Elgin Area Primary Water Supply System

Water Master Plan

60730275

October 2025

Elgin Area
Primary Water Supply System

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AECOM: 2015-04-13

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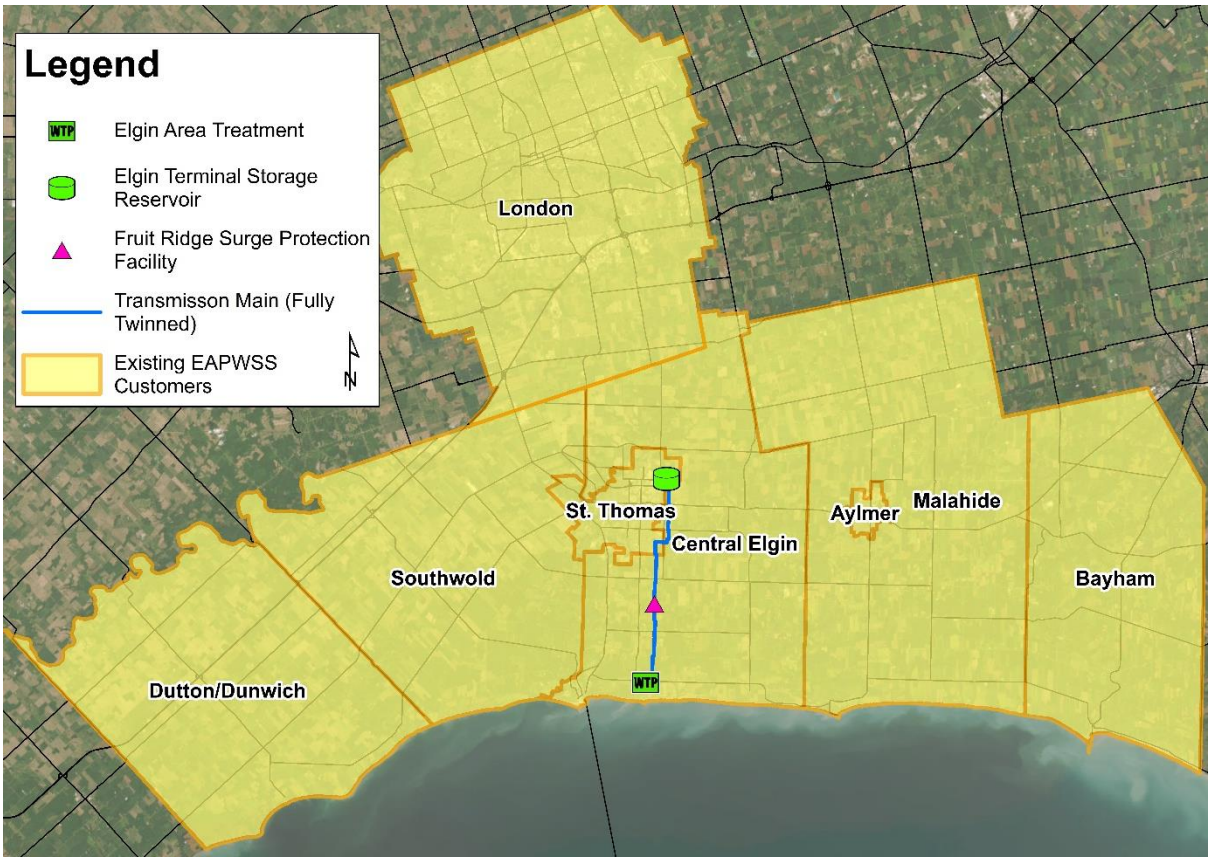
Elgin Area
Primary Water Supply System

Executive Summary

In 2024, Elgin Area Primary Water Supply System (“the Utility”) initiated a Master Plan process to guide the water supply system’s future water servicing strategy through a comprehensive infrastructure planning approach. The process involved extensive consultation and engagement with the public and public agencies, water system community members and Indigenous communities. The Master Plan is a detailed infrastructure planning study which provides a plan for achieving sustainable utility management for Elgin Area Primary Water Supply System over the twenty-year planning horizon. The Master Plan process has been undertaken to determine the potential challenges in meeting the future water demands and strategy options to overcome these challenges.

The geographical service area includes the City of London, City of St. Thomas, Town of Aylmer, Municipality of Bayham, Township of Malahide, Township of Southwold, Municipality of Dutton Dunwich, and the Municipality of Central Elgin. **Figure ES-1** below provides an overview of the area serviced by the Elgin Area Primary Water Supply System and the various regional water infrastructure.

Figure ES.1 Study Area Overview



Environmental Assessment Process

The Master Plan has been completed as set out in the Municipal Engineers Association Municipal Class Environmental Assessment document (as amended in February 2024).

The Elgin Area Primary Water Supply System Master Plan followed Approach 1 under the Municipal Class Environmental Assessment and satisfies Phase 1 and Phase 2 of the Municipal Class Environmental Assessment process. This approach is particularly suited for long-term planning, where decisions impacting water supply must address a range of servicing alternatives in an organized and strategic manner. The Master Plan identifies the best overall infrastructure servicing solutions to be implemented over the 20-year planning horizon, extending to 2046.

To conclude Phase 2 of the Municipal Class Environmental Assessment process, the Master Plan report has been made available for public review on the Elgin Area Primary Water Supply System website, accompanied by the issuance of the Municipal Class Environmental Assessment Notice of Master Plan.

Problem and Opportunity Statement

To meet Phase 1 of the five-phase Municipal Class Environmental Assessment planning process, the following Problem and Opportunity statement was developed and utilized for guiding the development of the Master Plan:

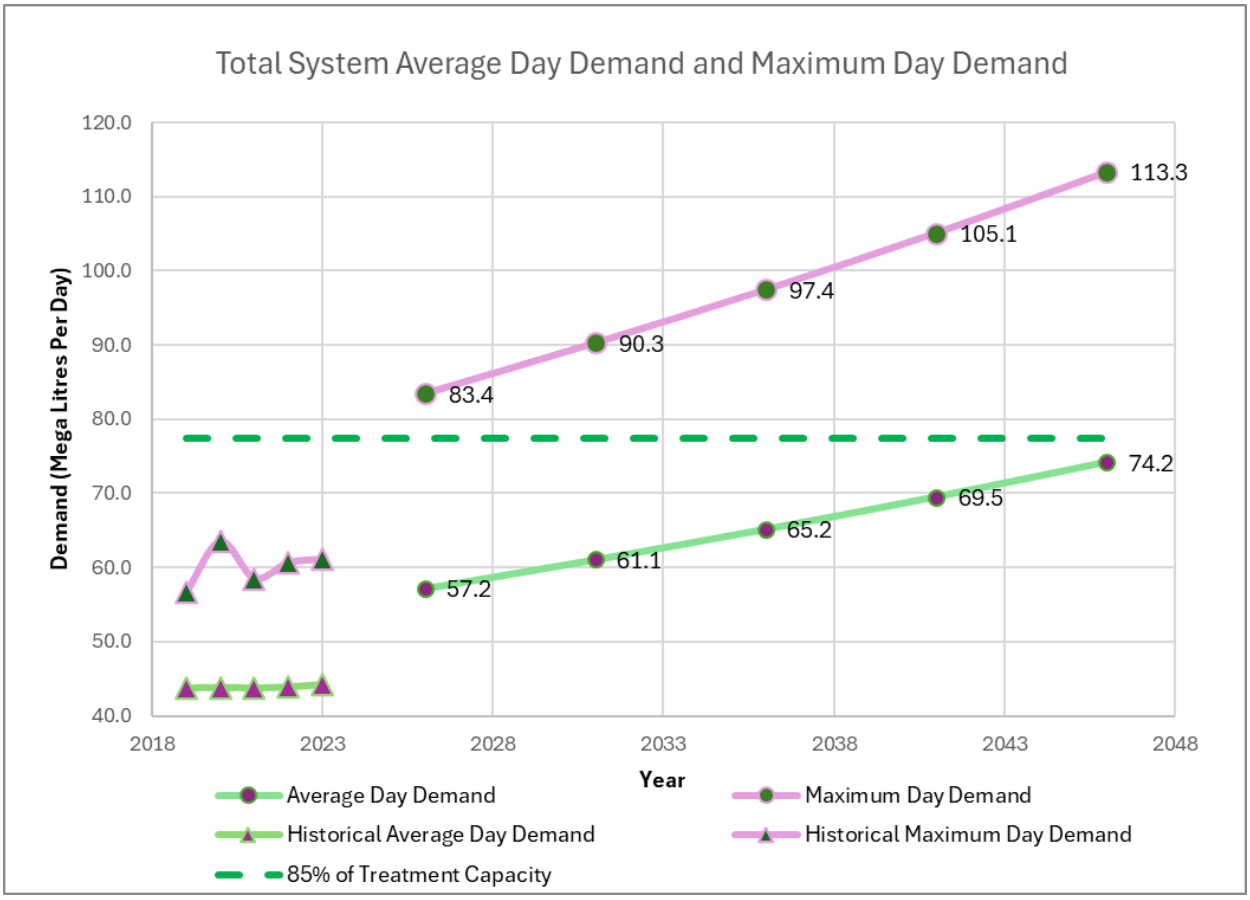
- The growth in water demands forecast for the 2046 planning horizon requires review and assessment of the system's capacity and required investment for the sustainability and reliability of the Utility's treatment, pumping, and transmission infrastructure.
- Develop and assess a range of water system strategies considered to support existing servicing and account for reasonably expected near, mid, and long-term future growth projections, including servicing to new communities.
- Develop a recommended investment strategy for the near, mid, and long-term future growth projections that will support future infrastructure planning and budgeting.
- Consult benefitting communities, the public, Indigenous communities, agencies, and other interested parties, through the development of the Plan to identify the preferred alternatives that best meet long-term needs of the utility.
- Determine operational challenges based on the system hydraulics review related to projected future demands and growth-related requirements for treatment, pumping, transmission infrastructure.
- Review and confirm the utility's operational storage needs.

- Assess primary transmission pipeline capacity with consideration of; projected future demand and growth-related requirements, adequacy of the existing 750mm diameter transmission main (temporarily out of service), anticipated timing for returning the existing 750mm diameter transmission main to service and/or construction of an adequately sized secondary main and, investigate solutions to facilitate redundancy.
- Review and assess pressure control infrastructure to mitigate excessive and transient pressure incidents related to projected future demands and growth-related requirements.
- Review opportunities to enhance energy efficiency, conservation, and recovery across the system.
- Review the impacts of climate change on the utility's infrastructure and assess mitigation and adaptation opportunities in alignment with the utility's framework.
- Ensure alignment with and continuity between the Plan and the Utility's other guiding plans including the Asset Management Policy and Plan, Financial Plan, Operational Plan, and various management systems.

Water Demand Forecasts

To estimate the projected water supply needs, surveys were sent to all member municipalities to understand their anticipated growth and water demand over the planning horizon. The collected growth information was assessed/analyzed/reconciled and used to estimate the projected water demand for the Elgin Area Primary Water Supply System. Consultation with other communities not currently supplied by the Utility were also completed; their demands were excluded from the projections presented in the Master Plan. The following figure presents the projected water demand applied in the Master Plan.

Figure ES.2 – Total System Average Day Demand and Maximum Day Demand



Based on the above forecasted demands and the Elgin Area Water Treatment Plant's current rated capacity of 91 Million Liters per Day, it was determined that the initial need to initiate planning for a treatment plant expansion is triggered as early as 2026, based on the Maximum day Demand for the system exceeding 85 percent of the plant capacity. Moreover, **Figure ES.2** shows the Maximum Daily Demand exceeds the plant rated capacity by 2036, and as such, the treatment plant expansion would need to be completed by 2036 to accommodate the projected flow. An alternative approach was identified and confirmed in **Technical Memorandum 2: System Capacity Evaluation and Hydraulic Modelling Analysis** to expand the Elgin Terminal Reservoir by 2036, which would defer the expansion of the Elgin Area Water Treatment Plant to 2041. Notwithstanding this, having the Elgin Terminal Reservoir expanded in the short-term would provide the enhanced system operational flexibility to manage system needs.

Recommended Solution

Through the environmental assessment process, it was determined that **Alternative 5A** – Optimizing and Upgrading the Existing System beyond the rated system capacity with

New Infrastructure is the recommended Water Servicing Alternative. **Figure ES.3** provides an overview of the recommended system improvements, which include the following key highlighted items, based on the water demand projections:

- Expand the Elgin Terminal Reservoir in the short term, and defer the Elgin Area Water Treatment Plant Expansion to 2041 completion (with planning to begin by 2031); and
- Recommission the Elgin Area A-Line Transmission main by 2036.

The feasibility of the Elgin Terminal Reservoir expansion is critical to the above recommended solution, in particular the deferral of the treatment plant expansion. If the reservoir expansion proves infeasible, the existing Elgin Area Water Treatment Plant will need to be expanded by 2036, with planning to being as early as 2026 to meet projected demands. The recommissioning of the Elgin Area A-Line Transmission Main will still need to be completed by 2036 at the latest, regardless of other planned works. It is recommended that system demands are carefully monitored in the short-term and water demand projections regularly revisited, to confirm and update timing for planning and implementation.

