecting a very small number of users.

The best risk mitigation strategy is to conduct lifecycle activities on assets as they are recommended. When a lifecycle activity is conducted on an asset, it will result in an improvement to the asset's risk factor by decreasing the likelihood of failure. Allowing assets to continue to deteriorate by not performing lifecycle activities will lead to increased annual maintenance costs and will increase the cost of services in the long-term by shortening the lifespan of an asset. This will put an increased strain on the financial sustainability of services in the long-term.

If a lifecycle activity is not conducted on a high-risk asset, the probability of a service interruption is also increased. Frequent, ongoing service interruptions may also lead to the damage of a municipality's reputation, decreasing the ability of a municipality to attract new businesses or prospective new residents. Asset risk factors may also be affected by changes in the consequence of an asset's failure, possibly due to new regulations, but for the purposes of this AMP, those factors are forecasted to remain consistent in the long-term.

The following represents the 20-year lifecycle activity cost forecast in terms of asset risk.



FUNDING STRATEGY

OVERVIEW

A funding strategy should sustainably fund the lifecycle management strategy 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.

FUNDING SOURCES

Table below summarizes the recommended strategy to fund the asset lifecycle costs identified for taxy levy-based. These funding forecasts were based on the funding sources identified in the Township's 2025 budget. The lifecycle costs required to sustain established levels of service are being recovered through several methods:

- Provincial/Federal grant funding has not been included in this forecast as its future availability is unknown.
- Debt financing is not required, the financing strategy does not include debt financing over the forecast period.
- 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 Township to proactively adjust amounts being transferred to these capital reserves during the annual budget process.

FUNDING SHORTFALL

This funding strategy has been developed to be fully funded, 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 service level expectations are maintained. In such an event, the difference could be made up through increases to the revenue streams over-and-above those presented hereafter.

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 a similar average annual increase of 5.3% 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