Figure ES.3: Recommended Water System Improvements for Elgin Area Primary Water Supply System

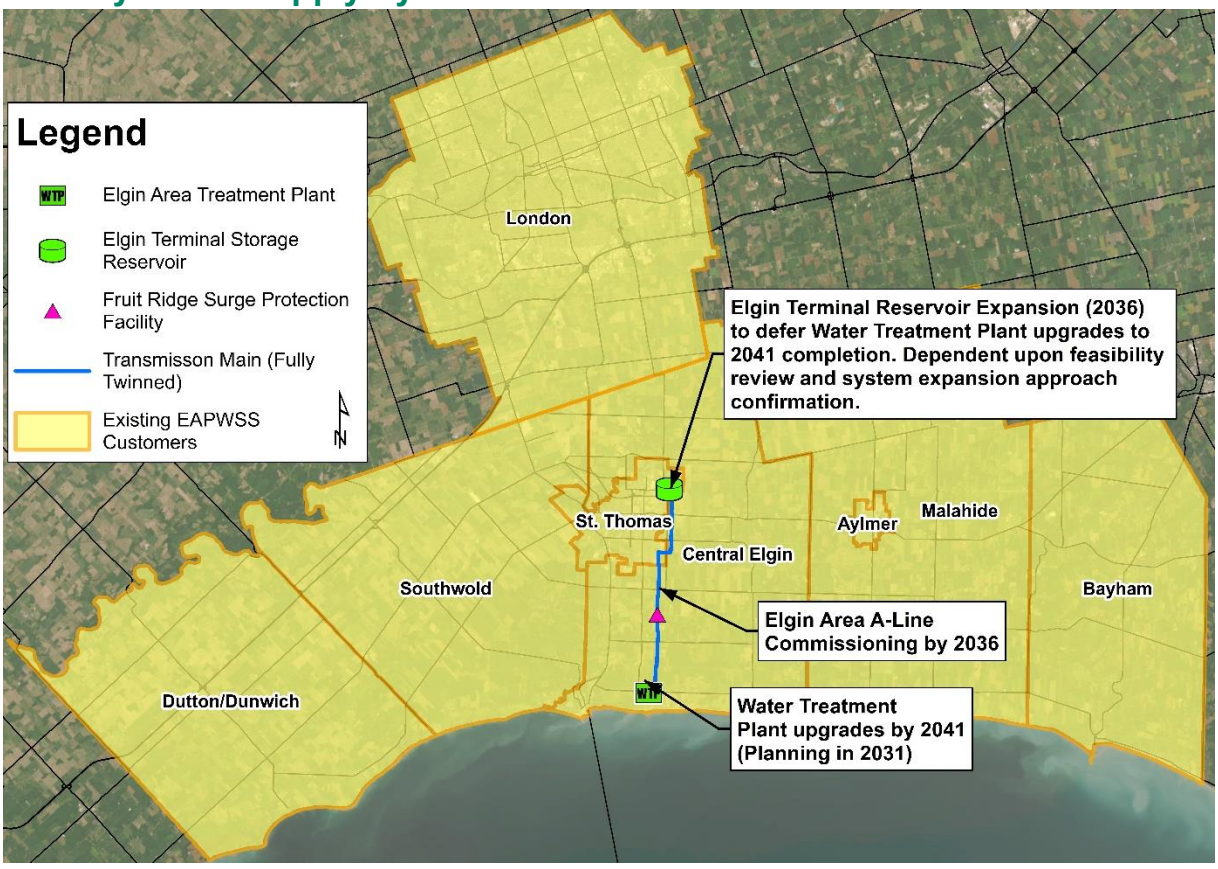


Table ES.1 summarizes the Recommended Improvements costs for implementation (In 2025 Millions of Canadian dollars).

Table ES.2 summarizes the Recommended Studies and costs for implementation (In 2025 Thousands of Canadian dollars).

Table ES.3 summarizes the Planed/Scheduled Studies and costs for implementation (In 2025 Thousands of Canadian dollars).

Table ES.1: Recommended Improvements

All Prices in Millions of Canadian Dollars (2025) – Class E Estimate

Project Type	Project	Class Environmental Assessment Schedule Requirement	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Costs for 2041-2046
Treatment	Treatment Plant Expansion	Schedule C	0	0	400	0
Treatment	Clarifier Upgrades **	Exempt	-	-	-	-
Treatment	Filter Upgrades **	Exempt	-	-	-	-
Treatment	Tank/Channel Rehabilitations **	Exempt	-	-	-	-
Storage	Elgin Terminal Reservoir Storage Expansion	Exempt	60	0	0	0
Transmission	Transmission A-Line Re-Commissioning	Exempt	0	10	0	0
Transmission	Transmission Pipeline B Air Valve Replacement	Exempt	1	0	0	0
Transmission	Transmission Pipeline B Chamber Flood	Exempt	2	0	0	0

Project Type	Project	Class Environmental Assessment Schedule Requirement	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Costs for 2041-2046
	Protection and Rehabilitations					

** Included as part of Treatment Plant Expansion cost

Table ES.2: Recommended Studies

All Prices in Thousands of Canadian Dollars (2025) – Class E Estimate

Study Area	Study	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Cost for 2041-2046
Treatment	Optimization of coagulation and polymer dosing strategy	300	0	0	0
Treatment	Taste and Odour Management Strategy	250	0	0	0
Treatment	Raw Water Quality Monitoring Program	175	175	0	0
Treatment	Feasibility study for coagulation, flocculation, clarifier capacity upgrades	200	0	0	0
Treatment	Pilot-plant feasibility study	120	0	0	0
Treatment	Feasibility study for filter capacity upgrades including filter-to-waste and backwash sequence capability	125	0	0	0
Treatment	Schedule ‘C’ Class Environmental Assessment for	500	0	0	0

Study Area	Study	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Cost for 2041-2046
	Treatment Plant Expansion*				
Transmission	Low Lift System Transient Hydraulic Analysis	100	0	100	0
All	Interim Flow Projection Update	50	0	0	0

All studies are subject to business case and risk/opportunity reviews undertaken by the Elgin Area Primary Water Supply System.

*Both the high lift and low lift pumping station expansions studies included as part of the Treatment Schedule C Environmental Assessment

Table ES.3: Planned/Scheduled Studies

All Prices in Thousands Canadian Dollars (2025) – Class E Estimate

Study Area	Study	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Cost for 2041-2046
Treatment	Water Quality Facility Plan Update	200	200	200	200
Treatment	Stress Testing	50	50	50	50
All	Asset Management Plan Update	200	200	200	200
All	Ongoing Condition Assessment	350	350	350	350
All	Climate Change Resiliency and Adaptation Plan	0	75	75	75
All	Financial Plan Update	120	120	120	120
All	50 Year Roadmap Study	150	20	50	20
All	Master Plan Update	150	150	150	150
All	Water Loss Review	50	0	50	0
All	System Reliability and Redundancy Review	100	0	100	0

Study Area	Study	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Cost for 2041-2046
All	Energy Audit and Pumping Optimization Update	0	200	0	200
Transmission	Elgin Area Primary Water System Hydraulic Model Update and Calibration	50	50	100	50
Transmission	Transient Hydraulic Modelling Update	150	0	150	0
Transmission	Ongoing Monitoring of Primary Transmission Mains	200	200	200	200

All studies are subject to business case and risk/opportunity reviews undertaken by the Elgin Area Primary Water Supply System.

Engagement

Community engagement has been undertaken, and included:

- Notices of Commencement and Public Information Centre and a Notice of Master Plan.
- A Public Information Centre was held virtually at 6:00pm on June 25th, 2025.
- Indigenous communities and various organizations and agencies were notified as part of the Municipal Class Environmental Assessment consultation process that included issuance of all notifications (e.g., study commencement and Public Information Centre notices). Local Indigenous communities and organizations were also offered the opportunity to meet to confirm their interests in the Master Plan process and how they would like to be engaged.
- Adjacent communities that are not currently serviced by the Elgin Area Primary Water Supply System were provided with the Notice of Commencement and an accompanying letter (with a survey link) to understand potential future supply needs.

Conclusion

The Master Plan Report outlines the process required to ensure that the proposed recommended solutions to the problem and opportunity statement meet the requirements of the *Environmental Assessment Act*.

The proposed projects resolve the problem and opportunity statement identified in this report. A preliminary evaluation of potential impacts has been included in the evaluation, which indicates minor and predictable impacts that can be addressed.

Appropriate public notification and an opportunity for comment was provided and no comments were received that could not adequately be addressed. Subject to receiving Municipal Class Environmental Assessment finalization following the 30-day review period, the Utility can start the planning, design and permitting-approvals phase for the projects according to the timing outlined in this report.

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B.2 Technical Memorandum 2 System Capacity Evaluation and Hydraulic Modelling Analysis (TM2)

B.3 Technical Memorandum 3 Evaluation of Alternatives (TM3)

B.4 Potential New Customers

Glossary of Terms

Potable Water: Water that is safe to drink and meets the health-based quality standards for human consumption.

Transmission Main: A large-diameter pipe that carries water from a water source (like a treatment plant or reservoir) to the benefiting community's distribution system.

Secondary System: Watermains that are owned by the primary water supply system that directly branch off of the primary transmission main or discharge from a secondary pumping station.

Raw Water: Untreated water sourced directly from the lake that will be transported to the treatment plant.

Low Lift Pump: A high-volume low-pressure pump that moves large volumes of water from the source such as the Raw water intake at the lake to the treatment plant.

High Lift Pump: High pressure pump that discharges water into the transmission mains.

Rated Capacity: The maximum volume of water that a treatment plant is permitted to treat per day.

Treatment Capacity: The maximum volume of water per day that a treatment plant can treat under its existing design parameters.

EAPWSS: Elgin Area Primary Water Supply System

LHPWSS: Lake Huron Primary Water Supply System

EAWTP: Elgin Area Water Treatment Plant

EA HLPS: Elgin Area High Lift Pumping Station

ETR: Elgin Terminal Reservoir

EMPS: Elgin-Middlesex Pumping Station

MECP: Ministry of Environment, Conservation and Parks

Average Day Demand (ADD): The average daily water usage within a year.

Maximum Day Demand (MDD): The average water usage on the day that the daily water consumption is the highest.

Maximum Week Demand (MWD): The highest average daily water demand within a one week period in a given year.

Peak Hour Demand: The highest water consumption during any single hour within a 24-hour period

Mega Liters: Equivalent to Million Liters

(ML/d): Million Liters per Day

(L/c/d): Liter per Capita per Day

(L/s): Liter per Second

(m/s): Meter per Second

(ft/s): Feet per Second

(km): Kilometer

(m): Meter

(ft): Feet

(in): Inch

(mm): Millimeter

(kg): Kilograms

(mg): Milligrams

(kg/d): Kilograms per Day

(mg/L): Milligrams per Liter

(psi): Pound per square inch

(kPa): Kilopascal

(TDH): Total dynamic head

1. Introduction

1.1 Background

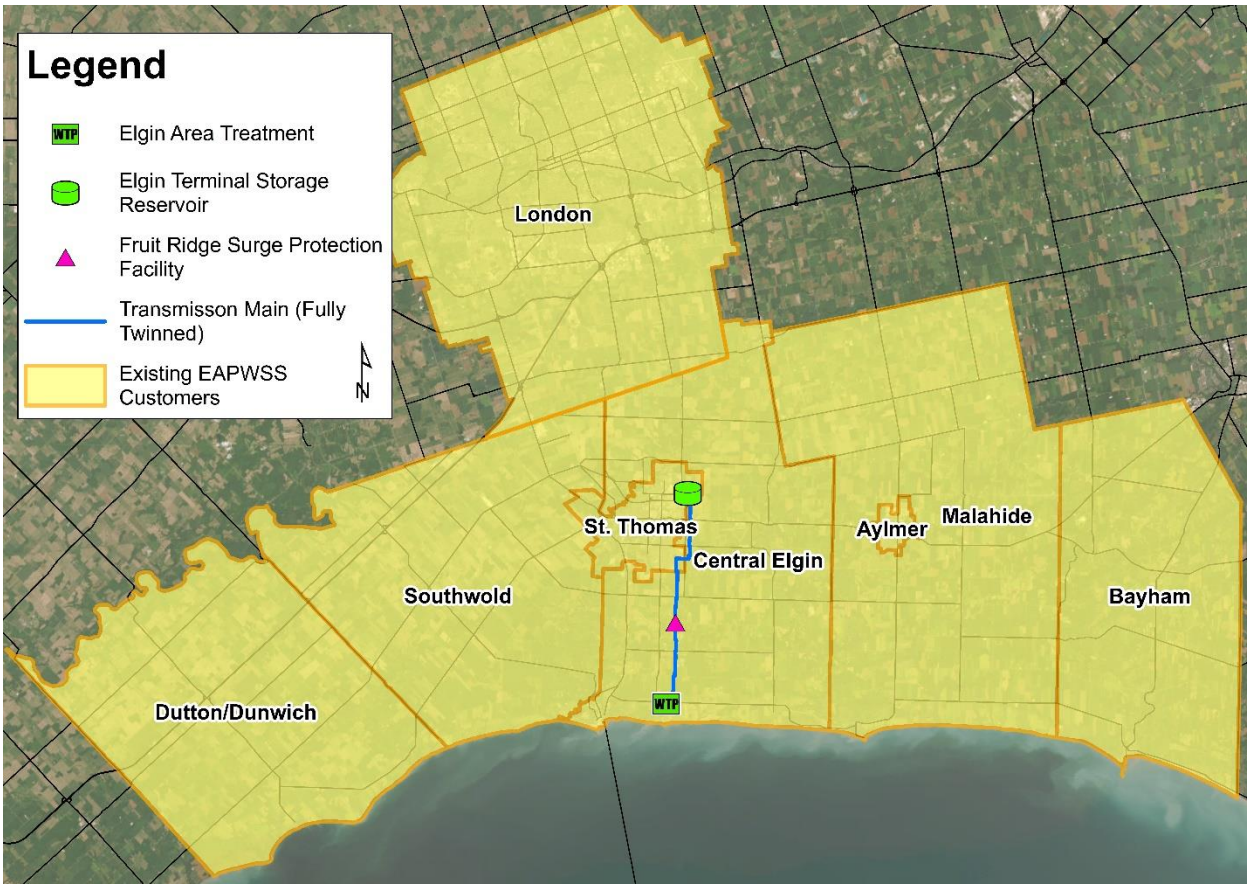
The Elgin Area Primary Water Supply System ('the Utility') is a regional water supply utility that delivers drinking water to benefitting communities within its geographical service area, including the City of London, Town of Aylmer, Municipality of Bayham, Municipality of Central Elgin, Municipality of Dutton Dunwich, Township of Malahide, City of St. Thomas, and Township of Southwold (Refer to **Figure 1-1**). Under the Provincial Transfer Order of 2000, the Utility is required to prepare a Master Plan (Plan) for the system, forecasting future investment and expansion requirements over a twenty-year planning period. This Plan is updated on a five-year planning cycle. The Utility's current Plan was completed in 2020 and accordingly is due to be updated to assess system growth and infrastructure needs. This ensures the Elgin Area Primary Water Supply System is a data-driven, sustainable, and future-ready utility that continues provide safe and reliable drinking water to current and future communities.