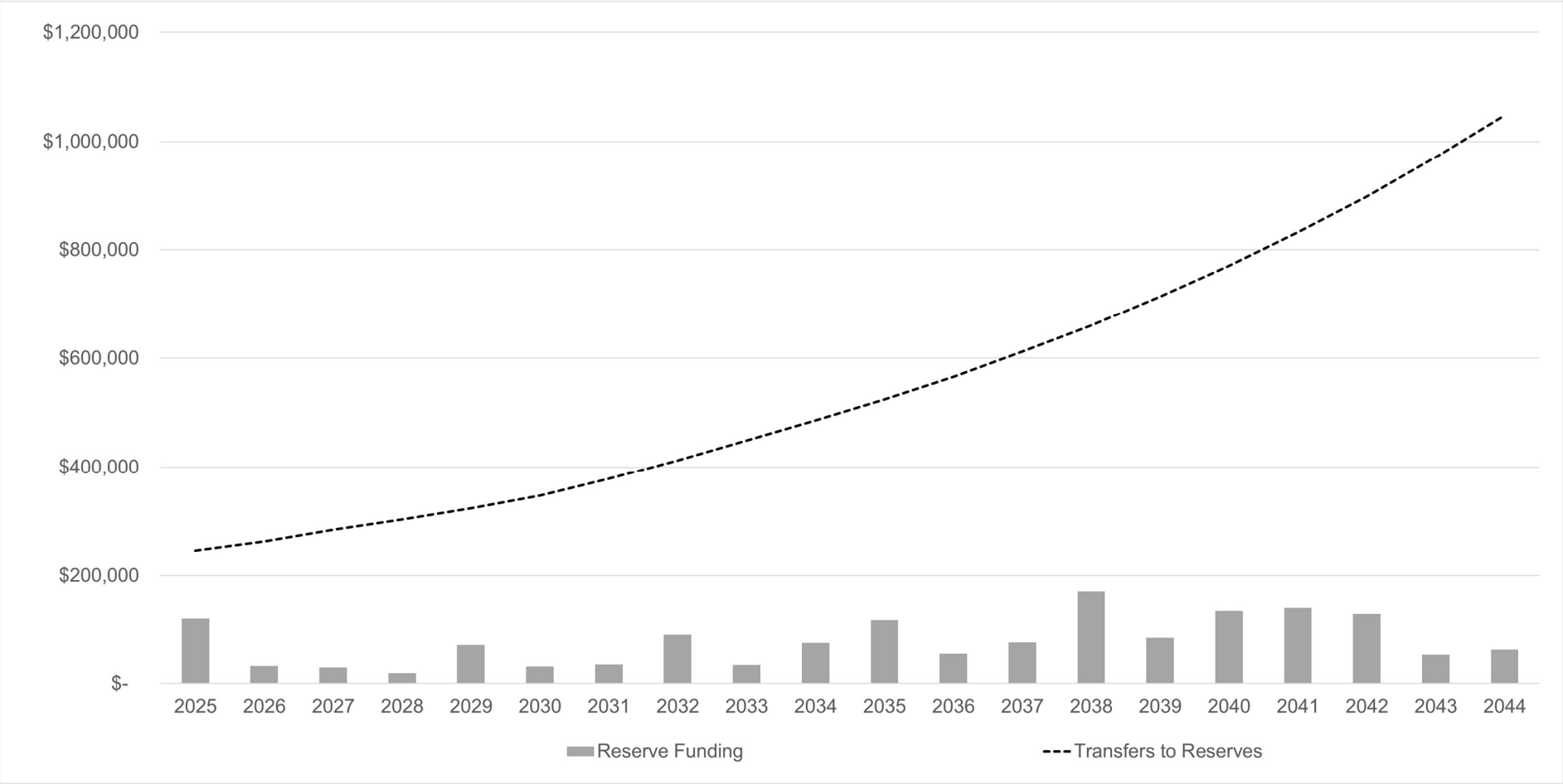
The Capital Budget Funding Strategy – Water Distribution System chart and figure below present the 20-year funding strategy for all forecasted, user fee-based, capital expenditures. This funding forecast is based on the current lifecycle activities identified this plan over their full expected lifetime. The lifecycle rehabilitation and renewal activities planned for assets are projected to cost, on average, approximately \$78,000 per year over the forecast period. The funding strategy for these costs is to primarily finance from reserves with contributions from additional funding streams, when available. There will be an annual increase to the transfer to reserves from operating for the forecast period. Due to the lengthy life expectancy of water distribution system assets, forecasted transfers to reserves may exceed the requirements in the 20-year forecasted period however they are necessary to fund future replacements beyond the forecasted 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.

CAPITAL BUDGET FUNDING STRATEGY – WATER DISTRIBUTION SYSTEM (\$MILLIONS)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Capital Costs	\$0.12	\$0.03	\$0.03	\$0.02	\$0.07	\$0.03	\$0.04	\$0.09	\$0.03	\$0.07	\$0.12	\$0.06	\$0.08	\$0.17	\$0.08	\$0.14	\$0.14	\$0.13	\$0.05	\$0.06
% 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	\$0.88	\$0.93	\$0.97	\$1.01	\$1.06	\$1.10	\$1.15	\$1.20	\$1.24	\$1.30	\$1.35	\$1.40	\$1.46	\$1.52	\$1.58	\$1.65	\$1.72	\$1.79	\$1.86	\$1.94
Revenue	\$1.13	\$1.19	\$1.25	\$1.31	\$1.38	\$1.45	\$1.53	\$1.61	\$1.69	\$1.78	\$1.87	\$1.97	\$2.07	\$2.18	\$2.30	\$2.42	\$2.55	\$2.69	\$2.83	\$2.98
Transfer to Reserves	\$0.25	\$0.26	\$0.28	\$0.30	\$0.32	\$0.35	\$0.38	\$0.41	\$0.45	\$0.49	\$0.52	\$0.57	\$0.61	\$0.66	\$0.71	\$0.77	\$0.83	\$0.90	\$0.97	\$1.05
Reserve Balance	\$0.47	\$0.72	\$1.02	\$1.35	\$1.67	\$2.07	\$2.51	\$2.94	\$3.49	\$4.06	\$4.64	\$5.36	\$6.13	\$6.89	\$7.82	\$8.79	\$9.86	\$11.06	\$12.45	\$13.93
User Fee Impact	6.5%	5.2%	5.2%	5.1%	5.1%	5.1%	5.3%	5.3%	5.4%	5.1%	5.2%	5.2%	5.2%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%	5.4%

CAPITAL BUDGET FUNDING STRATEGY – WATER DISTRIBUTION SYSTEM



RECOMMENDATIONS

CURRENT CONSIDERATIONS

The following recommendations have been provided for consideration:

- That the Township of Malahide Asset Management Plan for the Water Distribution System 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 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 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 Class. The Township should seek to provide additional images in future iterations of this asset management plan.
- 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.