The Utility retained AECOM Canada ULC to prepare a Master Plan to develop and assess a range of water servicing strategies to accommodate near, mid and long-term future growth, while maintaining the reliability and sustainability of the Utility.

This Master Plan has been undertaken with a broad scope and level of assessment that enables the Utility to identify needs and establish infrastructure alternatives and solutions. Specific projects identified within the Master Plan, that are required to achieve the preferred solution, may require more detailed investigations at the project specific level in order to fulfill the Municipal Class Environmental Assessment requirements (Schedule B and C projects) identified within the Master Plan.

This Master Plan addresses the requirements of the first two phases of the Municipal Class Environmental Assessment (February 2024), which is approved under the *Ontario Environmental Assessment Act*.

Figure 1-1:Study Area and Existing System



1.2 Study Purpose and Objectives

The purpose of this Master Plan study is to provide a comprehensive and environmentally sound planning process, which is open to public participation and to identify capital infrastructure projects and upgrades needed to provide sustainable water servicing to accommodate service areas and future growth to the 2046 planning horizon.

The objectives of this study include:

- Provide an opportunity to identify water supply issues within the existing Elgin Area Primary Water Supply System.
- Provide strategies to address water servicing needs of the Utility.
- Consult with interested agencies, Indigenous communities, and the public.
- Identify strategies that can address water system issues.

- Provide a 'suite' of projects that will address identified water system needs. This list will include required future studies (i.e. Schedule B or C projects), estimated costs and implementation timing and triggers.
- Prepare a Master Plan report that documents the consultation process followed and satisfies Phases 1 and 2 of the Municipal Class Environmental Assessment planning process.

1.3 Study Team Organization

To address all aspects of the environment, the full range of technical issues, and the requirements of the Master Plan process, this study was carried out by a project team consisting of staff from the Utility and AECOM. Key members of the project team included the following individuals listed in **Table 1-1**.

Table 1-1: Study Team

Elgin Area Primary Water Supply System	AECOM Canada ULC.
Marcy McKillop – Environmental Services Engineer **Ryan Armstrong –** Asset Management Coordinator **Andrew Henry –** Director **Billy Haklander –** Senior Manager – Capital Programs **John Walker –** Operations Manger **Erin McLeod –** Quality Assurance & Compliance Manger	**Neil Awde** – Project Director **Benny Wan** – Project Manager **Karl Grueneis –** Senior Environmental Planner **Paul Adams** – Environmental Planner **Vincent Tsang** – Hydraulic Modelling Engineer **Matt Simons** – Process Engineer

2. Planning Process

2.1 Municipal Class Environmental Assessment Process

The Utility is subject to the provisions of the Environmental Assessment Act and its requirements to prepare an Environmental Assessment for applicable public works projects. The Ontario MEA "Municipal Class Environmental Assessment" document (February 2024) provides municipalities with a five-phase planning procedure, approved under the Environmental Assessment Act, to plan and undertake all municipal sewage, water, storm water management and transportation projects that occur frequently, are usually limited in scale and have a predictable range of environmental impacts and applicable mitigation measures.

In Ontario, infrastructure projects such as improvements to the Elgin Area Primary Water Supply system are subject to the Municipal Class Environmental Assessment process and must follow a series of steps as outlined in the Municipal Class Environmental Assessment guide. The Municipal Class Environmental Assessment consists of five phases as summarized below:

- **Phase 1 – Problem or Opportunity**: Identify the problems or opportunities to be addressed and the needs and justification.
- **Phase 2 – Alternative Solutions**: Identify alternative solutions to the problems or opportunities by taking into consideration the existing environment and establish the preferred solution(s) considering public and agency review and input.
- **Phase 3 – Alternative Design Concepts for the Preferred Solution:** Examine alternative methods of implementing the preferred solution based upon the existing environment, public and agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.
- **Phase 4 – Environmental Study Report (ESR):** Document in an ESR, a summary of the rationale, planning, design and consultation process for the project as established through Phases 1 to 3 above and make such documentation available for scrutiny by review agencies and the public.
- **Phase 5 – Implementation:** Complete contract drawings and documents, proceed to construction and operation, and monitor construction for adherence to environmental provisions and commitments. Also, where special conditions dictate, monitor the operation of the completed facilities.

The Municipal Class Environmental Assessment process ensures that all projects are carried out with effectiveness, efficiency and fairness. This process serves as a mechanism for understanding economic, social and environmental concerns while implementing improvements to municipal infrastructure.

2.1.1 Project Planning Schedules

The Municipal Class Environmental Assessment defines three types of projects and the processes required for each (referred to as Exempt (Formerly Schedule A, A+), Schedule B, or Schedule C). The selection of the appropriate schedule is dependent on the anticipated level of environmental impact, and for some projects, the anticipated construction costs. Projects are categorized according to their environmental significance and their effects on the surrounding environment. Planning methodologies are described within the Municipal Class Environmental Assessment and are different according to the class type, as described below.

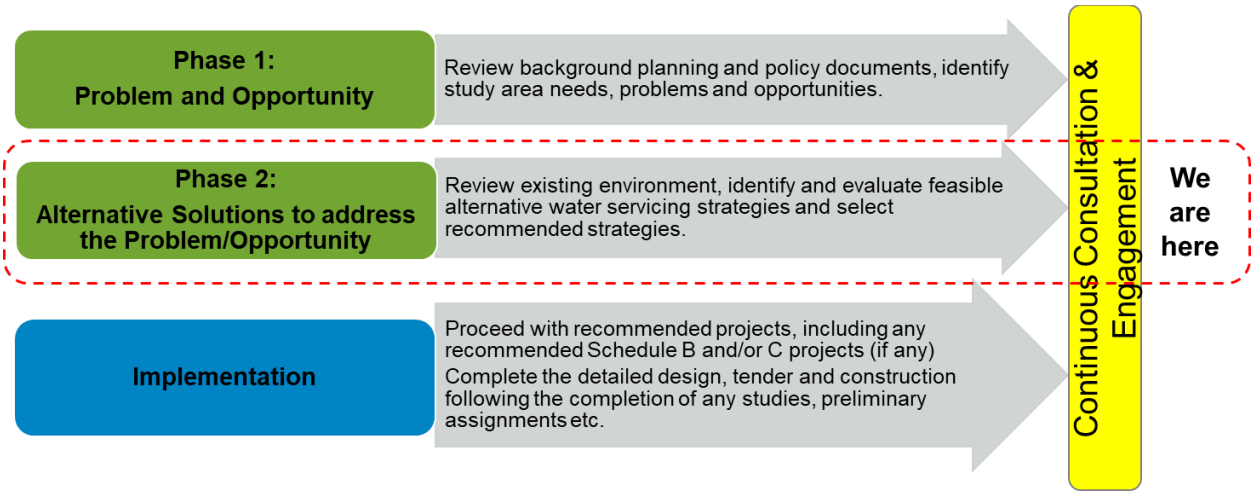
Exempt (Formerly Schedule A and A+): Projects are limited in scale, have minimal adverse environmental effects, and include a number of municipal maintenance and operational activities. These projects are exempt from the Municipal Class Environmental Assessment planning process.

Schedule B: These projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process (Phases 1 and 2), involving mandatory contact with directly affected public, Indigenous communities and with relevant review agencies to ensure they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation. At the end of Phase 2, a Project File Report documenting the planning process followed through Phases 1 and 2 shall be finalized and made available for public and agency review. Indigenous communities have the opportunity to submit a Section 16 Order request to the Minister of Environment, Conservation and Parks. Review agencies, community partners and the public may also raise concerns to the Minister (refer to Section **2.1.4** of this Report).

Schedule C: Such projects have the potential for significant adverse environmental effects and must proceed under the full planning and documentation (Phases 1 to 4) procedures specified in the Municipal Class Environmental Assessment document. Schedule C projects require that an Environmental Screening Report be prepared and filed for review by the public and review agencies.

This Master Plan Report has been prepared and will be made available for a minimum 30-day review period. **Figure 2-1** illustrates the process followed for the Elgin Area Primary Water Supply System Master Plan Municipal Class Environmental Assessment.

Figure 2-1: Municipal Class Environmental Assessment Planning Process



2.1.2 Municipal Class Environmental Assessment Master Planning Process

The Ontario Municipal Engineers Association Municipal Class Environmental Assessment Manual recognizes that, in many cases, it is beneficial to utilize the master planning process for projects which have common elements, looking at the overall infrastructure system rather than dealing exhaustively with project specific issues. The Utility has utilized this approach in preparation of this Master Plan study as the project:

- Has a broad scope and includes an analysis of several infrastructure systems rather than a site-specific problem.
- Recommends a set of works which are distributed geographically throughout the study area, some of which may be implemented over a period of time.

By planning in this way, the need and justification for individual projects and the associated broader context are better defined.

The Municipal Engineers Association Municipal Class Environmental Assessment manual outlines four (4) approaches to the master planning process. At a minimum, Master Plans address Phases 1 and 2 of the Municipal Class Environmental Assessment process. Master Plan Approach #1 (the approach used in this study) involves the preparation of a Master Plan report at the conclusion of the selection of broad preferred alternatives. To proceed with any recommended Schedule B projects identified, a Project File Report(s) must be filed for each project completing the remaining more detailed components of Phases 1 and 2. For Schedule C projects the remaining components of Phases 1,2,3 and 4 must be filed in an Environmental Study Report for public review.

Future Municipal Project Assessment Process

As part of its efforts to modernize and speed up the municipal infrastructure planning and approvals process, the Province of Ontario is planning to revoke the current 2024 Municipal Class Environmental Assessment and replace it with a streamlined Municipal Project Assessment Process where only certain municipal infrastructure planning projects (e.g. establishing a new surface water source, constructing a new water treatment plant or expanding an existing water treatment plant beyond existing rated capacity) would be subject to the Environmental Assessment Act. New pumping or storage facilities and transmission mains or watermains as currently listed in the Municipal Engineers Association Municipal Class Environmental Assessment as Schedule B would no longer be subject to the Environmental Assessment Act. The Municipal Project Assessment Process will outline the requirements for consultation, consideration of alternative designs, impact assessment studies, documentation and notification. As the new regulation is yet to be approved, the current 2024 Municipal Class Environmental Assessment planning process remains in effect.

2.1.3 Public Review of this Report and Next Steps

This Master Plan Report comprises the documentation for Phases 1 and 2 of the Municipal Class Environmental Assessment. Placement of this report for public review completes the planning stage of the project.

This Master Plan Report is available for public review and comment for a period of 30 calendar days starting on **October 28th,2025** and ending on **November 28th, 2025**. A public notice (Notice of Master Plan) was published to announce commencement of the review period. To facilitate public review of this document, copies are available online at the following website with alternate versions available upon request:

Digital / Online: https://www.huronelginwater.ca/elgin-area-water-supply-system-master-plan/

Interested persons may provide written comments to the project team by **November 15th, 2025**. All comments and concerns should be sent directly to the Project Managers:

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2.2 Municipal and Provincial Studies and Planning Context

2.2.1 Provincial Policy Statement (2024)

The 2024 Provincial Planning Statement provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Planning Statement sets the policy foundation for regulating the development and use of land province-wide, helping achieve the provincial goal of meeting the needs of a fast-growing province while enhancing the quality of life for all Ontarians.

Key Polices relevant to this project include the following:

- 2.9: Energy Conservation, Air Quality and Climate Change.
- 3.1: Infrastructure and Public Service Facilities.
- 3.6: Sewage, Water and Stormwater.
- 4.1: Wise Use and Management of Resources, Natural Heritage.
- 4.2: Wise Use and Management of Resources, Water.
- 4.6: Wise Use and Management of Resources, Cultural Heritage and Archaeology.

Relevance to Study: Investment in water servicing infrastructure within the Elgin Area Primary Water Supply System area, a Master Plan of this nature, will have regard for the range of planning objectives of the Provincial Planning Statement. In addition, future project specific Schedule B and Schedule C Environmental Assessments recommended by this Master Plan will consider and address impacts involving natural heritage, cultural heritage, water resources and climate change.

2.2.2 Climate Change

The Ministry of Environment, Conservation and Park's guide "Consideration of Climate Change in Environmental Assessments in Ontario" was finalized in October 2017, and

therefore, requires that all Municipal Class Environmental Assessments consider this within the scope of the project. Two approaches for consideration and addressing climate change in project planning include:

- Reducing a project's effect on climate change (climate change mitigation).
- Increasing the project's and local ecosystem's resilience to climate change (climate change adaptation).

Relevance to the Study: Climate change impacts were considered when evaluating all alternatives from a construction, energy use, and extreme weather events perspective.

2.2.3 Source Water Protection

Section A.2.10.6 of the Municipal Class Environmental Assessment document directs proponents, including the Utility to consider Source Water Protection in the context of the *Clean Water Act*. Projects proposed within a Source Water Protection vulnerable area are required to consider policies in the applicable Source Protection Plan, including their impact with respect to the project. A watershed-based Source Protection Plan contains policies to reduce existing and future threats to drinking water in order to safeguard human health through addressing activities that have the potential to impact municipal drinking water systems.

The Thames - Sydenham & Region, and Lake Erie Source Protection Regions are the relevant Source Protection Plans for this study, and they contain policies that address current and potential threats to municipal drinking water supply.

There are four types of vulnerable areas covered by the Source Protection Plan:

1. Intake protection zones – An Intake Protection Zone is the area around a surface body of water where water is drawn in and conveyed for municipal drinking water.

2. Highly Vulnerable Aquifers – Aquifers are underground layers of water that supply wells. Highly vulnerable Aquifers are susceptible to contamination due to their proximity to the ground surface or where the types of materials in the ground around it are highly permeable.

3. Significant groundwater recharge areas - Significant Groundwater Recharge Areas are characterized as having porous soils (e.g. sand or gravel), which allow for water to easily seep into the ground and flow to an aquifer.

4. Wellhead Protection Areas– Wellhead Protection Areas are areas of land around a municipal well where land use activities have the greatest potential to affect the quality of water flowing into the well.

Relevance to Study: The relevance of the policies of the Source Protection Plan has been considered in this study and used in the evaluation of Alternatives for water servicing. Recommended projects from this Master Plan that require Schedule B or Schedule C Environmental Assessments will be required to address Source Water Protection on a project specific level.

2.2.4 Kettle Creek Conservation Authority

A portion of the study area is located within the Kettle Creek Conservation Authority jurisdiction.

Ontario Regulation 41/24 is the regulation for all conservation authorities including the Kettle Creek Conservation Authority watershed. This regulation fulfils the general purpose of ensuring public safety and preventing property damage and social disruption, due to natural hazards such as flooding and erosion within regulated areas.

Relevance to Study: The preferred water servicing strategies and subsequent projects may require a permit from Kettle Creek Conservation Authority.

2.2.5 2020 Elgin Area Primary Water Supply System Water Master Plan

In 2020 the Utility completed a Water Master Plan Update. Master Plans are reviewed and updated every five (5) years to determine the need for updates in the servicing strategies.

Relevance to Study: The 2020 Master Plan was reviewed, and not all recommendations have been implemented. It is noted that many of the projects identified in the previous master plan remain valid and have been considered in this Master Plan study.

3. Problem and Opportunity Statement

Phase 1 of the five-phase Municipal Class Environmental Assessment planning process requires the proponent of an undertaking (i.e., the Elgin Area Primary Water Supply System) to first document factors leading to the conclusion that an improvement is needed and develop a clear statement of the identified problems or opportunities to be investigated. As such, the Problem and Opportunity Statement is the principal starting point in the undertaking of a Municipal Class Environmental Assessment and becomes the central theme and integrating element of the project. It also assists in setting the scope of the project.

The Municipal Class Environmental Assessment Master Plan Problem and Opportunity Statement is as follows:

- The growth in water demands forecast for the 2046 planning horizon requires review and assessment of the system's capacity and required investment for the sustainability and reliability of the Utility's treatment, pumping, and transmission infrastructure.
- Develop and assess a range of water system strategies considered to support existing servicing and account for reasonably expected near, mid, and long-term future growth projections, including servicing to new communities.
- Develop a recommended investment strategy for the near, mid, and long-term future growth projections that will support future infrastructure planning and budgeting.
- Consult benefitting communities, the public, Indigenous communities, agencies, and other interested parties, through the development of the Plan to identify the preferred alternatives that best meet long-term needs of the utility.
- Determine operational challenges based on the system hydraulics review related to projected future demands and growth-related requirements for treatment, pumping, transmission infrastructure.
- Review and confirm the utility's operational storage needs.
- Assess primary transmission pipeline capacity with consideration of; projected future demand and growth-related requirements, adequacy of the existing 750mm diameter transmission main (temporarily out of service), anticipated timing for returning the existing 750mm diameter transmission main to service and/or construction of an adequately sized secondary main and, investigate solutions to facilitate redundancy.

- Review and assess pressure control infrastructure to mitigate excessive and transient pressure incidents related to projected future demands and growth-related requirements.
- Review opportunities to enhance energy efficiency, conservation, and recovery across the system.
- Review the impacts of climate change on the utility's infrastructure and assess mitigation and adaptation opportunities in alignment with the utility's framework.
- Ensure alignment with and continuity between the Plan and the Utility's other guiding plans including the Asset Management Policy and Plan, Financial Plan, Operational Plan, and various management systems.

4. Consultation

The involvement of the community – residents, agencies, Indigenous communities, and those who may be potentially affected by a project – is an integral part of the Municipal Class Environmental Assessment process. The purpose of the consultation process is to provide an opportunity for the public to gain an understanding of the study process; contribute to the process for the development and selection of alternatives/design concepts; and provide feedback and advice at important stages in the Municipal Class Environmental Assessment process. Specifically, the objectives of the consultation efforts are to:

- Generate awareness of the project and provide opportunities for involvement throughout the planning process.
- Facilitate constructive input from public and agencies in addition to Indigenous communities at key points in the Municipal Class Environmental Assessment process, prior to decision-making.

The Municipal Class Environmental Assessment process requires two points of mandatory contact for a Master Plan study (following Approach 1) which are:

- The first point of mandatory contact is made at the end of Phase 2 when the proponent has identified a problem and opportunity statement, and developed, assessed, and evaluated alternative solutions to the problem based on the social, natural, and economic environments that could be impacted by the project. This initial contact is issued to invite the public and agencies to comment on the potential impacts and local sensitivities.
- The second point of mandatory contact is when the Master Plan report is complete. The Master Plan report documents the entire planning process through Phases 1 and 2. A proponent is required to place the Master Plan report on the public record for at least 30 calendar days which provides the public the opportunity to review.

For this study three (3) points of contact were made. The first was a Notice of Study Commencement, the second was the Notice of Public Information Centre, to introduce the project and provide a background summary of the need for this study including study findings and recommendations and the third was a Notice of Master Plan.

A summary of the consultation activities undertaken for this study is provided in this section.

4.1 Public Consultation

4.1.1 Notice of Study Commencement and PIC

Public notices of study commencement, Public Information Centre, and Notice of Master Plan were issued to notify agencies, local Community partners, Indigenous communities and the public of the status of the project, provide notification of the Public Information Centre and to invite feedback on the project. Refer to **Appendix A** for notices and contact list.

A list of public notices issued as part of the study are provided in **Table 4-1**.

All notices were posted on the Utility's website and emailed to existing and future customers, agencies and area Indigenous communities.

Table 4-1: Public Consultation Notices

Notice	Publication Date
Notice of Commencement **Appendix A.1**	February 14th, 2025
Notice of Public Information Centre **Appendix A.2**	June 3rd, 2025

*Publication date is excluding First Nations, this consultation occurred after receiving the Ministry of Environment Conservation and Parks acknowledgement letter.

4.1.2 Public Information Centre

A virtual Public Information Centre was held on June 25th, 2025, 6:00 pm to 8:00 pm using an online presentation format with a question-and-answer period at the end. The purpose of the Public Information Centre was to share study findings to date and gather comments on the following:

- The problem and opportunity statement.
- Existing conditions.
- The identification of water servicing strategies to address the problem and opportunity statement.
- The identification of alternative solutions to implement the servicing strategy.

- The evaluation of the alternative planning solutions and a recommended solution.
- Next steps in the process.

Representatives from the project team, including Utility staff and the AECOM Canada ULC team were available to discuss the project with participants. Three (3) community members attended the online presentation. There were no comments or questions asked at the conclusion of the presentation.

4.2 Member Communities

Existing member communities were sent the Notice of Commencement along with a survey requesting information on future water demands to the year 2046. The surveys and responses can be found in the **Appendix B.1 Flow Projection Memorandum**. The following existing member communities were contacted:

- The City of London,
- Town of Aylmer
- Municipality of Bayham
- Municipality of Central Elgin
- Municipality of Dutton Dunwich
- Township of Malahide
- City of St. Thomas
- Township of Southwold

4.3 Potential New Customers

Communities adjacent to the existing water system were sent the Notice of Commencement and were asked if they would be interested in receiving water from the Elgin Area Water Supply System. The following communities responded with an interest in potentially receiving water from the Utility through a separate survey:

- Oxford County
- Municipality of Thames Centre (Dorchester and Thorndale)

Further details for potential new customers can be found in **Appendix A.6**.

4.4 Agency Consultation

All relevant regulatory agencies and authorities were contacted at the project initiation stage through correspondence notifying them of the study commencement and

requesting their comments. All of these agencies were included in the project mailing list, which was updated regularly to ensure accuracy. They were also notified of the Public Information Centre and the Notice of Master Plan. The following section provides a summary of correspondence received from external agencies. Agency correspondence can be found in **Appendix A.**

Table 4-2: Agency Comments

Agency	Comment	Response
Ministry of Environment Conservation and Parks	Ministry of Environment, Conservation and Parks provided information on the following: Requirements for Duty to Consult with Indigenous communities.	This study has undertaken the necessary requirements to fulfil the Duty to Consult. See **Section 4.5** for details of Indigenous community consultation.
Ministry of Citizenship and Multiculturalism	Comments on Archaeological Resources and Potential Built Heritage Resources.	This study has been completed a high/broad level and further study will be required. Any projects requiring a Schedule B or Schedule C Municipal Class Environmental Assessment will undergo further Culture Heritage Resources Studies such as a Stage 1 Archaeological Assessment or Cultural Heritage Evaluation Report. See Appendix A for detailed comments and response.

4.5 Indigenous Communities

All Indigenous communities outlined in the Ministry of Environment, Conservation and Parks Notice of Commencement correspondence have been contacted via a Notice of Commencement/Project Introduction/Invitation to consult with an accompanying cover letter. These Indigenous communities were also sent the Notice of Public Information

Centre and the Notice of Master Plan. The following communities were contacted throughout the course of this study:

- Oneida Nation of the Thames
- Chippewas of the Thames First Nation
- Munsee-Delaware Nation
- Chippewas of Kettle and Stoney Point
- Aamjiwnaang First Nation
- Bkejwanong Territory (Walpole Island)
- Caldwell First Nation
- Eelŭnaapéewi Lahkéewiit (Delaware Nation at Moraviantown)
- Six Nations of the Grand River
- Mississaugas of the Credit First Nation

The Oneida Nation Council of Chiefs, Haudenosaunee Development Institute and Six Nations Elected Council were also contacted throughout the course of the Master Plan.

None of the communities contacted provided any comments or concerns.

5. Current and Projected Flow Demands and Design Criteria

5.1 Water Demand Forecast

5.1.1 Water Demand Forecast of Existing Member Communities

To support the flow projection analysis, surveys were distributed to the member communities that currently receive their water supply from the Elgin Area Primary Water Supply System. The surveys were sent to the following municipalities: Municipality of Central Elgin, Township of Southwold, City of St. Thomas, Township of Malahide, Municipality of Dutton-Dunwich, Town of Aylmer, Municipality of Bayham, and City of London to assist with water demand projections.

Survey responses were received from the following existing member communities:

- Municipality of Central Elgin,
- Township of Southwold
- City of St. Thomas

For the Town of Aylmer, Township of Malahide, Municipality of Bayham and Municipality of Dutton-Dunwich, the projected water demands were evaluated based on the available historical trend projection.

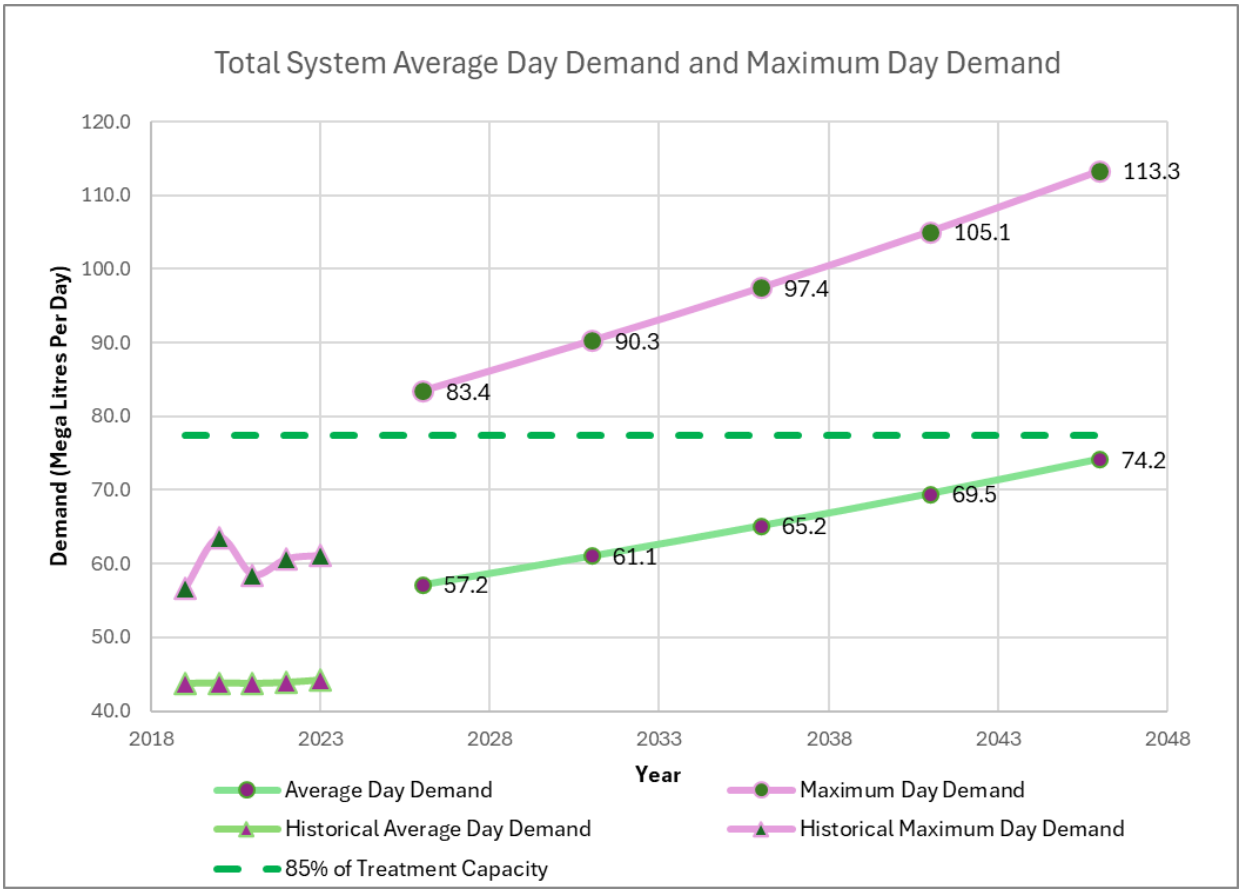
As part of the water demand projection exercise, a consideration of recent municipal Master Plan or Class Environmental Assessment for the municipal water system were considered, as well as County Official Plan growth projections.