- **Lifecycle Activities** – The lifecycle activities included in this plan are a like-for-like rehabilitation or replacement. In light of evolving best practices, and the introduction of new technology, contingencies should be included for enhancements to assets at the time of rehabilitation or replacement. This would not include growth-related capital, only enhancements that maintain current service levels.
- **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.
- **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.

APPENDIX A: GUIDING DOCUMENTS

The Township of Malahide used the following guiding documents in creating this AMP:

- Township of Malahide Official Plan;
- 2018 Strategic Asset Management Policy;
- 2020 Township of Malahide Service Delivery & Organizational Review (Performance Concepts Consulting);
- 2022 Asset Management Plan;
- 2022 Rate Study (Watson & Associates Economists LTD.); and
- 2023-2033 Township of Malahide Strategic Plan.

APPENDIX B: STATE OF INFRASTRUCTURE

WATER DISTRIBUTION NETWORK ASSETS

Water distribution network assets provide for the distribution of municipal drinking water to the community. These assets are vital to the distribution of drinking water and represent the highest risk to public safety. The network consists of 22,321 meters of PVC watermains of various sizes, 47 hydrants of various flow rates, 12 sample stations, and 1 booster station. The water distribution network is located in the Copenhagen area, extending from the limits of the Town of Aylmer, in the Port Bruce area, in the Grovesend area, and located in the Village of Orwell. The system is supplied by two systems, Port Burwell Area Secondary Water Supply System and Aylmer Area Secondary Water Supply System, and the water is treated by the Elgin Primary Supply System. The Copenhagen booster station asset provides support to the municipal drinking system for the purposes of providing additional pressure in the village of Copenhagen. The station is categorized by components assets which have their own distinct lifecycle activities and represent a moderate risk to public safety. The booster station components consist of 2 active pumps, 1 back-up pump, the structure, the electrical systems, check valves, and a pressure reducing valve. The condition of assets is based on a combination of age-based estimates, and staff and consultant-based inspections.