The City of London receives water from both the of Elgin Area Primary Water Supply System and the Lake Huron Primary Water Supply System. The City of London and the Elgin Area Primary Water Supply System have a water agreement that the City of London is obligated to take a minimum of 22.7 Million Liters per Day from the Elgin Area Primary Water Supply System. For the purposes of the Master Plan, it was assumed that this water agreement would remain with the minimum volume of 22.7 Million Liters per Day maintained, over the planning horizon.

Based on the mentioned above, the low, medium and high demand projections of the existing member communities were evaluated without new customers. The medium water demand projection was adopted as the projected water demand of the Elgin Area Primary Water Supply System as summarized in **Figure 5-1**.

Note, throughout the report “Mega Liters per Day” and “Million Liters per Day” are commonly used to quantify water flow and it should be noted that 1 Mega Liter per Day is equal to 1 Million Liters per Day.

Figure 5-1 Total System Average Day Demand and Maximum Day Demand of the Elgin Area Primary Water Supply System Existing Member Communities



For the low and high water demand projection and other details are discussed in Technical Memorandum – Flow Projections Analysis for Elgin Area Primary Water Supply System, which is provided in **Appendix B.1**.

5.2 Water Design Criteria

According to the Ministry of the Environment, Conservation and Parks Design Guidelines for Drinking Water Systems, Section 3.4.1, the drinking water system including the water treatment plant and treated water storage should be designed to satisfy the greater of the following demands:

- Maximum Day Demand plus fire flow (where fire protection is to be provided).

- Peak Hour Demand.

The above guidelines are intended for water supply in local distribution systems. The Elgin Area Primary Water Supply System is responsible for providing water treatment and transmission only. Providing distribution-related storage (fire, equalization and emergency) and meeting peak demands are the responsibility of the member municipality.

The Elgin Area Primary Water Supply System only provides water supply in accordance with water supply agreements and may meet some limited fluctuations in member community water needs above average day flow. Member communities are required to meet their water needs above average day within their distribution system - maximum day, peak hour, fire and emergency etc.

The treatment and pumping components were assessed under the Maximum Day Demand condition and if deficiencies were identified, the storage component was evaluated against the Maximum Week Demand to confirm the serviceability. For the hydraulic modelling, the extended Seven (7)-day Maximum Week Demand simulation, which also captured the Maximum Day Demand, was adopted to ensure serviceability.

6. Existing Water System

6.1 Existing Water System Description

The Elgin Area Primary Water Supply System provides potable water to eight benefiting municipalities: City of London, City of St. Thomas, Town of Aylmer, Municipality of Bayham, Township of Malahide, Township of Southwold, Municipality of Dutton Dunwich, and the Municipality of Central Elgin. **Figure 1-1** provides an overview of the area serviced by the Elgin Area Primary Water Supply System.

6.1.1 Water Conveyance Infrastructure

The majority (approximately 95%) of the potable water is conveyed through the primary transmission mains (commonly referred to as the 'A' Line, which is 750 mm diameter, and 'B' Line, which is 900 mm diameter) to the Elgin Terminal Reservoir located on the northeast limits of the City of St. Thomas. The 'A' line is currently out-of-service for operation and maintenance reasons.

Storage for the Elgin Area Primary Water Supply System is provided in two (2) in-ground reservoirs:

- Elgin Area Water Treatment Plant: One (1) Reservoir with a total storage capacity of 2.8 Million Liters.
- Elgin Terminal Reservoir: Two (2) cells each at a capacity of 27 Million Liters.

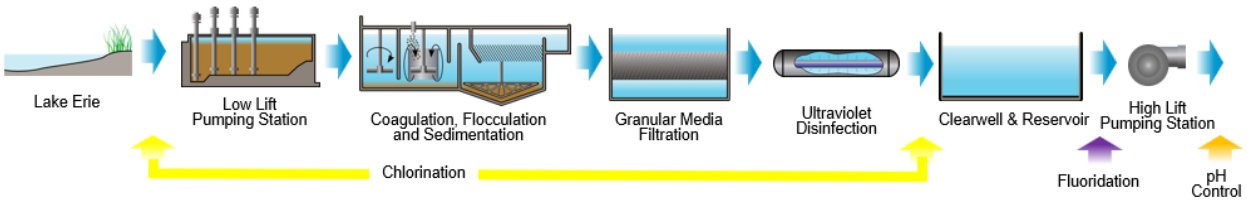
Water hammer / surge protection of the primary transmission mains is provided by:

- Elgin Area Water Treatment Plant: Two (2) surge tanks each at a capacity of 37 Cubic Meters
- Fruit Ridge Surge Protection Facility: 3,700 Cubic Meter surge tank

6.1.2 Elgin Area Water Treatment Plant

The Elgin Area Water Treatment Plant is a conventional water treatment plant with a 91 Million Liters per Day capacity located east of Port Stanley. The treatment plant produces drinking water which is pumped to supply all the benefiting municipalities in the Elgin Area Primary Water Supply System. Water is drawn from Lake Erie and pumped by the low lift pumping station to treatment which includes: pre-chlorination, screening, seasonal taste and odour control, coagulation, flocculation, sedimentation, filtration, ultraviolet disinfection, post-chlorination, fluoridation, and pH adjustment. An overview of the treatment schematic is displayed in **Figure 6-1.**

Figure 6-1: Conventional Treatment Process Overview



6.1.2.1 Raw Water Intake

A 1500-millimeter-diameter concrete intake pipe extends approximately 1.2 kilometers into Lake Erie at depth of 10 meters. The intake pipe has a bell end for the raw water to enter the pipe as well chlorination injectors in which chlorinated water is dosed to prevent mussels from accumulating and possibly blocking the intake structure. The pre-chlorination also aids in the treatment of manganese.

6.1.2.2 Low Lift Pumping Station

The Low Lift Pumping Station also commonly referred to as the Raw Water Pumping Station, receives raw water from the intake pipe, where it enters a surge well, followed by two (2) mechanical screens to prevent large debris from entering the pumps. The Low lift Pumping Station is equipped with four (4) fixed speed vertical turbine pumps:

- Two (2) pumps rated for 243 Liters per Second at 56 meters of Total Dynamic Head
- Two (2) pumps rated for 772 Liters per Second at 56 Meters of Total Dynamic Head

The Low Lift Pump Configuration offers a firm capacity of 91 Million Liters per Day and conveys water to the treatment plant processes. Prior to coagulation, the flow is split into a north and south treatment train via a 750-millimeter-diameter pipe.

6.1.2.3 Coagulation

Prior to the flow split of the north and south treatment trains, carbon dioxide is dosed to provide pH adjustment to optimize the treatment process for coagulation.

The coagulation process consists of two (2) flash mix chambers each with two (2) cells. Liquid Aluminum Sulphate (Alum) is dosed from two (2) bulk storage tanks. A polymer system is also used at the treatment plant to enhance the flocculation and sedimentation process. The system consists of a makeup tank, solution day tank, and the corresponding metering pumps which dose the polymer to both the flocculation and flash mixing tanks.

6.1.2.4 Seasonal Taste and Odour Control

The Elgin Area Water Treatment Plant has a seasonal taste and odour control system which currently consists of dosing powdered activated carbon to achieve the removal of various taste and odour compound including but not limited to, 2-methylisoborneol and geosmin.

6.1.2.5 Flocculation

Flocculation is provided by two (2) flocculation tanks, each with four (4) cells, containing one (1) vertical turbine mixer per cell. Different mixing energies are used within each cell to provide staged flocculation.

6.1.2.6 Sedimentation

Two (2) concrete below-grade rectangular sedimentation basins are used to clarify the flocculated water. Each basin is rated for 45 Million Liters per Day and contains three (3) settling area sections.

6.1.2.7 Filtration

Four (4) dual media filters, consisting of a top layer of anthracite and a bottom layer of filter sand, are used to filter the settled water. Each of the filters has a bed area of 97 square meters and contain gravel-less underdrains. The Filters are equipped with effluent control valves to adjust the flow rate through each of the filters. Two (2) backwash pumps are used to backwash the filters and remove trapped particles from the void space within the media. Work is currently ongoing at the plant to replace the two existing backwash pumps with two new vertical turbine pumps each with a rated capacity of 675 Liters per Second. In addition, one (1) blower is used to provide air scour at a rate of 55 cubic meters per hour during the backwash sequence.

6.1.2.8 Ultraviolet Disinfection

Currently filtered water undergoes disinfection by four (4) Trojan ultraviolet disinfection units with each dedicated to one filter effluent conduit pipe. At the time of this Master Plan, work is underway to replace the existing disinfection system with two (2) new ultraviolet units with a firm capacity of 91 Million Liters per Day as part of the Elgin Area Water Treatment Plant Ultraviolet Disinfection and Backwash Pump Replacement Project.

6.1.2.9 Chlorination Disinfection

A chlorine gas system consisting of three (3) chlorinators with a 228 Kilograms per Day capacity, provide disinfection at the plant in addition to the ultraviolet units. The chemical feed lines can dose the settled water, the filters directly, and the filtered

effluent water downstream of ultraviolet disinfection. Chlorine is typically added to the filtered water after the ultraviolet system to provide additional disinfection and sustain a chlorine residual throughout the transmission system.

6.1.2.10 Clear Well and Reservoir

Filtered effluent water is conveyed into one (1) Clearwell with an operating volume of 2.630 Million Liters. Following the Clearwell, water is stored within an onsite reservoir with a capacity of 2.8 Million Liters. Hydrofluosilicic Acid (Fluoride) is added within the suction conduit upstream of the pump well. Water is then drawn from the conduit and discharged to the High Lift Pumps to enter the transmission system.

6.1.2.11 High Lift Pumping Station

The High Lift Pump Station at the Elgin Area Water Treatment Plant is equipped with four (4) equally sized pumps and two (2) surge tanks:

- Four (4) pumps with a capacity of 350 Liters per Second at a Total Dynamic Head of 78 meters.
- Two (2) 37.0 Cubic Meter capacity hydropneumatic air chambers connected to the twinned primary transmission mains for transient pressure control.

Sodium hydroxide (Caustic Soda) is dosed to increase the pH of the drinking water, providing corrosion control and protecting the pipes within the transmission system.

6.2 Water System Needs Assessment

The hydraulic capacity of the following infrastructure components was assessed for the Elgin Area Primary Water Supply System:

- Water Treatment
- Pumping Stations
- Transmission Mains
- Storage

A value of 85% of the available capacity was used as a trigger point to initiate planning and coordination of the plant expansion to meet future demands.

6.2.1 Treatment

The total rated capacity of 91 Million Liters per Day for the Elgin Area Water Treatment Plant was determined to be insufficient for the planning horizon with the plant's rated

capacity being projected to be exceeded by 2036 and the trigger point of 85-percent capacity reached in 2026 for the Maximum Day Demand.

Recent operations and commentary from the 2024 Elgin Area Water Treatment Plant – Water Quality Facility Plan Update completed by Stantec, indicates the treatment plant can currently adequately operate at a capacity of 91 Million Liters per Day under most operating conditions, it is recommended that further stress testing be completed to verify sustainable operation at rated capacity flow. It is also acknowledged that the water quality of the raw water being treated will have a significant impact on operational treatment capacity. Specifically, Lake Erie can experience highly variable water quality conditions leading to operational challenges.

The Water Quality Facility Plan (Stantec, 2024) also reviewed individual treatment processes in comparison to industry guidelines, primarily the Ministry of Environment, Climate Change and Parks' Water Design Guidelines, to determine a theoretical capacity. The following paragraphs provide a commentary on the water treatment processes based on the Water Quality Facility Plan (Stantec, 2024) as well as other AECOM on-site experience.

6.2.1.1 Pre-disinfection

The pre-disinfection capacity was determined to be 42 Million Liters per Day as part of the Water Quality Facility Plan (Stantec, 2024), which is below the plant's rated capacity.

6.2.1.2 Coagulation

The Water Quality Facility Plan (Stantec, 2024) did not provide a unit process capacity for coagulation. Notwithstanding this, there were various recommendations such as using monitoring tools like ultraviolet transmittance and zeta potential to give operation staff more data in determining an optimum coagulant dosage. Further study is recommended to review ways to optimize the operation of the coagulation system in addition to evaluating potential expansion methods.

6.2.1.3 Seasonal Taste and Odour Control

The Water Quality Facility Plan (Stantec, 2024) did not provide a unit process capacity for the seasonal taste and odour control system. Further study is recommended to review taste and odour management including evaluating other methods, to ensure taste and odour compounds are adequately controlled.

6.2.1.4 Flocculation

The capacity of the flocculation process at the Elgin Area Water Treatment Plant was evaluated to be 41 Million Liters per Day in the Water Quality Facility Plan (Stantec,

2024). The report also noted that the Ministry of Environment, Climate Change and Parks' Water Design Guidelines for retention time ranges from 25-30 minutes in warm weather and 30-40 minutes in cold weather, though other sources suggest less time. It was also indicated that the flocculation process has a higher capacity in practice with optimized coagulation. This is still likely to be below the plant's rated capacity and should be investigated through a potential study.

Flocculation performance is dependent upon a number of factors including water chemistry, polymer used, mixing energies, etc. so jar testing and stress testing are more appropriate to evaluate flocculation process improvements. Performing these studies is recommended for a variety of raw water conditions. To meet projected capacity, it also suggested to complete a feasibility study that reviews potential expansion alternatives.

6.2.1.5 Sedimentation

The capacity of the sedimentation process at the Elgin Area Water Treatment Plant was evaluated to be 46 Million Liters per Day Water Quality Facility Plan (Stantec, 2024). The clarifiers were found to be in exceedance of recommended loading rates at rated capacity. This would increase the likelihood of elevated effluent settled water turbidity causing downstream filtration challenges. One additional area of concern is the impacts that cold water can have on the clarifier's efficiency. The higher loading rates coupled with reduced efficiency due to cold water could further reduce the capacity of the sedimentation process. It is recommended to complete stress testing to confirm operational limits, and a feasibility study to evaluate potential expansion alternatives.

6.2.1.6 Filtration

The capacity of the filtration process at the Elgin Area Water Treatment Plant was evaluated to be 91 Million Liters per Day in the Water Quality Facility Plan (Stantec, 2024). The report used a maximum loading criterion of 9.8 meters per hour with all 4 filters in service. The Ministry of Environment, Climate Change and Parks' Water Design Guidelines states that for "traditional dual media filter designs, a maximum filtration rate of 11.7 meters per hour is recommended, although filter rates of up to 20 meters per hour have successfully been achieved." At a filter loading rate of 11.7 meters per hour, with all filters in service, the theoretical capacity would increase to 109 million Liters per day. Like other unit processes, stress testing is recommended to further evaluate the filter performance. In addition to evaluating the feasibility of filter expansion, improvement upgrades should be reviewed. Currently the filters do not have a "filter-to-waste" nor extended terminal sub-fluidization wash capabilities, in which most new filter systems are equipped with. The incorporation of these capabilities and consideration for varying water quality should be included within a future feasibility study to review the filtration process.

6.2.1.7 Disinfection

In Ontario, water treatment plants are mandated to meet the disinfection requirements set out in the facility's Drinking Waterworks Permit. The Elgin Area Water Treatment is required to achieve 2-log removal (99%) of Cryptosporidium, 3-log removal (99.9%) of Giardia, and 4-log (99.99%) inactivation of viruses. The plant achieves removal and inactivation of microorganisms through the upstream conventional treatment, ultraviolet disinfection and chlorination processes. Removals / inactivation of microorganisms are assessed through Contact Time calculations as detailed in the Procedure for Disinfection of Drinking Water in Ontario. With all processes in operation under normal conditions with all equipment in service, the plant can adequately provide disinfection for the plant capacity.

In the Water Quality Facility Plan (Stantec, 2024), the capacity of the disinfection process at the Elgin Area Water Treatment Plant was evaluated to be 76 Million Liters per Day. It is expected this was calculated with one ultraviolet disinfection unit out-of-service. The plant is currently being upgraded to change the flow path in addition to replacing the existing ultraviolet disinfection units so the plant can adequately disinfect 91 Million Liters per Day under normal operating conditions, with one ultraviolet disinfection unit out-of-service.

The chlorination disinfection capacity was not assessed separately within the Water Quality Facility Plan (Stantec, 2024), notwithstanding this, the 228 Kilograms of Chlorine per day chlorination system has the ability to dose over 2.5 Milligrams of Chlorine per Liter at the plant's rated capacity of 91 Million Liters per Day which is adequate for normal conditions.

6.2.2 Pumping

6.2.2.1 Elgin Area Water Treatment Plant High Lift Pumps

Hydraulic model results indicate that with the A-Line and B-Line in service, 85% of the High Lift Pumping capacity would be reached for the 2036 flow condition. Possible station upgrades and a new facility would be required to meet projected demands and should be included with the Schedule 'C' Class Environmental Assessment for the treatment plant expansion. It is important to consider that there currently are some municipalities that require the Elgin Area Water Treatment Plant High Lift Pumps to operate for sufficient water pressure (i.e. filling of Port Stanley Elevated Water Storage Tank). Municipalities are encouraged to address distribution system operation constraints by having their own designated storage and maintaining system pressure independently of the Elgin Area Primary Water Supply System.

6.2.3 Transmission

Hydraulic model results indicated that the B-Line Transmission Main showed high head loss and velocity for the 2036 scenario and cannot independently supply the Elgin Terminal Reservoir for the projected flows. With both the B-line and A-Line main in service, there is sufficient capacity to supply demands within the planning horizon. Therefore, recommissioning and rehabilitation of the A-Line should be completed for the Elgin Area Primary Water Supply System.

From a hydraulic standpoint, additional transmission upgrades are not expected to be required for the projected growth of the water system; however, the age and condition of the transmission main will likely require proactive replacement. With the age and condition of the assets, planning beyond the 20-year horizon can help to remain proactive. A primary transmission main strategy can be developed that minimizes risks associated with future aging infrastructure. This planning would help inform asset replacements such as air release valves and chamber flood protection rehabilitation. In addition, a system reliability and redundancy review should be completed for future twinning sections of the transmission to manage risk.

6.2.4 Storage

The hydraulic analysis determined there are marginal storage deficits for the Elgin Area Treated Water Storage Reservoir which could be mitigated through reducing synchronization time, ensuring supply pumps are in operation, or utilizing the potential storage capacity through adjust operation setpoint levels. Further details can be found in the modelling memo attached in **Appendix B.2.**

The capacity of the Elgin Terminal Reservoir was found to be sufficient for the planning period, however, an expansion of the reservoir would provide the benefit of delaying an expansion of the Elgin Area Water Treatment Plant, and enhancing overall system operational flexibility. It is understood that preliminary engineering is underway related to an expansion of the Elgin Terminal Reservoir.

7. Identification and Screening of Alternative Water Servicing Strategies

Having identified hydraulic capacity deficiencies in the existing system to service existing and future populations, there are six (6) alternative servicing strategies moving forward. These strategies are being screened based on the water modelling and the technical ability to provide water in the most efficient manner to existing and future customers to the 2046 planning horizon.

7.1 Strategy 1: Do Nothing – Maintain the Status Quo

Assumes no improvements will be made to the systems beyond those already planned or approved. Regular maintenance activities will continue. This alternative does not address the problem and opportunity statement, and therefore this alternative is not to be carried forward to evaluation. **Not Carried forward for additional study.**

7.2 Strategy 2: Limit Growth / Soley Optimize the Existing System with no New Infrastructure

Assumes no improvements will be made beyond those already planned or approved and includes measures to limit future growth in the service areas. While limiting growth would reduce the need for upgrades and improvements to the water service system, it does not address the problem and opportunity statement or recognize the Regional Water Supply does not have the jurisdiction to implement such measures on member Municipalities. This also contradicts Provincial Policy Statement on municipal growth and the official plan for the member Municipalities. Therefore, this alternative is not to be carried forward to evaluation. **Not Carried forward for additional study.**

7.3 Strategy 3: Water Conservation / Reduction in Use

This alternative only partially addresses the problem and opportunity statement. Water conservation and reduction in use can provide some treatment and transmission relief but does not address future growth and would not be an adequate solution on its own. This alternative also does not recognize that the Regional Water Supply has limited jurisdictional control to implement conservation measures on member Municipalities. This strategy is encouraged as a best practice measure for community water systems. **Not Carried forward for additional study.**

7.4 Strategy 4: Water System Improvements to Rated Capacity

This alternative partially addresses the problem and opportunity statement by providing the ability to accommodate some limited future growth through upgrades (including system optimization) to the current system up to the rated capacity. However, the rated capacity for the system is not sufficient to provide water to existing and future customers to the 2046 planning horizon. **Not Carried forward for additional study.**

7.5 Strategy 5: Water System Improvements Beyond Rated Capacity

This alternative addresses the problem and opportunity statement by providing the ability to accommodate future growth through an expansion of the system beyond the current rated capacity. The existing system rated capacity is not sufficient to provide water to customers to the 2046 planning horizon, so this alternative would be necessary to provide water to existing and future customers. **Carried forward to be studied further and develop alternative servicing solutions.**

7.6 Alternative 6: Alternative Source for Selected Customers/Communities

This alternative would consider finding an alternative source of water for selected customers to supplement the current supply to accommodate future growth. This would require new water supply agreements and would be difficult to implement due to jurisdictional and intra-basin complexities. **Not Carried forward for additional study.**

8. Identification and Evaluation of Alternatives for Water Servicing Strategy 5

After screening the water servicing strategies identified in Section 7 of this report, it was determined, based on the water modelling and the technical ability to provide water in the most efficient manner, that **Strategy 5 - Water System Improvements beyond the Rated Capacity** was to be studied further to develop alternative servicing solutions. This section identifies the Alternatives Solutions evaluated to implement Strategy 5.

8.1 Alternative 5A – Optimizing and Upgrading the Existing System with new Infrastructure

This alternative would optimize and upgrade the existing system beyond current rated capacity through various system improvements and new infrastructure.

8.2 Alternative 5B – New Water Treatment Plant

This alternative would replace the existing Water Treatment Plant with a new plant above the current rated capacity.

8.3 Evaluation Criteria

A detailed qualitative assessment of each alternative for **Water servicing Strategy Number 5: Water System Improvement beyond the System Rated Capacity** was completed based on evaluation components and criteria. In this evaluation approach, trade-offs consider the advantages and disadvantages of each alternative to address the problem and opportunity statement with the least environmental effects and the most technical benefits which forms the rationale for the identification of the preferred alternative.

Each evaluation category was evaluated based on the following scoring system. Low impact is considered a preferred solution compared to moderate or high impact.

In order to evaluate the alternatives for Strategy Concept 5, a set of criteria were chosen which are categorized as follows in **Table 8-1.**

Table 8-1: Evaluation Criteria

Category	Criteria	Indicators
Socio-Economic:	**Long Term Impacts to the**	Potential effects (Noise, Dust, Vibration, property access) related to disruptions to residences,

Category	Criteria	Indicators
(Considerations to potential long- and short-term impacts to the communities the Utility services)	**Community in relation to the services provided by the utility**	agricultural, business, and travelling public during construction and operation.
		Potential effects on existing and approved / planned land uses.
		Degree of Property Acquisition / Easement requirements
	Supports growth and development	Conformance with approved local (communities the Utility services) , and provincial plans and policies.
		Ability to meet utility needs and strategic plan.
Cultural Environment (How the alternatives may impact existing Heritage Buildings or lands including potential archaeological sites.)	**Archaeology**	Potential effects to cultural heritage resources.
	Built Heritage	Potential effects to built heritage resources.
	Cultural Heritage Landscapes	Potential effects to Cultural Heritage Landscapes.
	Indigenous Communities	Potential Impacts to Treaty Lands.
Natural Environment (Potential Impacts to the Natural Environment due to the construction, operation of new or updated infrastructure)	**Impacts to the Aquatic Environment**	Potential for impacts to Aquatic habitat and Species at Risk
	Impacts to the Terrestrial Environment	Potential for impacts to Terrestrial habitat and Species at Risk
		Potential impacts to Groundwater Recharge Areas, Intake Protections Zones and Highly Vulnerable

Category	Criteria	Indicators
	Source water Protection	Aquifers in relation to current Source Water Protection Plans.
	Climate Change	Potential for impacts to climate change (greenhouse gas emissions)
		Potential for climate change to impact the projects and the ongoing operation (climate change resiliency)
Technical (The ability of the alternatives to meet the current and future needs of the utility and how it can be integrated with the existing system.)	**Meets Future Needs**	Addresses the existing system capacity constraints.
		Improvements to level of service utilization of the existing and future infrastructure.
		Meets the long-term capacity (treatment, transmission, storage and pumping) requirements to service the projected population growth to 2046.
		Alignment with Elgin Area Primary Water Supply Systems current Asset Management Policy
	Drinking Water Quality	Reliability of the water system (treatment, and transmission)
	Maintenance of Service	Ability to maintain or improve water quality.
		Operation redundancy to improve services security and allow for safe and efficient maintenance activities.
		Potential to minimize increases to operational and/or maintenance complexity of the system.

Category	Criteria	Indicators
	Constructability	Construction complexity including potential for utility conflicts.
		Security of Utility Infrastructure
	Legal Jurisdictional	Future regulatory requirements.
		Complexity of Approvals.
		Land Requirements.
Economic (Costs to construct, maintain and operate the new infrastructure for the utility)	**Project and Operations Changes Costs**	Capital Costs.
		Property Acquisition/Easement Costs (no costs / order of magnitude).
		Operation and Maintenance Costs (Day to Day costs and Contracted Operations Services costs).
		Life Cycle Costs

8.4 Evaluation of Strategy 5 Water Servicing Alternatives

A full evaluation matrix for Strategy 5 alternative is provided in **Table 8-2**. Based on the criteria and methodology applied as part of the evaluation process, the recommended alternative is **Alternative 5A – Optimizing and Upgrading the Existing System**.