WATERMAINS

HYDRANTS




SAMPLE STATIONS

BOOSTER STATION

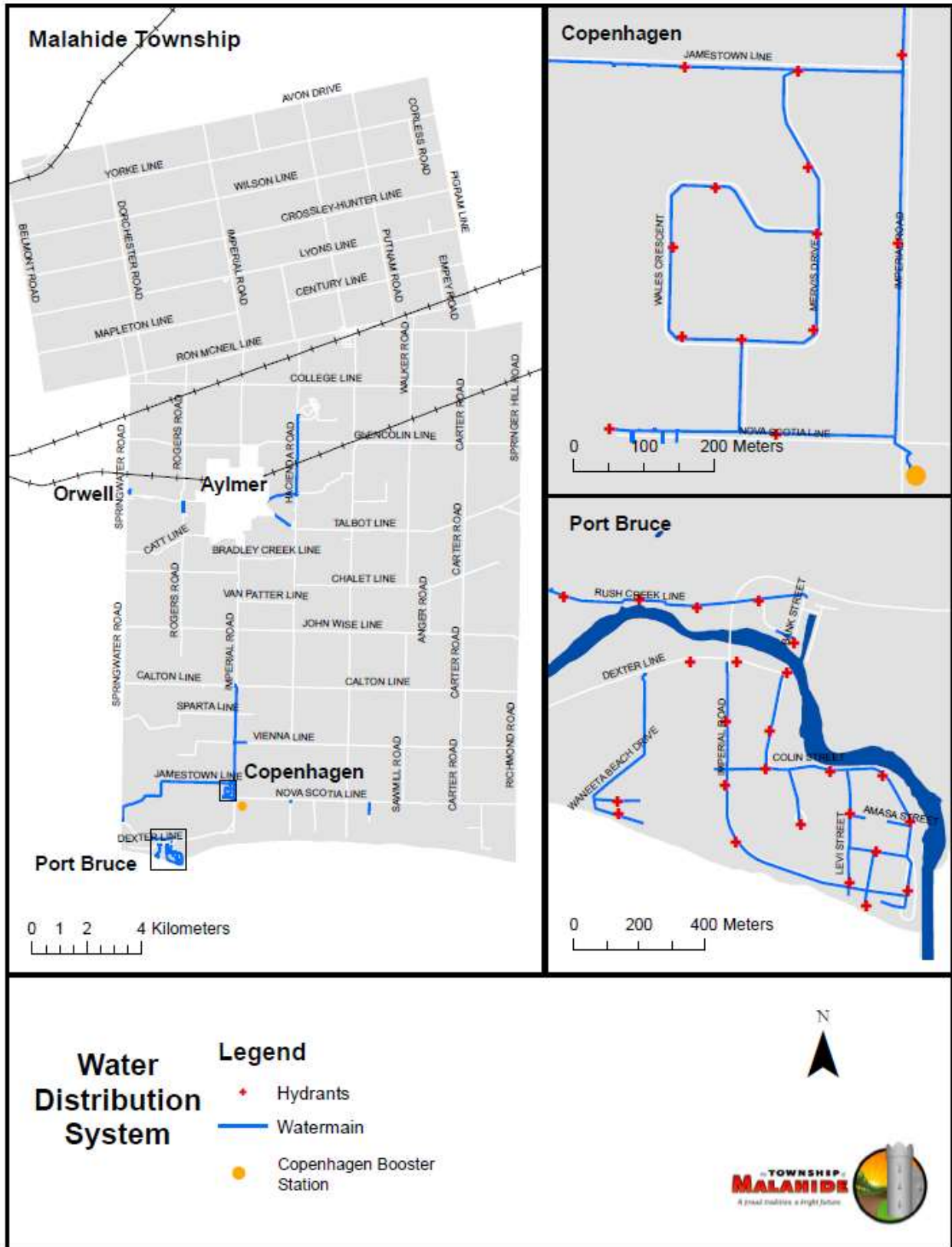
QUANTITY	22.32 KM	47	12	1
CURRENT REPLACEMENT VALUE	\$53.6 MILLION	\$0.417 MILLION	\$0.084 MILLION	\$0.402 MILLION
AVERAGE AGE	25	17	12	8
AVERAGE CONDITION	“VERY GOOD”	“GOOD”	“GOOD”	“GOOD”

EQUIPMENT & MONITORING ASSETS

Water Distribution System equipment and monitoring assets include water meters, equipment for the reading of those meters, and assets that provided for the monitoring of water quality and quantity. Water meters provide information regarding the consumption of municipal drinking water for the purposes of generating utility billings. These assets are important to the collection of user fees and represent a very low risk to public safety. Equipment assets include a remote water meter reader and a belt-clip water meter reader. These assets are important to collecting data from water meters regarding the consumption of municipal drinking water for the purposes of generating utility billings. These assets are currently required to read the style of water meters used by the municipality but represent a very low risk to public safety. The Supervisory Control and Data Acquisition System (SCADA) assets provide information regarding the quality and quantity of available municipal drinking water for the purposes of providing a legislated service level. These assets are important to the control of municipal drinking water and represent a medium risk to public safety. The SCADA network consists of 1 PLC and 1 PLC cabinet located at the Copenhagen Booster Station, and 1 shared server located at the municipal office. The condition of assets is based on a combination of age-based estimates, and staff and consultant-based inspections.