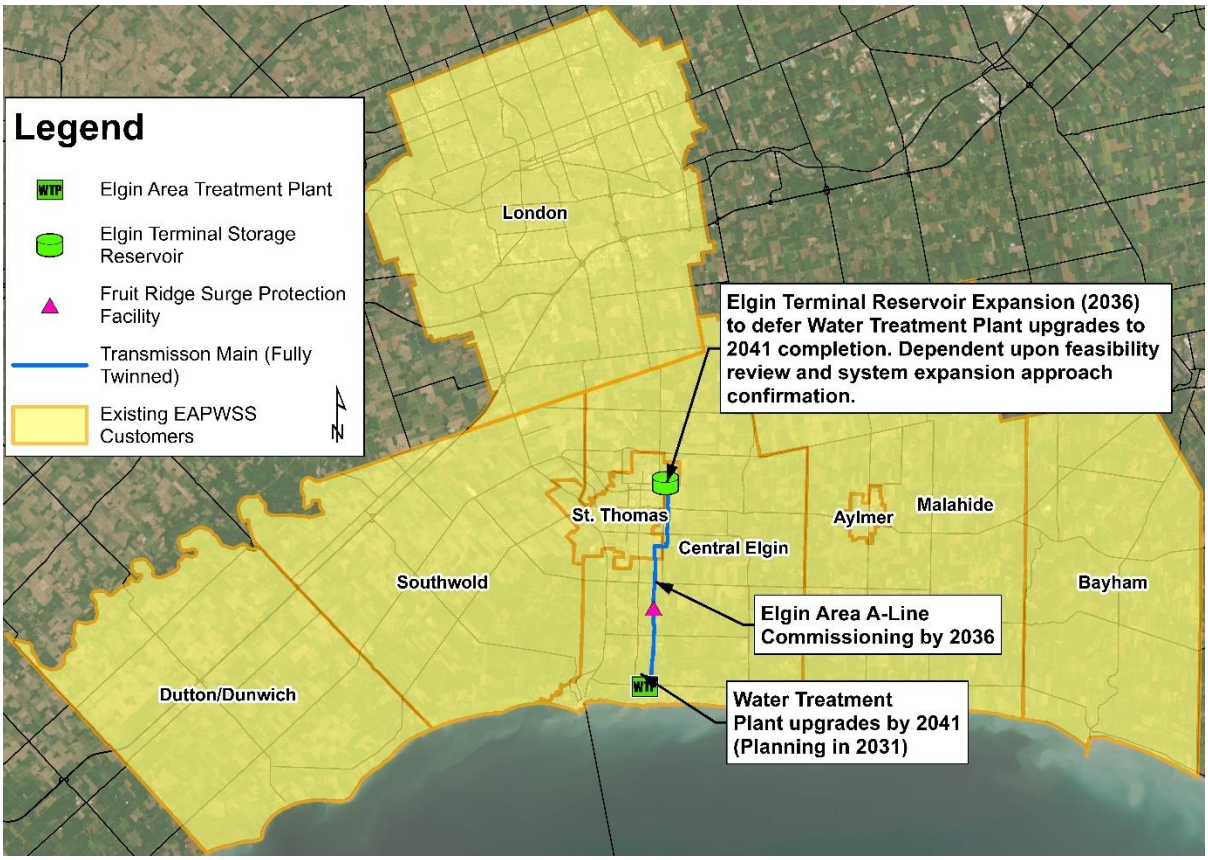
A summary for the rationale for this recommendation includes:

- Moderate impacts to Natural Heritage.
- Moderate Impacts to/from Climate Change.
- Meets the need of current and potential new customers.
- Moderate construction complexity.
- Straight forward permitting and approvals.
- Moderate capital cost.

Table 8-2: Evaluation of Strategy 5 Water Servicing Alternatives

Evaluation of Strategy 5 Water Servicing Alternatives PLACE HOLDER

Figure 8-1: Recommended Water System Improvements



8.4.1 Recommended Water Servicing Alternative

After evaluating against the criteria discussed in **Section 8.3**, it was determined that **Alternative 5A – Optimizing and Upgrading the Existing System with new Infrastructure** is the recommended Water Servicing Alternative.

This alternative optimizes and upgrades the existing system beyond the current rated capacity through various system improvements and new infrastructure. Detailed descriptions of the recommend projects to achieve this are discussed in more detail in **Section 9** of this report. **Figure 8-1** provides an overview of the recommended Water System Improvements which include the following key highlights:

Treatment and Pumping:

- Treatment Plant Expansion (Need and Approach Confirmation will be required with a Schedule 'C' Class Environmental Assessment for Treatment Plant Expansion). Environmental Assessment inclusive of both the low lift and high lift pumping station expansions.
- Ultraviolet Disinfection and Backwash Replacements (in progress).

- Clarifier and Filter Upgrades.
- Tank/Channel Rehabilitations.

Transmission:

- Rehabilitation and recommissioning of 'A-Line' Transmission Main.
- Chamber Flood Protection and Rehabilitations.
- Combination Air Valve Replacements.

Storage:

- Elgin Terminal Reservoir Expansion
- Elgin Area Water Treatment Plant On-Site Reservoir Expansion (Need and Approach Confirmation will be required with a Schedule 'C' Class Environmental Assessment for Treatment Plant Expansion).
- Tank Rehabilitations.

Figure 8-2 illustrates the potential Water Treatment Plant On-site expansion area, and **Figure 8-3** provides the potential Elgin Terminal Reservoir On-stie expansion area.

Figure 8-2: Potential Water Treatment Plant Expansion Area

Figure 8-3: Potential Elgin Terminal Reservoir Expansion Area

9. Recommended Improvements

9.1 Recommended Improvement Projects

The recommended projects for the water system have been categorized by differentiating between treatment, transmission and storage projects. The estimated capital cost and timing/schedule for each project is displayed in **Section 9.4.**

Moving forward in the planning horizon, it is recommended that continuous treatment plant improvements be implemented after the associated feasibility study has been conducted. An overview of the recommended projects is provided below:

9.1.1 Treatment

9.1.1.1 Plant Expansion

In response to the projected flows, it is recommended to carry out capacity expansion efforts at the Elgin Area Water Treatment Plant. The need and approach for the expansion is to be confirmed through a Schedule “C” Class Environmental Assessment. This project will likely be conducted in phases and broken down into sub-projects focussing on different portions of the treatment process. It is expected that the recommended process specific feasibility studies and stress testing will provide project prioritization based on the anticipated bottlenecks within the system. Conventional versus alternate/advanced treatment to be explored as part of the Class Environmental Assessment process.

9.1.1.2 Clarifier Upgrades

The feasibility study that examines the clarifiers will dictate the required scale of upgrades needed to address projected demands. This project would include the design and construction of additional clarifier capacity and address the exceedance of loading rates at capacity flow. A high-rate sedimentation alternative should be considered for this project to minimize space requirements and improve efficiency. It’s reduced footprint would allow for more flexibility in accommodating the expansion needs of other processes at the treatment facility. The associated process, mechanical, and electrical work would have to be incorporated to service the new clarification process.

9.1.1.3 Filter Upgrades

The filter and backwash upgrade project would improve the filtration capacity and provide enhanced backwashing capabilities leading to operational benefits at the facility. Filter-to-waste and extended terminal sub-fluidization wash would reduce filter ripening and potentially lead to reduced water and energy usage. Retrofitting the existing system

or construction of additional filters should be implemented based on the results of the recommended stress testing and associated feasibility study.

9.1.1.4 Tank and Channel Rehabilitation

As found in the 2022 Assessment Management Plan Report by the Elgin Area Primary Water Supply System and supported in the 2023 Elgin Area Primary Water Supply System: Water Treatment Plant-Asset Field Condition Assessment by WSP, a significant amount of tank and channel concrete is approaching it's expected end of service life within the planning horizon. This project would complete structural and concrete repairs to existing tanks and channels. It is recognized that future expansion initiatives may result in new concrete structures and subsequently address this need.

9.1.1.5 Low Lift Pumping Station Expansion

The firm capacity of 91 Million Liters per Day at the Low Lift Pumping Station is recommended to be expanded within the planning horizon. This project will entail the design, selection, and installation of new pumps including the required instrumentation programming to tie into the existing Supervisory Control and Data Acquisition system. Depending on the results of the Schedule 'C' Class Environmental Assessment for the treatment plant expansion, a new building/facility may be required to house the new equipment. It is also recommended that surge control be incorporated in this project to provide protection from transient pressure conditions. The installation of new pumps would support the water system's long-term operational reliability and service the expanded treatment processes. It is envisioned that this project is included within the treatment plant expansion.

9.1.1.6 High Lift Pumping Station Expansion

A project to expand the current High Lift Pumping capacity is needed to supply the increased flows to the benefiting municipalities within the planning horizon. This project will entail the design, selection, and installation of new pumps including the required instrumentation programming tie-in for the existing Supervisory Control and Data Acquisition system. Depending on the results of the Schedule 'C' Class Environmental Assessment for the treatment plant expansion which includes the high lift pumps, a new building/facility may be required for this project. The installation of new pumps would support the water system's long-term operational reliability and service the expanded treatment processes. It is envisioned that this project is included within the treatment plant expansion.

9.1.2 Storage

9.1.2.1 Elgin Terminal Storage Expansion

To provide added flexibility in the interim to handle high water demands, it is recommended that the Elgin Area Primary Water Supply System further review expansion at the Elgin Terminal Storage Reservoir to provide a buffer in delaying the expansion of the water treatment plant as well as to provide extra storage to minimize pumping during peak energy times.

9.1.3 Transmission

9.1.3.1 Transmission A-Line Re-commissioning

A project to re-commission the out of service A-Line Transmission Main should be completed to ensure reliable service throughout the transmission system within the planning horizon. This project would include a review of existing valves, fittings, and chamber flood protection measures to determine replacement needs. The existing in-line check valve in Chamber 28 should be evaluated for removal. In addition, pressure and leakage testing would be complete prior to integrating the pipeline back into service. Carrying forward this project would provide the water system with increased redundancy and reliability in meeting flow projections within the planning horizon as well as lower the cost of pumping. When using both A-Line and B-Line for equivalent flows, the transmission lines' pressure would be lower than it is currently, and customers should be prepared to adjust to lower pressures into their system.

9.1.3.2 Transmission Pipeline B Combination Air Valve replacement

Given the age of the pipeline, a systematic replacement of air release/vacuum valves is recommended to maintain system reliability. Many of the existing valves are likely to have decreased functionality from wear and corrosion which could pose increased risks of pipe stresses. To efficiently complete this project, it is also recommended to carry out the suggested pipe monitoring studies and condition assessments which will identify the highest priority locations requiring replacements. This project will improve the efficiency of the transmission system and reduce potential pipe failures.

9.1.3.3 Transmission Pipeline B Chamber Flood Protection and Rehabilitations

The water system's flood protection components and associated chambers will be addressed in this project to ensure the protection of the transmission system. Structural repairs and additional rehabilitation work should be completed to protect equipment from water damage.

9.2 Recommended Studies

The following recommended studies are suggested to inform capital project planning following the water treatment process needs assessment in **Section 6.2**:

9.2.1 Treatment

9.2.1.1 Optimization of Coagulant and Polymer Dosing Strategy

To enhance the capacity of pre-filtration, it is recommended to carry forward the development of an optimization strategy for both the coagulant and polymer used at the Elgin Area Water Treatment Plant. This strategy should move beyond the reliance on raw water turbidity as the basis for dosing and incorporate advanced monitoring tools such as particle charge instruments and/or online ultraviolet transmittance analyzers. The Water Quality Facility Plan (Stantec, 2024) found that the polymer did not provide measurable benefits to the treatment process and therefore should be reviewed. It is recommended to carry out a polymer strategy to identify alternate polymers that can better control the level of settled water turbidity and improve the performance of flocculation and sedimentation. Bench scale testing is suggested to compare the effectiveness of the polymers under a variety of conditions and the outcomes should inform the development of standard operating procedures.

9.2.1.2 Taste and Odour Management Strategy

A management strategy is recommended to be implemented at the Elgin Area Water Treatment Plant to enhance the removal of problematic compounds related to taste and odour. Treatment technologies capable of removing taste and odour concerns such as granular activated carbon or optimizing the existing powdered activated carbon system should be considered. Additionally, it was suggested within the Water Quality Facility Plan (Stantec, 2024), to evaluate the addition of monitoring tools capable of proactively detecting the occurrence of taste and odour events. The monitoring equipment should collect data to manage known and potential future challenges for the water system such as manganese, dissolved oxygen, algal blooms, and cyanotoxins. This would allow operators to make adjustments and control the treatment process based on enhanced data, thereby reducing the likelihood of customer complaints.

9.2.1.3 Raw Water Quality Monitoring Program

Building on the taste and odour management strategy, it is recommended that a raw water monitoring program is implemented at the facility. With increasing effects of climate change, algal blooms, and extreme weather events, the addition of advanced monitoring tools would support more proactive management of changes in water quality. Specifically, the plant should evaluate the feasibility of increasing the frequency of

monitoring data for manganese, ultraviolet transmittance, and ultraviolet absorbance. The enhanced monitoring capabilities would provide operation staff more tools to adjust dosing in-real time and effectively manage water quality challenges.

9.2.1.4 Pilot Plant Feasibility Study

Due to changing water quality and the potential introduction of new treatment technologies in a plant expansion, it is recommended to assess the feasibility of constructing a pilot plant. Using the pilot facility to trial alternate technologies under realistic operating conditions helps to determine their effectiveness. This pilot would also provide a controlled environment to implement different dosing strategies and further optimize treatment process prior to carrying it forward to full-scale. Many of the recommend studies potentially could be conducted using the pilot plant.

9.2.1.5 Feasibility Study for Coagulation, Flocculation, & Clarifier Capacity Upgrades

The preferred servicing strategy for upgrading the coagulation, flocculation, and clarifier capacities should be closely aligned with the planning of the treatment plant expansion. These studies should focus on evaluating means of increasing the capacity as a response to the projected flow, while also accounting for space requirements for the expansion of other processes at the facility. A comprehensive evaluation of various treatment technologies is recommended to enhance the process efficiency. In addition, the results from the proposed stress testing are expected to help inform these studies by determining the scale of the required hydraulic capacity upgrade.

9.2.1.6 Feasibility Study for Filter Capacity Upgrades

An additional feasibility study for filter capacity upgrades can be carried out subject to the information from further stress testing and planning for the plant expansion. This study would evaluate the possibility of constructing new filters or retrofitting the current system to extend the hydraulic capacity. As recommended in Water Quality Facility Plan (Stantec, 2024), filter-to-waste and extended terminal sub-fluidization wash should be included in this study as these potential changes help ensure future Ministry compliance while providing benefits in the operation of the filters.

9.2.1.7 Municipal Class Environmental Assessment Schedule ‘C’ – Treatment Plant Expansion

This Environmental Assessment would serve as a basis to inform the completion of a treatment plant expansion. The Schedule ‘C’ Environmental Assessment for the water treatment plant expansion should follow the designated process to evaluate the impacts to the natural, technical, social, cultural and economic environments, associated with this project. Potential expansion for both the low lift and high lift pumping stations would

be included within the Schedule 'C' Environmental Assessment. Alternatives capable of providing an increased flow capacity for both stations to support the expanded treatment plant should be assessed.

9.2.2 Transmission

9.2.2.1 Low Lift System Transient Analysis

Complete a transient analysis for the Elgin Water Treatment Plant Low Lift system to evaluate transient impacts and ensure robust transient protection using up to date data and transient modelling software. This would include the Low Lift Pumping Station and the transmission main.

9.2.3 Storage

9.2.3.1 Interim Flow Projection Update

The interim flow projection update would re-baseline existing conditions with new actual flows estimates based on the institutional-commercial-industrial growth and development activity in the surrounding area of the Elgin Area Primary Water Supply System. The updated information would provide a means of assessing the full impacts of the reservoir expansion including the delay of the plant expansion.

9.3 Other Planned/Scheduled Studies

The follow studies have been previously scheduled/planned to occur within the planning horizon or are recommended to be routinely completed by the Elgin Area Primary Water Supply System subject to being accepted through a business case review process.

9.3.1 Master Plan Update

The next Master Plan Update is scheduled in 2029 for the Elgin Area Water Supply System. This plan should provide a comprehensive evaluation and strategic planning process to ensure the facility continues to meet the current and future water system demands effectively. The update will help to further contribute to capital planning and treatment facility improvements.

9.3.2 Financial Plan Update

It is recommended that the Elgin Area Primary Water Supply System continues to update their financial plan to support the capital budgeting process for necessary water system improvements and maintenance. This plan typically should include the analysis of capital, operating, asset management, and lifecycle costs.

9.3.3 Asset Management Plan Update

The asset management plan is aimed at evaluating the condition, performance, and remaining useful life of assets for the water system. Assets are also typically assessed in terms of their risk and level of service provided to the water system to facilitate optimized repairs/maintenance. Lifecycle and financial planning should continue to be included within the asset management plan keeping in mind long-term budgeting to ensure sustainable funding for asset renewal and maintenance. In addition to many of the recommended studies, updating the asset management plan will help provide direction in which treatment plant improvements should be prioritized. It is recommended that the Elgin Area Primary Water Supply System continues conducting routine asset management planning.

9.3.4 Ongoing Condition Assessments

Ongoing condition assessments are a critical component of the Elgin Area Primary Water Supply System's effective asset management strategy, which provides the necessary insights to inform the maintenance, rehabilitation, and replacement of assets. It is recommended to continue undertaking assessments inclusive of both desktop reviews and detailed field investigations, carrying out recommendations from the asset management plan. This information can be analyzed to prioritize water system improvements and prevent any critical failure of assets from deterioration.

9.3.5 Climate Change Resilience and Adaption Plan

It is recommended to complete a climate change resilience and adaptation plan to evaluate the potential vulnerabilities and ensure the water system's reliable operation in worsening environmental conditions. The study should involve conducting risk assessments to determine the resiliency of the current infrastructure to extreme weather events and changing water quality. Adaptation plans can also be developed to provide mitigation strategies against environmental factors, including but not limited to enhanced storage capacities and protection against flooding. It is expected that once the initial plan is created, updates can be made routinely or if the environmental conditions change significantly.

9.3.6 50 Year Roadmap Study

It is recommended to complete a 50 Year Roadmap Study to evaluate the projected effect on the water system from population growth, urbanization, and industrial development, while accounting for climate variability and evolving regulatory standards. This study should also include how the Elgin Area Primary Water Supply System would respond to various long-term growth scenarios and initiate a high-level planning process to guide future infrastructure investments. In general, the long-term planning and vision

for the water system should be investigated to inform short-term decision-making, ensuring infrastructure resilience, operational efficiency, and effective future planning. Once the initial roadmap study is completed, updates can be carried out to reflect the dynamic changes based on the growth of the Elgin Area Primary Water Supply System.

9.3.7 Energy Audit and Pump Optimization Study Update

To enhance the sustainability of the water system and improve operational efficiency, it is recommended to complete an energy optimization update. This study should review opportunities to optimize pump operations and reservoir filling to reduce overall energy consumption. Incorporating demand patterns and analyzing system inefficiencies can help the Elgin Area Primary Water Supply System to offset the rising cost of electricity. Additionally, the previously mentioned hydraulic modelling studies can provide insight into pressure management within the transmission system which is linked to energy usage.

9.3.8 Water Loss Review

To continue maintaining levels of service, a water loss review should be conducted as part of the lifecycle strategy mentioned in the Asset Management Plan Report 2022 by the Elgin Area Primary Water Supply System. This study would help quantify the volume of water loss occurring between the treatment facilities and benefiting municipalities. Identifying areas prone to water loss can also highlight potential points of failure to inform future condition assessment in addition to estimating amounts of non-revenue water produced. The study can also include any opportunities to review water loss occurring within the treatment plant prior to entering the transmission system for non-revenue water savings and reduced water usage.

9.3.9 System Reliability and Redundancy Review

It is recommended to complete an evaluation of the water system’s reliability and redundancy. Primarily, areas of that lack redundancy should be identified and reviewed to consider the long-term reliability of the associated infrastructure. Areas such as untwined sections of the transmission main and pumping stations can be investigated the to determine the level of risk that is posed in lacking redundancy. This study should also be extended to review other asset areas such as treatment processes and digital technology infrastructure.

9.3.10 Treatment

9.3.10.1 Water Quality Facility Plan Update

To better inform the next Master Plan Update and understand the facilities treatment capabilities, a water quality facility plan update is recommended. This involves a detailed and strategic process that evaluates the treatment capabilities of the existing system and ensures regulatory compliance. With the increasing effects of climate change and population growth, the update should incorporate future water quality challenges and emerging contaminant considerations. Similar to previous iterations of the water quality facility plan, a phased implementation roadmap should be developed to prioritize improvements and provide recommendations.

9.3.10.2 Stress Testing

To gain further refined information on limiting treatment process capacities, it is recommended to undertake additional cold water stress testing. Running the test in different water quality conditions would help build certainty as to the true operable capacity of the facility. Additionally, cold water conditions provide insight into a low efficiency scenario for the clarifiers and a controlled environment to evaluate the achievable loading rates without reaching elevated settled water turbidity levels. Based on the results of the stress test, there is an opportunity for further prioritization on which treatment processes need to be addressed first in planning for the plant expansion. Carrying out additional stress testing throughout the planning horizon would provide a proactive assessment to ensure the treatment process are functioning efficiently and complying with regulatory requirements.

9.3.11 Transmission

9.3.11.1 Elgin Area Primary Water Supply System Hydraulic Model Update and Calibration

The Utility should consider a comprehensive update and calibration for the Elgin Area Primary Water Supply System hydraulic model. It is recommended that the network update should be conducted for every 2 years and model calibration to be completed every 5 years.

9.3.11.2 Transient Hydraulic Modelling Update

To maintain reliability in the transmission system, it is recommended to conduct transient hydraulic modelling study updates for the Elgin Area water system. Since transient pressures can vary significantly depending on factors such as pump operation setpoints and valve closures, it is important to model a range of scenarios. The

modelling of the system will support long-term decision making and enhance maintenance planning efforts for the water system. This should include:

- Validation of existing transient protection characteristics at the High Lift Pumping Station and operation with the existing as well as future upgraded high lift pumps in service as well as confirmation of surge tank operating levels, transient model validation based on high frequency transient monitoring data.
- Transient analysis update with both the A and B-Lines in operation, including a review of combination air valve requirements for transient protection as well as evaluation of the removal of the existing in-line check valve on the A-Line (Chamber 28).

9.3.11.3 Ongoing Monitoring of Primary Transmission Mains

In accordance with the Prestressed Concrete Cylinder Pipe Degradation Modeling Report completed in 2022 by Pure Technologies, it is recommended to continuously monitor the transmission mains for proactive pipeline replacements.

9.4 Recommended Capital Program

Based on the recommended infrastructures for the preferred servicing strategy, the capital cost and preferred timing/schedule was identified. The cost estimation was based on the size/ capacity and constructability. The costs included the following key considerations and excludes planning (class Environmental Assessments, studies etc.):

- Design and contract administration
- Permits and approvals
- Contingency
- Equipment acquisition and installation

The following tables below display the recommended capital program projects and studies:

Table 9-1 summarizes the Recommended Improvements costs for implementation (In 2025 Millions of Canadian dollars).

Table 9-2 summarizes the Recommended Studies and costs for implementation (In 2025 Thousands of Canadian dollars).

Table 9-3 summarizes the Planed/Scheduled Studies and costs for implementation (In 2025 Thousands of Canadian dollars).

Table 9-1: Recommended Improvements

All Capital Works' Prices in 2025 Millions of Canadian Dollars – Class E Estimate

Project Type	Project	Class Environmental Assessment Schedule Requirement	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Costs for 2041-2046
Treatment	Treatment Plant Expansion*	Schedule C	0	0	400	0
Treatment	Clarifier Upgrades **	Exempt	-	-	-	-
Treatment	Filter Upgrades **	Exempt	-	-	-	-
Treatment	Tank/Channel Rehabilitations **	Exempt	-	-	-	-
Storage	Elgin Terminal Reservoir Storage Expansion	Exempt	60	0	0	0
Transmission	Transmission A-Line Re-Commissioning	Exempt	0	10	0	0
Transmission	Transmission Pipeline B Air Valve Replacement	Exempt	1	0	0	0
Transmission	Transmission Pipeline B Chamber Flood Protection and Rehabilitations	Exempt	2	0	0	0

*Both the high lift and low lift pumping station expansions included as part of the Treatment Plant Expansion project.

** Included as part of Treatment Plant Expansion project cost (Estimates from 2024 Water Quality Facility Plan (Stantec, 2024): Clarifier Capacity Upgrades $65,700,000 and Filter Capacity expansion $32,000,000)

Table 9-2: Recommended Studies

All Studies' Prices in Thousands of Canadian Dollars (2025) – Class E Estimate

Study Area	Study	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Cost for 2041-2046
Treatment	Optimization of coagulation and polymer dosing strategy	300	0	0	0
Treatment	Taste and Odour Management Strategy	250	0	0	0
Treatment	Raw Water Quality Monitoring Program	175	175	0	0
Treatment	Feasibility study for coagulation, flocculation, clarifier capacity upgrades	200	0	0	0
Treatment	Pilot-plant feasibility study	120	0	0	0
Treatment	Feasibility study for filter capacity upgrades including filter-to-waste and backwash sequence capability	125	0	0	0
Treatment	Schedule 'C' Class Environmental Assessment for Treatment Plant Expansion*	500	0	0	0
Transmission	Low Lift System Transient Hydraulic Analysis	100	0	100	0
All	Interim Flow Projection Update	50	0	0	0

*Both the high lift and low lift pumping station expansions studies included as part of the Treatment Schedule C Environmental Assessment. All recommended studies are

subject to business case and risk/opportunity reviews undertaken by the Elgin Area Primary Water Supply System.

Table 9-3: Planned/Scheduled Studies

Note: All Prices in Thousands Canadian Dollars (2025) – Class E Estimate

Study Area	Study	Cost for 2026-2031	Cost for 2031-2036	Cost for 2036-2041	Cost for 2041-2046
Treatment	Water Quality Facility Plan Update	200	200	200	200
Treatment	Stress Testing	50	50	50	50
All	Asset Management Plan Update	200	200	200	200
All	Ongoing Condition Assessment	350	350	350	350
All	Climate Change Resiliency and Adaptation Plan	0	75	75	75
All	Financial Plan Update	120	120	120	120
All	50 Year Roadmap Study	150	20	50	20
All	Master Plan Update	150	150	150	150
All	Water Loss Review	50	0	50	0
All	System Reliability and Redundancy Review	100	0	100	0
All	Energy Audit and Pumping Optimization Update	0	200	0	200
Transmission	Elgin Area Primary Water System Hydraulic Model Update and Calibration	50	50	100	50
Transmission	Transient Hydraulic Modelling Update	150	0	150	0
Transmission	Ongoing Monitoring of Primary Transmission Mains	200	200	200	200

All studies are subject to business case and risk/opportunity reviews undertaken by the Elgin Area Primary Water Supply System.

10. Conclusion and Next Steps

The Master Plan Report outlines the process required to ensure that the proposed recommended solutions to the problem and opportunity statement meet the requirements of the *Environmental Assessment Act*.

The proposed projects resolve the problem and opportunity statement identified in this report. A preliminary evaluation of potential impacts has been included in the evaluation, which indicates minor and predictable impacts that can be addressed.

Appropriate public notification and an opportunity for comment was provided and no comments were received that could not adequately be addressed. Subject to receiving Municipal Class Environmental Assessment finalization following the 30-day review period, the Utility can start the Environmental Assessment for the recommended Schedule C project and also proceed to detailed design and permitting-approvals phase for the projects that do not require further Environmental Assessments according to the timing outlined in this report.

10.1 Approvals

Under the current Municipal Class Environmental Assessment policy framework, a Schedule C Environmental Assessment will be required to evaluate the Elgin Water Treatment Plant expansion details (e.g., potential on-site vs off-site locations for expansion) to select the alternative with the least environmental impact.

The remaining recommended projects in this report, will be exempt from the Municipal Class Environmental Assessment Schedule B and C processes. When these projects or studies get implemented, depending on the complexity, approvals will be required from various regulatory authorities including but not limited to Ministry of Environment Conservation and Parks (Drinking Water Works Permit,), previously identified Conservation Authorities where work is within their regulated areas, Electrical Safety Authority, and potentially Ministry of Natural Resources and Forestry.