	 WATER METERS	 EQUIPMENT	 SCADA
QUANTITY	650	2	3
CURRENT REPLACEMENT VALUE	\$0.412 MILLION	\$0.016 MILLION	\$0.062 MILLION
AVERAGE AGE	13	4	6
AVERAGE CONDITION	“FAIR”	“VERY GOOD”	“GOOD”

APPENDIX C: MAPS



APPENDIX D: LEVELS OF SERVICE

WATER ASSETS – LEVELS OF SERVICE

ATTRIBUTE	O.REG. 588/17	CURRENT (2024)	PROPOSED (2025-2044)
SCOPE	COMMUNITY LOS 1. Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system. 2. Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	Areas connected to the water distribution system include: Port Bruce, Copenhagen, Orwell, Grovesend, areas near the limits of the Town of Aylmer, and the Ontario Police College. <i>See Appendix C</i> Available/adequate fire flow coverage is described as a minimum 90-meter distance from a property to a fire hydrant, however the Township has attained a Water Tanker Shuttle Accreditation and is able to convey municipal drinking water to any location in the municipality for the purposes of fire suppression.	Current areas connected to the water distribution system will continue to be maintained, no further expansion of services is proposed. The Township will maintain a Water Tanker Shuttle Accreditation in order to continue to convey municipal drinking water to any location in the municipality for the purposes of fire suppression.
	TECHNICAL LOS 1. Percentage of properties connected to the municipal water system. 2. Percentage of properties where fire flow is available.	Percentage of total number of properties connected to the community's water distribution system: 26% Percentage of total properties with available/adequate fire flow coverage: 100%	Percentage of total number of properties connected to the community's water supply and distribution system will not significantly increase: 26% Percentage of total properties with available/adequate fire flow coverage will remain: 100%

ATTRIBUTE	O.REG. 588/17	CURRENT (2024)	PROPOSED (2025-2044)
RELIABILITY	<p>COMMUNITY LOS</p> <p>Description of boil water advisories and service interruptions.</p>	<p>A boil water advisory is issued when authorities suspect or have confirmed the presence of harmful microorganisms in the drinking water supply.</p> <p>There were no boil water advisory events that took place in 2024.</p> <p>There were no service interruptions due to watermain break events that took place in 2024.</p>	<p>The municipality will operate and maintain the system to ensure there are no boil water advisory events in the future.</p> <p>The municipality will operate and maintain the system to ensure there are no service interruptions due to watermain break events in the future.</p>
	<p>TECHNICAL LOS</p> <ol style="list-style-type: none"> 1. The number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system. 2. The number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system. 	<p>Number of connection-days per year of boil water advisories compared to the total number of properties connected to the water distribution system:</p> <p>0 Days per Year</p> <p>Number of connection-days per year due to watermain breaks compared to the total number of properties connected to the water distribution system:</p> <p>0 Days per Year</p>	<p>Target number of connection-days per year of boil water advisories compared to the total number of properties connected to the water distribution system:</p> <p>0 Days per Year</p> <p>Target number of connection-days per year due to watermain breaks compared to the total number of properties connected to the water distribution system:</p> <p>0 Days per Year</p>

APPENDIX E: DETAILED COST FORECASTS

Water Distribution System Expenditure Forecast (\$)

Assets	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Watermains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water meters	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	32,774
Hydrants	2,000	-	-	-	11,000	11,000	-	23,360	12,089	-	-	13,403	-	129,217	-	61,520	111,428	16,475	-	-
Booster Station	81,494	-	11,500	-	20,500	-	14,129	-	-	23,843	-	16,781	17,369	-	56,149	24,830	-	20,628	21,350	11,535
Sample Stations	-	-	-	-	-	-	-	-	-	-	-	-	32,843	-	-	-	-	-	-	-
PRV	20,000	-	-	-	20,000	-	-	-	-	-	20,000	-	-	-	-	20,104	-	-	-	-
SCADA	-	15,000	-	-	-	-	-	11,957	-	-	76,712	-	-	14,698	-	-	-	-	-	18,068
Equipment	-	-	-	-	-	-	-	13,286	-	7,820	-	-	-	-	-	-	-	18,741	-	-
Misc. Studies	-	-	-	-	-	-	-	20,000	-	20,000	-	-	-	-	-	-	-	43,000	-	-
Total	120,542	32,644	29,762	18,901	71,063	31,247	35,085	90,292	34,538	74,897	120,760	55,073	75,972	170,577	83,744	135,015	140,989	129,439	53,016	62,377